

PLANTS OF TONGA

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Plants of Tonga¹

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INTRODUCTION

The Tongan archipelago is a group of 150 or more islands and islets of volcanic and coral formation. Of these, only a relatively small number are sufficiently large or topographically suitable for plantations adequate to support populations of any size. Most of the islands are arranged in three main, roughly circumscribed, areas situated in the southern, central, and northern parts of the archipelago known as the Tongatapu, Ha'apai, and Vava'u groups respectively. The islands of these three groups are arranged in two roughly parallel lines from slightly southwest to northeast in the south Pacific Ocean between 15° and 23° south latitude and 173° and 177° west longitude. To the north, and somewhat remote from the northern Vava'u group, lie the volcanic islands of Niuafou'ou, Tafahi, and Niuatoputapu (Keppel). The islands of the eastern line are the more numerous and are of coral origin. For the most part, they are low, flat, and topographically uninteresting. The western line, extending from the extreme southern and at present uninhabited island of 'Ata to Niuafou'ou on the north, is of volcanic origin. It includes the island of Kao in the Ha'apai group which rises to a height of about 1,000 meters, the highest of the Tongan islands. Some of the islands—for example, Tofua, Fonualei, and Niuafou'ou—are still volcanically active. Tongatapu, the largest of the coral islands, with an area of nearly 100 square miles, is very flat and reaches an altitude of scarcely 50 meters at its highest point. On it is located Nuku'alofa, which is the largest town in Tonga and the seat of government (fig. 1, *a*).

A few miles to the east of Tongatapu lies the island of 'Eua, about 35 square miles in area and composed of a volcanic base overlaid for the most part with limestone. It has been built up to a height of approximately 300 meters at its highest point. An elevated ridge runs along the eastern side of the island, rendering that coast rugged and very picturesque (fig. 1, *b*). The seaward face of this ridge is precipitous in places, and some parts are reached only with great difficulty. A much lower ridge, with a maximum height of about 100 meters, lies toward the western side. The ridges and slopes, especially those on the eastern side, are well covered with native vegetation. Here, one finds some of the largest trees and densest forests in all Tonga. Specimens of

¹ The opportunity to visit the Tongan Islands and collect the data upon which this study is based was made possible by a John Simon Guggenheim Memorial Foundation Fellowship and a grant from the National Science Foundation. The manuscript was completed in 1955 and submitted to Bishop Museum for publication.



a



b

FIGURE 1.—a, Royal Palace, Nuku'alofa, with introduced specimens of *Araucaria excelsa* in foreground; b, near summit of eastern ridge on 'Eua island at an altitude of 300 meters, showing erosion scars in foreground.

Laportea harveyi, *Rhus taitensis*, *Alphitonia zizyphoides*, *Dysoxylum* spp., and other trees may reach considerable size. Tongatapu and 'Eua are the only permanently inhabited islands of the Tongatapu group.

The central, or Ha'apai, group is about 90 miles from Tongatapu. It includes the main islands of Lifuka, the former capital and site of the Chief's Palace; Nomuka; Kao; Tofua; and a large number of smaller islands, many of which now support no permanent inhabitants.

Vava'u, the largest and principal island of the Vava'u group, has an area of approximately 35 square miles and reaches an altitude of about 150 meters along the precipitous northern coast. Its surface is uneven and the southern, very irregularly and deeply indented coastline provides a beautiful and completely land-locked harbor, where the principal town of Neiafu is situated. At the northwestern part of the island is a lake of brackish water and nearby is a rather large swamp of marshy area unique in the islands. Another, a large central lake connected at one point with the sea during high water, is found on the island of Nomuka in the Ha'apai group. Large crater lakes also occur on Tofua and on Niuafu'ou. Ocean-going steamers are able to dock at Neiafu in Vava'u and at Nuku'alofa on Tongatapu. Cutters and interisland boats can reach a jetty at the village of Pangai on Lifuka Island in the Ha'apai group, and it is possible for very small boats to make a landing at a makeshift dock on 'Eua. And it is usually possible, in moderate seas, to get ashore from canoes or other small boats on the other low coral islands. It is much more difficult, however, to land on the volcanic islands of Tofua, Kao, Late, Niuafu'ou, or Tafahi where most of the coast is steep and abrupt and where protecting reefs are lacking or do not break the often strong wave action. These islands can be reached only by canoe or small boat and under most favorable weather conditions, or by swimming from larger boats which must stand well off shore for safety.

The population of Tonga is nearly 50,000. It is heavily concentrated on the islands of 'Eua, Tongatapu, Nomuka, Lifuka, and Vava'u and some of the smaller adjacent islands. The volcanic islands of 'Ata, Tofua, Kao, Late, and Niuafu'ou have few or no permanent inhabitants at the present time. The former population of about 1,300 on Niuafu'ou was evacuated after the disastrous volcanic eruption in 1946, and at present makes up a large part of the population on 'Eua. (See figure 2.)

The more heavily populated islands show a high percentage of land utilization, the indigenous plant species surviving only in occasional uncultivable areas, usually near the sea. Everywhere grows a number of species of greater or lesser usefulness presumably brought to the islands by the aborigines as they arrived in Tonga from other islands. These species predominantly show Asiatic, African, or Malaysian origin. A possible exception is the sweet potato, and there is considerable question as to how it reached Polynesia. In this group one may include that most useful of all plants for island peoples, the coconut.



a



b

FIGURE 2.—**a**, remains of church in village on Niuafu'ou Island destroyed by 1946 eruption (note lava flow which reached sea); vegetation is rapidly pioneering on older flows. Houses on right are used by temporary visitors who come to cut copra. **b**, lava flow on island of Niuafu'ou, where an extensive beach of "black sand" has been formed. Background trees at right form large grove of *Casuarina equisetifolia*.

Presumably, the unintentional introduction of certain weedy species occurred at the same time. A good many cultivated species, together with many weeds, owe their presence to the visits of European ships, starting early in the seventeenth century and continuing with increasing frequency to the present time. Some of these alien species find optimum conditions for growth and multiplication, and have undoubtedly played a part in limiting or even exterminating some endemics or indigenous species through aggressiveness. A high percentage of the usual strand and weed species includes those frequently found on other Pacific islands and elsewhere in tropical countries.

There is little fresh water available other than that impounded in tanks from rainfall. Aside from occasional small localized areas, the low coral islands present a monotonous repetition of plantation weeds and fallow-resting plantations of second-growth "bush." The dominant crop is coconuts, and large areas have been cleared for the extensive plantations found on most of the islands. At present, the high market value of copra makes it the most important source of income for the islanders. The second most important export crop is bananas, of which 50,000 or more cases are shipped annually to New Zealand. The more rugged topography of 'Eua, and to a somewhat lesser extent of Vava'u, prevents the cultivation of some parts of the islands. As a consequence, there are more opportunities on these islands for the survival of native species. Some of the islands, especially 'Eua and Kao, still have significant timbered areas with some of the tree species reaching a diameter of more than a meter and offering a source of timber. Lumbering operations are being developed by the government on 'Eua which, together with the fact that more and more of the forested land is being cleared for new plantations, threaten to reduce or eliminate many of the native species. Too, this has caused a soil erosion problem on some of the slopes. Lumbering operations on the volcanic islands of Late, Tofua, Kao, and Tafahi, because of the present lack of harbor facilities, are all but impossible. It seems improbable, therefore, that much timber will be cut on those islands in the immediate future, and it is on those islands that many of the native species will have the best chance of survival. However, with any marked increase in population, it will eventually become necessary to colonize and develop such islands.

The climate of Tonga is pleasant during most of the year. The annual temperature ranges from a low of around 75° F. in July and August to a high of 85° to 90° F. from January to March. Slightly higher or lower temperatures are not infrequent. The humidity is comparatively high, ranging from about 88° in the warmer months to a low of around 72° in the winter period. The average mean rainfall is about 80 to 90 inches, with the wettest season during the first six months of the year.

The collections upon which this report is based were made on the islands of Tongatapu, 'Eua, Nomuka, Lifuka, Kao, Vava'u and Niuafo'ou between February and June 1953. Projected visits to 'Ata, Tofua, and Late were aban-

done because of a combination of unfavorable weather and lack of transportation. But I predict that collections made on those islands, so far little-known botanically, where land utilization has been slight will increase to some extent the list of species known to grow in Tonga.

A number of botanists have visited Tonga in the past and made collections ranging from a few numbers to several hundred. Among the first collectors known to have reached the islands were Banks, Solander, the Forsters, and Nelson who accompanied Captain Cook on his voyages in the latter part of the eighteenth century. Among others who have collected there subsequently may be mentioned George Barclay, James Macrae, Captain W. F. Beechey, Alexander Mathews, Sir Edward Home, W. H. Harvey, Dr. E. Graeffe, J. N. Moseley, Charles Wilkes of the United States Exploring Expedition, T. B. Cartwright, J. J. Lister, and C. S. Crosby. With the exception of the collections made by Moseley on Tongatapu, Lister on 'Eua, and Crosby on Vava'u, most were relatively small and most were obtained during the nineteenth century. In 1926, H. E. Parks and W. A. Setchell collected on Tongatapu and 'Eua, and in 1951 Dr. Hans Hürlimann spent several weeks making collections, principally on Tongatapu, 'Eua, Tafahi, and Niuatoputapu.

Two comprehensive reports have been made on the flora of Tonga: (1) The flora of the Tonga or Friendly Islands, . . ., by W. B. Hemsley in the *Journal of the Linnaean Society (Botany 30: 158-217, 1894)*, which also included some species from islands outside the Tongan group, and (2) The flora of Vava'u, one of the Tonga Islands, by I. H. Burkill in the *Journal of the Linnaean Society (Botany 35: 20-65, 1901)*. In addition, occasional references to Tongan species are found in reports on the flora of nearby islands or on the Pacific area in general.

The collections cited by Hemsley and by Burkill in their reports, unless for some reason questioned, have been included in the list of citations for the different species. These specimens have not been studied and are only provisionally included. The Hemsley and Burkill publications when referred to with respect to synonymy are indicated as Hemsley's and as Burkill's lists. The specimens collected by Dr. Hürlimann which have been examined are also cited. Altitudes given in connection with the citation of some of the collections were estimated or obtained from map records.

I made no attempt to procure extensive collections of the lower plants, and only the most conspicuous and abundant species were taken. The small representation of the lower groups should, therefore, not be interpreted as an indication of their scarcity. Fleshy fungi, especially, appeared to be quite abundant in the moist forested areas. Parasitic fungi such as leafspots and rusts, on the contrary, were very scarce. In none of the regions visited were bryophytes conspicuously abundant, as is frequently true in tropical rain-forest areas. Such collections of the lower cryptogams as were made are included in this report as a matter of record.

The conspicuous and apparently well-established cultigens, as well as introduced weedy species, were either collected or noted and are, for the most part, included, as I believe that such information is of value in helping formulate a proper concept of the flora of any region. So far as I know, many of these introduced or migrant species are covered in no previous report on the Tongan flora.

In this work, 49 lower cryptogams, 71 pteridophytes, and 630 spermatophytes are recognized, making a total of 750 species and varieties.

The late Sir Peter Buck, then Director of Bishop Museum, originally suggested the desirability of a botanical survey of Tonga and assisted in the preliminary plans. The government of Tonga was interested in the project and, through Prince Tungi, rendered aid in every way possible. Mr. Willy Straatmans, Director of the Department of Agriculture, was most helpful in arranging for transportation between the islands, for living quarters in government rest houses, and for local transportation by land-rover on the islands of Tongatapu and Vava'u.

I was fortunate in obtaining the assistance of W. Toluta'u Ha'angana, a member of the Tongan department of agriculture staff, who served as chief assistant for the entire period of the work. "Tolu" proved to be a most intelligent and cooperative assistant at all times, and his knowledge of Tongan plants was considerable. Most of the local names given in this report were supplied by him, as well as the information about the uses made of the plants by the Tongan people. On many occasions his explanation for our presence on plantations or other private property of suspicious owners unable to understand English smoothed the way and avoided trouble. His agility in procuring drinking coconuts was likewise much appreciated.

Tongans do not always distinguish between closely related plants and sometimes apply the same name to more than one species. Also, occasionally the same name is given to widely different species, leading one to suspect that some names are erroneous. Such presumed errors were checked as far as possible and, if obviously wrong, eliminated. Where two or more names have been supplied for a given species, the one believed to be more commonly used is listed first.

In the identification of the collections I am greatly indebted to a number of specialists. The fleshy fungi were identified by Dr. J. A. Stevenson; the liverworts, by Dr. Margaret Fulford; the lichens, by Dr. Carroll W. Dodge; the mosses, by Mr. E. B. Bartram, who also furnished the description of the new species; the description of the new *Podocarpus*, by Mrs. Netta Gray; the pteridophytes (excepting *Selaginella*), by Mr. C. V. Morton; *Selaginella*, by Mr. A. H. G. Alston; the grasses, by Dr. J. R. Swallen; the orchids, by Mr. Charles Schweinfurth; *Ficus*, by Mr. W. J. H. Corner; *Pipturus* and *Santalum*, by Dr. Carl Skottsberg; certain members of the Apocynaceae, by

Dr. R. E. Woodson, Jr.; the Verbenaceae, by Dr. H. N. Moldenke; *Bidens*, by Dr. Earl E. Sherff; and *Nicotiana*, by Dr. T. H. Goodspeed.

Dr. A. C. Smith of the Smithsonian Institution, a student of the flora of the Pacific, in particular that of Fiji, has named a large number of the more difficult and often sterile specimens of the flowering plants. He has prepared the description of the new species and has contributed numerous comments relative to distribution and other pertinent information. For this most valuable assistance I am deeply grateful.

My wife, Ethel Yuncker, who accompanied me, took charge of the drying and care of the specimens as they were brought from the field. Her assuming responsibility for this tedious and monotonous work greatly reduced the task of preparing the specimens for shipment.

Dr. H. L. Mason, Director of the Herbarium at the University of California, lent me the unpublished manuscript list of collections made in 1926 by Setchell and Parks and also a number of herbarium specimens of questionable or critical species. These loans were most useful, and are appreciated.

Many other persons have assisted in various ways, including Tongan and European residents in the islands. To all who have aided in any way, I express my thanks.

The following symbols indicate herbaria where the collections are stored: BISHOP (Bernice P. Bishop Museum), BM (British Museum, Natural History), DPU (DePauw University), F (Chicago Natural History Museum), GH (Gray Herbarium), MO (Missouri Botanical Garden), UC (University of California, Berkeley), and US (United States National Museum).

FUNGI

Identifications of the following fungi are by J. A. Stevenson.

FAMILY THELEPHORACEAE

Genus **Stereum** S. F. Gray

Stereum caperatum (Berkeley and Montagne) Massée, Linn. Soc. Bot., Jour. 27: 161, 1890.

'Eua: on rotten log in forest above Fuai, near center of island, Apr. 5, 1953, Yuncker 15646.

FAMILY POLYPORACEAE

Genus **Daedalea** Persoon ex Fries

Daedalea elegans Sprengel, ex Fries, Syst. Myc. 1: 335, 1821.

'Eua: on rotten log in thicket near Fuai, near center of island, Apr. 7, 1953, Yuncker 15661.

Genus **Favolus** Fries

Favolus brasiliensis Fries, Elench. Fung., 44, 1828.

'Eua: on fallen log in shady, moist forest ravine near Fuai, near center of island, Mar. 19, 1953, *Yuncker 15346*; on rotten log in forest along trail to "Smoky Hole" above Fuai, near center of island, Mar. 31, 1953, *Yuncker 15578*.

Genus **Ganoderma** Karsten

Ganoderma mangiferae (Léveillé) Patouillard, Soc. Myc. France, Bull. 5: 74, 1889.

Tongatapu: on rotten log in forest near Lavengatonga village, Mar. 6, 1953, *Yuncker 15196*.

'Eua: on exposed roots of a forest tree, along trail above Fuai, near center of island, Apr. 6, 1953, *Yuncker 15655*.

Genus **Hexagonia** Fries

Hexagonia sp.

Tongatapu: on rotten twigs, in thicket near shore west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15035*.

Possibly a thick form of *H. polygramma*. Also, approaches *H. kurzii*.

Genus **Polyporus** Micheli ex Fries

Polyporus cinnabarinus Jacquin ex Fries, Syst. Myc. 1: 371, 1821.

Tongatapu: on rotten log in thicket near Navutoka village Feb. 27, 1953, *Yuncker 15081*.

This species approaches *P. sanguineus* L. ex Fries, the usual tropical form of these red polypores.

Polyporus polyzonus Persoon, in Gaudichaud, Voy. Freycinet, Bot., 171-172, 1826.

Tongatapu: on rotten log in thicket near Navutoka village, Feb. 27, 1953, *Yuncker 15081a*.

Polyporus vinosus Berkeley, Ann. Mag. Nat. Hist. II, 9: 195, 1852.

'Eua: on rotten log in forest along trail above Fuai, near center of island, Mar. 20, 1953, *Yuncker 15391*.

Genus **Trametes** Fries

Trametes cingulata Berkeley, Hook. Jour. Bot. Kew Gard. Miscel. 6: 164, 1854.

Lifuka: on fallen log in thicket along road from Pangai village to southern end of island, Apr. 28, 1953, *Yuncker 15795*.

Trametes lactinea Berkeley, Ann. Mag. Nat. Hist. I, 10: 373, 1842.

Tongatapu: on dead log in strand forest, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15034*.

This is a trametoid form of *Daedalea elegans* Sprengel.

Trametes corrugata (Persoon) Bresadola, Hedwigia 51: 316, 1911.

'Eua: on dead tree trunk in margin of forest above Fuai, near center of island, Apr. 5, 1953, *Yuncker 15640*.

FAMILY AGARICACEAE

Genus **Schizophyllum** Fries

Schizophyllum commune Fries, Syst. Myc. 1: 330, 1821.

Tongatapu: on dead fallen branch in strand thicket, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15031*.

FAMILY AURICULARIACEAE

Genus **Auricularia** Bulliard ex S. F. Gray

Auricularia polytricha (Montagne) Saccardo, Atti R. Instit. Veneto VI, 3: 722, 1885.

Tongatapu: on dead, fallen branch, strand forest, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15033* [determined by P. L. Lantz].

LICHENES

Identifications of the following lichens are by Carroll W. Dodge.

FAMILY COLLEMATACEAE

Genus **Physma** A. Massalongo

Physma boryanum (Persoon) A. Massalongo, Neogenea Lichenum, 7, 1854.

'Eua: on tree trunk, grove near Fuai, near center of island, Mar. 17, 1953, *Yuncker 15307*.

Physma hypopsilum Vainio, Acad. Sci. Fenn., Ann. A, 15(6): 45, 1921.

Tongatapu: on tree trunk in strand thicket, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15029*.

Physma plicatum (Persoon) Hue, Soc. Linn. Normandie, Bull. V, 9: 136, 1906.

Tongatapu: on tree trunk in strand thicket, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15030*.

FAMILY PANNARIACEAE

Genus **Pannaria** Delise

Pannaria wainioi Zahlbruckner, Cat. Lichenum Universalis 3 : 261, 1925.

Tongatapu : on tree trunk in strand thicket, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15031*.

FAMILY CLADONIACEAE

Genus **Cladonia** [Hill] Weber

Cladonia firma [Laurer] Krempelhuber, Zool.-Bot. Ges. Wien, Verh. 18 : 309, 1868.

'Eua : on base of coconut tree near Fuai, near center of island, Apr. 6, 1953, *Yuncker 15657*.

Cladonia pityrea (Floerke) Fries var. **adpersa** (Montagne and van den Bosch) Vainio, Acta Soc. Fauna Fl. Fenn. 14(1) : 255, 1897.

Kao : on a rock near the summit, alt. about 990 m., May 7, 1953, *Yuncker 15923*.

FAMILY PARMELIACEAE

Genus **Parmelia** Acharius

Parmelia latiloba Richard, Sertum Astrolabicum, xxxviii, 1834.

Tongatapu : on dead branch of tree in strand thicket, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15036*.

Parmelia setchellii Vainio, Univ. Calif. Pub. Bot. 12 : 5, 1924.

'Eua : on stem of coconut tree, above Fuai near center of island, Mar 17, 1953, *Yuncker 15308*.

Parmelia zollingeri Hepp in Zollinger, Syst. Verzeichn. Indisch. Archipel Ges. Pflanzen., 9, 1854.

'Eua : on tree trunk in grove above Fuai, near center of island, Mar. 17, 1953, *Yuncker 15302*.

FAMILY USNEACEAE

Genus **Ramalina** Acharius

Ramalina dichotoma Hepp in Zollinger, Syst. Verzeichn. Indisch. Archipel Ges. Pflanzen., 10, pl. 20, fig. 3, 1854.

Tongatapu : on tree trunk near beach below Navutoka village, Feb. 27, 1953, *Yuncker 15083*.

'Eua : on trunks and branches of trees, Fuai, near center of island, very abundant, Mar. 17, 1953, *Yuncker 15303*.

Ramalina leucosticta Taylor, Hook. London Jour. Bot. 6: 189, 1847.

Tongatapu: on dead tree branches, strand thicket, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15032*.

Ramalina taitensis Nylander, Soc. Linn. Normandie, Bull. II, 4: 162, 1870.

Tongatapu: on dead tree branches near sea, below Navutoka village, Feb. 27, 1953, *Yuncker 15091*.

Genus **Usnea** [Hill] Weber

Usnea insignis Motyka, Lich. Gen. Usnea Stud. Monogr., 66, 1936.

'Eua: on trunks of trees in grove near Fuai Plantation, near center of island, Mar. 17, 1953, *Yuncker 15305*.

The central cavity of the axis is rather narrower than usual in the subgenus *Eumitria*.

Usnea marivelensis (Vainio) Motyka, Lich. Gen. Usnea Stud. Monogr., 443, 1937.

Tongatapu: on branches of dead tree in strand forest, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15032a*.

FAMILY PHYSCIACEAE

Genus **Physcia** Acharius

Physcia plumosa (Taylor) Nylander, Soc. Sci. Nat. Cherbourg, Mém. 5: 106, 1857.

'Eua: on tree in grove above Fuai, near center of island, Mar. 17, 1953, *Yuncker 15301, 15309*.

MUSCI

As the mosses of Tonga are known only from a few random collections, the accompanying list of species may throw a little more light on this insular flora. Quite naturally, the majority of the species show a close relationship with those of Samoa and Fiji, but more extensive collections should expand the list considerably and will, no doubt, uncover further endemic types similar to those found in other nearby island groups. E. B. Bartram has made the identifications.

FAMILY DICRANACEAE

Genus **Trematodon** Michaux

Trematodon longicollis Michaux, Fl. Bor. Am. 2: 289, 1803.

Niuafou'u: on soil in clear area above 1946 lava flow, on way to summit of main crater, May 16, 1953, *Yuncker 16018*.

Genus **Campylopus** Bridel

Campylopus umbellatus (W. Arnott) Bartram, B. P. Bishop Mus., Bull. 101 : 44, 1933.

Kao: on soil near margin of small alpine lake near summit, above upper forest limit, alt. about 990 m., May 6, 1953, *Yuncker 15922* in part, 15961.

FAMILY LEUCOBRYACEAE

Genus **Leucobryum** Hampe

Leucobryum pentastichum Dozy and Molkenboer, Bryol. Jav. 1: 16, pl. 15, 1855.

'Eua: on rotten stump in forest above Fuai, near center of island, Mar. 21, 1953, *Yuncker 15409*.

Genus **Leucophanes** Hampe

Leucophanes smaradginum (Mitten) Paris, Index (Reprint), 767, 1894-1898.

Vava'u: on fibrous rooted base of coconut tree, top of 'Talau, west of Neiafu, May 24, 1953, *Yuncker 16154*.

FAMILY CALYMPERACEAE

Genus **Calymperes** Swartz

Calymperes tenerum C. Mueller, Linnaea 37: 174, 1871-1873.

'Eua: on base of *Erythrina* tree in grove near Fuai, near center of island, Mar. 17, 1953, *Yuncker 15304a*.

FAMILY BRYACEAE

Genus **Brachymenium** Schwaegrichen

Brachymenium melanothecium (C. Mueller) Jaeger, Adumbr. (Reprint) 1: 576, 1870-1875.

'Eua: on limestone outcrop near Fuai, near center of island, Mar. 22, 1953, *Yuncker 15411*.

Vava'u: on old dead coconut log in clearing near Houma village on south-eastern side of island. May 22, 1953, *Yuncker 16133*.

FAMILY BARTRAMIACEAE

Genus **Philonotis** Bridel

Philonotis (Philonotula) yunckereana Bartram, sp. nov.

Dioica: caespitosa, caespitibus densis, laete viridibus, intus fusciscentibus, haud nitidis; caulis erectus, circa 1 cm. altus, inferne dense radiculosus, ramis subfloralibus pluribus,

curvatis, vix ultra 5 mm. longis, dense foliosis; folia sicca et humida falcato-secunda, 1.5-1.8 mm. longa, anguste lanceolato-acuminata, marginibus ubique anguste revolutis, dense serrulatis; costa valida, breviter excurrente, dorso fere ad basin scaberula; cellulis angusta rectangularibus, papillois, basilaribus laxioribus; caetera ignota.

Niuafo'ou: on soil in open area just above 1946 lava flow, on way to summit of main crater, May 16, 1953, *Yuncker 16017* (type herb. Bartram; isotype, DPU).

This species is suggestive of *P. secunda* (Dozy and Molkenboer) Bryologia Javanica but is coarser in habit; the costa shorter excurrent; the leaf margins more densely serrulate; and the costa scabrous nearly to the base.

FAMILY ORTHOTRICHACEAE

Genus **Macromitrium** Bridel

Macromitrium incurvifolium Schwaegrichen, Suppl. II, 2: 144, 1827.

Kao: on moist soil between rocky outcrops in open alpine area above upper tree limit, alt. about 650 m., May 6, 1953, *Yuncker 15915*, in part; on a dwarf *masi'ata* (*Ficus*) tree, in open alpine area above upper forest limit, alt. about 900 m., May 6, 1953, *Yuncker 15917*.

Macromitrium pilicalyx Dixon, B. P. Bishop Mus., Occ. Papers 19(11): 225, 1948.

'Eua: on rotten log in forest near Fuai, near center of island, Mar. 18, 1953, *Yuncker 15338*.

Previously known only from Fiji.

Macromitrium tongense Sullivant, U. S. Expl. Exped. 17: 7, pl. 5, 1859.

Tongatapu: on rotting coconut log in old plantation, Sopu, west of Nuku-'alofa, May 30, 1953, *Yuncker 16211*; on tree trunk in open forest near sea, Sopu, Feb. 25, 1953, *Yuncker 15028*.

'Eua: on base of *Erythrina* tree trunk in grove near Fuai, near center of island, March 17, 1953, *Yuncker 15304*.

FAMILY METEORIACEAE

Genus **Aerobryopsis** Fleischer

Aerobryopsis vitiana (Sullivant) Fleischer, Hedwigia 44: 306, 1905.

Kao: on moist soil in open alpine area between rocky outcrops, alt. about 650 m., May 6, 1953, *Yuncker 15916*, mixed with a hepatic.

Aerobryopsis striatula (Mitten) Brotherus, in Engler and Prantl, Nat. Pflanzenfam. 1(3): 820, 1909.

Kao: on moist soil between rocky outcrops in open alpine area above upper tree limit, alt. about 650 m., May 6, 1953, *Yuncker 15915a*; around wet margin

of small alpine lake near summit above upper tree limit, alt. about 990 m., May 6, 1953, *Yuncker 15921a*.

The more robust habit, the darker coloration, and especially the pronounced longitudinal striation of the leaves when dry seem to distinguish this species from *A. vitiana*.

FAMILY PHYLLOGONIACEAE

Genus **Orthorrhynchium** Reichardt

Orthorrhynchium cylindricum (Lindberg) Brotherus, in Engler and Prantl, Nat. Pflanzenfam. 1(3) : 835, 1909.

'Eua: on trunk of tree in forest near Fuai, near center of island, Mar. 18, 1953, *Yuncker 15337*.

FAMILY SEMATOPHYLLACEAE

Genus **Taxithelium** Spruce

Taxithelium kerianum (Brotherus) Fleischer, Laubmfl. Java. 4: 1343, 1919.

'Eua: on rotten log in forest above Fuai, near center of island, Mar. 20, 1953, *Yuncker 15392, 15432*.

Vava'u: on rotten log in thicket, top of sea-facing coastal cliff along northwestern side of island, May 25, 1953, *Yuncker 16175*.

FAMILY HYPNACEAE

Genus **Ectropothecium** Mitten

Ectropothecium molle Dixon, Linn. Soc. N. S. Wales, Proc. 55(3) : 294, 1930.

Kao: around wet margin of small alpine lake near summit above upper tree limit, alt. about 990 m., May 6, 1953, *Yuncker 15921, 15922* in part.

Ectropothecium cyathothecium (C. Mueller) Brotherus, in Engler and Prantl, Nat. Pflanzenfam. 1(3) : 1066, 1909.

'Eua: on rotten log in moist, deep ravine near Fuai near center of island, Mar. 19, 1953, *Yuncker 15345*.

Vava'u: on rotten log in thicket near upper rim of sea-facing coastal cliff along northwestern side of island, May 25, 1953, *Yuncker 16176*.

Genus **Isopterygium** Mitten

Isopterygium minutirameum (C. Mueller) Jaeger, Adumbr. (Reprint) 2: 500, 1876-1880.

Tongatapu: on lower, swollen base of coconut tree, on plantation near Niutoua village, Mar. 2, 1953, *Yuncker 15135*.

HEPATICAЕ

Identifications of the following hepatics are by Margaret Fulford.

FAMILY RADULACEAE

Genus **Radula** Dumortier

Radula andicola Stephani, Hedwigia 23 : 114, 1884.

'Eua: on tree trunk in forest, along trail above Fuai, Mar. 21, 1953, *Yuncker 15410*.

FAMILY LEJEUNEACEAE

Genus **Lejeunea** Libert

Lejeunea flava (Swartz) Nees, Naturgesch. Eur. Leberm. 3 : 277, 1838.

'Eua: on base of tree in forest above Fuai, near center of island, Mar. 17, 1953, *Yuncker 15306*.

Genus **Brachiolejeunea** Spruce

Brachiolejeunea sp.

'Eua: on tree trunk in forest above Fuai, near center of island, Mar 17, 1953, *Yuncker 15310*.

FAMILY MARCHANTIACEAE

Genus **Dumortiera** Nees

Dumortiera hirsuta (Swartz) Nees, Acad. Caes. Leop.-Carol. Nat. Cur., Nova Acta 12 : 410, 1824.

'Eua: on wet rocks around opening of "Smoky Hole" in forest above Fuai, near center of island, Mar. 31, 1953, *Yuncker 15576*.

PTERIDOPHYTA

Identifications of the following pteridophytes are by C. V. Morton.

FAMILY OPHIOGLOSSACEAE

Genus **Ophioglossum** Linnaeus

Ophioglossum pendulum Linnaeus, Sp. Pl., ed 2, 1518, 1763.

Epiphytic plant, rhizome short. Fronds few, clustered, pendent, up to 1 m. or more long and 4 or 5 cm. wide, simple or occasionally forked, fleshy, lacking a midrib. Sporangia on a fertile segment, arising from surface in lower portion of sterile blade.

Tongatapu: *Mosley*.

Vava'u: *Crosby*.

Infrequent. Mauritius, India, southeastern Asia, Australia, Polynesia.

FAMILY MARATTIACEAE

Genus *Angiopteris* Hoffmann***Angiopteris commutata*** Presl, Suppl. Tent. Pterid., 25, 1845.

Coarse, terrestrial fern. Stipes stout, clustered, swollen and with two large, fleshy, scalelike stipules at base, blades bipinnate, up to 4.5 m. or more long, gracefully arching from short, thick stem, pinnules oblong, subsessile, up to 15 cm. or more long, serrulate at somewhat caudate apex, glabrous above, with brown filamentous scales scattered beneath. Sori short, oblong, numerous, forming a submarginal row, each sorus composed of 9 to 12 sporangia.

'Eua: in dense shade on steep slope near opening to "smoking cave." Ana'ahu, above Fuai plantation, Mar. 31, 1953, *Yuncker 15579*.

Infrequent. Tahiti.

Tongan name: *ponga*.

Angiopteris evecta (Forster f.) Hoffmann, Comment. Soc. Reg. Sci. Gotting. Cl. Phys. 12: 29, pl. 5, 1796.

Large, terrestrial fern, rhizome short, up to 1 m. tall. Fronds up to 3 m. or more long and 1.5 m. wide, bipinnate, pinnules linear-oblong to oblong-lanceolate, narrowly acuminate, sessile or short-stipitate, up to 15 cm. or more long and 2.5 cm. wide, margin serrulate, glabrous above, with fimbriate, brown, scattered scales beneath. Sori oblong, closely spaced in a submarginal row, each sorus with several sporangia.

'Eua: on steep moist banks of small stream in densely forested area near center of island, Mar. 18, 1953, *Yuncker 15331*; on eastern ridge above Fuai, in forest, alt. about 140 m., Nov. 9, 1951, *Hürlimann 219*.

Tafahi: beside path to summit of the Piu 'o Tafahi, in fog forest on rocky, steep volcanic slope, alt. about 420 m., Dec. 10, 1951, *Hürlimann 429*.

Western Melanesia, Polynesia.

Tongan name: *ponga*.

FAMILY GLEICHENIACEAE

Genus *Dicranopteris* Bernhardt***Dicranopteris linearis*** (Burmans) Underwood, Torrey Bot. Club, Bull. 34: 250, 1907.

Gleichenia linearis Clarke.

Terrestrial, much-branched plant with slender, hairy to nearly smooth rhizomes, stipes arising at intervals along rhizome, becoming quite long, bi- or trifurcately branched, ultimate branches forming rachis of linear-lanceolate pinnae. Pinnae up to 25 cm. or more long and 8 cm. wide, dissected to near rachis into linear, entire, obtuse, somewhat emarginate pinnules, pinnules coriaceous, bright green, sori small, round, along midrib.

Tongatapu: *Home*.

'Eua: *Lister*; on slope above open, sinkhole pond in open grazing area near center of island, Mar. 20, 1953, *Yuncker 15378*; first plateaus of eastern ridge above Fuai, dominant in heathlike vegetation, alt. about 150 m., Nov. 9, 1951, *Hürlimann 183*.

Kao: on open rocky alpine slope above upper forest limit, May 7, 1953, *Yuncker 15919, 15927*.

Vava'u: *Crosby*.

Occasional at higher altitudes. New Zealand, Polynesia.

Gleichenia dichotoma Hooker in Hemsley's and Burkill's lists.

Tongan name: *kahiva'e*.

FAMILY SCHIZAEACEAE

Genus *Schizaea* Smith

Schizaea dichotoma (Linnaeus) J. E. Smith, Acad. Turin, Mém. 5: 422, pl. 9, fig. 9, 1793.

Small, terrestrial fern with short rhizome covered with scalelike hairs. Fronds erect, stipe up to 30 cm. long, very slender, blade fanlike, dichotomously forked, up to 10 cm. long and wide, ultimate divisions linear, 2-3 mm. wide, minutely serrulate, sporangia in flat apical spikes.

Tongatapu: *Cook*.

'Eua: *Lister*; in rich, moist soil of deep forest, near center of island, Mar. 21, 1953, *Yuncker 15397*; on eastern ridge above Fuai, on volcanic soil in forest, alt. about 150 m., Nov. 9, 1951, *Hürlimann 192*.

Kao: in moist soil on steep, densely forested slope, May 6, 1953, *Yuncker 15889*.

Vava'u: *Crosby*.

Locally common in moist forested areas. Asia, Australia, Malaya, Madagascar, Polynesia.

Tongan name: *masalu*.

Schizaea digitata (Linnaeus) Swartz, Syn. Fil., 150, 380, pl. 4, fig. 1, 1806. *Actinostachys digitata* Wall.

No specimens of this species were found. It is possible that the Crosby specimen from Vava'u reported by Burkill as *S. digitata* is properly referable to the recently described species *S. melanesica* Selling, which is not dissimilar to *S. digitata*.

Vava'u: *Crosby*.

Asia, Polynesia.

FAMILY HYMENOPHYLLACEAE

Genus *Trichomanes* Linnaeus

Trichomanes bipunctatum Poirét, Encycl. Méth. 8: 69, 1808.

Small fern with filiform, creeping rhizomes. Fronds dark green, up to 10 cm. long, lanceolate, pinnatifid, rachis narrowly winged, sori large, with a winged, two-lipped, elongated involucre.

Tafahi: beside path from township of Tafahi toward Piu 'o Tafahi, alt. about 200 m., Dec. 10, 1951, *Hürlimann 410*.

Infrequent. Society Islands, Mauritius, and throughout Old World tropics.

Trichomanes elongatum A. Cunningham, Hook. Comp. Bot. Mag. 2: 368, 1836.

Small terrestrial fern. Stipes clustered, up to 15 cm. long, with scattered, brown, hair-like scales, blade deltoid-ovate, bipinnate, up to 15 cm. or more long, deep green in color, rachis narrowly winged by decurrent pinnule-margins, pinnules elliptic-lanceolate, incised, veins prominent, sori cylindrical-campanulate.

'Eua: in moist, rich soil, on steep ravine bank in deep forest near center of island, Mar. 21, 1953, *Yuncker 15395*; on eastern ridge above Fuai, alt. about 150 m., Nov. 9, 1951, *Hürlimann 191*.

Infrequent. New Zealand.

Trichomanes minutum Blume, Enum. Pl. Javae, 223, 1828.

Very small, epiphytic fern, with filamentous, freely branching rhizome. Stipe very slender, blade very small, up to 1 cm. long, round-ovate in outline, deeply incised into oblong segments, glabrous, vivid green, sporangia marginal.

'Eua: on tree trunk near stream in moist shady ravine north of Fuai, near center of island, Mar. 19, 1953, *Yuncker 15344*; in deep shady ravine near center of island, Mar. 29, 1953, *Yuncker 15549*.

Occasional in moist forested areas. Malaysia, Polynesia.

Trichomanes omphalodes (Vieillard) C. Christensen, Ind. Fil., 646, 1906.

Very small, epiphytic fern with filiform, creeping rhizomes and thin, peltate, closely appressed fronds scarcely 1 cm. wide.

Tafahi: beside path from township toward Piu'o Tafahi, alt. about 300 m., Dec. 10, 1951, *Hürlimann 411*.

Infrequent. Samoa, Fiji to New Caledonia.

FAMILY CYATHEACEAE

Genus *Cyathea* Smith

Cyathea rugosula Copeland, Univ. Calif. Pub. Bot. 12: 390, 1931 (fig. 3).

Stately tree fern, stems up to 6 m. or more tall and 15 cm. or more in diameter. Fronds tripinnate, up to 2 m. or more long, clustered at top of stem, rachis roughened-papillate, brown, primary divisions of blade oblong-lanceolate, up to 40 cm. or more long and 15 cm. or more wide, secondary divisions linear-lanceolate, sessile, up to 30 or more on each side, 8 cm. or more long and 10-15 mm. wide, ultimate pinnules oblong, about 2 mm. wide, covered beneath with sori.

'Eua: in jungle, alt. 200 m., *Parks 16016, 16032, 16226*; on moist banks of a small stream in deep shady forest ravine near center of island, Mar. 19, 1953, *Yuncker 15347*; in gully on eastern ridge above Fuai, alt. about 150 m., Nov. 9, 1951, *Hürlimann 217*.



FIGURE 3.—*Cyathca rugosula*, a beautiful and graceful endemic species of tree fern, in open forested area on 'Eua island.

Kao: on rather steep slope in open alpine area above upper forest limit, alt. about 810 m., May 6, 1953, *Yuncker 15911*; in forest near upper forest limit, alt. about 500 m., May 6, 1953, *Yuncker 15940*.

Tafahi: depressions of former volcanic mouth of Piu 'o Tafahi, alt. about 580 m., Dec. 11, 1951, *Hürlimann 438*.

Local and endemic.

The Lister collection referred by Hemsley to *Alsophila lunulata* (Forster) R. Brown undoubtedly represents *C. rugosula*, which is, perhaps, not sufficiently distinct from *Alsophila lunulata*.

Tongan name: *ponga*.

FAMILY POLYPODIACEAE

Genus *Dryopteris* Adanson

Dryopteris concolor (Langsdorff and Fischer) Kuhn, v. Decken's Reis. 3(3): 19, 1879.

Rather small, short-stemmed, terrestrial fern. Stipes clustered, slender, dark brown, shiny, scaly near base, up to 20-25 cm. long, blades up to 6-8 cm. long, deltoid, pinnatifid to bipinnatifid, with two basal pinnae, sori covered by reflexed margin.

Tafahi: rocky, steep slope below township of Tafahi, on humus between volcanic rocks in forest, alt. about 15 m., Dec. 13, 1951, *Hürlimann 482*.

Infrequent. Pantropic.

Dryopteris dissecta (Forster) O. Kuntze, Rev. Gen. Pl. 2: 812, 1891.

Ctenitis dissecta Copeland.

Rather large terrestrial fern with short rhizome. Stipes up to 30 cm. or more long, pubescent, dark brown, clustered. Blades up to 1 m. or more long, triangular-ovate, pinnate or sub-pinnate, each pinna lanceolate, up to 15 cm. or more long, divided nearly to costa, pinnules in turn dentate to deeply incised, costa and nerves brown-hairy, sori round, in two rows on pinnules.

Tongatapu: *Home*.

'Eua: *Lister*; in rich soil of dense forest on steep slope surrounding opening to "Smoky Hole," Ana'ahu, above Fuai, Mar. 31, 1953, *Yuncker 15580*; valley of Lakatoha River near Ohonua, alt. about 10 m., Nov. 10, 1951, *Hürlimann 243*.

Vava'u: *Crosby*.

Infrequent. Madagascar, southern India, Malaysia, Polynesia.

Called *Nephrodium dissectum* Desv. in Hemsley's and Burkill's lists.

Dryopteris euaensis Copeland, Univ. Calif. Pub. Bot. 12: 391, 1931.

Lastrea euaensis Copeland.

Rather large, terrestrial fern with repent, scaly rhizome. Stipes up to 30 cm. or more long, somewhat scaly at base, pubescent upward. Blade up to 70 cm. or more long and 30 cm. wide, elliptic-lanceolate in outline, gradually narrowed downward, pinnate, pinnae

up to about 15 cm. long and 10-15 cm. wide, deeply pinnatifid, pinnules oblong, lower surface and rachis pubescent, sori several, submarginal.

'Eua: in edge of thick forest, alt. 300 m., June 30, 1926, *Parks 16268, 16286, 16298*; in open shade, margin of sinkhole in forest above Fuai, near center of island, Mar. 21, 1953, *Yuncker 15407*; in rich forest floor, along trail to summit of east-central ridge above Fuai, Mar. 30, 1953, *Yuncker 15568*.

Restricted to 'Eua Island, so far as known.

The specimen collected by Lister, reported by Hensley as *Nephrodium harveyi* Baker, will doubtless be found referable to *D. euaensis*.

Dryopteris invisa (Forster f.) O. Kuntze, Rev. Gen. Pl. 2: 813, 1891.

Rather large, terrestrial fern, with creeping, scaly rhizomes. Stipes brown, up to 40 cm. or more long, puberulent. Blade up to 1 m. or more long and 30 cm. wide, pinnate, pinnae linear-lanceolate, sharply and coarsely falcate-serrate, up to 15 cm. or more long, sori round, in submarginal rows.

Tongatapu: *Home; Moseley*; in rich soil in thickets, Hufangalupe, near Vaini village, Feb. 26, 1953, *Yuncker 15056*; in low, wet area, near Nualei, Mar. 9, 1953, *Yuncker 15250*; near Nualei, in bush near plantation, Nov. 1, 1951, *Hürlimann 108*.

Lifuka: weed in old coconut plantation between coastal road and sea, north of Pangai village, Apr. 25, 1953, *Yuncker 15716*.

Vava'u: *Crosby*; in dense shade on forested slope along northern shore of Lake Anovai, May 19, 1953, *Yuncker 16049*.

Niuatoputapu: on steep slope of mountain ridge above Hihifo, in forest on volcanic soil, alt. about 80 m., Dec. 5, 1953, *Hürlimann 342*.

Common at lower altitudes throughout Tonga. Polynesia.

Dryopteris macroptera Copeland, Univ. Calif. Pub. Bot. 12: 392, 1931.

Cyclosorus macropterus Copeland.

Rather large, terrestrial fern. Leaves up to 2 m. long, rachis straw-colored, pinnate, pinnae oblong-lanceolate, 20 cm. or more long and 2 cm. wide, subfalcately divided to about middle, lobes shallowly crenate, sori round, numerous.

'Eua: in wet forest on plateau, alt. 200-300 m., June 26, 1926, *Parks 16177*; in wet canyon, *Parks 16040*; on steep slope above "Smoky Hole" in dense forest, Ana'ahu, Mar 31, 1953, *Yuncker 15581*.

Local. Endemic.

Dryopteris parasitica (Linnaeus) O. Kuntze, Rev. Gen. Pl. 2: 811, 1891.

Cyclosorus parasiticus Farwell.

Medium-sized, terrestrial fern with creeping rhizome. Stipes up to 50 cm. or more long and 2 mm. in diameter, yellow brown and scaly at base. Blade lanceolate, 40 cm. or more long and 20-25 cm. wide, pinnate with an acuminate, pinnatifid apex, rachis, costa, and both surfaces pubescent, pinnae linear-oblong, acuminate, 15 cm. or more long and 2 cm. wide, incised to below middle into oblique, oblong, falcate, obtuse, entire lobes, sori on each side of midrib of pinnule.

Tongatapu: *Nelson*.

'Eua: valley of Lakatoha River near Ohonua, alt. about 10 m., Nov. 10, 1951, *Hürlimann 244*.

Occasional. New Zealand, tropical America, Polynesia.

Nephrodium molle Desv. in Hemsley's and Burkill's lists.

Dryopteris subspinosa C. Christensen, Ind. Fil., 296, 1905.

Rather large terrestrial fern with scaly creeping rhizomes. Stipes stout, up to 50 cm. or more long, dark brown. Blade 100 cm. or more long, pinnate, pinnae oblong, attenuately acuminate, glabrous, 1-2 cm. wide and 15 cm. or more long, cut about halfway to costa into acute, falcate lobes, sori round, dorsal.

Tafahi: depression of former volcanic mouth of Piu 'o Tafahi, on humus in fog forest, alt. about 580 m., Dec. 11, 1951, *Hürlimann 455*.

Samoa.

Dryopteris unita (Linnaeus) O. Kuntze, Rev. Gen. Pl. 2: 811, 1891.

Terrestrial fern with creeping rhizomes. Stipes scaly at base, somewhat pubescent upward, up to 50 cm. or more long. Blade 50 cm. or more long and 20 cm. wide, pinnate, pinnae linear-lanceolate, 15 cm. or more long, acuminate, deeply incised to near midrib into oblong, falcate, cuspidate, closely approximated lobes, rachis, midrib, and lower surface pubescent, sori in submarginal rows.

Kao: in open shade of forest near upper tree limit, May 6, 1953, *Yuncker 15943*.

Vava'u: *Crosby*.

Infrequent. Southern India, Ceylon, Malaysia, Philippines, Fiji, Polynesia.

Nephrodium unitum R. Br. in Burkill's list. It appears probable that the specimen collected by Nelson on Tongatapu and reported by Hemsley as *N. haenkeanum* Presl is the same as *Dryopteris unita*.

Genus **Polystichum** Roth

Polystichum aristatum (Forster) Presl, Tent. Pterid., 83, 1836.

Rumohra aristata Ching.

Medium-sized, terrestrial fern, with creeping rhizome. Stipes up to 60 cm. or more tall, covered at base with dark-colored, narrow scales. Blade deltoid, up to 60 cm. or more long, pinnate toward apex, tripinnate downward, pinnae lanceolate, up to 15 cm. long, pinnules 10-15 mm. long, obliquely or rhomboidally ovate-lanceolate, sharply serrate or incised, sori rather small.

'Eua: *Lister*; in rather dense forest near the center of the island, Mar. 20, 1953, *Yuncker 15375*; in forest shade on sea-facing terrace along the trail to Lokupo, Mar. 27, 1953, *Yuncker 15511*; along the trail to the summit of the east-central ridge, Mar. 30, 1953, *Yuncker 15566*; eastern ridge above Fuai, alt. about 140 m., Nov. 9, 1951, *Hürlimann 222*.

Occasional. India, Malaysia, southeastern China, Japan, Polynesia.

Aspidium aristatum Sw. in Hemsley's list.

Genus **Tectaria** Cavanilles

Tectaria latifolia (Forster) Copeland, *Philippine Jour. Sci.* **2C**: 410, 1907.

Medium-sized, terrestrial fern, with short rhizome. Stipes up to 40 cm. or more long, brown, smooth. Blade mostly less than 1 m. long, deltoid in outline, pinnatifid above, pinnate downward, pinnae ovate-lanceolate, more or less pinnatifid, acuminate, sori small, round, irregularly scattered.

'Eua: valley of Lakatoa River near Ohonua, on limestone rock in forest, alt. about 10 m., Nov. 10, 1951, *Hürlimann 240*.

Vava'u: on moist shady forested slope above lagoon at Vaihoi, near Leimatua, May 26, 1953, *Yuncker 16187*.

Infrequent.

Tectaria stearnsii Maxon, *Biol. Soc. Washington, Proc.* **36**: 175, 1923.

Medium-sized, terrestrial fern with short rhizome. Stipe brown, up to 50 cm. or more long, brown-scaly below, pubescent upward. Blade about as long as stipe, ovate in outline, pinnatifid toward tip, pinnate downward, pinnae divided to near costa, or lower pinnae pinnate, pinnules dentate, nerves brown-hairy on upper surface, sori small, round, scattered.

Vava'u: on moist forest floor, slope above lagoon, Vaihoi, near Leimatua, May 26, 1953, *Yuncker 16189*.

Infrequent. Samoa, Rotuma.

Genus **Arthropteris** J. Smith

Arthropteris obliterated (R. Brown) J. Smith, *Cat. Cult. Ferns*, **62**, 1857.

Rather small, scandent, epiphytic fern with slender, wide-spreading, scaly rhizomes. Stipes remote, attached to short, stublike projections, blades pinnate, pinnae oblique, nearly sessile, obtuse or acutish, subauriculate on upper side near truncate base, sori dorsal on pinnae intermediate between costa and margin.

Tafahi: beside path from township to Piu 'o Tafahi, on forest tree, alt. about 250 m., Dec. 11, 1951, *Hürlimann 473*.

Infrequent. Society Islands westward to Africa.

Genus **Nephrolepis** Schott

Nephrolepis biserrata (Swartz) Schott, *Gen. Fil.*, ad. pl. **3**, 1834.

Terrestrial fern with short, creeping rhizome. Stipes up to 30 cm. or more long, clustered, blade oblong-elliptic in outline, up to 2 m. or more long and 30 cm. wide, pinnate, pinnae up to 20 cm. or more long and 2 cm. wide, margin usually serrate, apex acuminate, base rounded, sori large, in submarginal row.

Tongatapu: *Moseley*.

'Eua: *Lister*; in shade of open forest on seaward terrace above Lokupo, Mar. 27, 1953, *Yuncker 15536*.

Tafahi: near summit of Piu 'o Tafahi, alt. about 560 m., Dec. 11, 1951, *Hürlimann 466*.

Occasional. Rather widespread in tropical countries. Fiji, Carolines, Marianas, Australia, India, Africa, North and South America.

N. acuta Presl var. [?] in Hemsley's list. The collections from Tongatapu (Nelson, Home) and 'Eua (Lister) reported by Hemsley as *N. exaltata* (L.) Schott need to be reexamined; they will probably prove to be referable to either *N. biserrata* or *N. hirsutula*.

Nephrolepis hirsutula (Forster f.) Presl, Tent. Pterid., 79, 1836.

Terrestrial fern with creeping rhizome. Stipes clustered, brown, scaly, blades oblong in outline, up to 50 cm. or more long, pinnate, rachis densely brown-scaly, pinnae oblong-lanceolate, sessile, up to 10 cm. or more long and 1 cm. wide, serrulate, obtuse or acutish, pubescent, sori large, round, submarginal.

Tongatapu: in open thickets, near Vaini village, Feb. 26, 1953, *Yuncker 15044*.

'Eua: in thickets and open shade along trail above Fuai plantation near center of island, Mar. 21, 1953, *Yuncker 15406*; on dry soil on gully slopes, in open grassy central plain on way to eastern ridge, Mar. 25, 1953, *Yuncker 15439*.

Lifuka: in clearing near coastal road between Pangai and southern end of island, Apr. 28, 1953, *Yuncker 15785*.

Vava'u: in coconut plantation near village of Houma, May 22, 1953, *Yuncker 16121*.

Tafahi: roadside above township of Tafahi, on volcanic soil in forest, alt. about 70 m., Dec. 15, 1951, *Hürlimann 521*.

A common weedy species in waste areas and plantations throughout Tonga. Widely distributed in tropical areas of the Eastern Hemisphere.

Tongan name: *laufale*.

Various parts of plant are used in preparing medicines.

***Nephrolepis* sp.**

Closely resembles *N. hirsutula* but differs in some characters.

Kao: on rocky soil in rather open forested area, alt. about 570 m., May 6, 1953, *Yuncker 15901*.

Infrequent.

Genus ***Humata*** Cavanilles

Humata heterophylla (J. E. Smith) Desvaux, Prodr., 323, 1827.

Small epiphytic fern with brown-scaly, creeping rhizome. Stipes about 3-4 cm. long, glabrous, ridged by decurrent blade margins, blade lanceolate, up to 10 cm. or more long and 2.5 cm. wide, acuminate, base acute, decurrent, nerves pinnate, fertile fronds smaller, pinnatifid, sori dorsal, at ends of nervules.

'Eua: climbing on tree trunks in deep forest above Fuai, near center of island, Mar. 21, 1953, *Yuncker 15396*; on eastern ridge above Fuai, on large forest tree, alt. about 150 m., Nov. 9, 1951, *Hürlimann 218*.

Tafahi: on path to Piu 'o Tafahi where it reaches ridge of mountain, on tree in fog forest, alt. about 400 m., Dec. 10, 1951, *Hürlimann 421*.

Occasional. Malaysia, Polynesia.

Genus *Davallia* Smith

Davallia solida (Forster) Swartz, Schrader's Jour. Bot. 2: 87, (1800) 1801.

Terrestrial or epiphytic fern, with slender, creeping, scaly rhizome. Stipes up to 30 cm. or more long, greenish, blades 30 cm. or more long, deltoid, coriaceous, tripinnatifid, pinnales oblong wedge-shaped, toothed, sori oblong, cuplike, at ends of veins.

Tongatapu: *Home*; on coconut tree in plantation near Nualei village, Mar. 9, 1953, *Yuncker 15240*.

'Eua: *Lister*; on swollen, fibrous-rooted base of a coconut tree along trail between Fuai and Mua village, Mar. 28, 1953, *Yuncker 15542*.

Kao: on tree trunk on steep forested slope, May 6, 1953, *Yuncker 15886*.

Vava'u: *Crosby*.

Niuafou: in shade of trees in interlava island on way to summit of main crater, May 11, 1953, *Yuncker 15999*.

Tafahi: on path to Piu 'o Tafahi where it reaches ridge of mountain, on tree in fog forest, alt. about 400 m., Dec. 10, 1951, *Hürlimann 427*.

Frequent throughout Tonga, common on coconut trees. Malaysia, India, Philippines, Marianas, Polynesia.

The *Lister* specimen from 'Eua reported as *D. elegans* Swartz by Hemslley has not been studied but is believed to be referable to *D. solida*.

Genus *Microlepia* Presl

Microlepia speluncae (Linnaeus) Moore, Ind. Fil., xciii, 1857.

Rather large, terrestrial fern with hairy, creeping rhizome. Stipes 50 cm. or more long, brown, pubescent, blade tripinnate, pinnae lanceolate, up to 15 cm. long, pinnales oblique, dentate to deeply incised, sori small, commonly near base of sinus.

Vava'u: *Crosby*.

Niuafou: in shade of trees on inner slope of main crater surrounding large central lake, May 11, 1953, *Yuncker 16009*.

Occasional. Widely distributed in tropical countries.

Listed as *Davallia speluncae* Baker by Burkill.

Genus *Dennstaedtia* Bernhardt

Dennstaedtia parksii Copeland, sp. nov.² (fig. 4).

Rhizoma repens, circa 3.5 mm. diam., septato-pilosum; frons usque ad 70 cm. longa, stiptibus brunneis, 13-20 cm. longis, 2-3 mm. diam., nitidis, glabris; lamina pallido-viridis, ovato-oblonga, 30-50 cm. longa, 15-25 cm. lata, tripinnato-pinnatifida, apice pinnatifida, rachi straminea, supra sulcata, puberula; pinnae 9-12 jugae, inferiores ascendentes, superiores patentis, interiores petiolulatae, pinnulis 12-14 jugis, oblongis, maximis circa 3.5

² Description drawn up by C. V. Morton.

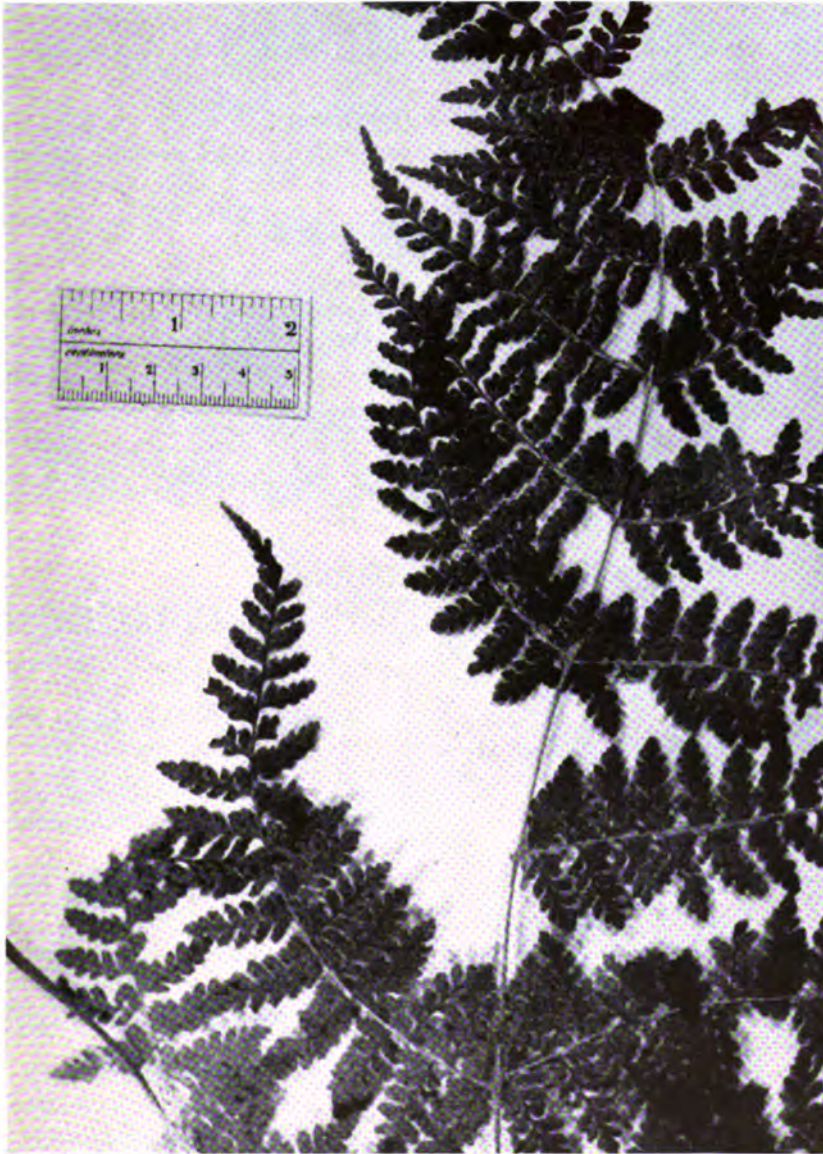


FIGURE 4.—*Dennstaedtia parksii*, Yuncker 15144, paratype, in herbarium of DePauw University.

cm. longis et 1.5 cm. latis, subobtusis, basi subtus barbatis, pilis septatis, pallidis, segmentis circa 6 jugis, usque ad 8 mm. longis et 3.5 mm. latis, utrinque 2- vel 3-lobatis, supra praecipae in costulis breviter setulosus, subtus glabris; textura tenuiter membranacea; sori singuli, marginales, in apice venulis singulis; indusium cupuliforme, cupulo tenero, hyalino, circa 0.5 cm. longo et lato, margine truncato, demum lacerato, glabro; receptaculum subcylindricum, magnum.

Tongatapu: June-July 1926, *W. A. Setchell and H. E. Parks 15204* (type in University of California herbarium, no. 466531); on limestone, sea-facing cliff, in forest shade, near shore below Fu'amotu, Mar. 4, 1953, *Yuncker 15144* (paratype, US); on side of moist, shady, limestone cliff facing sea, Fu'amotu, June 5, 1953, *Yuncker 16243* (paratype, US).

Tongan name: *holufe*.

The closest relationship of *D. parksii* is perhaps with *D. flaccida* (Forster) Bernhardt, the type species of *Dennstaedtia*. That species differs in having the rachis and rhachillae densely puberulent all around (rather than essentially glabrous except in the channel), the segments septate-pilose beneath on the veins, and the indusium much lower and more saucer-shaped than cup-shaped. Having the pinnules conspicuously barbate beneath at base seems to be a distinctive character of *D. parksii*.

Genus **Sphenomeris** Maxon

Sphenomeris chinensis (Linnaeus) Maxon, Washington Acad. Sci., Jour. **3**: 144, 1913.

Stenoloma chusanum Ching.

Terrestrial or sometimes scandent fern, with creeping, densely hairy rhizome. Fronds tufted, up to 1 m. or more long, stipe up to 50 cm. or more long, furrowed on upper side, yellow to brown, glabrous, blade ovate-lanceolate in outline, up to 80 cm. or more long, 3- or 4-pinnate, pinnae alternate, up to 20 cm. or more long, ovate-lanceolate, ultimate segments oblong-cuneate, truncate or rounded at apex, up to 4 mm. or more long, sori cuplike, terminal, one or two on each segment.

'Eua: climbing on tree trunk in forest along trail near summit of eastern ridge, Mar. 30, 1953, *Yuncker 15565*.

Kao: in thin soil covering rocky outcrop, in open alpine area above forest zone, alt. about 700 m., May 6, 1953, *Yuncker 15932*.

Occasional in forested areas. Japan, China, tropical Asia, Madagascar, Polynesia.

Genus **Schizoloma** Gaudichaud

Schizoloma ensifolium (Swartz) J. Smith, Jour. Bot. **3**: 414, 1841.

Lindsaya ensifolia Swartz.

Small, terrestrial fern, with creeping rhizome covered with brown, bristle-like scales. Fronds approximate, stipe up to 10 cm. or more long, straw-colored, glabrescent, blade lanceolate, pinnate, up to 25 cm. long, pinnae subopposite, up to 5 cm. long, narrowly lanceolate, sessile, serrulate, acute, decurrent at base, sori forming a marginal row, becoming continuous about tip.

'Eua: on dry soil, sides of erosion gully in grazing area near top of eastern ridge, Mar. 24, 1953, *Yuncker 15450*.

Kao: on thin soil in open, rocky, alpine area, May 6, 1953, *Yuncker 15913*.

Vava'u: *Crosby*; intermixed with grass at summit of cliff along coast north of Leimatua, May 20, 1953, *Yuncker 16072*.

Occasional throughout Tonga. Southern Asia, tropical Australia, Africa, Fiji, Polynesia.

Lindsaya ensifolia Sw. in Burkill's list.

Genus *Lindsaya* Dryander

Lindsaya decomposita Willdenow, Sp. Pl. 5: 425, 1810.

Rather small terrestrial fern. Stipes slender, 25-30 cm. or more tall, blade up to 30 cm. long, bipinnate, pinnae about 15 cm. long, pinnules about 1 cm. long, flabellate toward base of pinnae, upper margin more or less irregularly toothed, sori separate or united along upper and outer margin.

'Eua: on eastern ridge above Fuai, in forest, alt. about 140 m., Nov. 9, 1951, *Hürlimann 221*.

Infrequent. Society Islands westward to Asia.

Genus *Diplazium* Swartz

Diplazium harpeodes Moore, Ind. Fil., 330, 1861.

Rather large terrestrial fern with a rather thick, somewhat scaly, dark-brown rhizome. Stipes several, curving upward from end of rhizome, scaly toward base, scales linear-caudate, 1-2 cm. or more long, blade bipinnate, pinnules cut to near costa, lobes obtuse, serrate, sori linear, attached along side of vein.

'Eua: gully of little stream above Fuai, in shade in forest on volcanic slope, alt. about 90 m., Nov. 10, 1951, *Hürlimann 228*.

Infrequent. Samoa.

Diplazium petersenii (Kunze) Christ, Bull. Acad. Int. Géogr. Bot., 245, 1902.

Athyrium petersenii Copeland.

Medium-sized, terrestrial fern, with scaly, prostrate rhizome. Stipes clustered, curving upward from end of rhizome, up to 30 cm. or more long, scaly, blade up to 45 cm. long, lanceolate, pinnate, pinnae up to 8 cm. or more long and 1 cm. wide, acuminate, deeply lobed, lobes oblong, slightly falcate, rachis and pinnae scaly, sori linear, attached on side of vein.

Kao: in thin soil in open rocky alpine area near summit, alt. about 1,000 m., May 6, 1953, *Yuncker 15945*.

Infrequent. Southeastern China, India, Java.

Diplazium proliferum (Lamarck) Thouars, Fl. Trist. d'Ac., 35, 1804.

Moderate-sized terrestrial fern with scaly rhizome. Stipes clustered, 15 cm. or more long, blade up to 60 cm. or more long, pinnate, pinnules sessile or subsessile, oblong-lanceolate, 2-3.5 cm. wide and up to 15 cm. long, acuminate, base truncate, nerves beneath somewhat scaly, sori linear, attached along veins.

Tafahi: depression of former volcanic mouth of Piu 'o Tafahi, in fog forest, alt. about 580 m., Dec. 11, 1951, *Hürlimann 449*.

Infrequent. Polynesia to Australia, tropical Africa and Madagascar.

Genus *Asplenium* Linnaeus

Asplenium falcatum Lamarck, Encycl. Méth. 2: 306, 1786.

Terrestrial fern with a short, creeping, scaly rhizome. Stipes clustered near end of rhizome, up to 20 cm. or more long, brownish-scaly at base, glabrescent upward, blade lanceolate, up to 25 cm. or more long and about 10 cm. wide, pinnate, pinnae up to 20 or more on each side, obliquely ovate-lanceolate, up to 5 cm. or more long and 1 cm. wide, margins irregularly incised, sori linear, extending from midrib to near margin.

Tongatapu: *Nelson; Home; Moseley*.

'Eua: on moist rocks in ravine north of Ohonua village, Apr. 2, 1953, *Yuncker 15615*; in crevices and soil pockets in limestone outcrops on sea-facing slope near summit of eastern ridge, Matanga, Lokupo District, Apr. 8, 1953, *Yuncker 15683*; valley of Lakatoa River near Ohonua, on humus-covered limestone in forest, alt. about 15 m., Nov. 10, 1951, *Hürlimann 234*.

Vava'u: *Barclay; Crosby*; on limestone rocks in forest shade near the shore of Lake Anovai, May 19, 1953, *Yuncker 16039*.

Niufo'ou: under trees in forest on upper slope of main crater facing central lake, May 11, 1953, *Yuncker 16008*.

Tafahi: depression of former volcanic mouth of Piu 'o Tafahi, in fog-zone forest, alt. about 580 m., Dec. 11, 1951, *Hürlimann 444*.

Frequent in moist shady areas throughout Tonga. Asia, Africa, Madagascar, Australia, New Zealand, Melanesia, Polynesia.

This is the species given as *A. adiantoides* (L.) C. Christensen in many lists.

Asplenium gibberosum (Forster) Mettenius, Freg. Novara, Bot. 1: 211, 1870.

Terrestrial fern with suberect rhizome covered with thin, veiny, lanceolate scales. Stipes clustered, up to 50 cm. or more long, blade hardly as long as stipe, broadly ovate in outline, 4-5-pinnate, ultimate rachises winged, ultimate segments linear, one-nerved, the sori lateral, cuplike, on segments.

'Eua: bank of a streamlet, in forest near center of island, Mar. 20, 1953, *Yuncker 15393*; in moist ravine in forest along trail to summit of eastern ridge, Mar. 30, 1953, *Yuncker 15563, 15567*; gully of a little stream near Fuai, at base of tree in forest, alt. about 90 m., Nov. 9, 1951, *Hürlimann 227*.

Kao: on steep rocky slope in forest, May 6, 1953, *Yuncker 15884, 15896*.
Locally rather frequent. Polynesia.

Asplenium laserpitiifolium Lamarck, Encycl. Méth. 2: 310, 1786.

Moderate-sized, epiphytic, or less frequently, terrestrial fern, with a short rhizome with brownish scales. Stipes several, clustered, dark brown, smooth, blade ovate, 30 cm. or more long, 3-4-pinnate, ultimate pinnules obovate-cuneate, mostly 5-8 mm. long, sori elongate, submarginal.

Tafahi: steep slope above path between township of Tafahi and landing place Tafe, on volcanic soil covered with moving rocks, alt. about 50 m., Dec. 14, 1951, *Hürlimann 515*.

Infrequent. Society Islands and westward to the Seychelles.

Asplenium nidus Linnaeus, Sp. Pl., 1079, 1753.

Terrestrial or epiphytic fern with short creeping rhizome. Fronds simple, entire, glabrous, subcoriaceous, elongated, swordlike, up to 1 m. or more long and 15 cm. wide, forming a rosette-like cluster, costa prominent, sori numerous, linear, extending up to 3 cm. in length from costa.

Tongatapu: epiphytic on branch of a large tree in forest near coast back of Fatai village, Mar. 10, 1953, *Yuncker 15266*.

'Eua: on tree branch in forest on lower seaward terrace near Lokupo, Mar. 27, 1953, *Yuncker 15534*; about 3 to 4 miles south of Pangai, to east of road, on trunk of *Rhus taitensis*, alt. about 70 m., Nov. 12, 1951, *Hürlimann 250*.

Kao: on a dead tree on steep forested slope, May 6, 1953, *Yuncker 15885*.

Vava'u: *Crosby*; on humus in forest shade near top of seaward side of steep coastal cliff along northwestern side of island, May 25, 1953, *Yuncker 16171*.

Tafahi: depression of former volcanic mouth of Piu 'o Tafahi, alt. about 580 m., Dec. 11, 1951, *Hürlimann 447*.

Frequent throughout Tonga in forested areas. Asia, eastern Africa, Madagascar, tropical Australia, Micronesia, Fiji, Polynesia.

Tongan name: *hulufo*.

Asplenium obtusatum Forster f., Fl. Ins. Australia, Prodr., 80, 1786.

Terrestrial fern with short, creeping, scaly rhizome. Stipes up to 25 cm. or more long, grayish brown, scaly at base, glabrescent upward, blade broadly ovate, up to 15 cm. or more long and 8 cm. wide, pinnate, pinnae alternate, oblong, obtuse at apex, crenate, sori linear, reaching nearly to margin.

'Eua: *Lister*.

Occasional. Australia, New Zealand.

Asplenium remotum Moore, Ind. Fil., 160, 1859.

Terrestrial fern with scaly rhizome, the scales dark, attenuate. Stipes scattered or approximate, up to 10-20 cm. long, blades mostly pinnate, 50 cm. or more long, pinnae oblong-lanceolate, with obliquely unequally acute base and acuminate or caudate apex, up to 10 cm. long and 15 mm. wide, margin sharply serrate, veins mostly simple, sori extending from costa to margin.

'Eua: southern part of crest line on eastern ridge above Vaifefe, alt. about 290 m., Nov. 12, 1951, *Hürlimann 267*.

Infrequent. Fiji west to Celebes.

Asplenium unilaterale Lamarck, Encycl. Méth. 2: 305, 1786.

Rather small terrestrial fern with elongate scaly rhizome. Stipes scattered, up to 10 cm. or more long, blade lanceolate, up to 25 cm. or more long and 5 cm. wide, pinnate, pinnules obliquely oblong, irregularly serrate, acute, 2.5 cm. or more long, sori linear.

'Eua: on steep slope surrounding "Smoky Hole," or opening where a mountain stream goes under ground, in dense forest shade, Ana'ahu, near center of island, Mar. 31, 1953, *Yuncker 15577*.

Infrequent. Southern Asia, Malaysia, Japan, Polynesia.

Genus **Blechnum** Linnaeus

Blechnum orientale Linnaeus, Sp. Pl., 1077, 1753 [error as *B. occidentale*].

Terrestrial fern with thick, scaly, erect rhizome. Stipes up to 30 cm. or more long, scaly at base, blade ovate-lanceolate, up to 1 m. or more in length and 40 cm. wide, coriaceous, pinnate, pinnae linear, acuminate, sessile or subcurrent, closely spaced, up to 20 cm. long and 1 cm. wide, reduced to auricles downward, sori linear, forming continuous line along costa.

Tongatapu: *Home*.

'Eua: on dry volcanic soil, edge of forest near summit of main eastern ridge above Fuai, Mar. 24, 1953, *Yuncker 15458*.

Infrequent. Asia, Australia, Ceylon, Malaysia, New Zealand, Polynesia.

Blechnum sp.

Pinnae linear, up to 8 cm. or more long and scarcely 5 mm. wide, lower surface entirely covered with sporangia.

Kao: in thin soil between rock outcroppings in open area near summit, alt. about 1,000 m., May 6, 1953, *Yuncker 15944*. This was the only specimen seen.

Genus **Stenochlaena** J. Smith

Stenochlaena palustris (Burmans) Beddome, Ferns British India, Suppl., 26, 1876.

Large, scandent fern. Stipes up to 30 cm. or more long, straw-colored, essentially glabrous, blades pinnate, sterile blade up to 60 cm. or more long, pendent, pinnae firm, oblong-lanceolate, up to 15 cm. long and 3.5 cm. wide, apex attenuately sharp-acuminate, margin finely and sharply serrate, pinnately nerved, lateral nerves very numerous, slender, parallel, pinnae of fertile leaves linear, entire, margin revolute, sporangia covering lower surface.

Tongatapu: June 1, 1926, *Setchell and Parks 15185*; July 5, 1926, *Setchell and Parks 15518*.

Vava'u: *Crosby*; on hummocks or climbing on trees up to 5 or 6 m., in wet boggy margin of Ngofe swamp, near southwestern end of island, May 19, 1953, *Yuncker 16034*.

Infrequent. Asia, Australia, Polynesia.

Listed as *Acrostichum scandens* J. Sm. by Burkill.

Tongan name: *pasivaka*.

The long fibrous stems are sometimes used as timber and thatch binding.

Genus **Hypolepis** Bernhardt

Hypolepis tenuifolia (Forster) Bernhardt, Schrader's Neu. Jour. Bot. 1(2): 34, 1806.

Large, terrestrial fern with creeping, hairy rhizome. Stipes up to 1 m., or more long and 6 to 8 mm. in diameter, more or less pubescent, blade as long as stipe or longer, broadly ovate, 3-4 pinnate, axes and lower surface somewhat hairy, ultimate divisions lanceolate, serrate, about 2 cm. long or sometimes longer, deeply incised, sori marginal toward base of the sinus.

Tongatapu: *Moseley*.

'Eua: *Lister*; in open forest above Pangai village, Mar. 5, 1953, *Yuncker 15461*; in moist, dense forest north of Houma village, Mar. 26, 1953, *Yuncker 15514*.

Vava'u: *Crosby*; in shade of trees in wet swampy area bordering Ngofe swamp, May 19, 1953, *Yuncker 16036*.

Rather frequent. Malaysia, China, Australia, New Zealand, Polynesia.

Tongan name: *kahiva'e*.

Genus **Adiantum** Linnaeus

Adiantum capillus-veneris Linnaeus, Sp. Pl., 1096, 1753, var.

Small, delicate, terrestrial fern with creeping rhizome. Stipes dark and polished. Fronds bipinnate, pinnules fan-shaped, outer margin irregularly incised or lobed, thin, sori marginal, protected by reflexed pinnule lobe margins.

Tongatapu: in crevices in sea-facing limestone cliff, in dense shade, near shore below Fu'amotu village, Mar. 4, 1953, *Yuncker 15149*; June 5, 1953, same locality, *Yuncker 16242*; on shaded, moist wall of sea-facing cave near shore, vicinity of Ha'akame, Mar. 12, 1953, *Yuncker 15268*; former strand terrace below Fu'amotu, alt. about 5 m., Nov. 3, 1951, *Hürlimann 136*.

'Eua: *Lister*; in crevices and soil pockets in limestone outcroppings of sea-facing cliffs near summit of eastern ridge, Matanga, Lokupo District, Apr. 8, 1953, *Yuncker 15667*.

Vava'u: on moist wall near water front, Neiafu village, May 23, 1953, *Yuncker 16147*.

Occasional on dark, shady, moist walls and in similar places. Pantropic.

Tongan name: *ulu'itaupo'ou*.

Adiantum diaphanum Blume, Enum. Pl. Javae, 215, 1828.

Small terrestrial fern. Stipes black, shiny, scaly at base, glabrous upward, blades forked or simple, pinnules toward base flabellate, upper ones obliquely rhomboidal, glabrous on upper surface, covered with golden subappressed hairs beneath, sori few, marginal.

'Eua: *Lister*; on moist limestone rocks in river ravine just to north of Ohonua village, Apr. 2, 1953, *Yuncker 15623*.

Occasional. Southern Asia, Australia, New Zealand, Polynesia.

Adiantum hispidulum Swartz, Schrader's Jour. Bot. 2: 82, (1800) 1801.

Rather small terrestrial fern. Stipes dark, polished, persistently hairy, about equaling

upper foliar part, blades pedate, lowest pinnules flabellate, upper ones obliquely rhomboidal, white-pubescent, outer margin dentate, sori small, marginal.

Tongatapu: *Nelson*.

Vava'u: *Crosby*; on mossy limestone rocks, moist shady bank near lagoon at Vaihoi, near Leimatua, May 26, 1953, *Yuncker 16196*.

Occasional. Pantropic.

Genus *Pteris* Linnaeus

Pteris comans Forster f., Fl. Ins. Australia, Prodr., 79, 1786.

Rather large, coarse, terrestrial fern. Stipes straw-colored or brownish, up to 1 m. long, glabrous, blade about as long as stipe, deltoid-ovate or triangular, bipinnate with a terminal pinna up to 30 cm. long, lateral pinnae subopposite, deeply divided to near costa into linear-lanceolate lobes up to 10 cm. long and about 1 cm. wide, sori marginal, not reaching serrate, acute apex of lobes.

Tongatapu: *Nelson*.

'Eua: *Lister*; on moist bank of small stream in deep shady ravine near center of island, Mar. 19, 1953, *Yuncker 15350*; in thin shade of rather open forest on seaward-facing terrace above Lokupo, Mar. 27, 1953, *Yuncker 15528*.

Occasional. Norfolk Island, New Zealand, Tasmania, Australia, Fiji, Polynesia, Juan Fernandez.

Pteris ensiformis Burmann f., Fl. India, 230, 1768.

Terrestrial fern with creeping, brown-scaly rhizome. Stipes straw-colored, up to 30 cm. or more long, glabrous, sterile blades lanceolate, bipinnate, pinnules variable in size and shape, mostly oblong to linear-lanceolate, sharply serrate, fertile blades much larger, pinnate or bipinnate, pinnules linear, up to 25 cm. or more long and 5 mm. wide, sori marginal, extending to near serrate and often branched tip.

Tongatapu: *Cook*; *Nelson*.

'Eua: on moist soil in forest on seaward-facing terrace above Lokupo, Mar. 27, 1953, *Yuncker 15519*; in open forest on lower terrace near sea, near Ha'aluma, Apr. 1, 1953, *Yuncker 15583*.

Vava'u: *Crosby*; in forest shade just below upper rim of steep coastal cliff on northwestern side of island, May 25, 1953, *Yuncker 16179*.

Niuafou'u: in forest shade on inner, lake-facing slope of main crater, May 11, 1953, *Yuncker 16000*.

Tafahi: steep slope below township of Tafahi, on humus of rocky volcanic soil in forest, alt. about 15 m., Dec. 13, 1951, *Hürlimann 483*.

Frequent in moist, shaded areas throughout Tonga. China, India, Malaysia, tropical Australia, Polynesia.

Tongan name: *hulufo uhi*.

Pteris pacifica Hieronymus, Hedwigia 55: 355, 1914.

Terrestrial fern. Stipes up to 50 cm. or more long, light brown, brown-scaly near base, finely puberulent, glabrescent upward, blade about as long as stipe, ovate in outline, pinnate,

pinnae 6-10 opposite pairs, up to 15 cm. or more long, lanceolate, deeply divided almost to costa, lobes oblong, numerous, with bluntly acute apex, lively green in color, sori in marginal rows not continuous about base of the sinus or reaching entire apex.

'Eua: in dense forest near center of island, Mar. 20, 1953, *Yuncker 15374*; in forest on seaward-facing terrace above Lokupo, Mar. 27, 1953, *Yuncker 15516*.

Vava'u: in forest along upper rim of steep seaside cliff along northwestern coast of island, May 24, 1953, *Yuncker 16178*.

Niufo'ou: in grassy interlava "island" along trail to rim of main central crater, May 11, 1953, *Yuncker 16010*; inner wall of great crater circus, on path from Futu to the lake, alt. about 60 m., Jan. 7, 1952, *Hürlimann 672*.

Tafahi: on path from township of Tafahi toward Piu 'o Tafahi, alt. about 200 m., Dec. 11, 1951, *Hürlimann 476*.

Rather frequent in forested areas throughout Tonga. New Guinea, Celebes, Malaya, Fiji, Samoa.

The specimens from Tongatapu (Nelson; Home) and Vava'u (Crosby) reported as *P. quadriaurita* Retz in Hemsley's and Burkill's lists need re-examining. It is probable that they will be referable to *P. pacifica*.

***Pteris tripartita* Swartz, Schrader's Jour. Bot. 2: 67, (1800) 1801.**

Rather large, terrestrial fern with short rhizome. Stipes up to 60 cm. or more long, smooth, brown, blade up to 1 m. or more long, tripartite, each part in turn once or more divided, pinnae sessile, lanceolate, pinnatifid to near costa, sori forming a continuous row along margins of pinnae to near denticulate apex.

'Eua: *Lister*; in open forest above Fuai plantation, Mar. 18, 1953, *Yuncker 15314*; base of eastern ridge northeast of Ha'aluma, in forest, alt. about 70 m., Nov. 12, 1951, *Hürlimann 254*.

Vava'u: *Crosby*; in thicket near top of cliff along northwest coast, May 26, 1953, *Yuncker 16160*.

Tafahi: in plantation on path from township Tafahi to landing place Faihavanui, on rocky volcanic soil, alt. about 100 m., Dec. 15, 1951, *Hürlimann 560*.

Occasional throughout Tonga in shady areas. Africa, Asia, Australia, Polynesia.

P. marginata Bory in Hemsley's list.

***Pteris vittata* Linnaeus, Sp. Pl., 1074, 1753.**

Small to medium-sized fern. Stipes up to 10 cm. long, scaly, light brown in color, blade oblong-lanceolate in outline, pinnate, up to 75 cm. or more long, pinnae of various shapes and sizes, oblong-lanceolate to linear-lanceolate, sessile, denticulate, apex acute to acuminate, sori forming a marginal row to near tip.

Tongatapu: *Nelson; Home*; in crevices of limestone, sea-facing cliff, in deep forest shade, below Fu'amotu village, Mar. 4, 1953, *Yuncker 15147, 16241*.

'Eua: *Lister*; on limestone cliff, side of deep river ravine north of Ohonua village, Apr. 4, 1953, *Yuncker 15608, 15612*.

Vava'u: *Crosby*; in shade of shrubs just below upper rim on seaward face of steep coastal cliffs on northwest side of island, May 20, 1953, *Yuncker 16076*.

Frequent in shady situations throughout Tonga. Pantropic.

P. longifolia L. in Hemsley's and Burkill's lists.

Genus **Histiopteris** (Agardh) J. Smith

Histiopteris incisa (Thunberg) J. Smith, *Hist. Fil.*, 295, 1875.

Rather large, terrestrial fern, with a creeping rhizome. Stipes up to 1 m. or more long, erect, smooth, blade triangular-ovate, up to about 1 m. long, glabrous, tripinnate, pinnae opposite, sessile, oblong-lanceolate, ultimate segments triangular-oblong, entire or dentate, obtuse, sori marginal, mostly continuous except for tip and base of sinus.

Kao: in open rocky alpine area near summit, alt. about 950 m., May 6, 1953, *Yuncker 15950*.

Infrequent. Widely distributed in tropical and subtropical regions.

Genus **Vittaria** J. Smith

Vittaria elongata Swartz, *Syn. Fil.*, 109, 302, 1806.

Tufted epiphyte with slender, creeping, densely scaly rhizome, scales brown or black, linear-lanceolate, up to 11 mm. in length, subulate-pointed, blades linear, mostly 5-10 mm. wide and up to 150 cm. or more long, leathery, lateral nerves rather obscure, sori continuous along margins of blade.

Tafahi: on tree in depression of former volcanic mouth of Piu 'o Tafahi, in fog forest, alt. about 580 m., Dec. 11, 1951, *Hürlimann 441*.

Society Islands, Marquesas, Cook Islands, Fiji, Micronesia, Australia and westward to Malaysia and tropical Asia.

Genus **Antrophyum** Kaulfuss

Antrophyum alatum Brackenridge, *U.S. Expl. Exped.* 16: 64, 1854.

Rather small epiphytic or epilithic fern with densely matted rhizome. Fronds simple, entire, somewhat fleshy, elliptic or elliptic-lanceolate with acuminate apex and narrowing toward base, up to 5 cm. or more wide and 20-25 cm. or more long, nerves anastomosing to form rather large areolas, costa evident in lower part, sori linear, along nerves.

Tafahi: beside path from township toward the Piu 'o Tafahi, on lava rock in forest, alt. about 320 m., Dec. 10, 1951, *Hürlimann 413*.

Polynesia, Malaysia.

Antrophyum plantagineum (Cavanilles) Kaulfuss, *Enum. Fil.*, 197, 1824.

Rather small, epiphytic fern with creeping, scaly rhizome. Stipes up to 12 cm. or more long, slender, blade up to 20 cm. or more long and 5 cm. wide, attenuate at both ends, simple, glabrous, entire, nerves conspicuous and anastomosing to form elongated areolas, sori linear, resembling venation.

'Eua: on tree branch in forest near center of island, Mar. 29, 1953, *Yuncker 15547*; on eastern ridge in central part of island, near cliff, alt. about 200 m., Nov. 9, 1951, *Hürlimann 213*.

Occasional in forested areas. Southern India, Ceylon, Malaysia, Philippines, Micronesia, Polynesia.

Antrophyum plantagineum var. **angustatum** (Brackenridge) Moore, Ind. Fil., 82, 1857.

Plants smaller and with smaller and narrower fronds than in var. *plantagineum*.

'Eua: on branches of tree in deep forest, near center of island, Mar. 21, 1953, *Yuncker 15405*.

Vava'u: on tree on forested slope near shore of Lake Anovai, May 19, 1953, *Yuncker 16037*.

Occasional in forested areas; with the species.

Genus **Hymenolepis** Kaulfuss

Hymenolepis mucronata Fée, Gen. Fil. (2): 82, pl. 6, 1852.

Small epiphytic fern with short, scaly, creeping rhizome. Stipes approximate, about 5 cm. long, glabrous, blade simple, linear-elongate, up to 30 cm. or more long and 2 cm. wide, constricted at apex to form a cylindrical sporogenous part up to 6 or 8 cm. long, sporangia numerous, densely clustered.

Kao: on tree in forest, May 6, 1953, *Yuncker 15882*.

Tafahi: beside path to Piu 'o Tafahi where it reaches edge of mountain, alt. about 400 m., Nov. 10, 1951, *Hürlimann 426*.

Infrequent. Madagascar, southern Asia, Australia, Polynesia.

Genus **Polypodium** Linnaeus

Polypodium nigrescens Blume, Enum. Pl. Javae, 126, 1828.

Phymatodes nigrescens J. Smith.

Terrestrial or epiphytic fern with stout, dark-scaly, creeping rhizome. Stipes up to 60 cm. long, stout, naked, blades up to 1 m. long, broadly triangular-ovate or oblong-ovate, pinnately divided to near costa into widely separated, lanceolate lobes up to 30 cm. long and 4 cm. wide, lobes entire, acuminate, glabrous, sori large, round, in two rows near costa.

Tongatapu: *Veich*.

Tafahi: beside path from township toward Piu 'o Tafahi, alt. about 200 m., Dec. 11, 1951, *Hürlimann 477*.

Occasional. Southern India, Ceylon, Malaysia, tropical Australia, Polynesia.

Polypodium scolopendria Burmann f., Fl. India, 232, 1768.

Microsorium scolopendria Copeland.

Phymatodes scolopendria Ching.

Terrestrial fern with a stout, creeping rhizome. Stipes up to 30 cm. or more long, blades up to 40 cm. or more long, broadly triangular-ovate in outline, simple but deeply

and broadly divided to near costa into several lanceolate, acute lobes, sori large, commonly in two rows on lower surface of lobes.

Tongatapu: *Home*; *Moseley*; in sandy soil under coconut trees near beach, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15012*; at shore north of Hofoa, on coral sand at border of coastal forest, Oct. 30, 1951, *Hürlimann 94*.

'Eua: *Lister*; on swollen, fibrous-rooted base of coconut tree along trail between Pangai and Fuai, Mar. 25, 1953, *Yuncker 15477*.

Nomuka: in coconut plantation on lakeward side of road encircling island, Apr. 30, 1953, *Yuncker 15817*.

Lifuka: weed in coconut plantation along coastal road north of Pangai village, Apr. 25, 1953, *Yuncker 15734*.

Kao: on steep slope in moderate shade of rather open forest, May 6, 1953, *Yuncker 15956*.

Vava'u: *Crosby*.

Tafahi: toward summit of Piu 'o Tafahi, on volcanic soil in fog forest, alt. about 500 m., Dec. 11, 1951, *Hürlimann 467*.

A common plantation and waste area weed throughout the group, usually at lower altitudes. Africa, Madagascar, Ceylon, southern China, Malaysia, tropical Australia, New Zealand, Melanesia, Polynesia.

Tongan name: *laufale*.

P. phymatodes L. in Hemsley's and Burkill's lists.

Genus *Drynaria* Bory

***Drynaria rigidula* (Swartz) Beddome**, Ferns British India, pl. 314, 1869.

Epiphytic fern with a stout, fleshy rhizome densely covered with slender scales. Fronds of two kinds: scale fronds up to 15 cm. or more long, thin, scarious, ovate-lanceolate, veiny, shallowly lobed, forming a nestlike cluster about base for collection of detritus to be used as food; normal fronds up to 1 m. long, stipes comparatively short, somewhat fimbriate-scaly, blade pinnate, pinnae oblong, acute, up to 10 cm. or more long and 1 cm. wide, chartaceous, veiny, crenulate, glabrous, sori round, in two rows about midway between costa and margin.

'Eua: on coconut tree in Ohonua village, Apr. 2, 1953, *Yuncker 15610*.
Infrequent. India, Australia, Polynesia.

Genus *Acrostichum* Linnaeus

***Acrostichum aureum* Linnaeus**, Sp. Pl., 1069, 1753.

Terrestrial fern with short, erect rhizome. Stipes up to 30 cm. or more long, clustered, blades pinnate, up to 1 m. or more long when well developed, pinnae oval-ovate to linear-lanceolate, entire, up to 25 cm. long and 4 cm. wide in well-developed specimens, commonly much smaller, coriaceous, nerves fine, anastomosing, sori covering lower surface of terminal pinnae.

Tongatapu: *Moseley*; on slightly raised hummocks in marshy area, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15005*; in swamp between village of Navutoka and sea, Feb. 27, 1953, *Yuncker 15073*; in low swampy area

near Nualei, Mar. 9, 1953, *Yuncker 15249*; in crevices and depressions in limestone rocks just above high-tide zone near village of Ha'akame, Mar. 12, 1953, *Yuncker 15279*; in thin soil in crevices and depressions in a small sink-hole of limestone rock near Houma village, June 1, 1953, *Yuncker 16219*; on shaded, overhanging limestone cliff near sea, Fangaveha, June 7, 1953, *Yuncker 16247*; along shore of interior lagoon south of Ma'ofanga, in coastal forest on wet, muddy soil, Nov. 23, 1951, *Hürlimann 318*.

'Eua: in forest along streamlet, east coast at Vaifefe, Nov. 13, 1951, *Hürlimann 273*.

Vava'u: *Crosby*; on rocks at edge of lagoon in mangrove forest, Vaihoi, near Leimatua, May 26, 1953, *Yuncker 16199*.

Tafahi: on volcanic ash soil in forest on steep slope at Fakafafa moe Tauloto, alt. 20 m., Dec. 17, 1951, *Hürlimann 606*.

Locally abundant. Pantropic.

Tongan name: *hakato*.

Genus *Bolbitis* Schott

Bolbitis lonchophora (Kuntze) C. Christensen, Ind. Fil., Suppl. 3: 49, 1934.

Large terrestrial fern with dimorphic fronds. Sterile blades pinnate-pinnatifid and narrowed to a long, often radicate apex. Fertile fronds much smaller; sporangia borne all over lower surface.

Tafahi: on volcanic soil in cloud forest near crater of old volcano, Piu 'o Tafahi, alt. about 580 m., Dec. 11, 1951, *Hürlimann T450*.

Infrequent in Tonga. Christensen gives the range as "Tropical Polynesia, east to Rapa, west to New Caledonia and Queensland."

Genus *Pyrrosia* Mirbel

Pyrrosia adnascens (Swartz) Ching, Chinese Bot. Soc., Bull. 1: 45, 1935.

Cyclophorus adnascens Desvaux.

Small epiphytic fern, with long, creeping, slender, scaly rhizome. Fronds at intervals along rhizome, simple, entire, coriaceous, covered with stellate scales, dimorphic, sterile fronds oblong-elliptic or oblanceolate, 5-10 cm. long and 1-1.5 cm. wide, fertile fronds up to 15 cm. or more long, upper fertile half narrowed with sori covering lower surface.

Tongatapu: *Nelson*; *Home*.

'Eua: climbing on tree near seaward margin of forest above Houma village, Mar. 26, 1953, *Yuncker 15497*.

Vava'u: *Crosby*; on tree trunk near shore of Lake Anovai, May 19, 1953, *Yuncker 16038*; on branches of a large tree, near lagoon at Vaihoi, below Leimatua, May 26, 1953, *Yuncker 16195*.

Tafahi: roadside between township of Tafahi and landing place Faihavanui, alt. about 100 m., Dec. 15, 1951, *Hürlimann 558*.

Frequent in moist forested areas. Southern Asia, Polynesia.

Polypodium adnascens Sw. in Hemsley's and Burkill's lists.

FAMILY LYCOPODIACEAE

Genus *Lycopodium* Linnaeus***Lycopodium cernuum* Linnaeus, Sp. Pl., 1103, 1753.**

Terrestrial plant, rhizome creeping, aerial shoots erect and more or less scandent, up to 2 m. or more long, branched, branches repeatedly forking, about 5 mm. in diameter, simple below. Leaves very numerous, narrowly subulate, curved, 2-3 mm. long. Spikes terminal, about 1 cm. long and 3 or 4 mm. thick, drooping, sporophylls closely imbricated, broad at base, attenuate to a subulate apex, margin lacerate.

'Eua: *Lister*; on dry sides of eroded gulch near summit of eastern ridge, Mar. 24, 1953, *Yuncker 15444*; first plateaus of eastern ridge above Fuai, rather abundant in open area, alt. about 150 m., Nov. 9, 1951, *Hürlimann 184*.

Kao: in open alpine area above timber line, alt. about 630 m., May 6, 1953, *Yuncker 15937*.

Vava'u: *Crosby*.

Occasional at higher altitudes throughout Tonga. Widely distributed in warm countries.

Tongan name: *iku'i kuli*.

***Lycopodium squarrosum* Forster f., Fl. Ins. Australia, Prodr., 86, 1786.**

Epiphyte. Stems clustered, more or less pendent, up to 60 cm. or more long, branched, densely covered with linear-lanceolate, sharply acuminate leaves 1 cm. or more long, apical sporangia-bearing leaves somewhat smaller and slightly appressed but not strobilar in appearance.

Tafahi: below summit of Piu 'o Tafahi, on rotten log in fog forest, alt. about 590 m., Dec. 11, 1951, *Hürlimann 460*.

Polynesia and westward to the New Hebrides and Asia.

FAMILY SELAGINELLACEAE

The Selaginellaceae have been identified by A. H. G. Alston.

Genus *Selaginella* Beauvois***Selaginella laxa* Spring, Acad. Sci. Belg., Bull. 10: 233, 1843.**

Selaginella harveyi Baker, Jour. Bot. 23: 156, 1885.

Selaginella zitiensis Baker, Jour. Bot. 23: 177, 1885.

Selaginella brackenridgei Baker, Jour. Bot. 23: 178, 1885.

Selaginella pelagica Baker, Jour. Bot. 23: 250, 1885.

Slender, delicate, subrepent, herbaceous plant, the stems scarcely 1 mm. thick, bearing rhizophores below, repeatedly subdichotomously branched. Sterile leaves of different sizes, lateral ones obliquely oblong-ovate, acute or obtuse, minutely serrulate, intermediate ones smaller, elliptic-ovate, appressed, overlapping, acuminate, minutely serrulate. Spikes short, terminal, tetragonal, with ovate-lanceolate, acuminate, serrulate sporophylls.



FIGURE 5.—*Scaginella yunckeri*, Yuncker 15914, isotype, in herbarium of DePauw University.

Vava'u: on limestone rocks just below upper rim of precipitous coastal cliff along northern side of island above Leimatua, alt. about 150 m., May 20, 1953, *Yuncker 16061*.

Niuafo'ou: on rocks in open forest shade on inner slope of main crater surrounding large central lake, alt. 30-60 m., May 16, 1953, *Yuncker 15994*.

Infrequent.

The Tongan plant has been described as *S. harveyi*, but it does not appear to differ from *S. laxa* from Tahiti or the three species from the Fijian islands named by Baker.

***Selaginella yunckeri* Alston, sp. nov. (fig. 5).**

Species heterophylla ex affinitate *S. firmulae*, caulibus erectis e basi breviter decumbentibus, parte simplice 8-15 cm. alta, circa 1.25 mm. in diametro, in sicco pallide virido-stramineis, glabris, leviter compressis, parte decumbente rhizophoris paucis induta, rhizophoris omnibus ventralibus filiformibus, ramosis hinc et illinc dichotomis; caulim partibus ramosis, ramulorum systema ambitu oblongo-ovatum, 7-10 × 3.5 cm., gerentibus; ramis alternatis, internodis 1-1.5 cm. longis; foliis caulium partis simplicis fere aequalibus, eis partis ramosae dimorphis, imbricatis; foliis lateralibus maximis circa 2.10 mm. longis, 1.75 mm. latis, non lucentibus, pagina superiore obscuriori, inaequalateralibus; semi-facie superiore semi-ovata, basi late rotundata, ciliata vel ciliolata, ciliis 0.1 mm. longis, parte superiore dentata; semi-facie inferiore oblonga, basi rotundato-truncata apice cuneata, integra sed apicem versus minute serrulata; foliis axillaribus ovatis, leviter inaequalateralibus, basi utrinsecus ciliolatis; foliis intermediis quadrato-rotundatis, leviter trapezoideis, acuminato-aristatis, acumine minus quam laminae dimidio longiore, basi ciliolatis, costis curvatis; strobilis uno solo in summo ramulorum apicibus dispositis, usque ad 2 cm. longis, 1.5 mm. diametro, tetragonis; sporophyllis ovato-deltaideis, dentatis; apice vix acuminatis, carinatis; megasporis pallide viride-stramineis circa 44 μ in diametro, sublaevibus; microsporibus non visis.

Kao: in rocky alpine clearing, shallow soil, alt. about 650 m., May 6, 1953, *Yuncker 15914* (BM, type; US); in moist soil on rocky open slope above the upper forest limits, alt. about 900 m., May 7, 1953, *Yuncker 15933* (BM, US).

This species is one of a group represented by one or more endemic but allied species in each group of islands. The nearest is *S. firmula* A. Braun, from Fiji, which is a taller plant with the frondlike part more expanded and some large lateral leaves at the upper end of the erect parts of the stem.

FAMILY PSILOTACEAE

Genus *Psilotum* Swartz

***Psilotum complanatum* Swartz, Syn. Fil., 188, pl. 4, 1806.**

Epiphytic plant similar to *P. nudum* but somewhat larger and with branches flattened and up to 3.5 mm. wide, sporangia about 2.5 mm. in diameter.

Vava'u: *Crosby*.

Infrequent. Philippines, Society Islands.

Psilotum nudum (Linnaeus) Grisebach, Syst. Veg. Karaib., 130, 1837.

Terrestrial or epiphytic herb, up to 60 cm. or more tall. Stems arising from a stout rhizome, repeatedly dichotomously branched above, angular and longitudinally ribbed, about 2 mm. in diameter. Leaves minute, scale-like, alternate from angles of stem and branches. Spores produced in small, subglobose, axillary, three-lobed sporangia about 1 mm. in diameter.

Tongatapu: at base of coconut tree, between Fatai village and sea, Mar. 10, 1953, *Yuncker 15254*; about swollen, soil-packed base of coconut tree, plantation near Sopa, west of Nuku'alofa, May 30, 1953, *Yuncker 15293*.

'Eua: *Lister*; at base of tree in clearing in forest above Fuai plantation, Mar. 29, 1953, *Yuncker 15548*; on a limestone rock along a small stream immediately north of Ohonua village, Apr. 2, 1953, *Yuncker 15624*; on eastern ridge above cliff in central part of island, in excavations of wind-sheltered calcareous rock, alt. about 200 m., Nov. 9, 1951, *Hürlimann 205*.

Kao: about swollen base of large tree on steep forested slope, May 6, 1953, *Yuncker 15888*.

Niuatoputapu: on base of coconut tree in forest on plain southeast of Falehu, alt. about 5 m., Dec. 7, 1951, *Hürlimann 381*.

Reported as *P. triquetrum* Sw. in Hemsley's list.

Frequent throughout Tonga. Pantropic.

Tongan name: *limufonua*.

SPERMATOPHYTA

FAMILY CYCADACEAE

Genus *Cycas* Linnaeus**Cycas circinalis** Linnaeus, Sp. Pl., 1188, 1753.

Palmlike plant. Leaves clustered at crown, up to 1 m. or more long, curved, pinnately divided, pinnae stiff, glossy, up to 30 cm. long, narrowly linear-lanceolate, somewhat falcate, sharply acute. Inflorescence large, conelike, in center of crown of leaves, fruit borne on margin of brown woolly, modified leaves, ovoid, somewhat compressed, up to 5 cm. long, with a thin, fleshy covering.

Tongatapu: scattered in forest near sea below Niutoua village, Mar. 2, 1953, *Yuncker 15142*.

'Eua: *Lister*; above Vaifefe below cliff on eastern ridge, Nov. 13, 1951, *Hürlimann 272*; side of trail between Pangai and Fuai, Mar. 25, 1953, *Yuncker 15485*.

Vava'u: *Crosby*; roadside on way to summit of Talau, west of Neiafu, May 23, 1953, *Yuncker 16151*.

Niuatoputapu: near house, Falehu, Dec. 18, 1951, *Hürlimann 616*.

Distributed throughout Tonga, being especially common on 'Eua. Tropical Asia and Africa through Malaysia to Fiji and parts of Polynesia.

This species is frequently used as an ornamental about dwellings, in cemeteries, and so forth.

Tongan name: *longolongo*.

The seeds are said to be edible.

FAMILY PODOCARPACEAE

Genus **Podocarpus** L'Héritier

Podocarpus pallidus N. E. Gray, sp. nov. (fig. 6).

Arbustula vel frutex 2-6 m. altus, trunco ad 20 cm. diametro, cortice extimo cinereo vel in ramis junioribus fusco, cortice interiore clare rubro-fusco; ramulis numerosis ad ramorum apices verticillatis; alabastris parvis ovatis 2 mm. latis, squamis exterioribus 2-7 mm. longis anguste triangularibus carinatis, apice acuto-acuminatis vel longe attenuatis patentibus vel recurvatis; foliis plerumque ad ramulorum apices confertis, saepe patentibus, pallide viridibus, lanceolatis vel lineari-lanceolatis, 2.5-11 cm. longis, 6-11 mm. latis (juvenilibus 10.5-15.3 cm. longis et 13.5-17 mm. latis), apice breviter acutis vel acuminatis interdum mucronatis, basi in petiolum breve crassum plus minusve gradatim angustatis, margine interdum revolutis; costa supra plerumque basim versus subtiliter prominente, superne complanata vel impressa, subtus late prominente; foliis cum ductis resiniferis 1-5 sub vasi phloemate et interdum 2 supra xylum; strobilis masculis axillaribus sessilibus solitariis parvis ovatis, squamis exterioribus acuto-triangularibus valde carinatis scarioso-marginatis; strobilis masculis maturis 1-1.3 cm. longis et 4 mm. latis eburneis; microsporophyllis triangularibus, apice acutis; strobilis foemineis axillaribus solitariis pedunculo crasso 6-15 mm. longo enatis; receptaculo squamis 2 vel 3 coalescentibus carnosissimis inaequalibus 7-9 mm. longis demum rubescentibus composito, bracteolis 2 parvis subulatis 2 mm. longis basi subtento, saepe 1-ovulato; semine globoso vel subgloboso carnosissimo, 10-13 mm. longo, 8-10 mm. crasso, glauco vel caesio, obtuso vel obscure cristato.

'Eua: western plateau region, *Parks 16212*, female (type specimen F*. MO*, US),³ Powell Plantation, *Parks 16319* (UC*); above Fuai Plantation, near center of island, Mar. 18, 1953, *Yuncker 15319* (US). Found in forests at 200-250 m. alt. on this island.

Vava'u: upper rim of seaside limestone cliff, above Leimatua, on northern side of island, frequent, May 20, 1953, *Yuncker 16082* (US*); in thicket along upper rim of limestone cliff on eastern side of island below Ha'alafuli, May 22, 1953, *Yuncker 16099* (US*). Found at an altitude of 120 m. on this island.

Tongan name: *uhiuhi*.

P. pallidus is endemic in the Tongan islands and is the easternmost extent of the distribution of this genus in the southwest Pacific regions. It is a typical *Eupodocarpus* type; the seed has a fleshy outer coat and the receptacle is greatly enlarged and fleshy. It is placed in subsection *F* of *Eupodocarpus* because true resin canals are sometimes found above the vascular bundle. This distinguishing character is found only in species from Fiji, Tonga, and New Caledonia. The species most nearly related to it is *Podocarpus decipiens* Gray

³ An asterisk after the name of, or symbol for, a herbarium following the specimens examined signifies that the details of the leaves of this specimen have been examined in cross section.



FIGURE 6.—*Podocarpus pallidus*, Yuncker 16099, paratype, in herbarium of DePauw University.

in the Fijian islands from which it differs in the abruptly acute, mucronate leaves, the pale green color, and the solitary, sessile male cones. The specimens have previously been called *P. elatus* R. Brown, a species which is not found outside of Australia except in cultivation and from which it differs by the solitary male cones and the interrupted hypoderm on the upper side of the leaves. In *P. elatus* the male cones are in pairs.

FAMILY ARAUCARIACEAE

Genus *Araucaria* Jussieu

Araucaria excelsa R. Brown, in Aiton, Hort. Kew., ed. 2, 5: 412, 1813 (fig. 1, a).

Tall, stately tree with excurrent stem and whorled, horizontal to somewhat ascending, fanlike branches. Leaves small, stiff, awl- or scale-shaped, imbricated, the cones large and woody.

Tongatapu: near beach in Nuku'alofa, Nov. 23, 1951, *Hürlimann 291*.

A number of specimens of this fine ornamental tree are planted about the grounds of the palace where they have attained a height of 25 m. or more. They were not seen elsewhere in Tonga.

Tongan name: *paini*.

This tree is a native of Norfolk Island, and is now widely cultivated as an ornamental.

FAMILY PANDANACEAE

Genus *Freycinetia* Gaudichaud

Freycinetia urvilleana Hombron, in Dumont d'Urville, Voy. Astrolabe et Zélée, pl. 3, 1843.

High-climbing, coarse liana, the stem up to 2-3 cm. or more thick, clinging by aerial roots. Leaves narrowly lanceolate, long-acuminate and sharply acuminate, widened and clasping at base, up to 45 cm. or more long and 5 cm. wide, approximate toward ends of stems. Flowers lacking perianth, crowded in terminal or axillary fleshy clusters, dioecious.

'Eua: June 1926, *Parks 16279*; climbing high in deep forest near center of island, Mar. 22, 1953, *Yuncker 15433*.

Occasional. Endemic to Tonga.

Tongan name: *kahikahi*.

Genus *Pandanus* Linnaeus

Pandanus tectorius Parkinson, Jour. Voyage, Endeavour, 46, 1773.

Stout, branching tree, up to 5 m. or more tall, with numerous, aerial brace roots. Leaves up to 2 m. long and 7 cm. wide or smaller, apex long, slender, acuminate, margins and midrib armed with short, sharp spines. Fruit subglobose, up to 25 cm. thick.



FIGURE 7.—Tongan man wearing the apron-like *tauvala* of woven *Pandanus* leaves. The *tauvala*, a characteristic and unique part of the Tongan dress, is worn by both sexes.

Tongatapu: Cook; on uplifted coral plateau near sea at Houma, forming a distinct zone with dense growth, Oct. 28, 1951, *Hürlimann 12*; in thicket along rocky coast at Hufangalupe, Feb. 26, 1953, *Yuncker 15067*.

'Eua: margin of forest, near central part of eastern coastal ridge, Mar. 24, 1953, *Yuncker 15459*.

Vava'u: Crosby.

Common throughout Tonga on the lower terraces near the sea or on sea-facing cliffs. Polynesia to southern Asia.

Tongan name: *fa*.

The leaf fibers are much used in mat and basket weaving (fig. 7). The fruit segments may be chewed and used as food during times of food scarcity.

An interesting discussion of the status of the binominal *Pandanus tectorius*,

usually now preferred to *P. odoratissimus*, is found in Merrill's report on Cook's Voyages (Chron. Bot. 14: 354-356, 1954).

Martelli (Univ. Calif. Pub. Bot. 12: 356 ff., 1930) lists the following varieties and species as occurring in Tonga.

Pandanus odoratissimus L. f. [= *tectorius* Parkinson] var. **savaiensis** forma **major** Martelli.

'Eua: Powell plantation, June-July 1926, *Parks 16292*.

Pandanus odoratissimus var. **pseudo-linnaei** Martelli.

Tongatapu: Vahe Ha'ake, near houses, June 21, 1926, *Setchell and Parks 15359*.

Tongan name: *fa hina*.

Pandanus odoratissimus var. **setchellii** Martelli.

Tongatapu: belt of trees at Hufangalupe, June 28, 1926, *Setchell and Parks 15437, 15441*.

Tongan names: *fa hina, hingano*.

Pandanus odoratissimus var. **pyriformis** Martelli.

Tongatapu: Nuku'alofa, Aug. 1926, *Setchell and Parks 15644*.

Tongan name: *fa vula*.

Pandanus odoratissimus var. **sinensis** Warburg.

Vava'u: *Setchell 15651*.

Tongan name: *falahola*.

Pandanus whitmearianus Martelli.

Tongatapu: *Setchell and Parks 15650*.

Tongan name: *paogo*.

Pandanus corallinus Martelli.

Tongatapu: June 1926, *Setchell and Parks 15120*.

Tongan name: *fa kula*.

Additional Tongan names furnished were said to represent different forms recognized by the Tongans: *fafa, loukie* [used for weaving thin, soft mats], *loutotolo* [leaves not spiny], *tofua, tapahina* [leaves white-striped = *P. veitchii* Hort. ?], *tutuila* [leaves not spiny]. Specimens of these additional forms were not collected.

FAMILY POTAMOGETONACEAE

Genus **Syringodium** Kützing

Syringodium isoetifolium (Ascherson) Dandy, Jour. Bot. 77: 116, 1939.

Submerged herb, stem prostrate, branching, widely spreading. Leaves linear, sheathing at base. Flowers small; fruit small, nutlike.

Tongatapu: in shallow water, exposed at low tide, along beach at Nuku'alofa, Apr. 15, 1953, *Yuncker 15289*.

Common throughout Tonga. Fiji and westward.

Cymodocea isoetifolia Aschers. in Hemsley's and Burkill's lists.

Genus *Diplanthera* Thouars

Diplanthera uninervis (Forster) Ascherson, Engler and Prantl, Nat. Pflanzenfam., Nachtr. 1: 37, 1897.

Small, prostrate, spreading, submerged herb, stems very slender. Leaves linear-filiform, up to 8 cm. or more long. Flowers very small.

Tongatapu: in shallow water, exposed at low tide, along beach at Nuku'alofa, Apr. 15, 1953, *Yuncker 15288*.

Frequent on sandy beaches throughout Tonga. A widespread species.

Halodule australis Miq. in Hemsley's and Burkill's lists.

Genus *Ruppia* Linnaeus

Ruppia maritima Linnaeus var. ***pacifica*** St. John and Fosberg, B. P. Bishop Mus., Occ. Papers 15(16): 176, 1939.

Slender, submerged herb, stems filiform, long. Leaves filiform, clasping at base. Flowers very small, axillary.

Vava'u: growing in water about 1 m. deep, along shore of Lake Anovai, May 19, 1953, *Yuncker 16042*.

Niuafo'ou: *Kellers*, Oct. 24, 1930, *vide* St. John and Fosberg.

Occasional in lagoons and quiet waters. Hawaiian Islands, Hainan Island, Philippines.

Tongan name: *limu vai*.

FAMILY HYDROCHARITACEAE

Genus *Halophila* Thouars

Halophila ovalis (R. Brown) Hooker f., Fl. Tasmaniae 2: 45, 1860.

Small, submerged, creeping herb with filiform stems rooting at nodes. Leaves oval, apex rounded, base acute, entire, up to 2.5 cm. long, pinnately nerved, numerous slender, lateral nerves ending in a rather strong, continuous, submarginal nerve, petiole about as long as blade. Flowers very small and inconspicuous.

Tongatapu: *Home; Mosley*; in shallow water, exposed at low tide, along beach at Nuku'alofa, Apr. 15, 1953, *Yuncker 15290*.

Frequent throughout Tonga. From India to Australia, the Philippines, Fiji, and Polynesia.

H. ovata Gaud. in Hemsley's and Burkill's lists.

Halophila ovalis var. **bullosa** Setchell, Carnegie Inst. Washington, Pub. 341: 114, fig. 6, 1924.

Leaves commonly about 5 mm. wide and 1.5 cm. long, elliptic or elliptic-subspatulate, blades strongly bullate, petioles as long as, or longer than blades.

Tongatapu: on reef west of Nuku'alofa, July 15, 1926, *Setchell and Parks 15553*.

Nomuka: on sand in shallow water, exposed at low tide, below village, Apr. 30, 1953, *Yuncker 15806*.

Lifuka: on sand in shallow water, beach south of Pangai village, May 11, 1953, *Yuncker 15976*.

Frequent throughout Tonga. Also in Samoa.

FAMILY GRAMINEAE

Gramineae identifications are by J. R. Swallen.

Genus **Bambusa** Schreber

Bambusa vulgaris Schrader, in Wendland, Coll. Pl. 2: 26, pl. 47, 1810.

Coarse erect tufted grass up to 5-10 m. or more tall stems becoming thick and very hard. Blades lanceolate acuminate up to 35 cm. or more long and about 4 cm. wide but frequently smaller, sheaths auriculate at apex. Flowering infrequently, spikelets 1.5 cm. long, in large, paniculate clusters.

Tongatapu: edge of coconut plantation near Nualei village, Mar. 9, 1953, *Yuncker 15224*; in low area along trail between village of Fatai and sea, Mar. 10, 1953, *Yuncker 15256*.

Vava'u: in thicket near upper rim of steep seaside cliff along northwestern side of island, May 25, 1953, *Yuncker 16161*.

Infrequent. Widely distributed in tropical countries.

Two different varieties are recognized by the Tongans: a green-stemmed form called *kofe*, and one with yellow stems called *pitu*. The stems are used in house construction.

Genus **Eragrostis** Beauvois

Eragrostis amabilis (Linnaeus) Wight and Arnott, in Hooker and Arnott, Bot. Beechey Voy., 251, 1841.

Small, annual grass with erect or abruptly ascending, slender, glabrous stems up to 25 cm. or more tall. Blades up to 10 cm. long and about 4 mm. wide, sheaths long-ciliate about top. Spikelets four- to six-flowered, small, about 1 mm. long, inflorescence branches filiform, spreading to ascending in an open, usually narrowly oblong panicle, palea ciliate.

Tongatapu: in margin of grassy dooryard along coast road east of Nuku'alofa, Mar. 7, 1953, *Yuncker 15204*.

Lifuka: margin of coastal road north of Pangai, Apr. 25, 1953, *Yuncker 15726*.

Tafahi: in grassy area near school house, Dec. 17, 1951, *Hürlimann 580*.

Niuatoputapu: near shore near Vaipoa, Dec. 7, 1951, *Hürlimann 378*.

Occasional. Widespread in warm countries.

Genus *Centotheca* Desvaux

Centotheca lappacea (Linnaeus) Desvaux, Soc. Philom., Nouv. Bull. 2: 189, 1810.

Erect, rather stout grass, the culms up to 80 cm. or more tall. Blades lanceolate, up to 15 cm. long and 1-3 cm. wide. Spikelets green, about 5 mm. long, in terminal panicles up to 15 or 20 cm. long, branches several, slender, spreading.

'Eua: in ravine above Fuai, on steep slope in forest, Nov. 8, 1951, *Hürlimann 168*.

Vava'u: on forested slope, margin of Lake Anovai, May 19, 1953, *Yuncker 16048*; in open area along upper rim of coastal limestone cliffs on northwestern coast, May 25, 1953, *Yuncker 16174*.

Tafahi: in forest along road from Tafahi township to Piu 'o Tafahi, Dec. 10, 1951, *Hürlimann 414*.

Niuatoputapu: border of breadfruit plantation on south side of mountain ridge, opposite Vaipoa, Dec. 27, 1951, *Hürlimann 635*; on northwest side of the ridge above Hihifo in clearing in forested area, Dec. 5, 1951, *Hürlimann 337*.

Occasional throughout Tonga. From Tropical Africa and Asia through Malaya to Australia and Polynesia.

Genus *Arundo* Linnaeus

Arundo donax Linnaeus, Sp. Pl., 81, 1753.

Stout, coarse, reedlike grass, culms clumped, up to 5 or 6 m. tall, rhizome thick and knotty. Blades rather long, distichous, up to 5 cm. or more wide, margins scabrous. Panicle large, up to 50-60 cm. long, spikelets about 12 mm. long, the lemmas densely soft-hairy.

Lifuka: in old clearing about mid-island along trans-island road between Pangai and eastern side of island, May 6, 1953, *Yuncker 15767*.

Infrequent. Widespread in warm countries.

Tongan name: *kaho folalahi*. The stems are used in the construction of house walls.

Genus *Vetiveria* Bory

Vetiveria zizanioides (Linnaeus) Nash, in Small, Fl. Southeastern United States, 67, 1913.

Coarse, erect, tufted grass, stems up to 2 m. tall, roots somewhat aromatic. Leaves distichous, blades up to 1 m. long and about 1 cm. wide, more or less folded. Spikelets

about 4 mm. long, rough with numerous sharp points, narrowly elliptic, acute, in a purplish, erect panicle up to 20 cm. or more long, panicle branches slender, whorled, erect to spreading.

Tongatapu: in sandy soil near beach east of Nuku'alofa, Mar. 7, 1953, *Yuncker 15216*.

'Eua: in village of Pangai, Apr. 7, 1953, *Yuncker 15660*.

Lifuka: margin of plantation along coastal road north of Pangai, Apr. 25, 1953, *Yuncker 15728*.

Occasional throughout Tonga. Introduced into cultivation in America.

Tongan name: *ahisiaina*.

The roots are used for scenting oil.

Genus **Lepturus** R. Brown

Lepturus repens R. Brown, Prodr. Fl. Nov. Hollandiae, 207, 1810.

Caespitose, freely branching, leafy, glabrous grass, culms creeping at base, ascending upward. Blades linear, acuminate, up to 20 cm. or more long but mostly shorter, and 4-8 mm. wide, narrowing to junction with sheath, more or less scabrous. Spikelets single, alternate, sessile, in an internodal cavity, in slender, cylindrical spikes up to 15 cm. long and 1-2 mm. in diameter.

Tongatapu: in thin sandy soil on limestone bluff near Blow Hole area below Houma, June 1, 1953, *Yuncker 16223*.

'Eua: in sandy soil just above high-tide line near Ha'aluma, April 1, 1953, *Yuncker 15598*.

Lifuka: in sand just above high-tide limit, along beach on west coast north of Pangai village, Apr. 25, 1953, *Yuncker 15721*.

Frequent along the strand. Australia and Malaysia to Polynesia.

Genus **Sporobolus** R. Brown

Sporobolus indicus (Linnaeus) R. Brown, Prodr. Fl. Nov. Hollandiae, 170, 1810.

Rather densely tufted grass with slender, glabrous stems. Blades linear, acuminate, up to 15 cm. or more long and 2-3 mm. wide. Spikelets about 1-1.5 mm. long, numerous in erect, spike-like, narrow panicles up to 30 cm. or more long, branches filiform, ascending to spreading.

Tongatapu: roadside near Nualei, Oct. 29, 1951, *Hürlimann 29*.

'Eua: in grazing area, near Ohonua village, Apr. 2, 1953, *Yuncker 15622*.

Niuafou: in open thicket, upper rim of main crater, May 16, 1953, *Yuncker 15991*.

Niuatoputapu: in grassy area in Hihifo, Dec. 5, 1951, *Hürlimann 327*; roadside south of Matavai toward coast, Jan. 2, 1951, *Hürlimann 647*.

Occasional. India, China, Malaya, Philippines, Fiji and tropical America.

Tongan name: *fisihina*.

Genus **Eleusine** Gaertner

Eleusine indica (Linnaeus) Gaertner, *Fruct. et Semin. Pl.* 1: 8, 1788.

Tufted, erect or somewhat decumbent grass, often rooting at lower nodes, flowering culms up to 30 cm. or more tall, somewhat flattened, glabrous. Blades up to 20 cm. or more long, acuminate, glabrous or sheath somewhat pilose. Spikelets about 6 mm. or less long, closely imbricate on one side of rachis, spikes two to six in number, up to 7 cm. or more long, digitate, with one spike at some distance below others.

Tongatapu: *Home, Moseley*; in thicket near Nualei, Oct. 29, 1951, *Hürlimann 27*; weed in plantation near Nualei, Nov. 1, 1951, *Hürlimann 113*; weed in plantation along trail between Fu'amotu village and sea, Mar. 4, 1953, *Yuncker 15157*.

'Eua: in open grassy area at Fuai plantation, Mar. 22, 1953, *Yuncker 15415*.

Vava'u: *Barclay; Crosby*.

Tafahi: roadside between township of Tafahi and Faihavanui, Dec. 15, 1951, *Hürlimann 537*.

Frequent throughout Tonga as a plantation and waste-area weed. Pan-tropic, but extending far into the temperate zone.

Genus **Dactyloctenium** Willdenow

Dactyloctenium aegyptium (Linnaeus) Beauvois, *Ess. Agrost.*, 72, 1812.

Rather coarse grass, decumbent and creeping below and rooting from lower nodes, flowering culms ascending to 50 cm. or more high. Leaves up to 15 cm. or more long but mostly shorter, about 5 mm. wide, sheaths loosely imbricate. Spikelets numerous, densely crowded, spreading, about 3 mm. long, awned, in three or four, stout, digitate spikes 3 cm. or more long, more or less purplish.

Lifuka: on bank of drainage ditch along road to north of Pangai, May 11, 1953, *Yuncker 15975*.

Niuafou'u: along rim trail about summit of main crater surrounding central lake, May 6, 1953, *Yuncker 15992*.

Occasional. Pantropic.

Genus **Cynodon** L. C. Richard

Cynodon dactylon (Linnaeus) Persoon, *Syn. Pl.* 1: 85, 1805.

Low, creeping, sod-forming grass, rooting at lower nodes, flowering culms ascending to 15 cm. or more tall. Blades short, linear, hairy at base, somewhat scabrous. Spikelets about 2 mm. long, imbricate, in usually four or five slender spikes up to 5 cm. long.

Niuatoputapu: on terrace along the road on the southwest side of the mountain ridge near Matavai, Dec. 27, 1951, *Hürlimann 634*.

Vava'u: *Crosby*.

Throughout Tonga in lawns and grassy areas. Widely distributed in warm countries.

Genus **Melinis** Beauvois**Melinis minutiflora** Beauvois, Ess. Agrost., 54, pl. 11, fig. 4, 1812.

Much-branched, decumbent-ascending, pubescent grass, culms up to 1 m. tall. Blades up to 15 cm. long and 1 cm. wide, viscid-pubescent, sheath prominently nerved. Spikelets about 2 mm. long, sterile lemma two-lobed, with very slender awn up to 1 cm. long from between lobes, in a narrow, reddish-purple panicle, branches very slender.

Tongatapu: edge of thicket along road near Haveluliku village, June 3, 1953, *Yuncker 16229*.

Infrequent. Africa; introduced in America.

Genus **Digitaria** Heister**Digitaria horizontalis** Willdenow, Enum. Hort. Berol., 91, 1809.

Prostrate-ascending grass, flowering culms ascending to 50 cm. or more, spreading from base and rooting at lower nodes. Blades up to 15 cm. long and 8 mm. wide, pubescent. Spikelets narrow, about 2 mm. long, nearly glabrous, sessile, on a strongly three-angled, scabrous rachis, in several, terminal, lax racemes up to 10 cm. or so long.

Tongatapu: on coastal plateau near Houma, growing as a weed in open places, Oct. 28, 1951, *Hürtimann 16*.

Occasional. Pantropic.

Digitaria pruriens (Trinius) Buese, in Miquel, Pl. Jungh., 379, 1854.

Decumbent-ascending grass, flowering culms up to 60 cm. or more tall, branching from lower part, rooting at lower nodes. Blades linear, up to 20 cm. long and about 5 mm. wide, scabrous on margin, usually pilose, sheaths shorter than internodes, pilose. Spikelets lanceolate, about 3 mm. long, on short pedicels in three to several unequal, digitate, terminal or subterminal racemes.

Tongatapu: along trail leading from village of Fu'amotu to sea, Mar. 4, 1953, *Yuncker 15150*; weed in plantation near Lavengatonga village, Mar. 6, 1953, *Yuncker 15181*; side of trail between Ha'akame village and shore, Mar. 12, 1953, *Yuncker 15269*; in thin soil on limestone rocks near rim of breaker ledge, Blow Hole area near Houma village, June 1, 1953, *Yuncker 16225*.

'Eua: along trail back of Pangai village, Mar. 25, 1953, *Yuncker 15466*.

Nonuka: in sandy soil, side of road, Apr. 30, 1953, *Yuncker 15825*.

Lifuka: in plantation, landward side of coastal road, north of Pangai, Apr. 25, 1953, *Yuncker 15725*.

Vava'u: in open grassy plain near rim of seaside cliff along northwestern coast of island, May 25, 1953, *Yuncker 16164*.

Tafahi: on road between Tafahi and Faihavanui, Dec. 15, 1951, *Hürtimann 552*.

A common weed in plantations and waste areas throughout Tonga. Other Pacific islands.

Tongan name: *mohuku'apopoa*.

Digitaria sanguinalis (Linnaeus) Scopoli, Fl. Carn., ed. 2, 1: 52, 1772.

Decumbent, spreading, often purplish plant, stem rooting at lower nodes, ascending to 80 cm. or more high. Leaves linear, 10 cm. or more long and 5-8 mm. wide, more or less pilose, scabrous. Spikelets mostly paired, about 3 mm. long, in numerous, subfasciculate racemes.

Tongatapu: *Home*.

Vava'u: *Barclay; Crosby*.

Occasional. Widely distributed in tropical countries and extending far into the temperate zone.

Genus **Stenotaphrum** Trinius**Stenotaphrum secundatum** (Walter) Kuntze, Rev. Gen. Pl. 2: 794, 1891.

Creeping, stoloniferous grass, flowering stems up to 20 cm. or more tall. Blades less than 15 cm. long and 10 mm. wide, glabrous. Spikelets 4-5 mm. long, embedded in depressions on one side of an enlarged and flattened rachis, raceme up to 10 cm. long.

Tongatapu: near beach at Nuku'alofa, Nov. 23, 1951, *Hürlimann 203*. Presumably this grass was introduced as a lawn grass, but it is becoming established. It is widely used in warm parts of America for lawns.

S. americanum Schrank. in Hemsley's list.

Tongan name: *sipilini*.

Stenotaphrum subulatum Trinius, Acad. St. Pétersb., Sci. Nat., Mém. VI, 3(2): 190, 1835.

Culms decumbent, spreading, freely branching, rooting at lower nodes. Blades 5-10 cm. long, as much as 12 mm. wide. Raceme slender to rather stout, as much as 15 cm. long, spikelets 3 mm. long, deeply imbedded in rachis.

Tafahi: beneath a rock near Fakafafa moe Tauloto, Dec. 17, 1951, *Hürlimann 608*.

Infrequent. Mascarene Islands to Micronesia, Fiji, and Polynesia.

Genus **Brachiaria** (Trinius) Grisebach**Brachiaria subquadriparia** (Trinius) Hitchcock, Lingnan Sci. Jour. 7: 214, 1931.

Decumbent-ascending grass, rooting from lower nodes, branching downward. Blades linear, up to 15 cm. long and 8 mm. wide, acuminate, nerves pubescent. Spikelets solitary, subsessile, in two rows on one side of an angular rachis, racemes several, spreading.

Lifuka: on bank of drainage ditch along coastal road north of Pangai village, Apr. 25, 1953, *Yuncker 15731*.

Infrequent. Widely distributed in many tropical countries. Introduced into America, where it is rare.

Genus **Axonopus** Beauvois**Axonopus compressus** (Swartz) Beauvois, Ess. Agrost., 12, 1812.

Rather low, tufted grass with leafy stolons. Blades rather short, 4-8 mm. wide, obtuse, ciliate. Flowering stem up to 40 cm. tall, leaf sheaths compressed. Spikelets oblong, about 2 mm. long, sessile, alternate, in two rows on one side of angled rachis, in two to four subdigitate spikelike racemes.

Tongatapu: in low moist area along trail between Fatai village and sea, Mar. 10, 1953, *Yuncker 15253*.

'Eua: in grassy area near center of island, Mar. 22, 1953, *Yuncker 15420*.
Local. Pantropic.

Genus **Paspalum** Linnaeus**Paspalum cartilagineum** Presl, Reliq. Haenk. 1: 216, 1830.

Erect, tufted grass, up to 60 cm. or more tall. Blades up to 30 cm. long and 8 mm. wide, linear, acuminate. Spikes about 2 mm. long, plano-convex, in two rows in one-sided spikes, spikes usually three or four, paniculate.

Tongatapu: *Cook*.

'Eua: in open grazing area near eastern ridge, Mar. 24, 1953, *Yuncker 15452*.

Nomuka: edge of banana plantation, lakeward side of road encircling island, Apr. 30, 1953, *Yuncker 15932*.

Kao: on rocky open grassy alpine slope above upper forest limits, alt. about 800 m., May 7, 1953, *Yuncker 15924*.

Vava'u: *Crosby*; on grassy plain along upper rim of coastal cliffs along northern side of island above Leimatua, May 20, 1953, *Yuncker 16063*.

Frequent throughout Tonga in cultivated or grazed areas. Pantropic. [?] as *P. scrobiculatum* L. in Hemsley's and Burkill's lists.

Paspalum conjugatum Berger, Act. Helvet. Phys. Math. 7: 129, pl. 8, 1772.

Erect or somewhat stoloniferous grass, stems up to 60 cm. or more tall, branching downward, somewhat hairy. Blades up to 15 or 20 cm. long and 8 mm. wide, hairy toward base, somewhat scabrous. Spikelets plano-convex, 1-1.5 mm. long, ovate, imbricated, empty glumes ciliate with long white hairs, in two rows along one side of the usually two terminal, slender spikes, spikes up to 10 cm. or more long.

Tongatapu: along side of trail between Fu'amotu village and sea, Mar. 4, 1953, *Yuncker 15154*; near sea, Nuku'alofa, Nov. 23, 1951, *Hürlimann 302*.

Niuatoputapu: roadside near Matavai, Dec. 27, 1951, *Hürlimann 633*.

Throughout Tonga. Pantropic.

Tongan name: *vailima*.

Paspalum dilatatum Poiret, in Lamarck, Encycl. Méth. 5: 35, 1804.

Rather stout, tufted grass, stems ascending up to 1 m. or more tall. Blades linear, acuminate, up to 15 cm. or more long, margin somewhat scabrous. Spikelets ovate, pointed, imbricate, hairy, in two rows along one side of mostly four to six racemose branches of terminal panicle.

Tongatapu: roadside in Nuku'alofa, Nov. 23, 1951, *Hürlimann 305*; in old clearing along trail between Fu'amotu village and sea, Mar. 5, 1953, *Yuncker 15160*.

Occasional. Elsewhere widely grown as a forage grass.

Paspalum orbiculare Forster f., Fl. Ins. Australia, Prodr., 7, 1786.

Erect, tufted, glabrous grass, up to 60 cm. or more tall. Blades linear, slightly scabrous, up to 30 cm. or more long and 8 cm. wide. Spikelets ovate-orbicular, about 2 mm. long, glabrous, in two rows on one side of flattened rachis, in four to six spike-like racemes up to 4 cm. long.

'Eua: in swampy area in depression on eastern ridge above Fuai, Nov. 9, 1951, *Hürlimann 196*.

Occasional. Asia, Australia, Malaysia, Polynesia.

Paspalum vaginatum Swartz, Prodr. Veg. Ind. Occ., 21, 1788.

Rather low, creeping grass with long, horizontal rhizomes, flowering branches tufted, leafy, up to 60 cm. or more tall. Blades up to 15 cm. long and 8 mm. wide, two-ranked. Spikelets ovate-lanceolate, acute, in two rows on one side of rachis, racemes commonly two, spreading to reflexed, up to 5 cm. long.

Tongatapu: in sandy soil just above high-tide limit, Blow Hole area near Houma village, June 1, 1953, *Yuncker 16224*.

Tafahi: shore at Hou, Dec. 17, 1951, *Hürlimann 594*.

Niutoputapu: open coastal plain south of Falehau, Dec. 28, 1951, *Hürlimann 641*.

Occasional along the strand throughout Tonga. P'antropic.

Genus **Panicum** Linnaeus

Panicum ambiguum Trinius, Acad. St. Pétersb., Sci. Nat., Mém. VI, 3(2): 243, 1835.

Decumbent-ascending grass, stems rather weak, slender, up to 50 cm. or more tall, branching at base, subglabrous. Blades linear, up to 20 cm. or more long and 5 mm. wide, pubescent, scabrous along margin, ligule hairy. Spikelets ovate, acute, compressed, 3-4 mm. long, short-pedicellate, in usually two to four, alternately attached spicate racemes near end of culm.

Tongatapu: *U.S. Exploring Expedition; Mosley*.

'Eua: in open grazing area near center of island, Mar. 22, 1953, *Yuncker 15414*.

Nomuka: along road encircling island, Apr. 30, 1953, *Yuncker 15820*.

Vava'u: *Crosby*.

Tafahi: along road between Tafahi and Faihavanui, Dec. 15, 1951, *Hürlimann 551*.

Niutoputapu: roadside near Falehau, Dec. 18, 1951, *Hürlimann 620*.

Occasional throughout Tonga. Burma, Malaya, Polynesia.

Panicum decompositum R. Brown, Prodr. Fl. Nov. Hollandiae, 191, 1810.

Somewhat tufted, erect grass, flowering culms up to 50 cm. or more long, glabrous. Blades linear, up to 20 cm. or more long and 7 cm. wide, acuminate, sparsely pubescent. Spikelets 2-3 mm. long, on long, capillary, scabrous branches in an open panicle up to 30 cm. long and nearly as wide.

'Eua: occasional scattered plants in open grazing area above Fuai, Mar. 24, 1953, *Yuncker 15456*.

Infrequent. Central and western Australia.

Panicum maximum Jacquin, Icon. Pl. Rar. 1: pl. 13, 1781-1786.

Erect, coarse grass, up to 3 m. tall, stems up to 1 cm. thick near base, bearded at nodes. Blades linear-lanceolate, acuminate, up to 30 cm. or more long and 1.5 cm. wide, margin strongly serrate-sabrous. Spikelets 2-3 mm. long, green or purplish, on slender pedicels in large, diffuse panicles up to 30 cm. long, branches very slender.

Tongatapu: roadside east of Ma'ofanga, Oct. 29, 1951, *Hürlimann 22*; forming large colonies along road near Lavengatonga village, Mar. 6, 1953, *Yuncker 15175*.

Lifuka: about mid-island along road between Pangai village and eastern shore, Apr. 27, 1953, *Yuncker 15768*.

Introduced as fodder grass but becoming established throughout Tonga. Widely cultivated.

Panicum trigonum Retzius, Observ. Bot. 3: 9, 1783.

This species was reported by Hemsley on the basis of a United States Exploring Expedition specimen; but no specimen of this species collected by the expedition can be found in the United States Herbarium and there is some question regarding the occurrence of the species in Tonga.

Genus **Cyrtococcum** Stapf**Cyrtococcum oxyphyllum** (Hochstetter) Stapf, Hook. Icones, pl. 3096, 1922.

Decumbent, spreading grass, branching and rooting from lower nodes, stems slender, ascending to 40 cm. or more tall. Blades lanceolate, acuminate, 10-12 cm. long and 1 cm. wide, margins somewhat scabrous, sheath and lower surface puberulent. Spikelets about 1.5-2 mm. long, in dense, terminal panicles up to 10 cm. long.

Tongatapu: *Moseley*; weed in banana plantation near Nualei village, Mar. 9, 1953, *Yuncker 15234*.

Vava'u: *Barclay*; *Crosby*; on forested slope above northern shore of Lake Anovai, at southwestern end of island, May 19, 1953, *Yuncker 16047*; in clearing of old plantation at top of Talau, west of Neiafu, May 24, 1953, *Yuncker 16152*.

Occasional throughout Tonga. South Asia, Philippines, Pacific islands.

Panicum pilipes Nees in Hemsley's and Burkill's lists.

Genus **Oplismenus** Beauvois**Oplismenus burmannii** (Retzius) Beauvois, Ess. Agrost., 54, 1812.

Rather slender, somewhat pubescent, decumbent-ascending grass, stems branched and rooting from lower nodes, ascending up to 30 cm. or more high. Blades linear-lanceolate, acuminate, up to 5 cm. long and 8-10 cm. wide. Spikelets about 2 mm. long, in erect to nodding, paniculate racemes up to 5 cm. or more long, glumes with very slender awns.

Tongatapu: *Lesson; Cartwright.*

Infrequent. Tropical Africa, Asia, Malaysia, and Polynesia.

Oplismenus compositus (Linnaeus) Beauvois, Ess. Agrost., 54, 1812.

Wide-spreading, prostrate-ascending grass, stems prostrate and rooting from lower nodes, flowering stems ascending up to 50 cm. or more tall, slightly hairy. Blades lanceolate, acuminate, up to 10 cm. long and 2 cm. wide. Spikelets somewhat remote, about 3 mm. long, awned, awns rather stout, up to 1 cm. long, in spikes 1-2 cm. long, in green or purplish paniculate racemes.

Tongatapu: *Moseley*; weed in banana plantation near Nualei, Nov. 1, 1951, *Hürlimann 97.*

Kao: weed in old plantation below forest, May 6, 1953, *Yuncker 15876*; in open alpine area on slope above the upper forest limit, alt. about 870 m., May 6, 1953, *Yuncker 15912.*

Vava'u: *Crosby*; on forested slope about northern margin of Lake Anovai, May 19, 1953, *Yuncker 16046*; in thin shade of open forest along bank of lagoon at Vaihoi, near Leimatua, May 26, 1953, *Yuncker 16190.*

Tafahi: weed in plantation between Tafahi and Faihavanui, Dec. 15, 1951, *Hürlimann 556.*

A frequent weed in plantations and waste areas throughout Tonga. Old World tropics.

Oplismenus imbecillus (R. Brown) Roemer and Schultes, Syst. Veg. 2: 487, 1817.

Slender, freely branching, wide-spreading, decumbent-ascending grass, stems prostrate and rooting from lower nodes, flowering stems ascending to 30 cm. or more. Blades lanceolate, 6-8 cm. long and about 8 mm. wide, margins scabrous. Spikes 2-3 mm. long, sessile in spikes up to about 1 cm. long, in open, slender, elongated panicles, outer glume awned, awn purplish, up to 1 cm. long, rather stout.

'Eua: along trail westward of Fuai, about center of island, Apr. 5, 1953, *Yuncker 15650.*

Lifuka: in shade of trees in grove near shore toward north end of island, May 11, 1953, *Yuncker 15979.*

Occasional. Philippines, Australia.

Genus **Echinochloa** Beauvois**Echinochloa colonum** (Linnaeus) Link, Enum. Hort. Berol. 2: 209, 1822.

Decumbent-ascending grass, flowering culms to 40 cm. or more tall, glabrous, rooting and branching from lower nodes. Blades linear, acuminate, up to 10 cm. in length and

5 mm. in width, glabrous. Spikelets plano-convex, crowded, more or less clustered on one side of rachis, 1-2 mm. long, glumes puberulent and ciliate along margin, in few to several paniculate racemes.

Tongatapu: in banana plantation near Nualei, Nov. 1, 1951, *Hürlimann 110*; roadside between Ma'ofanga and lagoon, Nov. 23, 1951, *Hürlimann 315*; trailside between Fu'amotu and sea, Mar. 4, 1953, *Yuncker 15156*; roadside near Lavengatonga village, Mar. 6, 1953, *Yuncker 15183*.

'Eua: along trail through second-growth forest back of Pangai village, Mar. 25, 1953, *Yuncker 15468*.

Frequent. Africa, southern Asia, Polynesia, and tropical America.

Tongan names: *mohuku'apopoa, matala'ulie*.

Genus *Rhynchelytrum* Nees

Rhynchelytrum repens (Willdenow) C. E. Hubbard, Kew Bull., 110, 1934.

Decumbent-ascending grass, stems rather slender, rooting at lower nodes, up to 1 m. in length, flowering branches ascending to 80 cm. or more tall. Blades linear, acuminate, up to about 15 cm. long and 5 mm. wide, margin slightly scabrous. Spikelets about 5 mm. long, on short, capillary pedicels, more or less covered with long, silky hairs, in an open, loose, rosy-purple panicle up to about 15 cm. long.

Tongatapu: weed in plantation near Nualei, Oct. 29, 1951, *Hürlimann 39*; in open sunny area along trail between Fu'amotu village and sea, Mar. 4, 1953, *Yuncker 15151*.

'Eua: in open grassy area above Houma village, Mar. 26, 1953, *Yuncker 15490*.

Vava'u: in grassy plain along upper rim of coastal cliff above Leimatua, May 24, 1953, *Yuncker 16068*.

Occasional throughout the group. Widespread as a forage grass.

Tongan name: *salapona*.

Genus *Setaria* Beauvois

Setaria pallidifusca (Schumann) Stapf and Hubbard, Kew Bull., 259, 1930.

A decumbent-ascending grass, up to 1 m. tall, stem rooting at lower nodes, branching downward. Blades linear, acuminate, 30 cm. or more long and 5 mm. wide, glabrous or slightly pilose toward base, ligule hairy. Spikelets 2-3 mm. long, ovoid, lemma transversely rugose, with a tuft of yellow bristles at base, bristles up to 5-8 mm. long, in a dense spikelike, cylindrical panicle up to 12 cm. or more long.

Tongatapu: weed in plantation near Fu'amotu village, Mar. 4, 1953, *Yuncker 15152*.

'Eua: in open grazing area toward summit of eastern ridge, Mar. 24, 1953, *Yuncker 15445*.

Nomuka: in grassy clearing along road encircling island, Apr. 30, 1953, *Yuncker 15826*.

Occasional in open areas throughout Tonga. Pantropic.

(?) *S. glauca* Beauv. in Burkill's list.

Genus **Cenchrus** Linnaeus**Cenchrus calyculatus** Cavanilles, Icones Descr. Pl. 5: 39, pl. 463, 1799.

Stems coarse, long, and trailing. Blades up to 50 cm. or more long and 1.5-2 cm. wide, apex long and tapering. Spikelets sessile, bristly, inner bristles hirsute, in narrow racemes up to 15 cm. or more long, rachis puberulent.

Tongatapu: *Home; Moseley.*

'Eua: in open shade along trail above Houma village, Mar. 26, 1953, *Yuncker 15489.*

Nomuka: in clearing along road encircling island, Apr. 30, 1953, *Yuncker 15827.*

Vava'u: *Crosby.*

Frequent throughout Tonga. Also in Niue.

Tongan name: *hefa.*

Cenchrus echinatus Linnaeus, Sp. Pl., 1050, 1753.

Stems decumbent, ascending to 30 cm. or more, branching from below. Blades thin, up to 10 cm. or more long, somewhat scabrous, 5-10 mm. wide. Fruit bristly, burlike, pubescent, in loose racemes up to 5 cm. or more long.

Tongatapu: in dry, grassy area, Nualei, Oct. 27, 1951, *Hürlimann 3*; in sandy soil, margin of coconut plantation near Navutoka village, Feb. 27, 1953, *Yuncker 15089.*

Lifuka: in sand near beach, along coastal road north of Pangai, Apr. 24, 1953, *Yuncker 15709.*

Tafahi: near schoolhouse, Dec. 18, 1951, *Hürlimann 612.*

Frequent in sandy areas throughout Tonga. A widespread weedy species.

Tongan name: *hefa.*

Genus **Thuarea** Persoon**Thuarea involuta** (Forster) Roemer and Schultes, Syst. Veg. 2: 782, 1817.

Prostrate, widely spreading grass, freely branching, rooting at nodes, leaves, and stems pubescent. Blades 5-9 cm. long and 3-5 mm. wide, lanceolate, acuminate. Spikelets about 4 mm. long, in lateral row along one side of rachis, upper male, lower one or two female, spikes about 2 cm. long or less, fruit up to 1 cm. long, ovoid, long-beaked.

Tongatapu: at shore below Fu'amotu, Nov. 3, 1951, *Hürlimann 133*; pioneering in sand just above high-tide line near Fu'amotu village, Mar. 4, 1953, *Yuncker 15145.*

'Eua: along shore near Ha'aluma, Apr. 1, 1953, *Yuncker 15592.*

Lifuka: along beach north of Pangai village, Apr. 25, 1953, *Yuncker 15718.*

Vava'u: *Crosby.*

Tafahi: along shore below Tafahi, Dec. 13, 1951, *Hürlimann 496.*

Frequent along the strand throughout the group. Ceylon to Madagascar, Malaya, Australia, and Polynesia.

T. sarmentosa Pers. in Hemsley's and Burkill's lists.

Tongan names: *mohuku'apopoa*, *mohuku'apopoa tahi*, *musie liku*, *kefukcfu*.

Genus **Spinifex** Linnaeus

? **Spinifex littoreus** (Burmans f.) Merrill, Philippine Jour. Sci. **7C**: 229, 1912.

Coarse, rigid, widely spreading, prostrate grass. Blades involute, rigid, short, aggregated toward tops of stems, sheaths somewhat imbricate.

Tongatapu: on sandy flats outside Fatai, water-covered at high tide, Oct. 30, 1951, *Hürlimann 73*. Specimen sterile.

Covers large areas locally. India, China, Malaya, and Polynesia.

Genus **Imperata** Cyrillo

Imperata cylindrica (Linnaeus) Beauvois, Ess. Agrost., 165, 1812.

Rather slender, somewhat tufted, erect grass with strong rhizome, flowering culms up to 50 cm. or more long, glabrous. Blades up to about 20 cm. or more long and 6 mm. wide, acuminate. Spikelets paired, unequally pedicellate, surrounded by long, silky hairs, in a terminal, narrow, silky panicle.

'Eua: plants scattered about in open grazing area below summit of eastern ridge, Mar. 24, 1953, *Yuncker 15457*.

Kao: in open grassy, alpine area, 600-900 m. alt., May 6, 1953, *Yuncker 15918, 15936*.

Infrequent. Warm parts of the Old World, Polynesia. Introduced into America.

Genus **Miscanthus** Andersson

Miscanthus floridulus (Labillardière) Warburg, ex Schumann and Lauterbach, Fl. Deutsch. Schutzg. Südsee, 166, 1901.

Tall, reedlike, tufted grass, culms pithy, up to 3 m. or more tall, erect. Leaves numerous, blades up to 1 m. long and 2 cm. wide, linear, long-attenuate-acuminate, margin scabrous. Spikelets in pairs, with a tuft of silky hairs at base, hairs about as long as spikelet, in long, slender, spikelike racemes forming a large fanlike panicle up to 30 cm. or more long.

Tongatapu: in low moist area near Nualei, Mar. 9, 1953, *Yuncker 15241*.

'Eua: on slopes of a large sinkhole area near center of island, Mar. 20, 1953, *Yuncker 15388*.

Lifuka: about mid-island along road from Pangai to east coast, Apr. 27, 1953, *Yuncker 15755*.

Occasional throughout Tonga. Malaysia to Polynesia.

Tongan names: *kaho*, *kaho fo'iiki*.

The stems are used in the construction of house walls.

Genus **Saccharum** Linnaeus**Saccharum officinarum** Linnaeus, Sp. Pl., 54, 1753.

The sugar cane is a common plantation crop, though not cultivated on a commercial basis. Tongans chew the stalks to obtain the sugary sap, and the leaves are used as thatching material (fig. 8). The Tongan name is *to* and at least seven varieties are distinguished as follows.

Au: stem is green; leaves supply a favorite material for house thatching.

Fo'ufo'u: stem is light green, with long internodes.

Heleveka: stem is red with white stripes.

Ngata hina: stem is green and thick.

Ngata kula: stem is red and thick.

To hina: stem is green and slender.

To kula: stem is red and slender.



FIGURE 8.—Typical Tongan house showing characteristic oval shape, sugar-cane leaf thatch, and walls of interlaced coconut leaves.

Genus **Andropogon** Linnaeus**Andropogon intermedius** R. Brown, Prodr. Fl. Nov. Hollandiae, 202, 1810.

Erect, loosely tufted, rather stout grass, up to 1 m. or more tall. Blades linear, up to 50 cm. or more long and 5 mm. wide, the margins slightly scabrous, clasping at the base. Panicles purplish, up to 15 cm. or more long, branches very slender, ascending to spreading, sessile spikelets about 3 mm. long, bearing an awn about 15 mm. long.

'Eua: in open grazing area near top of eastern ridge, Mar. 24, 1953, *Yuncker 15440*; in open grassy area near center of island, Mar. 29, 1953, *Yuncker 15546*.

Vava'u: *Crosby*.

Occasional. Asia, Africa, New Hebrides, Australia, and Polynesia. *A. intermedius* R. Br. in Burkill's list.

Genus **Cymbopogon** Sprengel

Cymbopogon refractus (R. Brown) A. Camus, Rev. Bot. Appl. Agric. Colon. 1: 279, 1921.

Tufted, somewhat aromatic grass, culms up to 1 m. tall. Blades linear, about 5 mm. wide and 30 cm. or more long, attenuately acuminate. Spikelets 5-6 mm. long, in pairs, one sessile, one pedicellate, in short, paired, spreading, racemes, these usually partly enclosed in sheath.

Vava'u: in grassy plain along upper rim of steep coastal cliff above Leimatua, May 20, 1953, *Yuncker 16069*.

Infrequent. New Caledonia, Fiji to eastern Polynesia.

Genus **Sorghum** Moench

Sorghum halepense (Linnaeus) Persoon, Syn. Pl. 1: 101, 1805.

Coarse grass with stems up to 1.5 m. tall, arising from stout creeping rootstocks. Blades up to 2 cm. wide, rather long, margin scabrous. Spikelets ovate, about 5 mm. long, silky hairy, with an awn up to 1.5 cm. long, abruptly bent at about middle, strongly twisted in lower part, in large open panicles up to 30 cm. or more long.

Tongatapu: near Nualei, Oct. 29, 1951, *Hürlimann 33, 50*; in old clearing near Fu'amotu village, Mar. 4, 1953, *Yuncker 15163*.

'Eua: in second-growth area, along trail between Pangai and Fuai, Mar. 25, 1953, *Yuncker 15476*.

Lifuka: in roadside ditch, along coastal road north of Pangai village, Apr. 25, 1953, *Yuncker 15722*.

Introduced as a forage plant but becoming established in waste areas throughout Tonga. Widely cultivated.

Tongan name: *kola*.

Genus **Rhaphis** Loureiro

Rhaphis aciculata (Retzius) Desvaux, Opusc., 69, 1831.

Small, decumbent grass, stems creeping and rooting at nodes, somewhat turf-forming, flowering stems ascending up to 25 cm. or more tall. Blades up to 10 cm. or more long and 5 mm. wide, linear, acuminate, mostly basal, margin scabrous. Spikelets purple, pilose at base, 4-5 mm. long, narrowly lanceolate, some of glumes with barbed awns, in narrow paniculate clusters up to 5 cm. or more long, branches slender, whorled or scattered.

Tongatapu: *Home*; along path, Nualei village, Oct. 29, 1951, *Hürlimann 26*; in grassy area in Lavengatonga village, Mar. 6, 1953, *Yuncker 15185*.

'Eua: in grazing area near center of island, Mar. 22, 1953, *Yuncker 15416*.

Vava'u: *Crosby*.

Tafahi: roadside between Tafahi and Faihavanui, Dec. 15, 1951, *Hürlimann 529*.

A common weed in open grassy areas throughout Tonga. Tropical Asia, Malaya, Polynesia.

The matured fruit is easily detached and has a barbed callus which works its way into clothing and becomes irritating.

Andropogon aciculatus Retz. in Hemsley's list and *Chrysopogon aciculatus* Trin. in Burkill's list.

Tongan name: *matapekepeka*.

Genus **Heteropogon** Persoon

Heteropogon contortus (Linnaeus) Beauvois, ex Roemer and Schultes, Syst. Veg. 2: 836, 1817.

Rather coarse, tufted grass, flowering culms up to 60-80 cm. tall. Blades flat or folded, up to 7 mm. wide and 15 cm. or more long, glabrous. Spikelet sessile about 7 mm. long, slender, with pubescent awns up to 5-8 cm. or more long, awns bent and flexuous, raceme up to 5 or 7 cm. long, one-sided.

Vava'u: in loose soil on grassy plain along upper rim of coastal cliff above I.eimatua, May 20, 1953, *Yuncker 16064*.

Infrequent. Pantropic.

Genus **Coix** Linnaeus

Coix lachryma-jobi Linnaeus, Sp. Pl., 972, 1753.

Tall, coarse, erect, branched grass with stems up to about 1 m. or more tall. Blades up to 30 cm. or more long and 3 or 4 cm. wide, acuminate, base broad, cordate, margins scabrous. Fruit hard, bony, usually gray or white, shining, ovoid, about 1 cm. long.

Tongatapu: *Forster; Moseley*; in thicket near village of Nualei, Mar. 9, 1953, *Yuncker 15230*; in plantation near Nualei, Nov. 1, 1951, *Hürlimann 114*.

'Eua: near dwelling in Pangai village, Apr. 7, 1953, *Yuncker 15659*.

Vava'u: *Crosby*; in wet boggy margin of Ngofe swamp, southwestern end of island, May 19, 1953, *Yuncker 16032*.

Occasional throughout Tonga. Found throughout the Old World tropics and introduced into tropical America.

Tongan names: *hana, hana tuikahoa*.

The fruits are used as beads in ornaments.

Genus **Ischaemum** Linnaeus

Ischaemum murinum Forster f., Fl. Ins. Australia, Prodr., 73, 1786.

Decumbent-ascending grass, ascending to 20 cm. or more, culms glabrous, somewhat branching. Blades linear, 10 cm. or more long and 3-4 mm. wide, pilose-ciliate downward, acuminate. Spikelets paired, aristate, awn up to 1 cm. long.

Tongatapu: on exposed limestone rock near Houma, Oct. 28, 1951, *Hürlimann 11*.

Occasional.

Tongan name: *totoa*.

Sorghum (*Sorghum vulgare* Persoon var.), sweet corn (*Zea mays* Linnaeus var. *rugosa* Bonafous), and, more recently, rice (*Oryza sativa* Linnaeus) are cultivated as plantation crops.

FAMILY CYPERACEAE

Genus **Cyperus** Linnaeus

Cyperus alternifolius Linnaeus, Mantissa 1: 28, 1767.

Smooth, tufted, glabrous plant, stems stout, up to 2 m. or more tall, trigonous. Basal leaves reduced to lanceolate, acuminate sheaths, involucreal leaves 10 to 20, linear, acuminate, up to 25 cm. or more long and 10 mm. wide, spreading, umbrella-like. Flowering spikelets numerous, in large, compound clusters, on slender peduncles in axils of involucreal leaves.

Tongatapu: in a low, moist area near coastal road east of Nuku'alofa, Mar. 7, 1953, *Yuncker 15199*.

Infrequent. A native of Madagascar now widespread in warm countries and often cultivated as an ornamental.

Cyperus brevifolius (Rottboell) Hasskarl, Cat. Hort. Bogor. Alt., 24, 1844.

Stems slender, tufted, up to 30-50 cm. tall. Blades narrow, up to 10 cm. long and 3 mm. wide, involucreal bracts similar, spreading. Flowering spikes solitary, ovoid, green, usually 5-7 mm. long, spikelets numerous, about 3 mm. long.

Tongatapu: in grassy yard near school at Nualei, Oct. 27, 1951, *Hürli-mann 4*.

Occasional in plantations and grassy areas. Widespread in tropical countries.

Cyperus compressus Linnaeus, Sp. Pl., 46, 1753.

Stems erect to spreading, smooth, triangular, tufted, up to 40 cm. long. Leaves filiform, mostly somewhat shorter than stem, midrib rather prominent, sheathing stem up to 3 cm. or more at base. Spikelets up to 12 or more, in capitate, umbellate clusters, subtended by three or more leaflike bracts up to 10 cm. or more long.

Tongatapu: in low, swampy area near shore road east of Nuku'alofa, Mar. 7, 1953, *Yuncker 15209*; near shore, Sopu, west of Nuku'alofa, May 30, 1953, *Yuncker 15292, 15298*.

Lifuka: around base of trees in coconut plantation, seaward side of road north of Pangai village, May 10, 1953, *Yuncker 15799*.

Niuatoputapu: along road near coast behind Falehau, Dec. 7, 1951, *Hürli-mann 394*.

Frequent as a weed throughout Tonga. Pantropic.

Tongan names: *pakopako, pakopako ano*.

Cyperus cyperinus (Retzius) Suringar, *Cyperus Maleischen Archipel* . . . , 154, pl. 6, fig. 10, 1898.

Stems triangular, tufted, erect, up to 60 cm. tall. Blades up to 30 cm. long and 8 mm.

wide, involucre bracts similar. Spikes cylindrical, 2 cm. or more long, spikelets lanceolate, about 5 mm. long, numerous, brownish.

Tongatapu: in low, wet area near Nualei village, Mar. 9, 1953, *Yuncker 15229*.

Vava'u: *Crosby*; in wet boggy margin of Ngofe swamp, at southwestern end of island, May 19, 1953, *Yuncker 16033*.

Occasional in low, wet areas throughout Tonga. From tropical Asia through Malaya to Polynesia.

[?] *Mariscus cyperinus* var. *venusta* C. B. Clarke in Hemsley's list, and *M. cyperinus* Vahl in Burkill's list.

Cyperus cyperoides (Linnaeus) O. Kuntze, Rev. Gen. Pl. 3(2): 333, 1898.

Small, smooth, tufted herb. Blades up to 15 cm. or more long and 3-5 mm. wide, those of the involucre smaller. Spikes 1-2 cm. long, several, in umbellate clusters, spikelets lanceolate, 4-5 mm. long.

Tongatapu: on footpath near Nualei village, Oct. 29, 1951, *Hürlimann 37*.

Tafahi: roadside between the township of Tafahi and Faihavanui, Dec. 15, 1951, *Hürlimann 564*.

Occasional throughout Tonga.

Tongan name: *pakopako*.

Cyperus javanicus Houttuyn, Nat. Hist. 2(13): Aawyz. Plaat. [1], pl. 88, fig. 1, 1782.

Stems trigonous, up to 60 cm. or more tall, tufted. Blades linear, 7 mm. or more wide, longer than stem, scabrous along margins and midrib, those of involucre similar. Umbel of many rays up to 8 or 10 cm. long, compact, rays subpaniculately branched, covered with spikelets, the spikelets numerous, ovoid, compressed or subterete, up to 8 mm. long, brown.

Tongatapu: *Mosley*; scattered clumps in wet boggy area between village of Navutoka and sea, Feb. 27, 1953, *Yuncker 15084*; in sandy soil near shore east of Nuku'alofa, Mar. 7, 1953, *Yuncker 15208*.

Nomuka: in moist, depressed area on seaward side of road encircling island, Apr. 30, 1953, *Yuncker 15855*.

Lifuka: bank of roadside ditch along coastal road north of Pangai village, Apr. 25, 1953, *Yuncker 15751*.

Vava'u: in low, wet, marshy border of Ngofe swamp, May 19, 1953, *Yuncker 16035*.

Tafahi: near Fakafafa moe Tauloto, Dec. 17, 1951, *Hürlimann 603*.

Niutopotapu: along road on costal plain, southeast of Falehau, Dec. 7, 1951, *Hürlimann 384*.

Frequent throughout Tonga in low wet areas. From tropical Africa, south-eastern Asia, and Malaya to Polynesia.

Mariscus albescens Gaudich. in Hemsley's and Burkill's lists.

Tongan name: *mahelhele*.

Cyperus polystachyos Rottboell, Descr. Nov. Pl., 39, 1773.

Glabrous herb, stems up to 50 cm. or more tall, rather slender. Blades linear, shorter than stem, scarcely 5 mm. wide, those of involucre similar but commonly shorter. Spikelets linear-lanceolate, brown, about 1 cm. long, in compact umbellate inflorescences.

Tongatapu: in shallow depression near beach at Nuku'alofa, Nov. 23, 1951, *Hürlimann* 295.

Occasional in low areas. Pantropic.

Tongan name: *pakopako ano*.

Cyperus rotundus Linnaeus, Sp. Pl., 45, 1753.

Rhizome creeping, with cormlike enlargements, flowering stems up to 25 cm. or more tall. Blades linear, about 3 mm. wide, shorter than stem, those of involucre short. Spikelets linear-lanceolate, compressed, sessile, 1-2 cm. long, glumes red with a green keel, in umbellate clusters, rays of umbel unequal.

'Eua: in grassy meadow near center of island, Mar. 22, 1953, *Yuncker* 15417.

Niutoputapu: in grassy yard in Hihifo, Dec. 5, 1951, *Hürlimann* 326.

Common in open grassy areas throughout Tonga. Pantropic.

Tongan name: *pakopako*.

Cyperus seemannianus Boeckeler var. **monostachys** (Boeckeler) Kükenthal in Christophersen, B. P. Bishop Mus., Bull. 128: 18, 1935.

Rather coarse plant with flowering stems up to 1 m. or more tall. Blades up to 50 cm. long and 5 mm. wide, marginally scabrous, those of involucre somewhat shorter. Spikelets dark red, sessile, 3-5 mm. long, on rather long, branching rays, in umbellate clusters.

Tafahi: roadside between township of Tafahi and Faihavanui, Dec. 15, 1951, *Hürlimann* 565.

Infrequent. Samoa.

Genus **Kyllingia** Rottboell**Kyllingia monocephala** Rottboell, Descr. Nov. Pl., 13, pl. 4, fig. 4, 1773.

Stems arising up to about 30 cm. tall from rather slender, creeping rhizomes. Blades thin, flat, shorter than stem. Spikelets 1-flowered, numerous, in dense, globose, headlike cluster, involucre of three, long, sharply serrulate, slenderly pointed, leaflike bracts.

Tongatapu: *Moseley*; in low area, margin of swamp back of Navutoka village, Feb. 27, 1953, *Yuncker* 15080; common along trail below Niutoua village, Mar. 2, 1953, *Yuncker* 15134.

'Eua: in open grassy area along trail near center of island, Mar. 30, 1953, *Yuncker* 15389.

Vava'u: *Crosby*.

Tafahi: roadside between township of Tafahi and Faihavanui, Dec. 15, 1951, *Hürlimann* 532.

Very common throughout Tonga. Pantropic.

Tongan name: *pakopako*.

Genus **Eleocharis** R. Brown

Eleocharis dulcis (Burmamn f.) Trinius, ex Henschel, Vita Rumph., 186, 1833.

Glabrous, erect plant, stems simple, longitudinally grooved, pithy. Leaves lacking. Spikes solitary, terminal, about 3 cm. long, as thick as stem.

Vava'u: *Crosby*; forms shoreward zone in shallow water, Ngofe swamp, on southwestern end of island, May 19, 1953, *Yuncker 16027*.

Known only from the one station in Tonga. India, Malaya, Fiji. *E. plantaginea* R. Br. in Burkill's list.

Tongan name: *kuta*.

The stems are used in the weaving of mats.

Eleocharis geniculata (Linnaeus) Roemer and Schultes, Syst. Veg. 2: 150, 1817.

Stems numerous, tufted, up to 25 cm. or more long and 2 mm. in diameter, short-sheathed at base. Spikes small, several-flowered, terminal, somewhat thicker than stem, brown.

Kao: wet margin of a small alpine lake near summit above upper forest limit, alt. about 950 m., May 7, 1953, *Yuncker 15974*.

Rare in Tonga. Pantropic.

Genus **Fimbristylis** Vahl

Fimbristylis annua (Allioni) Roemer and Schultes var. **diphylla** (Retzius) Kükenthal, in Engler Bot. Jahrb. 56, Beibl. 125: 14, 1921.

Stems up to 50 cm. tall, longitudinally finely striate. Blades rather firm, linear, up to 5 mm. wide, commonly shorter than stem, those of involucre much smaller, scarcely exceeding inflorescence, marginally serrulate. Spikelets brown or red, ovoid, about 5 mm. long, on rays of unequal length, in terminal clusters.

Tongatapu: *Home; Moslecy*.

'Eua: on dry, red, volcanic soil, in open grazing area below summit of eastern ridge, Mar. 24, 1953, *Yuncker 15443*; near summit of eastern ridge, Mar. 24, 1953, *Yuncker 15449*; in open grazing area above Fuai plantation, Apr. 6, 1953, *Yuncker 15653*.

Kao: on open rocky, alpine slope above the upper forest limit, May 7, 1953, *Yuncker 15926*.

Vava'u: *Crosby*.

Frequent throughout Tonga. Pantropic.

Fimbristylis autumnalis (Linnaeus) Roemer and Schultes var. **complanata** (Retzius) Kükenthal, in Engler Bot. Jahrb. 59: 6, 1924.

Glabrous, tufted herb, stems up to 50 cm. or more long. Blades linear, 3-5 mm. wide, basal ones somewhat shorter than stems, those of involucre usually two, shorter than or exceeding length of inflorescence. Spikelets brown, ovoid, 5 mm. or more long, in short-rayed terminal umbels.

Tongatapu: in low, moist swamp margin, near Navutoka village, Feb. 27, 1953, *Yuncker 15079*; along seaside road, Sopu, west of Nuku'alofa, May 30, 1953, *Yuncker 15294*.

Niuatoputapu: in wet soil, coastal plain southwest of Falehau, Dec. 7, 1951, *Hürlimann 383*.

Frequent. Pantropic.

Tongan name: *takataka*.

Fimbristylis cymosa R. Brown, Prodr. Fl. Nov. Hollandiae, 228, 1810.

Glabrous, tufted plant, stems up to 30-50 cm. tall, somewhat flattened, finely striate. Leaves numerous, blades linear, 2-3 mm. wide, shorter than stems, minutely scabrous near apex, abruptly pointed. Spikelets brown, ovoid, about 5 mm. long, on short, terminal, umbellate rays.

Tongatapu: under coconut trees near beach, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15006*.

'Eua: in shallow depressions in rocks along shore just above high-tide zone, near Ha'aluma, Apr. 1, 1953, *Yuncker 15599*.

Niufo'ou: Just below upper rim of main crater, May 16, 1953, *Yuncker 15990*.

Frequent throughout Tonga. Australia to Polynesia.

Fimbristylis cymosa var. **pycnocephala** (Hillebrand) Kükenthal, in Christophersen, B. P. Bishop Mus., Bull. 128: 20, 1935.

Involucral leaves scarcely longer than inflorescence. Spikelets in subglobose, compact, terminal clusters.

Niufo'ou: at great crater lake behind Futu, Jan. 7, 1952, *Hürlimann 671*.

Tafahi: at shore at Hou, Dec. 17, 1951, *Hürlimann 589*.

Niuatoputapu: on coastal plain toward southeast coast behind Falehau, Dec. 7, 1951, *Hürlimann 387*.

Frequent near shore in wet soil or on rocks. Polynesia.

[?] *F. cymosa* var. *subcapitata* C. B. Clarke in Hemsley's list.

Tongan names: *pakopako*, *pako fai lolo*.

Fimbristylis monostachya (Linnaeus) Hasskarl, Pl. Jav. Rar., 61, 1848.

Glabrous, somewhat tufted plant, stems up to 30 cm. or more tall, slender, finely striate. Blades filiform, about 2 mm. wide, mostly somewhat shorter than stems. Spikelets solitary, 5-8 mm. long.

'Eua: on grassy slope of large sinkhole near center of island, Mar. 20, 1953, *Yuncker 15390*.

Vava'u: *Crosby*: on grassy plain bordering upper rim of precipitous coastal cliff along northern side of island, May 24, 1953, *Yuncker 16067*.

Occasional. Polynesia.

Identifications by E. H. Walker.

Genus *Rynchospora* Vahl

Rynchospora corymbosa (Linnaeus) Britton, New York Acad. Sci., Trans. 11: 84, 1892.

Glabrous plant with stout, trigonous, somewhat scabrous stems up to 1 m. or more tall. Blades linear, rather long, up to 1.5 cm. wide, margins scabrous. Spikelets up to 1 cm. long, in large, paniculate, terminal and lateral clusters.

Tongatapu: along road from Ma'ofanga toward interior lagoon, Nov. 23, 1951, *Hürlimann 314*.

'Eua: in wet marshy area toward summit of eastern ridge, Mar. 24, 1953, *Yuncker 15441*.

Vava'u: *Crosby*; in boggy margin of Ngofe swamp at southwestern end of island, May 19, 1953, *Yuncker 16028*.

Frequent in low wet areas throughout Tonga. Pantropic.

R. aurea Vahl in Burkill's list.

Tongan names: *hano, mahelhele*.

Genus *Lepironia* Richard

Lepironia mucronata L. C. Richard, in Persoon, Syn. Pl. 1: 70, 1805.

Leafless, rushlike plant with glabrous, minutely striate, pithy stems up to 1.5 m. or more tall and about 5 mm. thick. Spikes dark brown, 1-2 cm. long.

Vava'u: *Crosby*; covering a large area in Ngofe swamp at southwestern end of island, growing in 2-3 feet of water, May 19, 1953, *Yuncker 16026*.

In Tonga known only from the one station. Malaya, Australia, Fiji.

Tongan name: *kuta ngofe*.

Genus *Scleria* Bergius

Scleria depauperata Boeckeler, Flora 58: 118, 1875.

This species is included in both Hemsley's and Burkill's lists on the basis of collections by Harvey and by Crosby. Hemsley records it as "frequent." I found no specimens, however, nor have I been able to verify the earlier reports.

Scleria lithosperma (Linnaeus) Swartz, Prodr., 18, 1788.

Slender, laxly tufted plant, rootstocks woody, mostly glabrous, up to 80 cm. or more tall. Blades up to 20 cm. or more long and 2-3 cm. wide. Flowers scattered, distant, in spikelets about 3 mm. long, in lax panicles, nutlet hard, smooth, shining white, about 2.5 mm. long, ellipsoidal, slightly three-angled.

Nomuka: in low moist area on lakeward side of road encircling island, Apr. 30, 1953, *Yuncker 15831, 15849*.

Vava'u: *Barclay; Crosby*; near rim of precipitous seaside cliff above Ha'alaufulu, May 21, 1953, *Yuncker 16096, 16105*.

Niuafo'ou: at upper edge of main crater rim, May 16, 1953, *Yuncker 15995*.

Tafahi: near lower end of path to Piu 'o Tafahi, Dec. 10, 1951, *Hürlimann 401*.

Frequent, especially on the central northern islands of Tonga. Pantropic.

Scleria margaritifera Willdenow, Sp. Pl. 4: 312, 1805.

Rather stout, somewhat tufted plant, stems up to 1.5 m. tall, triangular, scabrid at angles. Leaves numerous, blades up to 30 cm. long and about 1 cm. wide or narrower, margins scabrous. Spikelets numerous, about 5 mm. long, in axillary, paniculate clusters, nutlets white or grayish lilac, globose, 2.5-3 mm. in diameter, somewhat rugose.

'Eua: on upper sea-facing terrace, in open shade, along trail to Lokupo, Mar. 27, 1953, *Yuncker 15225*.

Kao: in open area in forest, May 6, 1953, *Yuncker 15873, 15904*.

Vava'u: *Crosby*; edge of thicket-bordered grassy area at summit of Talau just west of Neiafu, May 23, 1953, *Yuncker 16140*.

Tafahi: on northeast slope of the Piu 'o Tafahi, Dec. 10, 1951, *Hürlimann 428*.

Niuatoputapu: on ridge of mountain above Vaipoa, Dec. 5, 1951, *Hürlimann 356*.

Rather frequent throughout Tonga. Australia, New Caledonia, Polynesia. Tongan name: *mahelhele*.

FAMILY PALMAE

Genus *Pritchardia* Seemann and Wendland

Pritchardia pacifica Seemann and Wendland, *Bonplandia* 9: 260, 1861.

Tree with stem up to 5 m. or more tall and 30 cm. thick, bark with longitudinal fissures. Leaves fan-shaped, plicate, up to about 1 m. long, petioles stout, about as long as blade. Inflorescence large, axillary, paniculate; fruit drupelike, one-seeded, black.

Tongatapu: U.S. Exploring Expedition.

'Eua: *Lister*; on steep slope above Vaifele, Nov. 13, 1951, *Hürlimann 271*; in thicket near shore in sandy soil, Ha'aluma, Apr. 1, 1953, *Yuncker 15607*.

Vava'u: *Crosby*.

Frequent toward the southern end of 'Eua and occasional elsewhere. Fiji and Polynesia.

Tongan name: *piu*. Sometimes cultivated as an ornamental.

Genus *Cocos* Linnaeus

Cocos nucifera Linnaeus, Sp. Pl., 1188, 1753.

Unbranched tree with swollen base and smooth, commonly more or less inclined trunk up to 20 m. or more tall. Leaves clustered at top, up to 4 m. or more long, pinnate, pinnae firm and coriaceous, oblong-lanceolate, long-acuminate. Flowers monoecious, in large, axillary clusters; fruit a large, one-seeded nut, enclosed in a thick, fibrous husk. Of aboriginal introduction.

C. nucifera is cultivated throughout the world in tropical countries for its many useful properties. Copra, the dried flesh of the seed, is the most important export crop of Tonga. Large plantations of coconut are located on all of the main islands. Trees also grow spontaneously outside of cultivation.

Tongan name: *niu*. The following varieties are recognized:

Niu kafa: fruit is large and long, but nut is very small; husk fibers are used in making a type of cordage called *kafa*.

Niu kula: fruit is very small, scarcely more than 3 inches long, containing little or no liquid, cavity being filled with white pulp or jellylike substance.

Niu leka: very slow-growing variety.

Niu matakula: base of fruit where stalk joins is red.

Niu mea: fruit is yellowish in color.

Niu mealava: fruit-stalk scar has a red ring surrounding it.

Niu ta'okave: fruits are very small, some yellow and some green.

Niu tea: fruit is pale green.

Niu 'ui: fruit is green.

Niu 'utongau: fruit is mostly green, husk sweet and edible.

Niu 'ai: fruit is very large, mostly green but sometimes yellow.

FAMILY ARACEAE

Genus *Epipremnum* Schott

Epipremnum pinnatum (Linnaeus) Engler, Pflanzenr. 37 (IV. 23B): 60, 1908.

High-climbing, much-branched, coarse, subherbaceous vine. Leaves alternate, ovate-oblong, acuminate, base rounded to cordate, entire, variously perforated with large holes, or larger leaves pinnately divided nearly to midrib into numerous oblong lobes, up to 40-60 cm. long. Flowers small, crowded on a cylindrical, fleshy spadix 2-3 cm. thick and 8-10 cm. long, spadix subtended by a leaflike, lanceolate spathe as long as, or longer than, spadix.

Tongatapu: in forest near sea below Fu'amotu village, Mar. 4, 1953, *Yuncker 15172*.

'Eua: *Lister*; in dense forested ravine north of Fuai, Mar. 19, 1953, *Yuncker 15369*.

Vava'u: near summit of Talau, west of Neiafu, May 24, 1953, *Yuncker 16158*.

Common throughout Tonga in forested areas. Burma to the Philippines and Polynesia.

Raphidophora pertusa var. *titiensis* Engl. in Hemsley's list.

Tongan name: *alu*.

The long slender stems (called *kaho alu*) are used in the weaving of baskets.

Genus *Colocasia* Schott

Colocasia esculenta (Linnaeus) Schott, Melet. Bot. 1: 18, 1832.

Acaulescent, tuber-forming herb. Leaves ovate-cordate, peltate, entire, acute to acuminate, of various sizes but mostly 30 cm. or more long, petiole sheathing at base. Flowers small, on a fleshy spadix surrounded by a yellowish or reddish spathe.

This species is of ancient introduction and is cultivated as a staple food crop throughout Tonga. A large number of varieties are recognized by the Tongans.

Tongan name: *talo*.

Genus **Alocasia** Necker

Alocasia macrorrhiza (Linnaeus) Schott, Oesterr. Bot. Wochenbl. 4: 409, 1854.

Large herb with stem 1 m. or more tall and up to 15 cm. or more in diameter. Leaves cordate-sagittate, glabrous, obtuse to acuminate, margins entire or wavy, up to 1 m. long and 60 cm. wide but some varieties smaller, petiole up to 1 m. or more long, sheathing at base. Flowers monoecious, on a fleshy spadix, enclosed in a greenish spathe.

Occasional in plantations. This southern Asiatic species is now widely distributed in Polynesia. The stem is sometimes used as food.

Tongan name: *kape*. The following varieties are recognized: *kape hina*, *fahenga 'uli*, *fahenga enge'enga*.

A number of varieties of *Caladium* [*C. bicolor* (Aiton) Ventenat ?] were seen as cultivated ornamentals about dwellings.

FAMILY LEMNACEAE

Genus **Lemna** Linnaeus

Lemna minor Linnaeus, Sp. Pl., 970, 1753.

Minute, floating herb, often growing in large colonies, stem elliptic, 2-3 mm. long, green above, paler or reddish beneath, functioning as a leaf, with threadlike roots. Flowers very inconspicuous.

Tongatapu: in bay of lagoon near Pea, Nov. 23, 1951, *Hürlimann 324*.

The available material of this specimen is meager and the identification is not certain. No previous report of *Lemna* from Tonga is known.

Of Old World origin, now of wide distribution.

FAMILY BROMELIACEAE

Genus **Ananas** Adanson

Ananas comosus (Linnaeus) Merrill, Interpret. Herb. Amboin., 133, 1917.

The pineapple is seen occasionally in plantations, but I saw no extensive plantings.

The Tongan name for the pineapple is *faina*. The following varieties are recognized: *faina*, fruit of medium size, the leaf margins spiny; *faina ha'amo*, fruit large and not as sweet as other varieties, the leaf spiny only toward the apex; and *faina 'initia*, the leaves at the top of the fruit red.

FAMILY COMMELINACEAE

Genus **Commelina** Linnaeus**Commelina benghalensis** Linnaeus, Sp. Pl., 41, 1753.

Low, fleshy, diffuse, pubescent herb, stems more or less prostrate. Leaves alternate, ovate or ovate-elliptic, blunt or acute, up to 6-8 cm. long, parallel-nerved, the base narrowed into a loosely clasping petiole. Flowers blue, delicate, long-pedicellate, subtended by a green, boat-shaped spathe.

Tongatapu: on sea wall of rocks along coast east of Nuku'alofa, Mar. 7, 1953, *Yuncker 15213*; weed in manioka plantation near Nualei, Oct. 29, 1951, *Hürlimann 47*.

Occasional plantation and waste area weed, less frequent than the following species. From tropical Africa and southern Asia to Japan, the Philippines and Polynesia.

Tongan name: *music matale pulu*.

Commelina diffusa Burmann f., Fl. India, 18, pl. 7, fig. 2, 1768.

Low, tender, fleshy herb with weak, more or less prostrate stems. Leaves alternate, lanceolate or ovate-lanceolate, up to 8 cm. or more long, the nerves subparallel, gradually acute, the base contracted into a ciliate, sheathing petiole 1-1.5 cm. long. Flowers irregular, blue, delicate, short-lived, on long, slender pedicels, subtended by a compressed boat-shaped spathe; the capsule two-parted.

Tongatapu: *Forster; Nelson*; in a low, wet, abandoned garden, Nuku'alofa, Mar. 7, 1953, *Yuncker 15202*; roadside along small road from Ma'ofanga to interior lagoon, Nov. 23, 1951, *Hürlimann 319*.

Vava'u: *Barclay; Crosby*; moist boggy margin of Ngofe swamp, May 19, 1953, *Yuncker 16041*.

A weed in plantations and waste areas, probably growing on all islands of the group. A native of tropical Asia extending eastward to Polynesia.

C. nudiflora L. in Hemsley's and Burkill's lists.

Tongan names: *music matale pulu, mohuku vai*.

Genus **Aneilema** R. Brown**Aneilema vitiense** Seemann, Fl. Vit., 314, pl. 96, 1868.

Low, creeping-ascending, tender herb, rooting at lower nodes. Leaves elliptic or lance-ovate, acute, base acute, up to 6 cm. or more long, petiole tubular-sheathing at base. Flowers whitish lilac, in a terminal, open, paniculate inflorescence.

Tafahi: near lower end of path to Piu 'o Tafahi, Dec. 10, 1951, *Hürlimann 402*.

In Tonga, known only from this collection. From the Philippines to Fiji and Samoa.

Genus **Rhoeo** Hance

Rhoeo discolor (L'Héritier) Hance, in Walpers, Ann. Bot. Syst. 3 : 660, 1852.

Low herb with short, thick, creeping, fleshy stems ascending up to 30 cm. Leaves numerous, narrowly lanceolate, entire, acuminate, dark green above, purple beneath, up to 30-40 cm. long and 4-6 cm. wide, fleshy, petiole about 1 cm. long, sheathing stem. Flowers small, white, about 1 cm. wide, several, in axillary, racemose clusters, surrounded by two large, purplish, boat-shaped bracts.

Tongatapu: on coral rocks near sea below Niutoua village, Mar. 2, 1953, *Yuncker 15129*.

Found throughout Tonga. Often planted in cemeteries, from where it becomes established as an escape. A tropical American species now widely grown as an ornamental in warm climates.

Genus **Zebrina** Schnizlein

Zebrina pendula Schnizlein, Bot. Zeit. 7 : 868, 1849.

Tender, decumbent herb with weak, semi-prostrate, creeping stems. Leaves alternate, ovate-lanceolate, acute, 3-6 cm. long, purple beneath, silvery green above with purple stripes, petiole tubular and sheathing stem. Flowers reddish or purplish, small, short-pedicellate, in few-flowered cymose clusters enclosed by sheathing bracts.

Tongatapu: along trail between Ha'akame village and sea, Mar. 12, 1953, *Yuncker 15275*.

A Mexican plant now of wide distribution as an ornamental; occasional to frequent as a weed in plantations and waste areas throughout Tonga.

FAMILY LILIACEAE

Genus **Dianella** Lamarck

Dianella ensifolia (Linnaeus) de Candolle, in Redouté, Liliacées, 1, pl. 1, 1802.

Rather coarse, short-stemmed, herbaceous plant. Leaves distichous, linear, swordlike, up to 50 cm. or more long and 2 cm. wide, gradually long-acuminate, finely parallel-nerved, narrowing to a clasping petiolar base. Flowers blue to white, small, in terminal panicles up to 60 cm. or more long.

Tongatapu: in sandy soil under trees and shrubs near beach, Sopu, west of Nuku'alofa, May 30, 1953, *Yuncker 16212*.

'Eua: *Lister*.

Kao: in rocky soil in open forest on upper slope, alt. about 600 m., May 6, 1953, *Yuncker 15893*.

Vava'u: *Crosby*; along upper rim of limestone coastal cliff above Leimatua, May 20, 1953, *Yuncker 16081*.

Occasional throughout Tonga in thickets. India and China to Malaya, Formosa, Australia, and Polynesia.

Recorded as *D. nemorosa* Lam. in Burkill's list.

Tongan name: *akahele*.

? *Dianella intermedia* Endlicher, Prodr. Fl. Norf., 28, 1833.

Short-stemmed, herbaceous plant. Leaves linear, grasslike, distichous, up to 50 cm. or more long and 1 cm. wide, finely parallel-nerved, clasping stem at base. Flowers whitish, small, in large, terminal, paniculate clusters.

Tongatapu: *Nelson*; in open bush on sand near shore northwest of Hofoa, Oct. 30, 1951, *Hürlimann 86*.

'Eua: on limestone rocks in open vegetation, border of cliff near center of eastern ridge, Nov. 9, 1951, *Hürlimann 212*.

Occasional. New Zealand, Norfolk Island, Fiji, Society Islands.

Tongan name: *afuafu*.

The taxonomy of this genus is complex and the identifications are tentative.

Genus *Cordyline* Commerson

Cordyline terminalis (Linnaeus) Kunth, Berlin Akad., Abh., 30, 1820.

Small tree with slender stem up to 3 m. or more tall. Leaves closely spirally clustered near end of stem, elliptic-lanceolate or oblong-lanceolate, acuminate, base acute, up to 60 cm. or more long and 15 cm. wide, smooth, entire, finely pinnately nerved, petiole deeply canaliculate, clasping stem. Flowers pink or red, small, numerous, in large, terminal, paniculate clusters; fruit fleshy, globose, yellow or reddish.

Tongatapu: *Moseley*; in coastal forest near Fatai, Oct. 30, 1951, *Hürlimann 55*; in thicket near sea, near Vaini, Feb. 26, 1953, *Yuncker 15059*; in clearing between Fatai village and sea, Mar. 10, 1953, *Yuncker 15262*.

'Eua: *Lister*; in thicket along trail between Pangai village and Fuai, Mar. 25, 1953, *Yuncker 15483*.

Kao: near the upper margin of slope forest, May 6, 1953, *Yuncker 15954*.

Vava'u: *Crosby*.

Frequent throughout Tonga. Presumably of Malaysian origin; now widely distributed in Polynesia.

Tongan names: *si, si matale'a*.

The leaves are used to wrap fish and other foods, and the roots may be eaten in times of food scarcity.

Genus *Asparagus* Linnaeus

Asparagus plumosus Baker, Linn. Soc. Bot., Jour. 14: 613, 1875.

Climbing, vinelike plant with sub-woody stems bearing small, recurved spines, branches forming a horizontal, flattened, fanlike frond. Cladophylls numerous, filiform, fascicled, mostly less than 1 cm. long. Flowers small, white, in few-flowered clusters; berry black.

'Eua: ravine of Lakatoa River near Ohonua, Nov. 10, 1951, *Hürlimann 236*; same location, Apr. 2, 1953, *Yuncker 15613*.

Lifuka: climbing in shrubbery of seaside thicket, north of Pangai village, Apr. 24, 1953, *Yuncker 15704*.

Occasional to frequent in thickets throughout Tonga. A south African plant now widely disseminated in warm countries.

Tongan name: *taupo'ou*.

Genus *Smilax* Tournefort

Smilax vitiensis (Seemann) A. de Candolle, in DC. Monogr. Phanerog. 1: 204, 1878.

Rather slender, woody vine. Leaves alternate, round-ovate, abruptly short-pointed, base rounded, cordate, palmately 5-7-nerved, up to 15 cm. long and 15 cm. wide, petiole up to 5 cm. or more long, with a pair of stipular tendrils. Flowers greenish, on slender pedicels up to 2 cm. long, in axillary, pedunculate umbels, peduncle up to 8 cm. or more long.

'Eua: climbing in trees, forest above Fuai plantation, near center of island, Mar. 21, 1953, *Yuncker 15401*; in forest on seaward terrace along trail descending to Lokupo, Mar. 27, 1953, *Yuncker 15512*.

Occasional on 'Eua. Also in Fiji.

Tongan name: *matafu'i*.

The cultivated garden asparagus (*Asparagus officinalis* Linnaeus var. *altilis* Linnaeus), onions (*Allium cepa* Linnaeus), and leeks (*Allium porrum* Linnaeus) are occasionally cultivated as vegetables. *Eucharis grandiflora* Planchon and Linden is a favorite ornamental species.

FAMILY AMARYLLIDACEAE

Genus *Zephyranthes* Herbert

Zephyranthes candida Herbert, Curtis's Bot. Mag., pl. 2607, 1826.

Small, bulbous plant with flat, narrow, grasslike leaves up to 20-30 cm. long. Flowers funnel-shaped, white or slightly rose-tinged on outside, up to 4 or 5 cm. long, solitary on a hollow scape about as long as leaves.

Tongatapu: in roadside ditch near Nuku'alofa, Mar. 7, 1953, *Yuncker 15218*.

An ornamental planted about dwellings and in cemeteries but escaping to roadsides and waste areas. A South American species now widely grown as an ornamental in warm countries.

Tongan name: *feu'u*.

Genus **Crinum** Linnaeus**Crinum asiaticum** Linnaeus, Sp. Pl., 292, 1753.

Coarse, bulbous herb. Leaves numerous, oblong, straplike, acute, up to 2 m. long or more and 25 cm. wide, fleshy, clasping at base. Flowers numerous, at top of fleshy scape, white, fragrant, perianth tube up to about 10 cm. long, filaments white, styles purplish.

Niutoputapu: in grassy area near old well in Hihifo, Dec. 7, 1951, *Hürli-mann* 399.

Occasionally cultivated as an ornamental throughout Tonga. A southern Asiatic species now widely cultivated in warm climates.

Crinum pedunculatum R. Brown, Prodr. Fl. Nov. Hollandiae, 297, 1810.

Fleshy, bulbous herb. Leaves fleshy, numerous, up to 1 m. or more long and 10 cm. wide. Flowers numerous, umbellate at top of stout, solid, fleshy scape, perianth tube green, up to 10 cm. long, with linear, white segments up to 5 cm. long.

'Eua: *Lister*.

An Australian species now widely cultivated as an ornamental.

Genus **Furcraea** Ventenat? **Furcraea gigantea** Ventenat, Soc. Philom., Bull. 1: 65, 1793.

Coarse, short-stemmed plant. Leaves nearly flat, spreading rosette fashion from short stem, linear-lanceolate, up to 1 m. or more long, fleshy, margin armed with strong, recurved teeth, apex acuminate and ending in a short, sharp spine. Flowers white, commonly replaced by bulbils, in large, terminal, paniculate clusters.

Tongatapu: forming a colony along side of trail below Ha'akame village, Mar. 12, 1953, *Yuncker* 15287.

Introduced for the fibers obtained from the leaves and used in cordage. Now established locally.

Tongan name: *faumalila*.

FAMILY TACCACEAE

Genus **Tacca** Forster**Tacca leontopetaloides** (Linnaeus) O. Kuntze, Rev. Gen. Pl. 2: 704, 1891.

Herb, up to 50 cm. or more tall. Leaves radical, large, palmately three-parted, each division in turn deeply lobed and divided into acuminate lobes and teeth, petioles up to 60 cm. or more long. Flowers pendent, greenish, numerous, in umbellate clusters at top of a hollow, bracteate scape sometimes up to about 1 m. tall; fruit globose, ribbed, fleshy, yellowish when ripe, crowned with withered floral parts. Tubers up to 8-10 cm. in diameter, sometimes larger under cultivation.

Tongatapu: *Moseley*; in calcareous soil in thicket near shore, Sopu, Feb. 25, 1953, *Yuncker* 15004.

'Eua: in border of pastured land near center of island, Apr. 5, 1953, *Yuncker* 15639.

Vava'u: *Crosby*.

Tafahi: in coconut plantation on coastal plateau between Tafahi and Tafe, Dec. 13, 1951, *Hürlimann 510*.

Niuatoputapu: in bushy second-growth forest on volcanic ridge above Vaipoa, Dec. 5, 1951, *Hürlimann 363*.

Frequent throughout the group. From tropical Africa and southern Asia to Australia, the Philippines, and Polynesia.

For an informative discussion of this species, see Merrill in the *Journal of the Arnold Arboretum* (26: 85-92, 1945).

Tongan name: *maho'a*. The tubers furnish starch used as an adhesive in the manufacture of tapa, or bark cloth.

FAMILY DIOSCOREACEAE

Genus *Dioscorea* Plumier

Dioscorea alata Linnaeus, Sp. Pl., 1033, 1753.

Herbaceous or somewhat woody, high-climbing vine with four-angled and winged stems, often bearing small, axillary tubers. Leaves opposite, ovate-cordate, attenuately acuminate, entire, up to 12 cm. or more long, palmately 9- to 11-nerved, petiole nearly as long as blade. Staminate flowers small, greenish, numerous in narrow, paniculate, axillary clusters, up to 30 cm. or more long.

Tongatapu: *Cook*.

Vava'u: *Crosby*.

Cultivated throughout Tonga for its edible tubers, which form an important part of the diet of the Tongan people. A large number of varieties are recognized by the Tongans. A native of the Old World tropics, now of pantropic distribution.

Tongan name: *'ufi*.

Dioscorea bulbifera Linnaeus, Sp. Pl., 1033, 1753.

Herbaceous, glabrous, high-climbing, twining vine. Leaves alternate, oval-ovate to suborbicular, abruptly acuminate, base deeply and obtusely cordate, up to 20 cm. or more long, palmately 7 to 11 or more nerved, petioles commonly half to as long as blade, twisted at base, green or reddish aerial tubers up to 5 cm. or more in diameter often present in the axils. Flowers small, in long, slender, spikelike clusters in axillary fascicles.

Tongatapu: *Cook*; in thicket near Navutoka village, Feb. 27, 1953, *Yuncker 15088*.

'Eua: in thicket along trail near center of island, Mar. 20, 1953, *Yuncker 15383*.

Vava'u: *Crosby*.

Tafahi: ridge of the Piu 'o Tafahi, Dec. 10, 1951, *Hürlimann 425*.

Niuatoputapu: along road between Vaipoa and Falchau, Jan. 2, 1953, *Hürlimann 650*.

Frequent throughout Tonga. A native of the tropics of the Eastern Hemisphere extending to Polynesia.

D. sativa L. in Hemsley's and Burkill's lists.

Tongan name: *hoi*.

The tubers are said to be poisonous unless properly cooked and are not used as food.

Dioscorea esculenta (Loureiro) Burkill, Gard. Bull. Straits Settlements, 1: 396, 1917.

Strong, high-climbing, more or less prickly-armed, subwoody, pubescent, twining vine with large, edible root tubers. Leaves alternate, ovate-cordate to suborbicular or reniform, attenuately acuminate, basal sinus broad, obtuse, up to 15 cm. or more long, woolly-pubescent. Flowers green, 4-5 mm. in diameter, in slender, axillary spikes up to 50 cm. long.

Introduced and cultivated for its edible tubers. From India to the Philippines and Polynesia.

Dioscorea pentaphylla Linnaeus, Sp. Pl., 1032, 1753.

Strong, twining, pubescent, somewhat prickly, herbaceous vine with more or less angular stems. Leaves alternate, palmately 3- to 5- to 7-foliolate, leaflets elliptic-lanceolate, attenuately acuminate, entire, up to 15 cm. or more long, with numerous, small, oblong, translucent lines, petiolules up to 1 cm. long. Flowers yellowish white, slightly fragrant, in axillary panicles longer than leaves.

Vava'u: in thicket at summit of Talau, west of Neiafu, May 24, 1953, *Yuncker 16157*.

Niufo'ou: on wall of great crater above Futu, Jan. 7, 1952, *Hürlimann 659*.

Occasional in thickets. From India to the Philippines and Polynesia.

Tongan name: *lena*.

The tuber is edible but of poor quality and is eaten only in times of food shortage.

FAMILY IRIDACEAE

Genus **Belamcanda** Adanson

Belamcanda chinensis (Linnaeus) de Candolle, in Redouté, Liliacées 3, pl. 121, 1802.

Short-stemmed herb. Leaves somewhat tufted, up to 50 cm. or more long and 4 cm. wide, two-ranked, ascending, narrowly lanceolate, acuminate, parallel-nerved, the nerves obvious. Flowers short-lived, opening one at a time, about 5 cm. wide, yellow outside, reddish-yellow with red spots within, in a large, many-flowered, di- or trichotomously branched terminal inflorescence; fruit about 2-3 cm. long, seeds globose, black, glossy.

Tongatapu: margin of cemetery near sea below Ha'akame village, Mar. 12, 1953, *Yuncker 15278*.

Cultivated as an ornamental in villages and cemeteries. A native south-eastern Asiatic species now widely distributed as an ornamental in warm countries.

FAMILY MUSACEAE

Genus **Musa** Linnaeus

Musa nana Loureiro, Fl. Cochinchinensis, 644, 1790.

I was unable to determine with certainty the presence of this dwarf Chinese banana, but it was claimed to grow in Tonga. If so, it is probable that some of the Tongan names listed under the following species refer to it.

Musa paradisiaca Linnaeus subspecies **normalis** O. Kuntze, Rev. Gen. Pl. 2: 692, 1891.

The fruit of this subspecies, commonly known as the plantain, is usually cooked before eating. The Tongan name for this subspecies is *hopa*. The following varieties are recognized by the Tongans.

Fetau kula: fruit is round.

Fetau ulu'ikuma.

Lehia: bunch bears three or four hands of very large fruits.

Maholi hina.

Maholi 'uli.

Misipeka: small bunches of red fruits.

Pikipiki hina: fruit is small, white, the flesh firm.

Puko: small bunches of fruit nearly as large as the *lehia* variety.

Putalinga kula: stem is large, red, the bunches large, the fruit the size of those of the *puko* variety.

Putalinga puku.

Tatcau.

Tokoni vai: large bunches of hard-fleshed fruit.

Tu'utu'ukautala.

Uhotaha.

V'aivai hako: fruit is medium-sized, long, round, curved.

V'aivai puki.

Musa paradisiaca Linnaeus subspecies **sapientum** (Linnaeus) O. Kuntze, Rev. Gen. Pl. 2: 692, 1891.

The fruit of this subspecies, one of the bananas of commerce, is generally eaten raw. The following varieties are recognized by the Tongans.

Mahimahi: stem is short to medium, the bunches and fruit small.

Mamac: leaves are purplish, the fruit white and short.

Pata lahelahc: stem is medium tall, the fruit green with whitish bloom.

Pata tonga: stem is medium tall, the fruit green, somewhat ribbed, larger than variety *pata lahelahc*.

Siaine fisi: stem is tall, with large bunches of large fruits.

Siaine ha'amoa: stem is medium tall, the fruits and bunches large.

Siaine initia: stem is tall and red, with large clusters of red fruits.

Siaine tonga: stem is short, with short clusters of short fruits.

It is probable that some of the above varieties are incorrectly placed as to subspecies, as it was not possible to determine their exact relationship. So far as I know, no wild species of *Musa* occur in Tonga. Plantains and bananas are grown extensively throughout the group and are an important item in the diet of the Tongans. A comparatively large number of bunches are shipped annually to the New Zealand markets.

FAMILY ZINGIBERACEAE

Genus *Zingiber* Adanson

Zingiber zerumbet (Linnaeus) J. E. Smith, *Exot. Bot.* 2: 103, pl. 112, 1804.

Herbaceous plant with pubescent, leafy branches rising to about 1 m. tall from a thickened, fleshy rhizome. Leaves alternate, distichous, entire, oblong-elliptic or lanceolate, acuminate, clasping the stem at the base, up to about 30 cm. long and 5 cm. wide, pubescent beneath. Flowers white or pale yellow, in a large, bracteate, cone-like spike at top of a leafless scape up to about 30 cm. tall, bracts rounded, overlapping, becoming red.

Tongatapu: in a low wet area near Nualei, Mar. 9, 1953, *Yuncker 15221*.

'Eua: in thicket at margin of forest near summit of central part of eastern ridge, Mar. 24, 1953, *Yuncker 15455*.

Vava'u: *Crosby*.

Tafahi: at summit of Piu 'o Tafahi, Dec. 11, 1951, *Hürlimann 459*.

Niuatoputapu: on southward slope of mountain ridge opposite Vaiṗoa, Dec. 25, 1951, *Hürlimann 636*.

Frequent in thickets throughout the group. An Asiatic species now widely distributed in warm countries.

Tongan name: *angoango*.

The rhizome is used in preparing medicines.

Genus *Hedychium* Koenig

Hedychium coronarium Koenig, *Retz. Observ. Bot.* 3: 73, 1783.

Erect herb, stems up to 1 m. tall from a stout rootstock. Leaves distichous, oblong-lanceolate to lanceolate, acuminate, up to 50 cm. more long and 10 cm. wide, petiole short clasping stem with an elongated sheathlike portion. Flowers very fragrant, white turning yellow, perianth tube slender, up to 6 or 8 cm. long, in dense, terminal, bracteate spikes, bracts oblong to obovate or lanceolate, imbricate.

Tongatapu: in moist area along trail below Fatai village, Mar. 10, 1953, *Yuncker 15263*.

'Eua: in Pangai village, Mar. 25, 1953, *Yuncker 15488*.

Common in villages as an ornamental and occasionally as an escape. An Indian species now widely distributed in warm countries as an ornamental.

Tongan name: *tevunga*.

The aromatic parts of this plant are used to scent oil.

Genus **Curcuma** Linnaeus**Curcuma longa** Linnaeus, Sp. Pl., 2, 1753.

Erect, leafy, herbaceous plant with aromatic, fleshy rootstock. Leaves elliptic-oblong, distichous, acuminate, finely pinnately nerved, petiole about as long as blade, sheathing at base. Flowers several, yellowish, in axils of greenish bracts forming a dense, cone-like or cylindrical head at end of leafless peduncle.

Tongatapu: in swampy area below Nualei village, Mar. 9, 1953, *Yuncker 15248*.

'Eua: in deep forest on ridge above sea-facing terraces above Lokupo, Mar. 27, 1953, *Yuncker 15537*.

Vava'u: *Crosby*.

Occasional throughout Tonga. An Indian species now widely disseminated in warm countries.

Tongan name: *ango*.

The rootstock provides a yellow dye and the leaves are used to wrap fish and in the preparation of medicines.

FAMILY CANNACEAE

Genus **Canna** Linnaeus**Canna indica** Linnaeus, Sp. Pl., 1, 1753.

Smooth, erect, rhizomatous herb, up to about 1.5 m. tall. Leaves oblong-ovate or lanceolate, entire, acute to acuminate, with long, basal, petiolar part sheathing stem, blade up to 50 cm. or more long and 20-25 cm. wide, pinnately nerved, lateral nerves slender and numerous. Flowers irregular, medium to large, showy, red or yellow, in terminal racemose or paniculate clusters; fruit a warty, bristly capsule, seeds globose, hard, black.

Tongatapu: forming large patches in low moist areas near Vaini, Feb. 26, 1953, *Yuncker 15060*.

'Eua: in low moist area between Pangai village and Fuai, Mar. 25, 1953, *Yuncker 15472*.

Vava'u: *Crosby*; in waste areas near northwestern coastal cliff, May 25, 1953, *Yuncker 16159*.

Common in low moist areas throughout Tonga. A tropical American plant now of pantropic distribution. A number of horticultural forms are grown for ornament.

Tongan name: *misimisi*.

FAMILY MARANTACEAE

Genus **Maranta** Linnaeus**Maranta arundinacea** Linnaeus, Sp. Pl., 2, 1753.

Erect, slender, glabrous, somewhat dichotomously branched herb, up to about 1 m. tall, rootstock fleshy. Leaves rather thin, ovate-oblong, acuminate, base rounded, blade

up to 20-25 cm. long, finely and closely pinnately nerved, petiole winged, clasping. Flowers white, about 2 cm. long, in loose, terminal, few-flowered clusters.

Tongatapu: in low wet area near Fatai village, Mar. 10, 1953, *Yuncker 15259*.

'Eua: in thicket near Ha'aluma, Apr. 1, 1953, *Yuncker 15606*.

Found about villages, occasionally adventive. A tropical American species of pantropic distribution.

Tongan name: *misimisi koka'anga*.

The starchy rootstocks are used in preparing a paste employed in the manufacture of bark cloth and sometimes eaten.

FAMILY ORCHIDACEAE

Orchid identifications are by Charles Schweinfurth.

Genus *Habenaria* Willdenow

Habenaria sp.

Short, erect, leafy, glabrous herb. Leaves oblong-lanceolate, acuminate, sheathing stem at base, up to 15 cm. long and 1-1.5 cm. wide, parallel-nerved, with midrib more prominent than lateral nerves. Flowers several, sessile or subsessile, in a terminal spicate inflorescence; capsule about 8 mm. long.

'Eua: in moist forest floor humus, near center of island, Mar. 21, 1953, *Yuncker 15404*. This specimen is poor and specific determination is not possible.

Infrequent.

Genus *Spiranthes* L. C. Richard

Spiranthes sinensis (Persoon) Ames, *Orchidaceae* 2: 53, 1908.

Erect, glabrous, terrestrial, slender herb, up to 30 m. or more tall. Leaves grasslike, up to 15 cm. or more long and 4-5 mm. wide, acuminate, clasping stem at base, parallel-nerved. Flowers 3-4 mm. long, commonly rose-colored, numerous, in a terminal, bracteate, spikelike spiral raceme.

Lifuka: in shady thicket near southern end of island, Apr. 28, 1953, *Yuncker 15775*.

Infrequent. Southern and eastern Asia, Malaya, Australia, New Zealand, and Polynesia.

Genus *Corymborchis* Thouars

Corymborchis veratrifolia (Reinwardt) Blume, *Fl. Jav. Orch.*, 105, pls. 42E, 43, fig. 1, 1858.

Rather coarse, erect, terrestrial herb, up to 1 m. or more tall. Leaves broadly or narrowly elliptic, acuminate, with narrowed base clasping stem, up to 30 cm. or more long and 8 to 11 cm. wide, parallel-nerved, six to eight of the nerves being prominent, intermediate nerves very slender. Flowers 1.5-3 cm. long, pedicellate, numerous, in loose, axillary panicles up to 15 cm. or more wide.

Tongatapu: *Moseley*.

'Eua: in moist humus, forested area behind village of Pangai on way to Fuai, Mar. 25, 1953, *Yuncker 15467*.

Occasional but locally abundant. East Indies, Malaya, Melanesia, and Polynesia.

Tongan name: 'uto'uto.

Genus **Malaxis** Solander ex Swartz

Malaxis latisegmenta C. Schweinfurth, B. P. Bishop Mus., Bull. 141: 22, fig. 7, c, 1936.

Erect, glabrous, terrestrial herb, with stem up to 10 cm. long. Leaves elliptic to elliptic-oblong or ovate-elliptic, narrowed to a clasping petiole, up to 10 cm. or more long and 5 cm. wide, parallel-nerved, with five rather prominent nerves and numerous very slender intermediate nerves. Flowers yellow or greenish yellow, numerous, about 8 mm. wide, in an elongated terminal raceme 10 cm. or more long; pedicels up to about 1 cm. long; mature pods about 1 cm. long.

'Eua: in moist humus floor of rather dense forest, near center of island. Mar. 21, 1953, *Yuncker 15403*.

Kao: in open forest, May 6, 1953, *Yuncker 15887*.

Occasional to frequent. Fiji.

Malaxis resupinata (Forster) O. Kuntze, Rev. Gen. Pl. 2: 673, 1891.

Erect, glabrous, terrestrial herb. Leaves elliptic to oval, abruptly acuminate, narrowed to canalicate-winged petiole which clasps stem at base, up to 15 cm. or more long and 8 cm. wide, parallel-nerved with about five of nerves prominent and intermediate nerves very slender. Flowers magenta, short-pedicellate, numerous in a bracteate raceme up to 20 cm. or more long.

'Eua: in rich humus of forest floor in deep shade on steep opening about "Smoking Hole" near center of island, Mar 31, 1953, *Yuncker 15575*.

Common. Society Islands.

Malaxis sp.

Small, erect, glabrous, terrestrial herb. Leaves oval, acute, narrowing at base to winged petiole, parallel-nerved, 3-4 cm. long and 2 cm. wide.

Kao: in wet soil near margin of small alpine lake near summit, alt. about 990 m., May 6, 1953, *Yuncker 15910*. This specimen is sterile and specific determination is impossible.

Genus **Oberonia** Lindley

Oberonia glandulosa Lindley, Folia Orchidacea Oberonia 6, no. 37, 1859.

Rather small, glabrous, epiphytic herb, leafy stems up to 10 cm. or more tall. Leaves equitant, sharply acuminate, clasping stem at base, pale green, 3-5 cm. or more long. Flowers minute, short-pedicellate, numerous, in dense, cylindrical, spicate-racemose, terminal clusters up to 10 cm. or more long; pedicels and rachis glandular-pubescent; the pod 3-4 mm. long.

'Eua: epiphytic on old, inclined tree trunk in deep forest near center of island, Mar. 21, 1953, *Yuncker 15402*. The plants were past the flowering stage and identification on fruit and vegetative characteristics is not wholly certain.

Occasional. Tahiti, Samoa, New Hebrides, Cook Islands.

Genus **Liparis** L. C. Richard

Liparis kenejiae Schlechter, Repert. Sp. Nov. Beib. 1: 182, 1911.

Glabrous, erect, terrestrial herb, with short stem. Leaves lanceolate or oblong-lanceolate, sharply acuminate, clasping at base, up to 15 cm. or more long, 1-4 cm. wide, parallel nerved. Flowers short-pedicellate, less than 1 cm. long, red or brownish yellow, in a terminal, bracteate raceme; peduncle up to 15 cm. or more long.

'Eua: on red volcanic soil bank in open grazing area toward eastern ridge near central part, Mar. 24, 1953, *Yuncker 15446*.

Infrequent. New Guinea.

Genus **Appendicula** Blume

Appendicula reflexa Blume, Bijdr., 301, 1825.

Terrestrial or epiphytic, glabrous herb; stem rather slender, up to 30 cm. or more long, pendulous. Leaves oblong or oblong-elliptic, emarginate, mucronate, clasping at base, about 2-3 cm. long and 5-10 cm. wide with internodes about 8 mm. long. Flowers very small, in abbreviated axillary clusters; fruit about 5 mm. long.

Kao: at base of tree on steep, forested slope, May 6, 1953, *Yuncker 15807*.

Infrequent. Malaya, Fiji.

Genus **Phaius** Loureiro

Phaius tankervilleae (Banks) Blume, Mus. Bot. Lugd.-Bat. 2: 177, 1856.

Stout, erect terrestrial, with a cluster of elliptic or elliptic-oblong, plicate leaves up to 100 cm. long and 20 cm. wide. Scape lateral, up to 140 cm. tall, bearing a loose raceme of 10-20 large flowers which are white without and red brown within.

Vava'u: *Crosby*.

Ranges from northern India and southern China to Australia and the Pacific islands.

P. grandifolius Lour. in Burkill's list.

Genus **Spathoglottis** Blume

Spathoglottis pacifica Reichenbach f., in Seemann, Fl. Vit., 300, 1868.

Tall, terrestrial herb, with cluster of elliptic-oblong, plicate leaves about 80 cm. long and 13 cm. wide. Scape lateral, up to 100 cm. tall, bearing a more or less dense raceme of medium-sized pink flowers.

Tongatapu: *Graeffe*.

'Eua: *Lister*.

Vava'u: *Crosby*.

Occasional. New Hebrides, Fiji, Society Islands, Samoa.

Spathoglottis plicata Blume, Bijdr., 401, 1825.

Erect, glabrous, terrestrial herb, up to 50 cm. or more tall when in flower. Leaves oblong-lanceolate, plicate, long-acuminate, narrowed to basal petiolar part which clasps stem at base, parallel-nerved, about five of the numerous nerves prominent, about 50-120 cm. long and 5-23 cm. wide. Flowers lavender, mostly 2-3 cm. wide, short-pedicellate in rather short, terminal racemose clusters; bracteate flowering stalk about 50-170 cm. long; parts of inflorescence finely puberulent.

'Eua: on dry soil in grassy area near summit of central part of eastern ridge, Mar. 24, 1953, *Yuncker 15437*; on ledge of sea-facing limestone outcrop, Lokupo district, on eastern side of island, Apr. 8, 1953, *Yuncker 15669*.

Kao: on steep slope in open grassy area above upper forest limit, May 6, 1953, *Yuncker 15929*.

Occasional. Occurs on many Pacific islands including the Hawaiian Islands, where it was originally introduced.

Genus **Geodorum** Jackson

Geodorum pictum (R. Brown) Lindley, Gen. and Sp. Orch., 175, 1833.

Erect, glabrous, terrestrial herb, the leafy stem up to 20 cm. or more tall. Leaves elliptic-lanceolate, acuminate, clasping at petioled base, up to 35 cm. long and 7 cm. wide, parallel-nerved with about five of the numerous nerves prominent. Flowers pale lavender, short pedicellate, nodding, in nodding, racemose clusters at top of a bracteate stalk shorter than leaves but two to three or more times longer than leafy stem; the fruit ellipsoidal, about 1 cm. in diameter, ridged. (The following cited specimens are probably this species.)

Tongatapu: in shady forested area near Sopu, May 30, 1953, *Yuncker 15295*.

Nomuka: in shade of thicket along road encircling island, Apr. 30, 1953, *Yuncker 15863*.

Vava'u: in open grassy area near village of Leimatua, May 20, 1953, *Yuncker 16051*.

Occasional in shade of shrubs or in open forest at lower altitudes. Australia, New Caledonia, New Guinea, Fiji.

Genus **Dendrobium** Swartz

Dendrobium macranthum A. Richard, Sertum Astrolabicum, 15, pl. 6, 1834.

Stout, glabrous herb about 60 cm. high. Stem with numerous, distichous, elliptic leaves up to 11 cm. long and 4 cm. wide, sessile blades unequally bilobed at apex. Raceme terminal, loosely 6- to 9-flowered; flowers rather large, long-pedicelled, white.

'Eua: *Lister*.

New Hebrides, Samoa.

Dendrobium platygastrum Reichenbach f., *Otia Bot. Hamburg*, 55, 1878.

Rather low, glabrous, epiphytic herb. Stem 20 cm. or more tall, clavate, broadly flattened upward, adorned with bases of clasping leaves, glossy, golden colored. Leaves several, distichous, elliptic or oblong-elliptic, acute, up to 14 cm. long and 4-5 cm. wide, parallel-nerved. Flowers rather small, on pedicels about 1 cm. long, in loosely few-flowered racemose clusters; capsule ellipsoidal, about 2 cm. long.

Kao: on tree in forest on rather steep lower slope of island, May 6, 1953, *Yuncker 15934*.

Infrequent. Fiji.

Dendrobium tokai Reichenbach f., *Hamb. Gartenz.* 21:293, 1865; in Seemann, *Fl. Vit.*, 304, pl. 92, 1868.

Stout, coarse, glabrous, epiphytic herb, stems up to 50-100 cm. long. Leaves oblong to elliptic or lanceolate-ovate, obtuse, with base narrowed to clasping petiole, leathery, parallel-nerved, up to 15.5 cm. long and 4.5 cm. wide. Racemes large, terminal or lateral, loosely flowered; flowers attractive, greenish yellow with a violet-striped lip up to 5 cm. or more wide, on slender pedicels 2-5 cm. long.

Vava'u: on branch of large tree in forested area near lagoon at Vaihoi, near village of Leimatua, May 26, 1953, *Yuncker 16202*. This conspicuous and attractive species was found only at this station; but a Tongan Government officer said that it also occurs on Niuatoputapu (Keppel Island).

Fiji, Samoa, San Cristobal Island.

Genus **Bulbophyllum** Thouars**Bulbophyllum rostriceps** Reichenbach f., *Otia Bot. Hamburg*, 55, 1878.

Small, glabrous, epiphytic herb with slender, creeping stem rooting at nodes, and bearing remote small pseudobulbs. Leaves elliptic-oblong, acute at both ends, up to 6.5 cm. long and 1 cm. wide, parallel-nerved, shortly petioled. Flowers pink or magenta, on very slender pedicels up to 4 cm. or more long.

Kao: on forest tree, steep rocky slope, May 6, 1953, *Yuncker 15903*. Probably this species.

Infrequent. Fiji.

Genus **Phreatia** Lindley**Phreatia graeffei** Kränzlin, *Pflanzenr.* 50 (IV. 50^{II}, B²³: 26, 1911).

Glabrous, epiphytic herb; short stem concealed by equitant, spreading leaf sheaths. Leaves oblong, abruptly obtuse and unequally bilobed, with base conduplicate, up to 30 cm. or more long and 4 cm. wide, parallel-nerved. Inflorescence up to 24 cm. long. Flowers white or yellowish, minute, on short pedicels, in a dense spikelike raceme up to 13 cm. long.

Kao: on tree in forest on steep slope, May 6, 1953, *Yuncker 15902*. Probably this species.

Infrequent. Fiji. Samoa.

Genus **Saccolabium** Blume

Saccolabium constrictum Reichenbach f., *Otia Bot. Hamburg*, 52, 1878.

Glabrous, epiphytic herb, with stout stem up to about 30 cm. or more long. Leaves leathery, oblong to ligulate or rarely elliptic-oblong, obtuse and unequally bilobed at apex, clasping at sessile base, 10-23 cm. long, up to 3 cm. wide. Inflorescences lateral, up to about 30 cm. long, bearing racemes up to 15 cm. long. Flowers small, dense, white to deep purplish pink, on pedicels scarcely 1 cm. long.

'Eua: on tree in forest along trail to summit of eastern ridge at about middle of island, Mar. 30, 1953, *Yuncker 15571*; on branches of tree in rather dense forest near center of island, Mar. 21, 1953, *Yuncker 15408* (sterile); on tree, margin of forest above Fuai plantation, Mar. 29, 1953, *Yuncker 15550* (sterile).

Rather frequent. Fiji.

Genus **Taeniophyllum** Blume

Taeniophyllum fasciola (Forster f.) Reichenbach f., in Seemann, *Fl. Vit.*, 296, 1868.

Small, leafless epiphyte with roots flattened and chlorophyll-bearing, spreading octopuslike on bark of trees. Flowers very small, white, in short racemes; fruit cylindrical, up to 2 cm. long, ridged, short-apiculate.

Tongatapu: near shore on peninsula northwest of Hofoa, on bark of *Pittosporum*, Oct. 30, 1951, *Hürlimann 88*; on tree trunk in open forest near shore, Sopu, Feb. 25, 1953, *Yuncker 15019*; on tree trunk in swampy area near Nualei village, Mar. 9, 1953, *Yuncker 15228*; on tree trunk in open forest, west of Nuku'alofa, May 30, 1953, *Yuncker 16207*.

Rather frequent on trees, usually near the shore. Most of the specimens observed were not in flower but it is believed that they all belong to this species. Guam, Fiji, Samoa, Society Islands.

Tongan name: *kumukumu tahi*.

FAMILY CASUARINACEAE

Genus **Casuarina** Linnaeus

Casuarina equisetifolia Linnaeus, *Amoen. Acad.* 4: 143, 1759 (fig. 2, b).

Tall, hard-wooded tree, somewhat resembling a pine. Leaves very small, whorled, awl-shaped. Branchlets numerous, very slender, green, longitudinally ribbed, equisetum-like. Flowers mostly monoecious; male flowers in terminal, spikelike inflorescence; female flowers in a subglobose, short-pedunculate head which ripens into a hard, rough, conelike fruit 1-1.5 cm. or more long.

Tongatapu: *Home*; *Cartwright*; on small island outside of Fatai, Oct. 30, 1951, *Hürlimann 66*.

'Eua: on low hill in open grazing area near center of island, Mar. 24, 1953, *Yuncker 15453*.

Vava'u: *Crosby*; near upper rim of steep seaside cliff above Leimatua, May 30, 1953, *Yuncker 16060*.

Niufo'ou: near upper edge of recent lava flow on way to upper rim of main crater, May 16, 1953, *Yuncker 15993*; on shore of great lake in sector of Futu, Jan. 7, 1952, *Hürlimann 667*.

Niuatoputapu: on mountain ridge above Vaipoa, Dec. 5, 1951, *Hürlimann 355*.

Occasional throughout the group but abundant on Niufo'ou. From Indo-Malaysia to Polynesia and now in cultivation in most tropical countries.

Tongan name: *toa*.

The bark is used in medicines and the hard, durable wood is a favorite in the construction of houses, the manufacture of tool handles, and so forth.

FAMILY PIPERACEAE

Genus *Piper* Linnaeus

Piper latifolium Linnaeus f., *Suppl. Pl. Emendanda*, 468, 1781.

Shrub, up to 3 m. or more tall. Leaves suborbicular, shortly acute, base rounded-truncate or cordate, up to about 10 cm. wide or sometimes much larger, glabrous, palmately 11-12-nerved, petiole up to 6 cm. in length, vaginate-winged to near blade. Spikes multiple, axillary, up to 10 cm. or more long and 4-6 mm. in diameter, floral bracts round-peltate, flowers dioecious.

Tongatapu: *Forster; Moseley*.

I found no specimens of this species, and I suspect that the ones collected by Forster and by Moseley, as reported by Hemsley, are *P. puberulum* (Benth) Benth. Not having these specimens available at the present time, it is not possible to determine their identity. *P. latifolium* is said to occur from the Society Islands westward to the New Hebrides, although it appears to be absent from Samoa and Fiji.

Piper methysticum Forster f., *De Plant. Esculent.*, 76, 1786.

Shrub with thick, woody rhizome, up to 3 m. or more tall, glabrous, nodes swollen. Leaves round-ovate, short-acuminate, base deeply cordate, up to 20 cm. or more long and 15-20 cm. wide, palmately 9-13-nerved, nerves minutely puberulent beneath, petiole up to 3 cm. long, vaginate at base. Spikes leaf-opposed, solitary, up to 5 or 6 cm. long, greenish white.

Tongatapu: *Home*.

'Eua: *Lister*; cultivated at Fuai plantation near center of island, Mar. 28, 1953, *Yuncker 15541*.

Vava'u: *Crosby*; along trail on way to summit of Talau, west of Neiafu, May 23, 1953, *Yuncker 16149*.

Of ancient introduction. Aside from one or two plantings of less than an acre each, all of the plants noted were occasional specimens about villages or borders of plantations, and the like.

Tongan name: *kava*.

The roots are pulverized and used in the preparation of the beverage known as kava.

Piper puberulum (Benthani) Benthani, in Seemann, Fl. Vit., 262, as synonym, and pl. 75, 1868.

Shrub 1-3 m. tall, stems nodose. Leaves alternate, elliptic to rounded-ovate, acuminate, base from acute to shallowly cordate, very variable in size, up to 15 cm. long and as wide, palmately 7-9-nerved, main nerves branching upward, the petiole 3 cm. or less long, vaginate-winged to middle or above. Spikes solitary, axillary, up to 15 cm. or more long; fruit fleshy and red when mature. (The following two varieties occur in Tonga.)

Piper puberulum var. *puberulum*.

Lower surface of leaf blades puberulent.

Kao: on rocky slope in thin forest, May 6, 1953, *Yuncker 15874*.

Seemingly rare in Tonga although rather frequent in Fiji.

Piper puberulum var. *glabrum* (C. de Candolle) A. C. Smith, Jour. Arnold Arboretum 24: 356, 1943.

Leaf blades glabrous on both sides.

Tongatapu: common in thickets about Vaini village, Feb. 26, 1953, *Yuncker 15063*; in thicket near coast below village of Navutoka, Feb. 27, 1953, *Yuncker 15096*.

'Eua: in thicket above Fuai plantation, Mar. 20, 1953, *Yuncker 15370*; on limestone margin of sinkhole in forest near center of island, Mar. 18, 1953, *Yuncker 15323*.

Vava'u: margin of open forest above Leimatua village, May 18, 1953, *Yuncker 16024*; in thicket near upper rim of seaside limestone cliff along northwestern side of island, May 25, 1953, *Yuncker 16163*.

This variety is very common throughout Tonga, often forming extensive colonies in open forests or in partial shade. It is presumed that the specimens collected on Tongatapu by Home and on 'Eua by Lister (as reported by Hemsley) and by Crosby on Vava'u (as reported by Burkill) are this variety. Also in Fiji and Samoa. For an extensive discussion of this and other Pacific species of *Piper* see A. C. Smith (Jour. Arnold Arboretum 24: 347-361, 1943).

P. macgillivrayi C.DC. in Hemsley's and Burkill's lists.

Tongan name: *kavakava'uli*.

The leaves are used in preparing medicines.

Genus *Peperomia* Ruiz and Pavon

Peperomia leptostachya Hooker and Arnott, Bot. Beechey Voy., 96, 1832.

Decumbent-ascending, pubescent, succulent herb. Leaves opposite or more commonly in whorls of three, oval to obovate, usually acute at both ends, up to 5 or 6 cm. long and 2-3 cm. wide, palmately five-nerved, petiole up to 1 cm. long. Spikes slender, axillary and terminal, up to 10 cm. or more long; fruit scarcely 1 mm. long, globose-subobovoid, viscid.

'Eua: *Lister*; along trail to summit of east-central ridge, on old limestone outcrop, Mar. 30, 1953, *Yuncker 15564*; on limestone rocks in deep shady ravine near Ohonua village, Apr. 2, 1953, *Yuncker 15617*; on sea-facing side of limestone cliff near top of eastern ridge, Apr. 8, 1953, *Yuncker 15680*.

So far as known, this species is found only on 'Eua Island in Tonga. It is, however, one of the commonest and most widespread of the Polynesian species.

Tongan name: *mata taha, matatane*.

Peperomia sp.

Low, decumbent-ascending, glabrous herb. Leaves alternate, lance-elliptic, acute at both ends, palmately five-nerved.

'Eua: epiphyte, on tree in rather thick forest near summit of eastern ridge, Mar. 30, 1953, *Yuncker 15552*; on sea-facing limestone cliff in thicket near top of eastern ridge at about its center, Apr. 8, 1953, *Yuncker 15681*.

As only sterile specimens of this species were found, it is not possible to identify it with certainty. In vegetative characteristics the plants resemble forms of *P. lasiostigma* C. de Candolle of Fiji. They also are suggestive of *P. biformis* C. de Candolle of Samoa.

FAMILY SALICACEAE

Genus **Salix** Linnaeus

Salix babylonica Linnaeus, Sp. Pl., 1017, 1753.

Large, broad-crowned tree with very slender branches of weeping habit. Leaves alternate, narrowly lanceolate, slenderly acuminate, serrate, up to 15 cm. long, pinnately nerved. Flowers in catkins.

Tongatapu: yard tree in Nuku'alofa, Mar. 7, 1953, *Yuncker 15207*; Nov. 23, 1951, *Hürlimann 300*. This was the only specimen seen.

Presumably of rather recent introduction. An Asiatic species now of wide distribution throughout the world as an ornamental.

Tongan names: *hakoloa'ani, uilow*.

FAMILY ULMACEAE

Genus **Celtis** Linnaeus

Celtis sp.

Nomuka: sterile tree about 5 m. tall, stem about 10 cm. in diameter, in thicket near central lake, along road encircling island between sea and lake, Apr. 30, 1953, *Yuncker 15848*.

While this is probably the species referred by Hemsley (Linn. Soc. Bot., Jour. 30: 192, 1894) to *C. pacifica* Planchon, it does not appear to represent that species, which is apparently limited to eastern Polynesia. Neither does

our plant represent *C. paniculata* (Endlicher) Planchon, originally from Norfolk Island but often accredited with a wide distribution in the Pacific. The Niue plant which I listed (B. P. Bishop Mus., Bull. 178: 45, 1943) as *C. paniculata* seems closer to the Fijian *C. harperi* Horne. This is perhaps also the closest relative to the Tongan plant, represented further by a U.S. Exploring Expedition specimen (US 206851) from Tongatapu, but the identity of my material must await a study of the genus throughout the Pacific. (See A. C. Smith, Torrey Bot. Club, Bull. 70: 535-537, 1943, for notes on the two species from Fiji.)

Genus *Trema* Loureiro

Trema amboinensis (Willdenow) Blume, Mus. Bot. Lugd.-Bat. 2: 61, 1856.

Tree, up to 7-8 m. tall. Leaves two-ranked, alternate, oblong-ovate to lanceolate, acuminate, base cordate, up to 15 cm. long and 5 cm. wide, scabrid above, soft-pubescent beneath, finely serrate, palmately three-nerved, midrib strongly branching upward, petiole about 1 cm. long. Flowers very small, numerous, in dense, pubescent, axillary, cymose clusters.

Tongatapu: *Graeffe*; in old clearing between Fatai village and the sea, Mar. 10, 1953, *Yuncker 15252*.

Vava'u: *Crosby*.

Occasional. Southeastern China to Australia and eastward to Polynesia.

Given as *Sponia ambryncensis* [*amboinensis*] Decne. in Burkill's list.

Tongan name: *mangle*. The leaves are used in preparing medicines.

Trema orientalis (Linnaeus) Blume var. ***viridis*** Lauterbach, Engler Bot. Jahrb. 50: 321, fig. 2, D, 1913.

Small to medium-sized tree, or sometimes a shrub, with reddish bark and finely pubescent branches. Leaves alternate, ovate-lanceolate, acuminate, base shallowly and somewhat obliquely cordate, scabrous, crenately toothed, up to 9 cm. or more long and 4-5 cm. wide, palmately three-nerved, midrib branched upward, petiole about 1 cm. long. Flowers small, greenish, in small, axillary cymes.

'Eua: in forested area near sea, vicinity of Ha'aluma, Apr. 1, 1953, *Yuncker 15604*.

Nomuka: in thicket along road encircling island, Apr. 30, 1953, *Yuncker 15837*.

Lifuka: in clearing near eastern end of island, Apr. 27, 1953, *Yuncker 15762*.

Kao: in thicket near lower margin of slope forest, *Yuncker 15938*.

Niutopotapu: northern slope of mountain range above Vaipoa, Dec. 27, 1951, *Hürlimann 637*.

Frequent in thickets throughout Tonga. Other Pacific islands.

Tongan name: *mangle*.

The leaves are used in medicines.

The species of *Trema*, as represented in Tonga, are separated with difficulty, and it is possible that only one species occurs in the Fiji-Tongan area. In addition to the two given above, Hemsley reported *T. discolor* B. and H., based on a Tongatapu collection by Moseley. It is believed likely that this collection represents one of the two species given, probably *T. orientalis*.

FAMILY MORACEAE

Genus **Morus** Linnaeus**Morus alba** Linnaeus, Sp. Pl., 986, 1753.

Shrub or small tree, up to 5 or 6 m. tall. Leaves ovate, acute, base truncate or cordate, toothed and sometimes lobed, nearly glabrous, three-nerved from base, midrib branched upward, 10-12 cm. or more long and 7-8 cm. wide, petiole slender, 3-4 cm. long. Flowers small, in short, dense, headlike, axillary, pedunculate clusters; fruit up to 2 cm. long, fleshy, edible, purple when mature.

Tongatapu: in thicket between village of Fatai and sea, Mar. 10, 1953, *Yuncker 15255*.

Infrequent in Tonga. A native of tropical Asia, now widely distributed in temperate and warm countries.

Tongan name: *fuamelic*.

Genus **Broussonetia** L'Héritier**Broussonetia papyrifera** (Linnaeus) Ventenat, Tabl. Regn. Veg. 3: 547, 1794.

Small tree or shrub, up to 8 m. tall, with densely hairy branches and milky latex. Leaves alternate, scabrous above, velvety beneath, ovate, sharply acuminate, base cordate, serrate, entire or often lobed, up to 18 cm. or more long and 15 cm. wide, petioles up to 6 cm. or more long. Flowers small, in axillary clusters; fruit club-shaped, pulpy.

Tongatapu: in old plantation near Lavengatonga Village, Mar. 6, 1953, *Yuncker 15179*.

'Eua: near Pangai village, Mar. 25, 1953, *Yuncker 15471*.

Vava'u: *Crosby*.

Of ancient introduction, now more or less naturalized throughout Tonga. An eastern Asiatic species now widely introduced throughout the Pacific islands area.

Tongan name: *hiapo*.

The fibrous bark is used to make tapa, or bark cloth.

Genus **Artocarpus** Forster**Artocarpus altilis** (Parkinson) Fosberg, Washington Acad. Sci., Jour. 31: 95, 1941.

Medium to large, round-topped tree, latex abundant, milky. Leaves alternate, up to 60 cm. or more long and 30 cm. wide, rather thick, deeply pinnately lobed, lobes acuminate

or, in some varieties, entire or shallowly divided with two or four short, triangular lobes, petioles short. Male flowers in large, dense, yellow, club-shaped, spikelike clusters, female flowers in globose to oval, headlike clusters which develop into round or oval fruits 15 cm. or more thick.

Frequent in plantations and about dwellings throughout Tonga. A Malaysian species now cultivated throughout the Pacific islands area.

Tongan name: *mei*.

The cooked fruit is an important item in the diet of the Tongans, who distinguish the following varieties:

Avcloloa: leaf is of medium size, the fruit oval and many-seeded.

Avcnonou: fruit is smaller than that of *avcloloa*.

Kca kulufau: fruit is very large and round.

Kca ma'ama'a: fruit is oval, prickly or scabrous.

Lautolo: fruit is of medium size, round; leaves deeply pinnately lobed.

Ma'ofala: fruit is very small, oval.

Maopo: fruit is large, oval, smooth; leaves toothed.

Puou: leaves are lobed, the fruit medium-sized, round.

I'ahivahi: leaves are rather deeply lobed, the fruit medium-sized, round.

This species has more frequently been known as *Artocarpus incisa* (Thunberg) Linnaeus f. or *A. communis* Forster. For a comment on the status of Parkinson's original description of this and other questionably proposed species, see Merrill (Chron. Bot. 14: 359 ff., 1954).

Artocarpus integra (Thunberg) Merrill, Interpret. Herb. Amboin., 190, 1917.

Tree, up to 12-15 m. tall. Leaves alternate, elliptic-oblong to obovate, short-acuminate, base acute, entire or sometimes three-lobed, up to 15 cm. or more long. Male flowers in terminal or axillary spikelike clusters, up to 8 cm. long and 2.5 cm. in diameter, female flowers in globose or oblong heads borne on trunk or older branches; fruit green, oblong, up to 50 cm. or more long.

Vava'u: *Crosby*.

Occasional. An Asiatic species now widely distributed in warm countries.

A. integrifolia L. in Burkill's list.

Tongan name: *mei*.

The fruit is used as food.

Genus **Antiaris** Leschenault

Antiaris bennettii Seemann, Bonplandia 10: 3, pl. 7, 1862.

Medium-sized tree, branchlets and petioles pubescent glabrescent. Leaves ovate-oblong or elliptic-oblong, acuminate, base inequilaterally subcordate, glabrous, pinnately nerved, lateral nerves submarginally loop-connected, petiole comparatively short. Flowers monoecious, male congested in disklike, short-pedunculate receptacles, in axillary fascicles, female solitary, fruit drupaceous, ovate, densely hairy.

Tongatapu: *Home*.

Also in Fiji.

Hemsley (Linn. Soc. Bot., Jour. 30: 193, 1895) includes this species in his Flora of Tonga on the basis of a collection made by Home. One of the names applied by Fijians to this plant is *navu ni toga*. Seemann (Fl. Vit., 252, 1865) says: "*Navu ni Toga* literally means the *navu* from the Tongan islands; and it is not improbable that the tree may have been introduced from there. I have not met with any specimens from Tonga in our herbaria; but that would not prove that *A. bennettii* has originally not been derived from Tonga, as that group has been explored only very superficially, and Sir E. Home found it east of Fiji, viz. at Wallis Island in long. 176° W."

No specimens of this tree were found and no reference was made to any plant of this description by Tongans; nor have I been able to verify the accuracy of the Hemsley citation. If it occurs in Tonga, it is rare.

Genus **Ficus** Tournefort

The following species of *Ficus* were identified by E. J. H. Corner.

Ficus aspera Forster f., De Plant. Esculent., 36, 1786.

Small tree up to 8 m. or more tall, with red or yellow fruit.

Tongatapu: *Moseley*.

New Hebrides and probably Fiji but reported from Tonga only on the basis of the Moseley collection.

Ficus carica Linnaeus, Sp. Pl., 1059, 1753.

Small tree sometimes up to 8 m. tall, young growth finely pubescent. Leaves alternate, rounded-ovate in outline, palmately lobed and nerved, bluntly acute, base cordate, finely pubescent, petioles about as long as blade. Flowers dioecious, fruit large, pear-shaped, fleshy, edible.

The edible fig of commerce, this Asiatic species is now widely cultivated in warm countries. Several well-grown trees were seen in Tonga.

Ficus obliqua Forster f., Fl. Ins. Australium, Prodr., 77, 1786.

Broad-topped tree, up to 30 m. or more tall. Leaves alternate, elliptic-oblongate, acute, base acute or slightly cordulate and obtuse, entire, glabrous, up to 8 cm. or more long and 4 cm. wide, pinnately nerved, midrib prominent, lateral nerves fine and inconspicuous, petioles up to 2 cm. long. Fruit about 5 mm. in diameter, globose, orange-colored.

Tongatapu: behind post office, Nuku'alofa, Nov. 23, 1951, *Hürlimann 289*; growing in open forest near Navutoka village, Feb. 27, 1953, *Yuncker 15122*; growing about a semi-dead tree along the trail between Fatai village and sea, Mar. 10, 1953, *Yuncker 15251*.

'Eua: in seaside forest, Ha'aluma, Apr. 1, 1953, *Yuncker 15603*.

Lifuka: in thicket near sea along coast north of Pangai village, Apr. 24, 1953, *Yuncker 15744*.

Vava'u: *Crosby*.

Niuatoputapu: in yard in Hihifo, Dec. 6, 1951, *Hürlimann 372*.

Frequent throughout Tonga. Samoa to the New Hebrides.

Tongan name: 'ovava.

The leaves are used in preparing medicines.

Ficus prolixa Forster f., Fl. Ins. Australia, Prodr., 77, 1786.

Medium to large, round-topped tree. Leaves alternate, elliptic-oblong or oblanceolate, acute at both ends, up to 15 cm. or more long and 6 cm. wide but mostly somewhat smaller, entire, glabrous, pinnately nerved, midrib prominent, lateral nerves slender, petioles up to 2 cm. long. Fruit globose, 5 mm. in diameter.

Tongatapu: *Forster*.

Vava'u: *Crosby*.

Possibly widespread in the Pacific but reported from Tonga only on the basis of the Forster and Crosby collections.

Ficus pumila Linnaeus, Sp. Pl., 1060, 1753.

Small, hairy, woody vine, adhering to walls and so forth, with rootlike tendrils. Leaves ovate-cordate, acute, scarcely 5 cm. long, reticulate-veiny, puberulent, sessile or subsessile. Flowers and fruit rare.

Tongatapu: covering walls of water tank near house in Nualei village, Mar. 9, 1953, *Yuncker 16255*.

Infrequent. An Indo-malayan plant widely distributed in warm countries as an ornamental vine.

Ficus scabra Forster f., Fl. Ins. Australia, Prodr., 76, 1786.

Rather small tree with puberulent twigs. Leaves alternate, ovate, acute, base rounded-cordate, oblique, up to 15 cm. or more long and 12 cm. wide, scabrous, pinnately nerved, nerves puberulent, petioles about 1 cm. long. Fruit globose, about 1 cm. in diameter, puberulent; peduncle short.

Tongatapu: *Home*; in forest near lagoon, near Vaini village, Feb. 26, 1953, *Yuncker 15049*; near Fangaveha, clinging to face of perpendicular seaside limestone cliff, some branches pendent, June 7, 1953, *Yuncker 16249*.

'Ūua: in open forest above Fuai plantation near center of island, Mar. 20, 1953, *Yuncker 15387*.

Kao: in thin soil, in rocky alpine area near summit, alt. about 860 m., May 6, 1953, *Yuncker 15920*.

Niuatoputapu: on northwest slope of the mountain ridge above Hihifo, Dec. 5, 1951, *Hürlimann 338*.

Found throughout Tonga. Also in Samoa and perhaps elsewhere but frequently too widely interpreted.

This species resembles *F. storckii* closely: but according to E. J. H. Corner, who has studied the types, they differ in the fact that *F. storckii* has cystoliths on both sides of the lamina, whereas *F. scabra* has them on only the underside.

Tongan name: *masi'ata*.

Ficus storckii Seemann, Fl. Vit., 251, pl. 69, 1868.

Small tree, up to 7 m. or more tall, young growth puberulent. Leaves alternate, acuminate, base obliquely rounded, obtuse or subcordate, up to 15 cm. or more long and 6 cm. wide, palmately three-nerved, midrib strongly branched upward, petioles mostly 2-3 cm. long. Fruit globose, about 1 cm. in diameter, clustered along the stem, dull red.

Vava'u: *Barclay*.

In Niue and Fiji, but reported from Tonga only on the basis of the Barclay collection.

Ficus tinctoria Forster f., Fl. Ins. Australia, Prodr., 76, 1786.

Shrub or medium-sized tree with wide-spreading branches, up to 10 m. or more tall. Leaves alternate, elliptic or elliptic-ovate, acute, base obliquely acute or obtusish, up to 20 cm. or more long and 8 cm. wide but mostly smaller, glabrous, entire, pinnately nerved, lateral nerves slender, somewhat reticulate venulose, often purplish beneath in dry specimens, petiole about 1 cm. long. Fruit axillary, globose, yellow or orange, about 12 mm. in diameter; peduncles about 1 cm. long.

Tongatapu: *Home*; in forest near lagoon, near Vaini village, Feb. 26, 1953, *Yuncker 15068*.

'Eua: *Lister*; in edge of forest near center of island, Mar. 18, 1953, *Yuncker 15330*; near summit of sea-facing limestone cliff near middle of eastern ridge, Apr. 8, 1953, *Yuncker 15689*.

Vava'u: *Crosby*; edge of mangrove thicket, shore below Houma village, May 22, 1953, *Yuncker 16124*; upper rim of seaside limestone cliff along north-western side of island, May 25, 1953, *Yuncker 16170*; near margin of lagoon, Vaihoi, May 26, 1953, *Yuncker 16188, 16192*.

Niuafou'u: above great lake in interior of crater in sector of Futu, Jan. 7, 1953, *Hürlimann 670*.

Frequent throughout Tonga. Formosa and Micronesia to Fiji and Polynesia.

Tongan names: *masi, masi pa, masi'ata*.

FAMILY URTICACEAE

Genus **Laportea** Gaudichaud**Laportea harveyi** Seemann, Bonplandia 9: 259, 1861, *nomen*; Fl. Vit., 238, pl. 59, 1868.

Large forest tree, up to 15 m. or more tall, trunk becoming 1 m. or more thick. Leaves alternate, broadly ovate or oval-ovate, acute, base rounded, obtuse or cordate, irregularly toothed, up to 30 cm. or more long and 20 cm. wide, three-nerved from base, midrib branched upward, thin, with stinging hairs, petiole up to 15 cm. or more long. Flowers very small, greenish white, numerous, in large, axillary, paniculate clusters.

'Eua: *Lister*; in central valley between Pangai and Fuai, Nov. 8, 1951, *Hürlimann 156*; in forest above Fuai plantation, near center of island, Mar. 18, 1953, *Yuncker 15329*.

Tafahi: beside road from township of Tafahi toward Faihavanui, in forest on steep volcanic slope, Dec. 18, 1951, *Hürlimann 614*.

Frequent on 'Eua, occasional elsewhere in Tonga. Also in Fiji and Niue. Tongan name: *salato*.

Contact with the leaves produces a very painful and persistent sting. I was told that whipping with the leaves was sometimes used in early times as a form of punishment.

Genus **Fleurya** Gaudichaud

Fleurya interrupta (Linnaeus) Gaudichaud, Voy. Freycinet, Bot., 497, 1826.

Herbaceous, scantily branched, nearly glabrous plant, up to 30 cm. or more tall. Leaves alternate, thin, ovate, acuminate, base rounded, truncate or subcordate, coarsely toothed, up to 6-8 cm. or more long and 5-6 cm. wide, petioles slender, up to 6-8 cm. or more long. Flowers small, greenish, in small clusters scattered along a slender, axillary peduncle.

Tongatapu: *Cook; Moscley*.

Vava'u: *Crosby*.

Tafahi: in plantation above road from township of Tafahi toward Faihavanui, Dec. 15, 1951, *Hürlimann 561*.

An occasional weed of plantations. From Africa to Australia and Polynesia.

Genus **Pilea** Lindley

Pilea microphylla (Linnaeus) Liebmann, Vidensk. Selsk. Skr. 5(2): 302, 1851.

Low, much-branched, glabrous, succulent, fernlike plant with tender stems. Leaves opposite, elliptic to spatulate or obovate, 3-4 mm. long. Flowers mostly monoecious, minute, greenish, clustered in leaf axils, stamens opening explosively.

Tongatapu: in moist soil under water tank in Nuku'alofa, Mar. 5, 1953, *Yuncker 15174*.

Occasional on moist soil, walls, rocks, and so forth, especially about villages. A tropical American species of wide distribution in warm countries. Often used as an ornamental pot plant.

Genus **Procris** Commerson

Procris pedunculata (J. R. and G. Forster) Weddell var. **ornata** A. C. Smith, *Sargentia* 1: 25, 1942.

Fleshy, somewhat decumbent, glabrous, terrestrial or epiphytic herb. Leaves alternate, up to about 15 cm. long, oblanceolate-oblong, acuminate, base oblique, petioles scarcely 1 cm. long. Flowers white, monoecious or dioecious, male flowers in branching, axillary clusters, female flowers crowded on a fleshy, headlike, axillary receptacle becoming red when mature.

'Eua: on moist forest floor along trail from central plain to summit of

eastern ridge, Mar. 20, 1953, *Yuncker 15559*; on limestone cliff facing sea, near summit of eastern ridge, about middle of island, Apr. 8, 1953, *Yuncker 15687*.

Local in distribution in Tonga. Society Islands, Samoa, Niue, Melanesia and westward to Java or beyond.

Elatostemma sesquifolium Hassk. of Hemsley's list, based on a specimen collected on 'Eua by Lister, is presumably referable to this variety. Schröter (Fedde Repert. Sp. Nov. **45**: 265, 1938) so cites a Lister collection from 'Eua.

Genus *Pipturus* Weddell

Identifications of *Pipturus* are by Carl Skottsberg.

Pipturus argenteus (Forster f.) Weddell var. ***lanosus*** Skottsberg, Acta Horti Gothob. **7**: 62, 1932.

Small tree, up to 8 m. or more tall, young growth rather densely white-pubescent. Leaves alternate, oval-ovate, acuminate, base obtuse or abruptly acute, up to 15 cm. long and 8 cm wide, serrate, three-nerved from base, midrib branched upward, green above, white-woolly beneath, petiole slender, up to 8 cm. long. Flowers greenish white, in few-flowered, headlike clusters scattered along slender, axillary peduncles; fruit fleshy.

Tongatapu: *Forster*; in clearing along trail below Nualei, Mar. 9, 1953, *Yuncker 15225*.

'Eua: border of cliff on windswept limestone rocks near center of eastern ridge, Nov. 9, 1951, *Hürlimann 211*; in deep ravine short distance northeast of Ohonua village, Apr. 2, 1953, *Yuncker 15614*; on seaward face of limestone cliff on eastern ridge, Apr. 8, 1953, *Yuncker 15682*.

Kao: on rocky slope in open forest, May 6, 1953, *Yuncker 15879*.

Vava'u: *Lister*; near upper rim of limestone coastal cliff along north-western side of island, May 25, 1953, *Yuncker 16162*.

Niufo'ou: in crevice of 1946 lava flow along way to summit of main central crater, May 16, 1953, *Yuncker 15998*.

Tafahi: on rocky, volcanic soil, beside path from township of Tafahi to the Piu 'o Tafahi, Dec. 10, 1951, *Hürlimann 403*; on steep slope above northeast coast near northern end of island, Dec. 17, 1951, *Hürlimann 599*; on rocky volcanic soil, steep slope beneath township of Tafahi, Dec. 13, 1951, *Hürlimann 481*.

Niuatoputapu: bush forest on volcanic rock soil, on mountain range, eastward of Vaipoa, Dec. 5, 1951, *Hürlimann 364*.

Frequent on cliffs and rocky areas throughout Tonga. Also in Samoa and Rotuma.

Presumably, this is the *P. argenteus* Wedd. of Hemsley's and Burkill's lists.

Tongan names: *olonga, tou*.

A cordage fiber is obtained from the bark, and the bark and leaves are used in the preparation of medicines.

Pipturus argenteus (Forster f.) Weddell var. ?

Small tree. Leaves elliptic-lanceolate, up to 10 cm. long and 4 cm. wide, green, rugose, slightly pubescent above, very densely white-lanate beneath. Flowers minute, short-pedicellate, in small paniculate, axillary clusters.

Kao: on rocky slope in clearing in forest, May 6, 1953, *Yuncker 15899*.

Tongan name: *tou*.

FAMILY SANTALACEAE

Genus **Santalum** Linnaeus

Identifications of *Santalum* are by Carl Skottsberg.

Santalum yasi Seemann, *Bonplandia* 9: 258, 1861, *nomen*; Fl. Vit., 210, pl. 55, 1867.

Glabrous shrub or small tree, 4-5 m. or sometimes up to 7 m. tall, young branches slender and often somewhat pendulous. Leaves opposite, lanceolate, acute or acuminate, base acute, up to 8 or 9 cm. long and 2 cm. wide, pinnately nerved, petiole scarcely 1 cm. long, narrowly ridged by decurrent leaf blade. Flowers small, four-parted, at first greenish white, becoming dark red or purplish, short-pedicellate, in axillary, paniculate clusters up to 2 or 3 cm. long; fruit about 1 cm. in diameter and black when mature.

Tongatapu: toward coast near Fatai, Oct. 30, 1951, *Hürlimann 60*; on limestone terrace westward of Fu'amotu, Nov. 3, 1951, *Hürlimann 142*; in beach thicket, Sopa, Feb. 25, 1953, *Yuncker 15016*; in thicket near Niutoua village, Mar. 2, 1953, *Yuncker 15161*.

'Eua: in old clearing back of Pangai village along way to Fuai, Mar. 25, 1953, *Yuncker 15474*.

Nomuka: in thicket along road encircling island between sea and central lake, Apr. 30, 1953, *Yuncker 15853*.

Lifuka: near beach north of Pangai village, Apr. 24, 1953, *Yuncker 15702*.

Vava'u: along trail leading to summit of Talau, west of Neiafu, May 23, 1953, *Yuncker 16142*.

Niutopotapu: on volcanic soil on mountain ridge above Vaipoa, Dec. 5, 1951, *Hürlimann 350*.

Frequent in thickets throughout Tonga. Also in Fiji.

Tongan name: *ahi*.

The wood is fragrant and is used to perfume oil.

FAMILY OLACACEAE

Genus **Anacolosa** Blume

Anacolosa lutea Gillespie, B. P. Bishop Mus., Bull. 91: 5, fig. 3, 1932.

Small tree, up to 4 or 5 m. tall, branchlets slender. Leaves appearing two-ranked, oblong-elliptic or ovate, obtuse or acutish, base acute, up to 15 cm. long and 5 cm. wide, coriaceous, entire, pinnately nerved, petiole about 5 mm. long. Flowers six-parted, about

4 mm. long, white, in few-flowered, axillary fascicles; fruit subglobose or ovoid, yellow, about 2 cm. long, somewhat angled.

Vava'u: *Crosby*; along margin of lagoon, Vaihoi, May 26, 1953, *Yuncker 16184*.

Infrequent. Also in Fiji and Samoa.

Presumably, this is the *A. ilicoides* Mast. of Burkill's list.

Genus *Ximenia* Plumier

Ximenia americana Linnaeus, Sp. Pl., 1193, 1753.

Small, somewhat thorny tree, up to 3 m. tall. Leaves alternate, elliptic or oblong-elliptic, retuse with mucro, base acutish, up to 7 cm. long and 3.5 cm. wide, glabrous, petiole 5-8 mm. long. Flowers four-parted, white, fragrant, about 5 mm. long, pubescent within, in short, usually axillary racemes; fruit juicy, edible.

Tongatapu: along coast north of Hofoa, Oct. 30, 1951, *Hürlimann 91*; in seaside forest, below Navutoka village, Feb. 27, 1953, *Yuncker 15099*.

Nomuka: in thicket on seaward side of road encircling island, Apr. 30, 1953, *Yuncker 15811*.

Lifuka: in thicket along road between Pangai village and southern end of island, Apr. 28, 1953, *Yuncker 15873*.

Vava'u: *Crosby*; in seaside thicket below Houma village, May 22, 1953, *Yuncker 16134*.

Frequent throughout Tonga. Pantropic.

X. elliptica Forst. in Burkill's list.

Tongan name: *vitahi*.

FAMILY LORANTHACEAE

Genus *Amylotheca* van Tieghem

Amylotheca insularum (Gray) Danser, Jard. Bot. Buitenzorg, Bull. III, 10: 301, 1929.

Coarse, woody, mistletoe-like hemi-parasite growing on tree branches. Leaves opposite, elliptic-ovovate, apex rounded, base acute, entire, somewhat leathery, up to about 5 or 6 cm. long and 3 or 4 cm. wide, petiole about 1 cm. long. Flowers yellowish red, 2-3 cm. long, corolla tubular, longitudinally angular, calyx very short, truncate, sessile, two or three together on short branches in a one-sided, many-branched cluster.

Tongatapu: *U.S. Expl. Exped.; Mosley*; on branches of an *Inocarpus* tree in swamp between village of Navutoka and sea, Feb. 27, 1953, *Yuncker 15075*.

'Eua: *Lister*; on branches of *Pittosporum* tree, slope of eastern ridge above Fuai, Nov. 9, 1951, *Hürlimann 224*.

Vava'u: *Crosby*; on branches of *Pittosporum* tree, upper edge of seaside cliff along northwestern side of island, May 25, 1953, *Yuncker 16166*.

Occasional in forests throughout Tonga. Also in Fiji, Samoa, and Society Islands.

Tongan names: *kainikavca*, *topu'uno*.

The leaves are used in medicines.

FAMILY ARISTOLOCHIACEAE

Genus *Aristolochia* Linnaeus

Aristolochia elegans Masters, Gard. Chron. 2: 301, 1885.

Slender, glabrous, high-climbing, twining vine. Leaves alternate, broadly triangular-reniform, obtuse, base broadly cordate, entire, petioles long and slender. Flowers solitary, axillary, on peduncles mostly 4-6 cm. long, tubular, tube curved with widely flaring limb up to 8 cm. wide, maroon with greenish-white markings. Fruit an oblong, angular, deeply grooved capsule, 4-6 cm. long, opening parachute-like when ripe.

'Eua: climbing in trees and shrubs in deep ravine near village of Ohonua, Apr. 2, 1953, *Yuncker 15616*.

Apparently of recent introduction in Tonga. A South American species widely grown as an ornamental.

Tongan name: *fue paipa holani*.

FAMILY POLYGONACEAE

Genus *Polygonum* Linnaeus

Polygonum glabrum Willdenow, Sp. Pl. 2: 447, 1799.

Glabrous herb up to 50 cm. or more tall. Leaves alternate, elliptic-lanceolate, acuminate, base cuneate, entire, up to 15 cm. or more long and 4 cm. wide, pinnately nerved, petiole about 2 cm. long, stipules forming a loose, brown, membranous sheath (ocrae) 1-2 cm. long. Flowers small, white, in compound spikelike clusters.

'Eua: *Lister*.

Nomuka: [collector?].

Vava'u: *Crosby*; along southern margin of Ngofe swamp on southwestern side of island, May 19, 1953, *Yuncker 16031*.

Infrequent in Tonga. A widespread tropical and subtropical species of both hemispheres.

Genus *Antigonon* Endlicher

Antigonon leptopus Hooker and Arnott, Bot. Beechey Voy., 308, 1841.

Attractive vine introduced and planted about dwellings, along walls, and so forth as an ornamental. Leaves alternate, wrinkled, cordate, entire, up to 10 cm. or more long, apiculate, petioles up to 2.5 cm. or more long. Flowers rose pink, in long, slender, loose racemes which end in branched tendrils.

Occasional in villages or along roadsides. A native of Mexico now cultivated in warm climates throughout the world.

FAMILY CHENOPODIACEAE

The beet (*Beta vulgaris* Linnaeus), chard (*Beta vulgaris* var. *cicla* Linnaeus), and spinach (*Spinacia oleracea* Linnaeus) are occasionally cultivated in plantations as vegetable crops.

FAMILY AMARANTHACEAE

Genus **Amaranthus** Linnaeus**Amaranthus blitum** Linnaeus, Sp. Pl., 990, 1753.

Low, spreading, nearly prostrate herb. Leaves small, alternate, obovate, obtuse, base acute, on slender petioles. Flowers very small, in few-flowered, axillary, sessile clusters.

'Eua: weed beside trail near center of island, Apr. 5, 1953, *Yuncker 15643*. A depauperate specimen but seemingly this species.

Not common in Tonga.

Amaranthus paniculatus Linnaeus, Sp. Pl., ed. 2, 1406, 1763.

More or less pubescent herb. Leaves oblong-ovate to lanceolate. Flowers very small, in numerous, long, slender, ascending, dark red or yellowish spikes arranged in large, showy, panicle clusters.

Vava'u: *Barclay*.

Widely cultivated as an ornamental. Occasional as a weed.

Amaranthus viridis Linnaeus, Sp. Pl., ed. 2, 1405, 1763.

Coarse, glabrous, erect herb, up to about 1 m. tall. Leaves alternate, ovate to ovate-lanceolate, obtusish, base acute, long-petiolate. Flowers minute, greenish, sessile, in axillary clusters, in long, densely flowered, terminal and axillary spikes; fruit a membranous utricle.

Tongatapu: weed in banana plantation, Nualei, Nov. 1, 1951, *Hürlimann 100*; dooryard weed, Fu'amotu village, Mar. 4, 1953, *Yuncker 15164*.

'Eua: plantation weed on western side of island, Mar. 25, 1953, *Yuncker 15470*.

Tafahi: roadside weed between township of Tafahi and Faihavanui, Dec. 15, 1951, *Hürlimann 541*.

A weed of plantations and waste areas throughout Tonga. Widespread in warm climates.

Tongan names: *longolongo'uha*, *tupu'a*.

The young leaves are sometimes eaten as a vegetable.

Hemsley lists *Amaranthus caudatus* Linnaeus as collected by Cook on Tongatapu. This is an ornamental species, and there is some question as to whether it was in Tonga at the time of Cook's voyages.

Genus *Cyathula* Loureiro***Cyathula prostrata*** (Linnaeus) Blume, Bidjr. Fl. Java., 549, 1825.

Low, subprostrate, pubescent herb, the slender stems spreading and rooting at lower nodes. Leaves opposite, rhombic or ovate, acute at both ends, up to 5 cm. long and 2 cm. wide, petioles up to about 1 cm. long. Flowers very small, in loosely flowered clusters, in slender, elongated, terminal, spikelike racemes, reflexed in fruit, perianth segments becoming rigid, hooked awns.

'Eua: in forest clearing near summit of eastern ridge, Mar. 30, 1953, *Yuncker 15562*.

Vava'u: *Barclay; Crosby*.

Tafahi: along road, depression of former crater on summit of Piu 'o Tafahi, Dec. 11, 1951, *Hürlimann 451*.

Niuatoputapu: on hillside above Hihifo, Dec. 5, 1951, *Hürlimann 335*.

A plantation and waste area weed throughout the group. Pantropic.

Tongan name: *tolomo'unqa*.

Genus *Achyranthes* Linnaeus***Achyranthes aspera*** Linnaeus, Sp. Pl., 204, 1753.

Coarse, erect or decumbent herb, up to 40 cm. or more tall, pubescent in younger parts. Leaves opposite, oval-obovate, acute, base wedge-shaped, entire, up to 12 cm. or more long, petiole 1-2 cm. long. Flowers small, greenish, sessile, in a long, slender, usually simple, terminal spike; fruit dry, about 5 mm. long, abruptly reflexed.

Tongatapu: *Mosley*; weed in waste area near sea below village of Niu-toua, Mar. 2, 1953, *Yuncker 15137*.

'Eua: *Lister*; trailside weed on sea-facing terrace near Lokupa, Mar. 27, 1953, *Yuncker 15517*.

Lifuka: weed in plantation near sea above Pangai village, May 10, 1953, *Yuncker 15800*.

Vava'u: *Barclay*.

Tafahi: roadside weed, Dec. 15, 1951, *Hürlimann 540*.

A common plantation and waste area weed throughout the group. Pantropic.

Tongan name: *tamatama*.

Used to tie up wound in circumcision.

Genus *Alternanthera* Forskål***Alternanthera sessilis*** (Linnaeus) R. Brown, ex Roemer and Schultes, Syst. 5: 554, 1819.

Spreading, subprostrate, branching herb, rooting at lower nodes, internodes with two pubescent lines. Leaves opposite, narrowly elliptic-obovate or oblanceolate, obtuse or acutish, base cuneate, entire, up to 5 or 6 cm. long, petiole up to about 1 cm. long. Flowers small, scarious, sessile, white, in compact, axillary, headlike clusters.

Tongatapu: near shore, Nuku'alofa, Nov. 23, 1951, *Hürlimann 299*.

Vava'u: in wet boggy soil, margin of Ngofe swamp, May 19, 1953, *Yuncker 16043*.

Occasional as a waste area weed. Pantropic.

Tongan name: *fisi'iano*.

Genus *Gomphrena* Linnaeus

Gomphrena globosa Linnaeus, Sp. Pl., 224, 1753.

Low, branching, hairy herb. Leaves opposite, ovate to oblanceolate, cuspidate, entire, ciliate, up to 6 cm. or more long. Flowers small, in dense, chaffy-bracteate, pink, red or white, globose, cloverlike heads, on long, axillary and terminal peduncles and subtended by two ovate, involucre-like, leafy bracts.

Vava'u: *Barclay*.

Grown throughout Tonga as an ornamental, occasionally escaping. A tropical American species now widely distributed as an ornamental in warm and temperate climates.

FAMILY NYCTAGINACEAE

Genus *Boerhavia* Linnaeus

Boerhavia diffusa Linnaeus, Sp. Pl., 3, 1753.

Prostrate, glabrous or subglabrous herb, widely branching with reddish or green stems. Leaves scattered, somewhat fleshy, lanceolate to ovate, obtuse or acutish, base commonly obtuse, wavy-margined, lighter green or red beneath, up to 4 cm. long, petioles short. Flowers pinkish, small, tubular, on slender pedicels, in axillary and terminal, umbellate-paniculate clusters; fruit small, glandular, club-shaped, about 3 mm. long.

Lifuka: prostrate weed, in waste area between Pangai and southern end of island, Apr. 28, 1953, *Yuncker 15779*.

Vava'u: *Crosby*.

Tafahi: on volcanic rock, Dec. 15, 1951, *Hürlimann 516*.

Niuatoputapu: on mixed volcanic-calcareous soil, plantation near Matavai, Dec. 26, 1951, *Hürlimann 630*.

Occasional as a plantation and waste-area weed. Pantropic.

B. repens L. in Burkill's list.

Tongan name: *akataha kula*.

Genus *Pisonia* Plumier

Pisonia aculeata Linnaeus, Sp. Pl., 1026, 1753.

Dense, somewhat scrambling shrub, with stiff, axillary, recurved, sharp spines up to 1 cm. long. Leaves alternate, ovate-oblong or elliptic, obtuse or acutish, the base acute, up to 10 cm. long. Flowers yellowish-white, small, in terminal and axillary, pedunculate, cymose clusters; the fruit oblong or clavate, up to 15 cm. long, viscid-glandular.

Tongatapu: on the shore eastward of Ma'ofanga, Oct. 29, 1951, *Hürlimann 20*.

Tafahi: near Fakafafa moe Tauloto, on sandy coral soil, Dec. 17, 1951, *Hürlimann 610*.

Occasional. Pantropic.

Tongan name: *vi taha*.

Pisonia grandis R. Brown, Prodr. Fl. Nov. Hollandiae 1: 422, 1810.

Medium to large, soft-wooded tree. Leaves opposite, rather thin, oval-ovate, obtuse to acutish, base acute, up to 20 cm. or more long and 10 cm. wide, petiole up to 5 cm. or more long. Flowers small, fragrant, in terminal, cymose clusters; fruit glandular.

Tongatapu: in forest between village of Niutoua and shore, Mar. 2, 1953, *Yuncker 15127*.

Nomuka: *fide* Burkill's list.

Lifuka: *Harvey*.

Vava'u: *Crosby*.

Occasional. From the Moluccas, Borneo, Australia, Marianas, the Philippines through Polynesia.

P. inermis Forst. in Hemsley's list.

Tongan name: *fotulona*.

The timber is used for fence posts and in general construction work.

Genus **Bougainvillea** Commerson

Bougainvillea spectabilis Willdenow, Sp. Pl. 2: 348, 1799.

Scrambling or climbing, armed, woody, vinelike shrub. Young growth finely pubescent. Leaves alternate, entire, elliptical, acute at both ends. Flowers nearly 2.5 cm. long, surrounded by three, large, purplish-red, ovate, veiny bracts.

This introduced ornamental is occasionally planted about dwellings. One or two specimens were noted along roadsides. It is a Brazilian species now pantropic in cultivation.

Tongan name: *felila*.

Mirabilis jalapa Linnaeus, the common garden four-o'clock, is cultivated as an ornamental garden plant.

FAMILY PHYTOLACCACEAE

Genus **Rivina** Linnaeus

Rivina humilis Linnaeus, Sp. Pl., 121, 1753.

Shrublike herb up to 1 m. tall. Leaves alternate, ovate-lanceolate, acute at both ends, 5-8 cm. long and 2-3 cm. wide, glabrous, bright green, pinnately nerved, petioles 2-3 cm. long. Flowers small, white, pale lavender or greenish, on slender pedicels 2-4 mm. long, in terminal and axillary, cylindrical racemes; fruit red, fleshy, one-seeded.

Tongatapu: weed in waste area along road near Navutoka village, Feb. 27, 1953, *Yuncker 15093*.

'Eua: *Lister*.

Nomuka: in lakeside clearing along road encircling island between sea and central lake, Apr. 30, 1953, *Yuncker 15845*.

A weedy plant of waste areas, probably on all of the islands. An American species of pantropic distribution.

Tongan name: *polo*, presumably because of the superficial resemblance of the fruit to the fruit of species of *Solanum* which are also known as *polo*.

The red juice of the fruit is used as a dye.

FAMILY AIZOACEAE

Genus *Sesuvium* Linnaeus

Sesuvium portulacastrum (Linnaeus) Linnaeus, *Syst.*, ed. 10, 1058, 1759.

Succulent herb with prostrate, spreading stems up to 60 cm. or more long. Leaves narrowly spatulate, narrowed downward to short, clasping petiole. Flowers axillary, white to rose or pale lavender, solitary, on pedicels up to 1 cm. or more long; capsular fruit ovoid, seeds few, black.

Tongatapu: *Forster*; on tidal flat, Sopu, near Nuku'alofa, Feb. 25, 1953, *Yuncker 15041*; in limestone rock crevices near Blow Hole area, vicinity of Houma village, June 1, 1953, *Yuncker 16226*; on bare coral rocks on coastal terrace near Houma, Oct. 28, 1951, *Hürlimann 17*.

'Eua: *Lister*; on thin soil over coral rocks near shore, Lokupo, Mar. 27, 1953, *Yuncker 15518*.

Nomuka: on limestone rocks near sea, Apr. 30, 1953, *Yuncker 15854*.

Tafahi: near Hou, on lava rocks along shore, Dec. 17, 1951, *Hürlimann 592*.

A common strand plant throughout Tonga. Pantropic.

Tongan name: *kihikihimaka*.

Genus *Tetragonia* Linnaeus

Tetragonia expansa Murray, *Comment. Soc. Reg. Sci. Gotting. Cl. Phys.* 6: 13, 1783.

Somewhat succulent, assurgent herb with stems up to 1 m. or more long. Leaves alternate, smooth, ovate, acute, the base decurrent on the petiole, entire, up to 12 cm. long. Flowers small, yellow green, solitary, on short, axillary pedicels; fruit up to 1 cm. long, with four or five apical horns.

Tongatapu: July 19, 1926, *Setchell and Parks 15564*.

'Eua: *Lister*.

Infrequent. Australasia.

FAMILY PORTULACACEAE

Genus **Portulaca** Linnaeus**Portulaca oleracea** Linnaeus, Sp. Pl., 445, 1753.

Fleshy, glabrous, prostrate, spreading herb. Leaves obovate or oblong-cuneate, entire, fleshy, up to about 2.5 cm. long. Flowers four to six-parted, sessile, terminal, yellow, withering early; capsule membranous, dehiscent by a lid, the seeds numerous, small, black, slightly roughened.

Tongatapu: *U.S. Expl. Exped.*; weed in plantation near Nualei, Oct. 29, 1951, *Hürlimann 43*; on sand near lagoon, Hufangalupe, vicinity of Vaini village, Feb. 26, 1953, *Yuncker 15051*.

'Eua: in plantation between Pangai and Fuai, Mar. 25, 1953, *Yuncker 15465*.

Vava'u: *Crosby*.

Common throughout Tonga as a plantation and waste-area weed. A native of Europe now widely distributed as a weed.

Tongan name: *tamole*.

The plants are sometimes cooked and eaten as a vegetable.

Portulaca quadrifida Linnaeus, Mantissa 1: 73, 1767.

Prostrate, fleshy, much-branched herb, stems slender, creeping and rooting at nodes, nodes pilose. Leaves opposite, elliptic-ovate or ovate, up to 6 mm. long and 3 mm. wide, acute or obtuse, acutish at base, petiole short. Flowers solitary, sessile, terminal, surrounded with long hairs and a four-parted involucre, corolla yellow; capsule circumscissile, the seeds gray.

Tongatapu: *U.S. Expl. Exped.*

Vava'u: *Barclay; Crosby*.

Occasional as a waste-area weed. A native of the Old World tropics now widespread as a weed.

Tongan name: *ngingie*.

Portulaca samoensis von Pollenitz, Repert. Sp. Nov. 33: 163, 1933.

Much-branched, prostrate, fleshy herb, stems slender with tufts of long white hairs at nodes. Leaves elliptic, obtuse or acutish, base acute or obtusish, 5-10 mm. long and 2 mm. wide, glabrous, petiole about 1 mm. long.

Tongatapu: on rocks near sea, near Ha'akame village, Mar. 12, 1953, *Yuncker 15282*; on thin soil on limestone rocks near the sea, Blow Hole area below Houma village, June 1, 1953, *Yuncker 16222*. Occasional on rocks near the shore.

Also in Samoa, Fiji, and Micronesia.

Tongan name: *kihikihi ngingie*.

FAMILY MENISPERMACEAE

Genus *Stephania* Loureiro

Stephania forsteri (de Candolle) A. Gray, U.S. Expl. Exped., Bot. 1: 36, 1854.

Soft-wooded, twining, glabrous vine. Leaves alternate, round-ovate, bluntly pointed, the base rounded to retuse, peltate, up to 12 cm. or more long and 10 cm. wide, the petiole slender, nearly as long as the blade, attached 2-3 cm. from the margin of the blade. Flowers greenish, dioecious, in compound umbellate clusters; the fruit about 6 mm. in diameter, flattened and slightly laterally concave, red.

Tongatapu: *U.S. Expl. Exped.*

'Eua: in thicket near the center of the island, Mar. 28, 1953, *Yuncker 15544*.

Nomuka: in thicket along the road encircling the island between the sea and the central lake, Apr. 30, 1953, *Yuncker 15823*.

Vava'u: *Harvey*; *Crosby*; in thicket along the road near Houma village, May 22, 1953, *Yuncker 16115*.

Frequent in thickets throughout Tonga. Malaya to Polynesia.

S. hernandiaefolia Walp. in Hemsley's and Burkill's lists.

FAMILY ANNONACEAE

Genus *Cananga* Hooker f. and Thomson

Cananga odorata (Lamarck) Hooker f. and Thomson, Fl. India 1: 130, 1855.

Tree, up to 15 m. or more tall. Leaves alternate, elliptic-oblong, acute, base rounded, obtuse, entire, up to 20 cm. or more long and 7 cm. wide, pubescent, pinnately nerved, petiole mostly less than 2 cm. long. Flowers greenish yellow, drooping, pubescent, very fragrant, the petals linear-lanceolate, up to 8 cm. or more long, on long, puberulent pedicels, in axillary, pedunculate, umbellate clusters; fruit oblong, fleshy, black, seeds numerous.

Tongatapu: *Gracffe*; *Moseley*; in Navutoka village, Feb. 27, 1953, *Yuncker 15086*; in Ma'ofanga village, Nov. 23, 1951, *Hürlimann 312*.

'Eua: in Pangai village, Apr. 7, 1953, *Yuncker 15658*.

Vava'u: *Crosby*.

Introduced and cultivated in villages throughout Tonga. A southern Asiatic plant now widely cultivated in tropical countries.

Tongan name: *mohokoi*.

The wood is used for canoe outriggers; the leaves and bark in medicines; and the flowers for ornaments, in leis, and for scenting oil.

Genus *Polyalthia* Blume

Polyalthia amicorum A. C. Smith, sp. nov. (fig. 9).

Arbor ad 5 m. alta trunco circiter 45 cm. diametro partibus novellis pilis fuscis 0.1-0.3 mm. longis exceptis glabra; ramulis gracilibus apices versus haud 1 mm. diametro teretibus



FIGURE 9.—*Polyalthia amicorum*, Yuncker 16228, isotype, in herbarium of DePauw University.

copiosissime lenticellatis, hornotinis nigro-purpurascensibus vel brunneis flexuosis demum cineris: petiolis gracilibus canaliculatis 1.5-3 mm. longis; foliorum laminis in sicco papyraceis fusco-viridibus anguste oblong-ellipticis (5-) 7-11.5 cm. longis, 2-3.7 cm. latis, basi inaequilateraliter rotundatis vel subcordatis et in petiolum subito decurrentibus, apice obtusis vel rotundato-cuspidatis, margine integris et paullo incrassatis, obscure pellucido-punctatis, costa utrinque striato-rugulosa supra plana subtus prominente, nervis secundariis utrinsecus 7-9 arcuato-adscentibus anastomosantibus et rete venularum copioso utrinque manifeste prominulis; inflorescentiis infructescensisque desideratis.

Tongatapu: tree about 5 m. tall, stem about 45 cm. in diameter, near Pikula, June 1, 1953, *Yuncker 16228* (type in U.S. Nat. Herb., nos. 2128585 and 2157731).

Tongan name: *motelolo*.

In spite of the absence of flowers and fruits, the cited specimen can confidently be referred to *Polyalthia*, representing the first Tongan record and an extension of the genus eastward from Fiji. Its closest relative seems to be the Fijian *P. amygdalina* (A. Gray) Gillespie, to which it is strikingly similar in indument of young parts and in leaf shape and leaf texture. However, the new species differs from *P. amygdalina* in the crowded lenticels of its branchlets, in its smaller leaf-blades (those of the Fijian species attaining a size of about 15×5 cm.), and in having its leaf-apices obtuse or rounded-cuspidate rather than acute. Another Fijian species suggesting *P. amicornum* in vegetative characters is the Lauan *P. laddiana* A. C. Smith, but that has more sparsely lenticillate branchlets and broader, ovate-elliptic leaf-blades which are acute to acuminate at apex.

Genus *Artabotrys* R. Brown

Artabotrys uncinatus (Lamarck) Merrill, Philippine Jour. Sci. **7C**: 234. 1912.

Climbing shrub with spreading, somewhat zigzag branches. Leaves elliptic- or oblong-lanceolate, acuminate, the base acute, somewhat glossy, entire, up to 15 cm. or more long and 4 or 5 cm. wide, the petiole scarcely 1 cm. long. Flowers greenish yellow, fragrant, 2.5 cm. or more long, on stout, hooked, axillary peduncles; the fruit of several, clustered, yellowish, fleshy carpels about 2 cm. long.

Tongatapu: in thicket between Ha'akame village and sea, Mar. 12, 1953, *Yuncker 15283*; in village of Nukunuku, Nov. 18, 1951, *Hürlimann 284*.

Lifuka: in Pangai village, climbing over trellis, Apr. 25, 1953, *Yuncker 15701*.

Vava'u: climbing in thicket near Houma village, May 22, 1953, *Yuncker 16117*.

Rather frequent as a cultivated ornamental, occasionally as an escape. A native of southern China, now widely cultivated in tropical countries.

Tongan name: *mohokoi honolulu*.

The flowers are used to scent oil.

Genus **Annona** Linnaeus**Annona muricata** Linnaeus, Sp. Pl., 536, 1753.

Small tree. Leaves alternate, oblong or oblong-elliptic, acute or acuminate, glabrous, somewhat glossy above, up to about 14 cm. long and 4 cm. wide, petioles short. Flowers 2-3 cm. or more long, yellowish green, solitary or in pairs; the fruit fleshy, heart-shaped, up to 15 cm. or more long, covered with short, fleshy spines, seeds numerous, embedded in the white, juicy, somewhat acid, edible pulp.

Tongatapu: in a garden in Nuku'alofa, Mar. 8, 1953, *Yuncker 15219*.

Occasional in villages as an introduced fruit tree. From tropical America. Now widely cultivated in tropical countries.

Tongan name: 'apele 'initia.

Annona reticulata Linnaeus, Sp. Pl., 537, 1753.

Small to medium-sized tree. Leaves alternate, elliptic- or oblong-lanceolate, acute, up to 17 cm. long and 5 cm. wide, pinnately nerved, the petioles about 12 mm. long. Flowers about 2.5 cm. long, axillary; the fruit about 10 cm. thick, smooth, divided into hexagonal areas, edible.

Occasional in villages. From tropical America. Now widely cultivated in tropical countries for its fruit.

Annona squamosa Linnaeus, Sp. Pl., 537, 1753.

Small tree. Leaves two-ranked, oblong or elliptic-lanceolate, acute, up to 12 cm. or more long and 4-5 cm. wide, the petioles about 1 cm. long. Flowers solitary, greenish yellow, about 2.5 cm. long, petals narrowly lanceolate, obtusish, concave at base; fruit about 8 cm. thick, somewhat heart-shaped, tuberculate, sweet, edible.

Tongatapu: *U.S. Expl. Exped.*

Vava'u: *Crosby*.

Occasional in villages. From tropical America. Now widely grown in tropical countries for its fruit.

Tongan name: 'apele papalangi.

FAMILY MYRISTICACEAE

Genus **Myristica** Linnaeus**Myristica hypargyrea** A. Gray, U.S. Expl. Exped., Bot. 1: 33, 1854.

Medium-sized tree, up to 10 m. or more tall, the twigs minutely puberulent glabrescent. Leaves oblong-elliptic, acute, base obtuse or acute, up to 35 cm. or more long and 12 cm. wide, pinnately nerved, midrib prominent, lateral nerves slender, green above, whitish beneath, petiole stout, up to 2 cm. long. Flowers small, axillary, brown-pubescent; fruit rounded-ovoid, densely brown-pubescent, up to 4 or 5 cm. long, with deeply lacinated aril.

Tongatapu: *U.S. Expl. Exped.*; near lagoon at Fatai, Oct. 30, 1951, *Hürlimann 56*; in open woods near Vaini village, Feb. 26, 1953, *Yuncker 15064*.

'Eua: *Lister*; in open forest along trail to summit of eastern ridge, Mar.

20, 1953, *Yuncker 15385*; on terrace south of Vaingana River, Nov. 13, 1951, *Hürlimann 279*.

Kao: in open forest on rocky slope, May 6, 1953, *Yuncker 15968*.

Rather frequent in forested areas. Also in Samoa.

Tongan name: *kotone*.

The wood is used for banana shooks and general building purposes; the flowers and fruits, for leis; and the aril, for ornament.

Myristica inutilis Rich, ex A. Gray, U.S. Expl. Exped., Bot. 1: 34, 1854.

Small tree with slender branchlets. Leaves lanceolate, oblong- or obovate-elliptic, acuminate, base obtuse or acutish, thin, up to 25 cm. long and 7 cm. wide, pinnately nerved, brown-pubescent beneath, petioles up to 2.5 cm. long. Flowers small, in axillary clusters; fruit oblong, brown-pubescent when young, up to 3 cm. long, short apiculate, aril lacinated.

Tongatapu: *U.S. Expl. Exped.*

In Samoa, Solomon Islands, and the New Hebrides, but there is some question as to the occurrence of this species in Tonga. It was included by Hemsley in his list but later collectors have apparently not found it. It was cited by Gray from Tutuila and Savaii as abundant and from Tongatapu.

FAMILY MONIMIACEAE

Genus *Hedycarya* Forster

Hedycarya alternifolia Hemsley, Linn. Soc. Bot., Jour. 30: 215, 1894.

Glabrous tree. Leaves alternate, round-ovate or broadly elliptical, obtuse, remotely and obscurely denticulate, up to 10 cm. or more long and 8 cm. wide. Flowers very small, on a depressed hypanthium, in axillary racemose clusters.

'Eua: *Lister*. Endemic.

Perkins [in *Pflanzenr.* 49 (IV. 101. Nachtr.): 7, 1911] excludes this species from the genus and, further, expresses doubt that it belongs in the Monimiaceae.

Hedycarya denticulata (A. Gray) Perkins and Gilg, *Pflanzenr.* 4 (IV. 101): 19, 1901.

Tree up to 10 m. or more tall. Leaves opposite, elliptic-ovate, acute at both ends, distantly and minutely denticulate, up to 10 cm. or more long and 6 cm. wide, petiole 2 cm. or more long. Flowers very small, borne on a convex hypanthium, in terminal branching clusters; fruit ovoid, pointed, up to 1 cm. long.

'Eua: in forested area near center of island, Mar. 18, 1953, *Yuncker 15333*.

Infrequent. Also in Samoa.

Hedycarya dorstenioides A. Gray, *Jour. Bot.* 4: 83, 1866.

Small to medium-sized, glabrous tree. Leaves opposite, elliptic, acute at both ends, entire, up to 12 cm. or more long and 7 cm. wide, pinnately nerved, petioles 1 to 2 cm. long. Flowers minute, in a convex hypanthium up to about 1 cm. wide, in branching racemose or paniculate clusters; fruit ovoid, acute, about 1 cm. long, black.

'Eua: *Lister*; margin of forest at summit of eastern ridge, Mar. 30, 1953, *Yuncker 15561*; near base of eastern ridge below Fuai, Nov. 8, 1951, *Hürli-mann 158, 162*.

Abundant in Fiji.

FAMILY LAURACEAE

Genus *Persea* Gaertner

Persea americana (Linnaeus) Miller, Gard. Dict., ed. 8, no. 2, 1768.

Medium to large tree. Leaves alternate, entire, mostly 10 cm. or more long, elliptic, oval, or sometimes obovate, pubescent beneath, somewhat coriaceous, acute, nerves prominent, petioles up to 5 cm. long. Flowers small, greenish, short-pedicellate, in terminal, paniculate clusters; drupe fleshy, 5 cm. or usually more long, subglobose to pear-shaped, seed single, large, round.

Introduced and occasional in villages. A tropical American species now pantropic in distribution.

Tongan name: '*avoka*'.

The fruit is used as food.

Genus *Litsea* Lamarck

Litsea mellifera A. C. Smith, Jour. Arnold Arboretum 32: 54, 1951.

Tree, up to 35 m. tall. Leaves alternate, broadly elliptical or elliptic-ovate, obtusely pointed, base abruptly acute, 10-18 cm. long and 6-14 cm. wide, light green above, whitened beneath, pinnately nerved, nerves prominent, tomentulose beneath, petioles up to 4 cm. long. Flowers small, unisexual, in umbellate-racemose, axillary clusters; fruit ellipsoidal, up to 3 cm. long, in persistent cupulate calyx.

'Eua: in margin of forest near Reichelmann's Fuai plantation near center of island, alt. about 240 m., Mar. 22, 1953, *Yuncker 15431*.

Tongan name: *mamea*.

This interesting collection, with young staminate inflorescences, is very similar to the Fijian material of *L. mellifera*; no basis for even infraspecific separation can be found from the specimens at hand. Apparently this is the first record of *Litsea* in Tonga, a very satisfying discovery since the genus occurs in Fiji (see A. C. Smith, op. cit., pp. 45-57) and Samoa. *L. mellifera* is known from several of the Fijian islands and occurs there with considerable frequency at altitudes from sea level to about 850 m.; it is less common, however, than *L. pickeringii* (Seemann) Drake, a species more to be expected in Tonga because it occurs on the islands of Lau (A. C. Smith).

Genus *Cryptocarya* R. Brown

Cryptocarya glaucescens R. Brown var. *pacifica* Burkill, Linn. Soc. Bot., Jour. 35: 52, 1901.

Small tree. Leaves alternate, elliptic, or elliptic-subobovate, obtuse or subacute, base acute, 6-7 cm. or more long and 3-4 cm. wide, pinnately nerved, finely venulose. Fruit globose, about 1 cm. in diameter, with slightly raised longitudinal ribs, bluntly pointed at apex, base abruptly narrowed to pedicel.

Vava'u: *Crosby 241*; mountain trail near Neiafu, Aug. 1926, *Setchell and Parks 15653*.

Perhaps endemic; the Horne Fijian specimens cited by Burkill represent *C. turbinata* Gillespie, a Fijian endemic, and the New Caledonian record mentioned by Burkill needs further consideration.

Tongan name: *motou*.

Cryptocarya hornei Gillespie, B. P. Bishop Mus., Bull. **83**: 6, fig. 4, 1931.

Small tree, up to 6 or 8 m. tall, with slender branches. Leaves alternate, somewhat coriaceous, glossy, lanceolate to ovate, acuminate, base acute, three-nerved from near base, entire, petioles scarcely 1 cm. long. Flowers small, in terminal and axillary, paniculate, finely yellow-hairy clusters; fruit globose, with extended apex, glossy, up to 1 cm. in diameter.

'Eua: in open forest near center of island, Mar. 19, 1953, *Yuncker 15357*; margin of forest above Fuai plantation, near center of island, Apr. 5, 1953, *Yuncker 15641*.

This is the first report of this species for Tonga, where it is infrequent; the type is from Fiji.

Tongan name: *motou*.

The bark is used to scent oil.

Genus **Endiandra** R. Brown

Endiandra elaeocarpa Gillespie, B. P. Bishop Mus., Bull. **83**: 7, fig. 6, 1931.

Tree, up to 25 m. tall. Leaves opposite or alternate, ovate to obovate, apex rounded or bluntly acuminate, base acute, coriaceous, pinnately nerved, entire, petiole up to 1.5 cm. long. Flowers small, in paniculate clusters up to 5 cm. long; fruit green to black, cylindrical, up to 6 cm. long and 2 cm. thick, often curved.

Vava'u: along road above Ha'alaufuli on way to coastal cliff on north-eastern side of island, May 21, 1953, *Yuncker 16112*.

This specimen is sterile, but it agrees well with this species in its vegetative characters. If it is correctly identified, this is apparently a new record for it in Tonga. Also found in Fiji and Samoa.

Tongan name: *motou*.

Genus **Cassytha** Linnaeus

Cassytha filiformis Linnaeus, Sp. Pl., 35, 1753.

Slender, filiform, branching, glabrous, yellow or yellowish green, twining, parasitic plant, attached to host by means of suckerlike haustoria. Leaves reduced to minute scales. Flowers small, greenish white, sessile, in pedunculate, spikelike clusters; fruit fleshy, subglobose, about 5 mm. thick.

Tongatapu: along road about 2 km. west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15008*.

'Eua: *Lister*; on herbs and shrubs along strand, Lokupo, Mar. 27, 1953, *Yuncker 15523*.

Lifuka: in thicket near sea north of Pangai village, Apr. 25, 1953, *Yuncker 15733*.

Vava'u: *Crosby*.

Niuatoputapu: toward seacoast south of Falehau, Dec. 7, 1951, *Hürlimann 390*.

Frequent throughout Tonga. Pantropic.

Tongan name: *fatai*.

FAMILY HERNANDIACEAE

Genus *Gyrocarpus* Jacquin

Gyrocarpus americanus Jacquin, *Stirp. Am.*, 282, pl. 178, 1763.

Medium to large tree, up to 12 m. or more tall, branches rather thick. Leaves alternate, ovate, acuminate, base rounded, abruptly acute at long petiole, up to 20 cm. or more wide, entire or occasionally lobed, palmately three-nerved. Flowers small, green, unisexual, in rather broad, terminal, cymose clusters; fruit nutlike.

Tongatapu: margin of cemetery, Nuku'alofa, *Setchell and Parks 15294*.

'Eua: in village of Ohonua, Apr. 2, 1953, *Yuncker 15633*; near dwelling in Pangai village, Apr. 28, 1953, *Yuncker 15793*.

Occasional. A species of pantropic distribution.

Tongan name: *pukovili*.

The leaves and bark are used in preparing medicines.

Genus *Hernandia* Plumier

Hernandia moerenhoutiana Guillemain, *Sci. Nat. Bot.*, Ann. II, 7: 187, 1837.

Large tree, up to 10 or 12 m. tall. Leaves alternate, oval-oblong or somewhat obovate, obtuse or somewhat pointed, base acute, entire, up to 10 cm. or more long and 8 cm. wide, palmately three-nerved, midrib strongly branched upward, petiole up to 6 cm. or more long. Flowers cream-colored, in loose, many-flowered, long-stalked, axillary clusters near ends of branches; fruit enclosed in a white or reddish, fleshy, balloonlike vesicle.

Tongatapu: *Moseley*; edge of Niutoua village, Mar. 2, 1953, *Yuncker 15109*.

'Eua: *Lister*; in Ohonua village, Apr. 2, 1953, *Yuncker 15630*.

Nomuka: on knoll near beach short distance above village, Apr. 30, 1953, *Yuncker 15812*.

Vava'u: *Crosby*; in clearing on slope leading to lagoon at Vaihoi, May 26, 1953, *Yuncker 16198*.

Occurs throughout Tonga. Society Islands to Fiji.

Tongan name: *pipitui*.

The flowers and the fruit are used for leis and ornamentation, and the wood for general construction purposes.

Hernandia ovigera Linnaeus, in Stickman, *Herb. Amb.*, 14, 1754.

Medium to large tree, up to 20 m. or more tall. Leaves alternate, ovate, acute, peltate near base, entire, up to 20 cm. long and nearly as wide, five- to nine-nerved from petiole, petiole up to about as long as blade. Flowers monoecious, white, numerous in long-stalked, axillary and terminal, cymose clusters; fruit dry, somewhat ribbed, enclosed in an enlarged, fleshy, white or reddish, balloonlike vesicle with circumscissile opening.

Tongatapu: *Home*.

'Eua: in forest on seaward terrace near Lokupo, Mar. 27, 1953, *Yuncker* 15533.

Lifuka: in seaside thicket north of Pangai village, Apr. 24, 1953, *Yuncker* 15711.

Vava'u: *Crosby*.

Niuatoputapu: between Hihifo and Vaipoa, Dec. 7, 1951, *Hürlimann* 373.

Grows throughout Tonga, usually near the sea. From Indo-Malaysia to Polynesia.

H. peltata Meisn. in Hemsley's and Burkill's lists.

Tongan names: *fotulona*, *puko*.

The trunks are used for dugout canoes and the timber for banana shooks and general building purposes.

FAMILY CAPPARIDACEAE

Genus **Crataeva** Linnaeus

Crataeva religiosa Forster f., *Pl. Esculent.*, 45, 1786.

Small tree. Leaves alternate, three-foliate, leaflets elliptic or elliptic-obovate, sharply acuminate, base wedge-shaped, entire, up to 15 cm. or more long and 7 cm. wide, thin, petiolules less than 1 cm. long, petiole up to 12 cm. or more long. Flowers four-parted, clustered toward ends of branches on slender pedicels up to 4 cm. long, petals spatulate, creamy white, spreading to about 5 cm. in width, gynophore slender, up to 4 or 5 cm. long.

Tongatapu: in clay soil in thicket near Bay of Mu'a by Pelehake, Aug. 10, 1953, *W. T. Ha'angana* [*Yuncker* 16282]. This is the only specimen known in Tonga, and presumably was introduced.

From India to the Philippines and into Polynesia.

Genus **Capparis** Linnaeus

Capparis sandwichiana de Candolle, in DC. *Prodr.* 1: 245, 1824.

More or less prostrate, straggling or trailing shrub. Leaves alternate, oval or rounded, obtuse, base cordulate, entire, up to 4 cm. or more long, pinnately nerved, petiole slender, up to 4 cm. or more long. Flowers irregular, about 5 cm. wide, at first white, turning pink as they age, solitary, axillary, stamens numerous, ovary exerted on a long gynophore; fruit green, berrylike, ellipsoidal, about 5 cm. long, ridged, many-seeded, peduncle curved.

Tongatapu: in crevices on perpendicular face of seaside cliff at Fangaveha, June 7, 1953, *Yuncker 16250*. Believed to be a new record for Tonga, where it is rare.

Known also from Hawaii, Niue, Pitcairn Island, Cook Islands, Tuamotus; rare in Fiji and Samoa.

Cleome spinosa L. is occasionally cultivated as an ornamental in villages and cemeteries.

FAMILY CRUCIFERAE

Genus **Lepidium** Linnaeus

Lepidium virginicum Linnaeus, Sp. Pl., 645, 1753.

Erect, much-branched, glabrous or somewhat puberulent herb. Basal leaves up to 12 cm. long, dissected, terminal lobe large, obovate, lateral lobes small, stem leaves alternate, about 2.5 cm. long, oblanceolate, serrate, sessile, acute. Flowers very small, white, in terminal and axillary, racemose clusters; fruit 3 mm. or less wide, flat, nearly round, notched at apex.

Tongatapu: weed in plantation, Nualei, Oct. 27, 1951, *Hürlimann 5*; roadside east of Nuku'alofa, Mar. 7, 1953, *Yuncker 15206*.

'Eua: weed at Fuai plantation, Mar. 22, 1953, *Yuncker 15418*.

Niuatoputapu: near shore in Hihifo, Dec. 29, 1951, *Hürlimann 645*.

A common dooryard and waste area weed throughout Tonga. An American species now of wide distribution in warm climates.

Genus **Coronopus** Gaertner

Coronopus didymus (Linnaeus) J. E. Smith, Fl. Brit. 2: 691, 1800.

Low, spreading, pubescent, fetid weed. Leaves one- to two-pinnately dissected, the divisions narrowly linear, entire or toothed. Flowers very small, white, in small, axillary, racemose clusters; fruit flattened, deeply notched at apex, wrinkled.

Tongatapu: weed in plantation, Nualei, Nov. 1, 1951, *Hürlimann 102*; weed on sand in cemetery near Haveluliku village, June 3, 1953, *Yuncker 16233*.

'Eua: weed in old coconut plantation near Ha'aluma, Apr. 1, 1953, *Yuncker 15586*.

A plantation and waste-area weed throughout Tonga. This European weed is now of wide distribution in tropical and temperate regions.

Seneciera didyma Pers. in Hemsley's list.

Tongan name: *lesivao*.

Genus **Nasturtium** R. Brown

Nasturtium samentosum (Solander) O. E. Schulz, Bot. Jahrb. 32: 595, 1902.

Low, short-stemmed, glabrous herb with creeping, flagelliform branches. Leaves mostly radical, deeply pinnately lobed and divided, terminal leaflet rounded and somewhat larger than lateral ones. Flowers small, white, in long, racemose clusters on mostly leafless peduncles up to 10 cm. or more long; the pods subterete, divergent, about 2.5 cm. long.

Tongatapu: in crevices on seaside limestone cliff at Fangaveha, June 7, 1953, *Yuncker 16251*.

'Eua: weed near plantation house, Mar. 22, 1953, *Yuncker 15422*.

Kao: on thin soil near summit, alt. about 990 m., May 6, 1953, *Yuncker 15909*, a form [?] with small, scarcely divided, dentate leaves.

Vava'u: *Barclay*.

A roadside and waste-area weed throughout Tonga. Widespread in the Pacific area.

Cardamine sarmentosa Forst. in Hemsley's list.

Tongan name: 'atono.

The cauliflower (*Brassica oleracea* Linnaeus var. *botrytis* Linnaeus), cabbage (*B. oleracea* var. *capitata* Linnaeus), kohlrabi (*B. caulorapa* Pasquale), radish (*Raphanus sativus* Linnaeus), and turnip (*Brassica rapa* Linnaeus) are cultivated to some extent as garden vegetables.

FAMILY CRASSULACEAE

Genus *Bryophyllum* Salisbury

Bryophyllum pinnatum (Lamarck) Kurz, Asiatic Soc. Bengal, Jour. 40(2): 52, 1871.

Fleshy, glabrous plant, somewhat woody at the base, the flowering stems up to about 1 m. tall. Leaves very fleshy, opposite, simple or pinnately compound, with three or five oval-oblong, crenately toothed, obtuse leaflets which readily develop young plants from notches when in contact with soil, petioles up to 5 cm. or more long. Flowers about 3-4 cm. long, four-lobed, calyx greenish, thin, inflated, corolla reddish, tubular, in large terminal panicles.

Tongatapu: in sandy waste area near sea east of Nuku'alofa, Feb. 27, 1953, *Yuncker 15173*.

Occasional in sandy or rocky areas near the sea throughout Tonga. A tropical Asian species now of pantropic distribution.

Tongan name: *pipi vao*.

FAMILY PITTOSPORACEAE

Genus *Pittosporum* Banks

Pittosporum arborescens Rich., ex A. Gray, U.S. Expl. Exped., Bot. 1: 223, 1854.

Tree, up to 9 or 10 m. or more tall. Leaves alternate, crowded toward ends of branches, obovate-oblong, oblong, or elliptic, obtuse or subacute, base acute to cuneate, up to 12-14 cm.

long and 5 cm. wide, subcoriaceous, glabrous, somewhat glossy above, paler beneath, pinnately nerved, strongly areolate-venulose by transmitted light, petiole 1-2 cm. long, ridged by decurrent blade margins. Flowers in terminal and axillary cymose clusters; fruit globular-ovoid, about 1.5-2.5 cm. long, surface rough, dark, splitting longitudinally when ripe, halves recurving, yellow orange within.

Tongatapu: *U.S. Expl. Exped.; Graeffe*; near Vaini village, Feb. 26, 1953, *Yuncker 15039*.

'Eua: *Lister*; in thin forest above Fuai plantation, near center of island, Mar. 19, 1953, *Yuncker 15361*.

Nomuka: in thicket along road encircling island, Apr. 30, 1953, *Yuncker 15824*.

Lifuka: near center of island along trail between Pangai village and eastern coast, Apr. 27, 1953, *Yuncker 15769*.

Vava'u: *Crosby*; along upper rim of limestone coastal cliff on northwestern shore of island, May 25, 1953, *Yuncker 16167*.

Frequent in forested areas throughout Tonga. Also in Fiji.

Tongan name: *masikona*.

The fruit is used to poison fish.

Pittosporum brackenridgei A. Gray, U.S. Expl. Exped., Bot. 1: 225, 1854.

Small, glabrous tree, up to 5 or 6 m. tall. Leaves alternate, somewhat coriaceous, crowded toward ends of branches, oval-oblong or elliptical, obtuse or subacute, base acute, pinnately nerved, up to 12-14 cm. long and 5 cm. wide, petiole 1-2 cm. long. Fruit subglobular, many-seeded.

Tongatapu: *Cartwright*.

'Eua: *Lister*.

Infrequent. Also in Niue.

Pittosporum rhytidocarpum A. Gray, U. S. Expl. Exped., Bot. 1: 228, pl. 18, 1854.

Shrub or small tree up to 5 or 6 m. tall, glabrous except for pubescent inflorescence. Leaves alternate, somewhat crowded toward ends of branches, oblanceolate to obovate-oblong, acute to short-acuminate, narrowing to base, pinnately nerved, margins entire or slightly undulate, up to 12-17 cm. long and 5 cm. wide. Flowers in terminal or axillary clusters, short-pedicellate, corolla tubular, about 1 cm. long, lobes spreading; fruit oblong, about 3 cm. long, thick and woody, two-edged, warty.

'Eua: *Lister*.

Infrequent. Also in New Hebrides and Fiji where it is very common.

Pittosporum spathaceum Burkill, Hook, *Icones Pl.* 26: pl. 2561, 1898.

Small tree, with slender branches. Leaves alternate, clustered near ends of branches, elliptic-obovate, glabrous, apex rounded, obtuse, base acute, 6-8 cm. long and 2.5-3 cm. wide. Flowers in few-flowered panicles about half as long as leaves, calyx spathaceous, short appendiculate, petals linear, longitudinally striate, ovary bicarpellate.

Vava'u: *Crosby 200*. Apparently known only from the type.

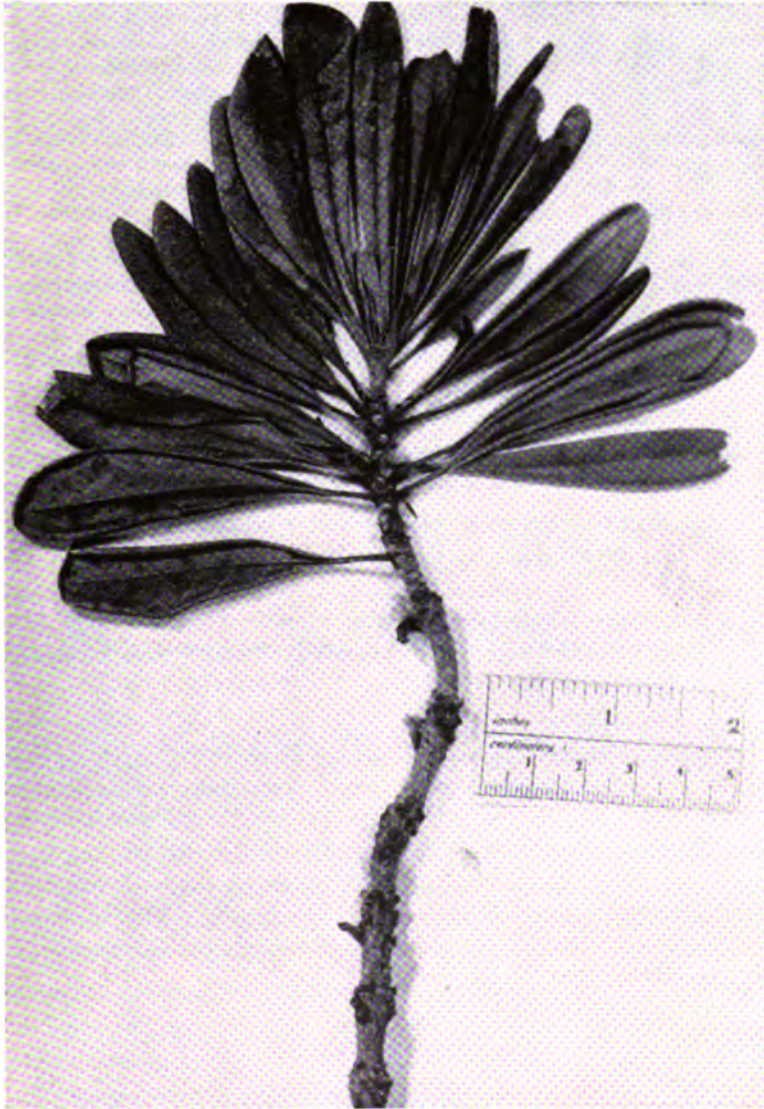


FIGURE 10.—*Pittosporum yunckeri*, Yuncker 15668, isotype, in herbarium of DePauw University.

Pittosporum yunckeri A. C. Smith, sp. nov. (fig. 10).

Frutex ad 1 m. altus, ramulis crassis (apicem versus 3-5 mm. diametro) teretibus primo minute pallido-tomentellis mox glabris lenticellatis; foliis numerosis alternatis vel subverticillatis, petiolis gracilibus canaliculatis striatis 1-1.5 cm. longis ut ramulis primo canescente-tomentellis (pilis 0.3-0.5 mm. longis) mox glabris, laminis subcoriaceis anguste obovatis, (4-) 6-9 cm. longis, (1-) 2-3.5 cm. latis, basi attenuatis et in petiolum longe decurrentibus, apice rotundatis, margine integris et valde revolutis, juvenilibus utrinque ut petiolis copiose tomentellis, maturis supra glabris nitidis obscure punctatis subtus demum glabris, costa supra elevata interdum in sulcua subtus prominente, nervis secundariis utrinsecus 8-10 arcuato-adscendentibus et rete venularum supra obscuris vel impressis subtus inconspicue elevatis; inflorescentiis ♀ subterminalibus vel lateralibus paucifloris (in alabastro floribus 3-6, maturitate 1-3) ad 3 cm. longis, pedunculo 2-10 mm. longo gracili et bracteis pedicellisque ut petiolis tomentellis, bracteis papyraceis anguste oblongis 2-3 mm. longis intus glabris, pedicellis sub anthesi gracilibus (2-) 5-7 mm. longis; calyce cupuliformi sub anthesi circiter 4 mm. longo et apice 5 mm. diametro, sepalis 5-7 liberis imbricatis ovatis circiter 4×2 mm., apice obtusis, extus sub anthesi copiose tomentellis (pilis fulvis ad 0.3 mm. longis), intus glabris; corolla glabra alba, tubo circiter 12 mm. longo faucibus 2.5 mm. diametro segmentis circiter 1.2 mm. latis, lobis 5 patentibus oblongo-obovatis 7-8 mm. longis circiter 5 mm. latis maturitate conspicue revolutis reticulato-nervatis; staminibus sterilibus 5 glabris circiter 5 mm. longis, filamentis carnosis, antheris lineari-sagittatis ad 1.5 mm. longis; pistillo corollae tubum subaequante, ovario oblongo-ovoideo sub anthesi circiter 6×3 mm. copiose strigoso-tomentello, style crasso glabro quam ovario paullo brevior, stigmate subcapitato circiter 2 mm. diametro.

Tongatapu: in soil pockets on perpendicular face of seaside limestone cliff, Fangaveha on southern coast of island, alt. 3-5 m., June 7, 1953, *Yuncker 16248*.

'Eua: on sea-facing limestone cliff near summit of eastern ridge, Matanga, Lokupo district, alt. about 230 m., flowers white, Apr. 8, 1953, *Yuncker 15668* (type in U.S. Nat. Herb., no. 2128458).

Tongan name: *lauteau*.

Pittosporum yunckeri, characterized by its crowded, obovate, strongly revolute leaves, its few-flowered inflorescences, and its free sepals, is not closely related to any of the species recorded from the Fiji-Tonga-Samoa region. It is more suggestive of some of the species of eastern Polynesia, such as *P. rapense* F. Brown (described in fruit only), from which its rounded leaf-apices and the comparatively thin and evanescent leaf-indument readily distinguish it. The Hawaiian *P. confertiflorum* A. Gray also suggests our species, but the similarity is superficial.

FAMILY ROSACEAE

Genus **Osteomeles** Lindley

Osteomeles anthyllidifolia (Smith) Lindley, Linn. Soc., Trans. 13: 99, pl. 1, 1821.

Low, somewhat prostrate shrub, or rarely a small tree. Leaves 2-3 cm. or more long, pinnately compound, leaflets thick, spatulate, scarcely 1 cm. long and 2-4 mm. wide, sessile, dark green and glossy above, paler and silky-pubescent beneath. Flowers white, 1-1.5 cm. wide; fruit globose, becoming white, up to about 8 mm. in diameter, pulpy, five-seeded.

'Eua: border of eastern ridge in central part of island, Nov. 9, 1951, *Hürlimann 206*; in dry, open, grazing area on western slope of eastern ridge, Apr. 6, 1953, *Yuncker 15652*; on sea-facing limestone cliff near summit of eastern ridge, Apr. 8, 1953, *Yuncker 15679*.

In Tonga, apparently limited to the eastern ridge on the island of 'Eua. Also known in the Ryukyu and Bonin Islands, the Hawaiian Islands, Pitcairn, and other islands of Polynesia.

Genus *Eriobotrya* Lindley

Eriobotrya japonica (Thunberg) Lindley, Linn. Soc., Trans. 13: 102, 1821.

Low, evergreen tree, up to about 6 m. tall. Leaves clustered toward ends of stout, pubescent stems, alternate, elliptic, or oval-oblong, sharply acuminate, base cuneate, up to 20 cm. or more long, sharply toothed, glossy above, rusty-woolly beneath, pinnately nerved, petiole short, winged. Flowers white, fragrant, 1-2 cm. wide, in terminal, branching, densely woolly clusters; fruit yellow, globose, downy, edible.

Tongatapu: side of trail near Nualei village, Mar. 9, 1953, *Yuncker 15223*.

Cultivated for its fruit and occasionally as an escape. A native of China now widely cultivated.

Tongan name: *loketi*.

Genus *Parinarium* Aublet

Parinarium glaberrimum Hasskarl, Tijdschr. Nat. Ges. 10: 147, 1843 [*nomen nudum*]; Flora 27: 583, 1844.

Small to rather large tree, up to 10 m. or more tall. Leaves alternate, elliptic-oblong or ovate-lanceolate, acute, base rounded, obtuse, up to 20 cm. or more long and 8 cm. wide, entire, somewhat coriaceous, pinnately nerved, midrib with two glands near base. Flowers crowded, in branching, pubescent, axillary, racemose clusters, corolla whitish, anthers yellow, on bluish filaments; fruit large, brown, rough.

Tongatapu: in Nukunuku village, Jan. 11, 1952, *Hürlimann 679*; below Fatai village, Mar. 10, 1953, *Yuncker 15261*.

Vava'u: *Crosby*; along road west of Houma village, May 22, 1953, *Yuncker 16119*.

Tafahi: in grassy area, Tafahi township, Dec. 15, 1951, *Hürlimann 568*.

In villages and occasionally in forested areas. From Java and Borneo eastward to Polynesia.

P. laurinum A. Gray in Burkill's list.

Tongan names: *pipi*, *pipi failolo*.

The seeds are used to scent oil.

Parinarium insularum A. Gray, U. S. Expl. Exped., Bot. 1: 488, pl. 54, 1854.

Somewhat twiggy tree up to 12 m. or more tall. Leaves alternate, ovate or lance-ovate, acute to acuminate, the base rounded, obtuse or cordulate, 7-8 cm. long and 3-4 cm. wide,

glossy above, pinnately nerved, areolate-nervulose, nervules prominent beneath, petiole about 5 mm. long, stout. Fruit ellipsoidal, brown-scurfy, 4-5 cm. long.

Vava'u: *Crosby*; near Mataika village, May 27, 1953, *Yuncker 16205*.
Infrequent.

Also in Fiji and Samoa.

Tongan name: *hea*.

The garden rose (*Rosa* spp.) is planted as a common ornamental about dwellings. One depauperate peach tree (*Prunus persica* Siebold and Zuccarini) was seen in Nuku'alofa.

FAMILY CONNARACEAE

Genus *Santaloides* [Linnaeus] O. Kuntze

Santaloides samoense (Lauterbach) Schellenberg, in Engler Bot. Jahrb. **58**: 180, 1923; Pflanzenr. **103** [IV. 127]: 122, 1938.

Woody vine, glabrous throughout. Leaves alternate, odd-pinnate, leaflets ovate or round-ovate, acuminate, base rounded, obtuse, blade margin sometimes subpeltately continuous over petiolule, up to 6 cm. or more long and 4 cm. wide, pinnately nerved, areolate venulose, somewhat chartaceous, petiolules about 5 mm. long. Flowers 4-5 mm. wide, white, on slender pedicels about as long as flowers in paniculate clusters.

'Eua: climbing in forest on western slope near summit of central part of eastern ridge, Mar. 24, 1953, *Yuncker 15442*.

Kao: climbing in trees, on rocky forested slope, May 6, 1953, *Yuncker 15890*.

Tongan names: *kavahaha, tuamea*.

The cited specimens agree very well with an isotype of the species, *Vaupel 491* (US), thus providing what appears to be a new generic record for Tonga (A. C. Smith).

FAMILY LEGUMINOSAE

Genus *Serianthes* Bentham

Serianthes myriadenia Planchon, ex Bentham, Hook. London Jour. Bot. **5**: 108, 1846.

Broad-topped tree, up to 8 or 10 m. tall, branchlets, leaves, and so forth brown-pubescent. Leaves bipinnate, alternate, pinnae several, up to 10 cm. or more long, leaflets numerous, oblong, obtuse, base cordulate, asymmetrical, about 12 mm. long and 5 mm. wide, sessile. Flowers several, in branching, axillary clusters, calyx about 1 cm. long, dentate, densely pubescent, corolla greenish yellow, up to 2 cm. long, lobed to about middle, pubescent, stamens numerous, exerted, deep red; pod oblong, somewhat compressed.

Vava'u: *Crosby*; at summit of Talau, west of Neiafu, May 23, 1953, *Yuncker 16141*.

Infrequent. Fiji.

Tongan name: *mohemohe*.

Genus *Albizzia* Durazzini

Albizzia lebbeck (Linnaeus) Bentham, Hook. London Jour. Bot. 3: 87, 1844.

Tree, up to 8 or 12 m. tall. Leaves alternate, bipinnate, pinnae about six, up to 15 cm. long, leaflets six to eight, oblong, obtuse, base obtuse, asymmetrical, variable in size, up to 3-5 cm. long, subsessile, glabrous. Flowers yellowish, in headlike clusters up to 4 cm. in diameter; pods oblong, up to 20 cm. long and 3 cm. wide, flat, reticulate, impressed opposite seeds.

Tongatapu: in yard, Ma'ofanga, Nov. 23, 1951, *Hürlimann 321*.

Infrequent as a cultivated tree. A native of tropical Asia and Africa, now widely cultivated and naturalized.

Tongan name: *kasia*.

The timber is used for a variety of purposes.

Genus *Acacia* Willdenow

Acacia simplicifolia (Linnaeus f.) Druce, Bot. Exch. Cl. Brit. Isles, Rept. 4: 602, 1917.

Tree, up to 6-8 m. tall, glabrous. Leaves alternate, broadly elliptical or subovate, obtuse, base cuneate-decurrent, parallel-nerved, up to 10-12 cm. long and 8 cm. wide, petiole less than 1 cm. long, winged by decurrent blade margins. Flowers small, yellow, in axillary, headlike clusters 1 cm. or less in diameter; pods up to 12 cm. or more long, somewhat constricted between seeds.

Tongatapu: *Cook; Home*; in strand thicket along road to east of Nuku'alofa, Feb. 27, 1953, *Yuncker 15100*.

'Eua: *Lister*; seaward margin of strand thicket, Ha'aluma, Apr. 1, 1953, *Yuncker 15590*.

Nomuka: in strand thicket above village, Apr. 30, 1953, *Yuncker 15866*.

Lifuka: along beach toward northern end of island, Apr. 25, 1953, *Yuncker 15745*.

Vava'u: *Crosby*.

Niuaotupapu: near shore at Hihifo, Dec. 6, 1951, *Hürlimann 370*.

A frequent strand species throughout Tonga, Samoa, Fiji, New Hebrides, and New Caledonia.

A. laurifolia Willd. in Hemsley's and Burkill's lists.

Tongan name: *tatangia*.

The wood is used in handicraft work.

Genus *Leucaena* Bentham

Leucaena glauca (Linnaeus) Bentham, Jour. Bot. Hook. 4: 416, 1842.

Shrub or small tree, up to 5 or 6 m. tall, young growth puberulent. Leaves alternate, bipinnate, with five or six pairs of pinnae, leaflets numerous, oblong, acute, asymmetrical, sessile, 6-12 mm. long and about 2 mm. wide. Flowers small, white, in globose, headlike, axillary clusters, about 2.5 cm. in diameter, peduncle up to 4 or 5 cm. long; pods thin, flat, up to 15 cm. long and 1.5 cm. wide, seeds small, brown.

Tongatapu: in thicket near sea, Sopa, Feb. 25, 1953, *Yuncker 15013*.

'Eua: in thicket northeast of Ohonua village, Apr. 2, 1953, *Yuncker 15625*.

Nomuka: in thicket on seaward side of road encircling island, Apr. 30, 1953, *Yuncker 15851*.

Vava'u: forming a large colony on seaside cliff along trail to Talau, west of Neiafu, May 23, 1953, *Yuncker 16145*.

Frequent throughout Tonga. A tropical American plant now of pantropic distribution.

Tongan name: *siale mohemohe*.

The timber is used for posts and in house construction.

Leucaena insularum (Guillemin) Daniker, Nat. Ges. Zürich, Vierteljahrsschr. 77: Beibl. 19, 176, 1932.

Small tree, up to 5 m. or more tall, the young growth puberulent. Leaves alternate, bipinnate with eight or more pairs of pinnae, leaflets oblong, 45 or more on each pinna, acutish, obliquely inequilateral, up to about 7 mm. long, sessile. Flowers very small, pale pink, in globose, headlike, axillary, pedunculate clusters, peduncles up to 2 cm. or more long; pods slightly curved, up to 10 cm. or more long and 2 cm. wide.

Tongatapu: *Cook*; at shore north of Hofoa, Oct. 30, 1951, *Hürlimann 92*; near beach below Niutoua village, Mar. 2, 1953, *Yuncker 15108*.

'Eua: forming dense thicket along strand short distance above high-tide limit, Lokupo, Mar. 27, 1953, *Yuncker 15532*.

Lifuka: in thicket near beach at southern end of island, Apr. 28, 1953, *Yuncker 15791*.

Rather frequent throughout Tonga, Fiji, Niue, and New Caledonia.

L. forsteri Benth. in Hemsley's list.

Tongan names: *feifai, mohemohe*.

The timber is used in handicraft work.

Genus ***Mimosa*** Linnaeus

Mimosa pudica Linnaeus, Sp. Pl., 518, 1753.

Low, decumbent, subwoody, loosely branching, prickly plant. Leaves bipinnate, pinnae usually in one or two pairs, each with 15 or more pairs of linear-oblong leaflets up to 8 mm. or more long, acute, asymmetrical, sessile, sensitive. Flowers small, in globose, rose-pink, headlike, pedunculate, axillary clusters; the pod flat, thin, 1-2 cm. long, bristly.

Tongatapu: in waste area near Nualei, Oct. 29, 1951, *Hürlimann 45*; in grassy area near Niutoua village, Mar. 2, 1953, *Yuncker 15158*.

'Eua: *Lister*.

Vava'u: *Harvey, Crosby*.

A common weed in plantations, grazing areas and waste areas throughout Tonga. An American species now pantropic in distribution.

Tongan name: *mateloi*.

Genus *Adenantha* Linnaeus*Adenantha pavonina* Linnaeus, Sp. Pl., 384, 1753.

Medium to large tree. Leaves bipinnate with about 6 or 8 pinnae, each usually with 9-11 or more leaflets, the leaflets oval or oval-oblong, obtuse at both ends or the base sub-acute, up to 4.5 cm. long and 3 cm. wide, glabrous, the petiolules about 2 mm. long. Flowers small, greenish-white, short-pedicellate, in slender, spikelike, pedunculate, racemose clusters up to 15 cm. or more long, fragrant; pods up to 25 cm. or more long and 2 cm. wide, falcately curved, becoming spirally twisted upon opening, the seeds lens-shaped, bright red, shining, very uniform in size, ornamental.

Tongatapu: near village of Niutoua, Mar. 2, 1953, *Yuncker 15113*.

'Eua: along roadside near Houma village, Mar. 26, 1953, *Yuncker 15510*.

Niufo'ou: behind Futu, Jan. 7, 1952, *Hürlimann 655*.

Occasional in or near villages throughout Tonga. An Indian species now pantropic in cultivation.

Tongan name: *lopa*.

The wood is durable and used in handicraft work; the seeds, as beads for ornamentation.

Genus *Entada* Adanson*Entada phaseoloides* (Linnaeus) Merrill, Philippine Jour. Sci. **9C**: 86, 1914.

Stout, glabrous, woody vine, climbing high in forest trees. Leaves alternate, even-pinnate, leaflets glossy, commonly four, asymmetrically oval-ovate, blunt or acute, obtuse or cordulate at base, up to 10 cm. long and 5 cm. wide but mostly smaller, venulose, petiolules up to 5 mm. long. Flowers very small, greenish, in long, axillary, short-pedunculate spikes up to 30 cm. long; pod very large, woody, up to 1 m. long and 10 cm. wide, seeds lens-shaped, brown, 3 cm. or more in diameter.

Tongatapu: near coast north of Fatai, Oct. 30, 1951, *Hürlimann 61*; climbing high in tree, along road between Lavengatonga village and sea, Mar. 7, 1953, *Yuncker 15188*.

'Eua: *Lister*; central valley between Pangai and Fuai, Nov. 10, 1951, *Hürlimann 230*; margin of forest near center of island, Mar. 18, 1953, *Yuncker 15324*.

Vava'u: *Crosby*; summit of Talau, west of Neiafu, May 24, 1953, *Yuncker 16156*.

Niufo'ou: in thicket in interlava "island" on way to upper rim of main crater, May 16, 1953, *Yuncker 16006*.

Frequent in forested areas throughout Tonga. From Africa to southeastern Asia and Polynesia.

E. scandens Benth. in Hemsley's and Burkill's lists. See Johnson (*Sargenia* **8**: 136-137, 1949) for an interesting discussion of this species.

Tongan names: *valai, pa'anga, lau pa'anga*.

Genus **Maniltoa** Scheffer**Maniltoa amicorum** A. C. Smith, sp. nov. (fig. 11).

Arbor ad 18 m. alta, trunco ad 75 cm. diametro, partibus inflorescentiae exceptis ubique glabra, ramulis gracilibus teretibus lenticellatis; foliis plerumque 9-12 (interdum 7-20) cm. longis 3-jugis vel apicem ramulorum versus 2-jugis raro 1-jugis, petiolis teretibus rugulosis 6-15 mm. longis, rhachi gracili, petiolulis ut petiolis rugulosis ad 4 mm. longis vel subnullis; laminis foliolorum subcoriaceis in sicco viridi-olivaceis inaequilateraliter ellipticis, (4-) 5-9 cm. longis, (2-) 3-5 cm. latis, basi obtusis, apice obtusis vel obtuse cuspidatis et leviter emarginatis, margine integris paullo recurvatis, costa supra leviter elevata subtus prominente, nervis secundariis principalibus utrinsecus 7-9 cum aliis interspersis marginem versus anastomosantibus et rete venularum conspicuo supra paullo subtus manifeste prominulis; inflorescentia apicem ramulorum versus axillari breviter racemosa circiter 15-flora juventute bracteis numerosis involucreta, bracteis papyraceis, maximis suborbiculari-obovatis ad 20×15 mm. apice rotundatis dorso copiose sericeo-puberulis (pilis pallidis 0.1-0.2 mm. longis) margine crispato-ciliolatis mox caducis, bracteis exterioribus minoribus glabrescentibus; rhachi sub anthesi 12-16 mm. longa basibus florum incrassata, bracteis floriferis medianis anguste obovatis 18-25 mm. longis 3-5 mm. latis apice rotundatis dorso ut bracteis majoribus pilosis, bracteolis lateralibus lineari-lanceolatis 5-6 mm. longis 0.5-1 mm. latis dorso in lineam medianam hispidulis mox caducis; pedicellis teretibus sub anthesi 10-13 mm. longis in receptaculum ad 3 mm. diametro incrassatis; sepalis 4 sub anthesi reflexis submembranaceis oblongis, 11-12 mm. longis, 3-6 mm. latis, apice obtusis; petalis 5 raro 6 membranaceis obovato-lanceolatis, sub anthesi 12.5-13.5 mm. longis 2-2.5 mm. latis, basi angustatis, apice subacutis; staminibus 35-40 plerumque 2-seriatis, filamentis teretibus 10-15 mm. longis, antheris oblongo-ellipsoideis 1.8-2 mm. longis apice obscure apiculatis; ovario stipitato sub anthesi circiter 5×2.5 mm., ovulis 1 vel 2, stylo tereti 6-7 mm. longo inferne pilis castaneis paucis ad 1 mm. longis dorso crispato-piloso; legumine juvenili falcato-ellipsoideo ad 4×2.5 cm., utroque obtuso, pericarpio ruguloso.

'Eua: stately tree about 18 m. tall, trunk about 75 cm. in diameter, straight and free of branches below, with tender pink new growth appearing here and there from large buds, on side of ravine short distance northeast from village of Ohonua on western side of islands, Apr. 2, 1953, *Yuncker 15635*.

Vava'u: tree about 12 m. tall, trunk about 45 cm. in diameter, in open forest along upper rim of coastal limestone cliff on northwestern side of island, May 25, 1953, *Yuncker 16168* (type, in U.S. Nat. Herb., nos. 2128567 and 2157730); tree about 15 m. tall, trunk about 45 cm. in diameter, on forested slope above Lake Anovai, on southwestern side of island, May 19, 1953, *Yuncker 16040*.

"Vava'u and Lifuka": Aug.-Oct. 1855, *H. II. Harvey* (Gray Herb.).

Tongan names: *tamanu, pekepeka*.

An excellent timber tree.

This is doubtless the plant listed as *Cynometra grandiflora* A. Gray by Hemsley (Linn. Soc. Bot., Jour. 30: 176, 1894) and Burkill (op. cit. 35: 35, 1901). It is closely related to two of the Fijian species of *Maniltoa* reviewed by me in 1950 (Jour. Arnold Arboretum 31: 166-171), *M. grandiflora* (A. Gray) Scheffer and *M. brevipes* A. C. Smith. Differences among these three species are mainly matters of degree, but it seems that the sum of their minor characters indicates the desirability of keeping them apart. From *M. grandiflora*.



FIGURE 11.—*Maniltoa amicornum*, Yuncker 16168, isotype, in herbarium of DePauw University.

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flora, the new species differs in the somewhat more prominent venation of its leaflets and in its more compact inflorescences, with the rachis and pedicels at anthesis being only about half as long (these parts in Gray's species being about 3 cm. and 2-2.5 cm. long respectively). The sepals of our species are slightly the shorter, as are the petals, filaments, and style (in *M. grandiflora* the petals are 12-19 × 3-4 mm., the filaments are 15-25 mm. long, and the style is 9-10 mm. long). Although in foliage, *M. amicorum* is essentially similar to *M. brevipes*, the venation of the leaflets is finer and more obviously prominulous beneath. The new species is further distinguished by having its bud-enclosing bracts sericeous-puberulent rather than glabrous dorsally, in the longer rachis of its inflorescence (about 1 cm. long in *M. brevipes*), in its shorter style, and in the larger bracts, both median and lateral, subtending the flowers.

Genus *Tamarindus* Linnaeus

Tamarindus indica Linnaeus, Sp. Pl., 34, 1753.

Medium to large, thickly branched, round-topped tree. Leaves alternate, even-pinnate, leaflets up to 36 or more on each pinna, opposite, oblong, obtuse or slightly emarginate, base obliquely inequilateral, about 2 cm. long and 5 mm. wide, sessile. Flowers yellow, striped with red, in axillary or terminal, racemose clusters; pods up to 12 cm. or more long, curved, seeds several, embedded in pulpy tissue.

Tongatapu: margin of coconut plantation below Nualei village, Mar. 9, 1953, *Yuncker 15237*.

Lifuka: northern margin of Pangai village, May 11, 1953, *Yuncker 15087*.

Vava'u: *Crosby*.

Occasional in villages. An African species now of wide distribution in tropical countries.

Tongan name: *tamalinc*.

The pulpy part of the pod is edible.

Genus *Intsia* Thouars

Intsia bijuga (Colebrooke) O. Kuntze, Rev. Gen. Pl. 1: 192, 1891.

Rather large tree. Leaves alternate, even-pinnate, leaflets four, oval-ovate, obtuse or emarginate, base oblique, up to 8 or 10 cm. long and 5-7 cm. wide, glabrous, finely pinnately nerved, petiolules about 5 mm. long. Flowers about 1 cm. long, calyx puberulent, only one petal developing, petal pinkish, rounded; pod up to 20 cm. long and 6 cm. wide, coriaceous, seeds orbicular.

Kao: margin of forest near abandoned plantation, alt. about 30 m., May 6, 1953, *Yuncker 15957*.

Rare in Tonga. From Madagascar through Malaya and from the Philippines and the Caroline Islands eastward to Fiji and Samoa.

Tongan name: *fchi*.

The wood is very hard and is used in handicraft work.

Genus **Bauhinia** Linnaeus

Bauhinia monandra Kurz, Asiatic Soc. Bengal, Jour. 42(2) : 73, 1874.

Shrub or small tree with brown-hairy young growth. Leaves alternate, rounded-ovate in outline, up to 10 cm. or more wide, deeply cleft a third or more of its length into two winglike lobes, otherwise entire, palmately nerved. Flowers white, pink and yellow variegated, in terminal or axillary racemes, with solitary stamen; pod elongated, up to 15 cm. or more long.

An introduced ornamental, rather frequent in villages and occasionally an escape. A tropical American species now widely cultivated.

Genus **Cassia** Linnaeus

Cassia javanica Linnaeus, Sp. Pl., 379, 1753.

Rather small tree. Leaves alternate, pinnate, up to about 30 cm. long, leaflets oval, obtuse, up to 5 cm. long. Flowers pink and white, in large racemose clusters; pod cylindrical, up to 30 cm. or more long.

An introduced ornamental, this Malayan species is now widely cultivated. A few specimens of what was taken to be this species were noted in villages. It is probable that *C. fistula* Linnaeus also is present, though it was not noted. *Cassia alata* Linnaeus is frequent in dooryards.

Cassia leschenaultiana de Candolle, Soc. Phys. Hist. Nat. Genève, Mém. 2 : 132, 1824.

Pubescent, subshrubby herb, up to 80 cm. or more tall. Leaves pinnate, alternate, up to about 7 cm. long, leaflets linear-oblong, apex rounded, mucronate, base obliquely inequilateral, up to 30-40 on each leaf, 1-2 cm. long and 3 mm. wide, essentially sessile. Flowers yellow, 1-1.5 cm. wide, several, in axillary fascicles; pods up to 5 cm. long and 4 mm. wide, very thin, linear, slightly falcate.

Vava'u: roadside between Mataika and Feletoa villages, May 19, 1953, *Yuncker 16023*.

Infrequent. A pantropic weed, possibly of Asiatic origin.

Tongan name: *matcloi vava'u*.

Cassia occidentalis Linnaeus, Sp. Pl., 377, 1753.

Glabrous, erect, branching herb, up to 1 m. or more tall, slightly woody at base. Leaves alternate, even-pinnate, leaflets mostly 10 or 12, elliptic- or ovate-lanceolate, acuminate, base inequilaterally rounded, up to 7 cm. or more long and 2-3 cm. wide, petiolules 1-2 mm. long, petiole with a conspicuous gland near base. Flowers yellow, about 2.5 cm. wide, in few-flowered, axillary, racemose clusters; pods flat, glabrous, falcate, up to 12 cm. or more long.

'Eua: *Lister*.

Lifuka: in thicket near beach north of Pangai village, Apr. 24, 1953, *Yuncker 15708*.

Occasional. A tropical American species now pantropic in distribution.

Tongan name: *pi*.

Cassia sophera Linnaeus, Sp. Pl., 379, 1753.

Subshrubby herb, up to 1 m. or more tall, young parts somewhat pubescent. Leaves alternate, even-pinnate, leaflets about 14, lanceolate or lance-ovate, acuminate, base somewhat obliquely acute, 3-4 cm. long and 1-1.5 cm. wide, petiolules about 1 mm. long. Flowers yellow, about 2 cm. wide, several, in axillary, pedunculate, racemose clusters.

Tongatapu: *Forster; Home.*

'Eua: in waste area near Ohonua village, Apr. 2, 1953, *Yuncker 15620.*

Tafahi: on stone wall in Tafahi township, Dec. 15, 1951, *Hürlimann 576.*

Occasional as a plantation and waste-area weed. Pantropic.

Tongan name: *matui.*

Cassia toro Linnaeus, Sp. Pl., 376, 1753.

Erect, slightly woody plant, up to about 1 m. tall. Leaves alternate, pinnate, leaflets commonly six, oval-obovate, obtuse, base obliquely obtuse, finely pubescent, petiolules 1-2 mm. long. Flowers yellow, about 1-2 cm. wide, in axillary pairs on short peduncles; pods slender, up to 15 cm. long and 3 mm. thick.

Tongatapu: roadside near air field of Fu'amotu, Nov. 3, 1951, *Hürlimann 144*; in clearing near Navutoka village, Feb. 27, 1953, *Yuncker 15078.*

Vava'u: roadside above Ta'anea village, May 21, 1953, *Yuncker 16085.*

An occasional waste-area weed. A tropical American species now widespread in warm countries.

Tongan names: *te'ekosi, pini papalangi.*

Genus **Delonix** Rafinesque**Delonix regia** (Bojer) Rafinesque, Fl. Tellur. 2: 92, 1836.

Rapidly growing, medium-sized, round-topped, spreading tree with smooth, light-colored bark. Leaves alternate, up to 60 cm. long, bipinnate, leaflets very numerous, oblong, obtusish, base oblique, subsessile. Flowers bright red, 8 cm. or more wide, petals clawed, upper petal with whitish or yellowish streaks; pods flat, pendent, up to 30 cm. or more long and 3 to 5 cm. wide.

Niuatoputapu: ornamental tree in Falehau village, Dec. 7, 1951, *Hürlimann 379.*

Occasional in villages as an ornamental. An African species now widely cultivated in warm countries.

Tongan name: *'ohai.*

Genus **Caesalpinia** Linnaeus**Caesalpinia crista** Linnaeus, Sp. Pl., 380, 1753.

Scandent or scrambling shrub with long branches and leaves armed with sharp, recurved spines or prickles, young parts brown-pubescent. Leaves large, bipinnate, leaflets oblong to ovate, acuminate, mucronate, base rounded, obtuse, up to 8 cm. long and 4 cm.

wide but mostly somewhat smaller, petiolules 2-3 mm. long. Flowers in supra-axillary, racemose clusters, calyx greenish brown, corolla yellow; pod nearly lenticular, prickly, about 5 cm. long, seeds smooth, glossy, nearly round, very hard.

Tongatapu: in seaside forest below village of Lavengatonga, Mar. 6, 1953, *Yuncker 15195*.

Nomuka: sprawling over shrubs in thicket along shore above village, Apr. 30, 1953, *Yuncker 15868*.

Vava'u: *Crosby*.

Niuatoputapu: in forest on edge of mountain range above Vaipoa, Dec. 5, 1951, *Hürlimann 351*.

Occasional throughout Tonga. Widespread in warm countries.

C. bonducella Flem. in Hemsley's list. For discussions relative to the complicated nomenclature of this species, see Urban (*Symb. Ant.* 2: 269, 1900) and Merrill (*Philippine Jour. Sci.* 5C: 53, 1910).

Tongan name: *talatala'amoā*.

The slender, prickly stems are used to make snares with which to capture fruit bats.

Caesalpinia pulcherrima (Linnaeus) Swartz, *Observ. Bot.*, 166, 1791.

Glabrous shrub or small tree, up to 2 m. or more tall, branches usually armed with short, stiff, scattered prickles. Leaves alternate, bipinnate, leaflets oblong, obtuse or shallowly emarginate, base obliquely inequilateral, up to 2.5 cm. long, light green. Flowers red or orange, about 2.5 cm. wide, on long pedicels in large, terminal racemes, stamens long-exserted; pods oblong, flat, up to 10 cm. long.

'Eua: *Lister*.

Occasional as an ornamental. Widely cultivated in warm countries.

Genus **Sophora** Linnaeus

Sophora tomentosa Linnaeus, *Sp. Pl.*, 373, 1753.

Shrub, up to about 4 m. tall, densely gray-pubescent. Leaves alternate, odd-pinnate, leaflets up to about 21, obovate or suborbicular, apex rounded, obtuse, base obtuse or slightly acute, up to 5 cm. or more long and 3.5 cm. wide, petiolules about 3 mm. long. Flowers yellow, about 2 cm. long, on pedicels about 5 mm. long, in terminal racemes up to 15 cm. or more long; pods up to 15 cm. long, strongly constricted between seeds.

Tongatapu: *U.S. Expl. Exped.*; *Graeffe*; small island in lagoon northeast of Fatai, Oct. 30, 1953, *Hürlimann 80*; outer margin of seaside thicket, Sopa, west of Nuku'alofa, May 30, 1953, *Yuncker 15297*.

'Eua: seaward margin of strand thicket, Ha'aluma, Apr. 1, 1953, *Yuncker 15588*.

Nomuka: in thicket near sea a short distance above village, Apr. 30, 1953, *Yuncker 15865*.

Frequent in strand thickets throughout Tonga. Pantropic.

Tongan names: *lata*, *fetu'a tahi*.

Genus **Crotalaria** Linnaeus**Crotalaria mucronata** Desvaux, Jour. Bot. Desv. 3 : 76, 1814.

Erect, widely branching, subshrubby, finely pubescent plant, up to 1.5 m. or more tall. Leaves alternate, trifoliolate, leaflets elliptic-obovate, apex rounded, emarginate, base cuneate, up to 6 cm. or more long and 3 cm. wide, pinnately nerved, petiolules about 3 mm. long. Flowers yellow with fine purple stripes, about 1.5 cm. long, short-pedicellate, in elongated, terminal, slender, spikelike racemes; pods about 4 cm. long, subcylindrical, slightly curved, pubescent.

Tongatapu: weed in plantation below Fatai village, Mar. 10, 1953, *Yuncker 15264*; in sandy waste area near sea, Sopu, west of Nuku'alofa, May 30, 1953, *Yuncker 16209*.

Occasional. Widely disseminated in warm countries as a weed.

Tongan name: *pi'isi*.

Crotalaria retusa Linnaeus, Sp. Pl., 715, 1753.

Rather coarse herb, up to 50 cm. or more tall. Leaves alternate, cuneate-obovate, apex rounded, mucronulate, up to 7 cm. or more long and 2 cm. wide, finely pubescent, petioles about 3 mm. long. Flowers numerous, yellow, in long, terminal, racemose clusters; pods up to 5 cm. long.

Tafahi: below township of Tafahi toward place of Hou, Dec. 17, 1951, *Hürlimann 581*.

Niuatoputapu: near shore in Vaipoa, Dec. 7, 1951, *Hürlimann 375*.

As far as I know, this species is limited to the northernmost islands of Tonga. Widespread as a weed in tropical countries.

Genus **Indigofera** Linnaeus**Indigofera suffruticosa** Miller, Gard. Dict., ed. 8, no. 2, 1768.

Erect, much branched, subshrubby plant, up to 2 m. tall, appressed-pubescent. Leaves alternate, pinnately compound, leaflets nine to 13, opposite, oblong, or elliptic-oblong, acute, mucronate, base acute, up to 3 cm. long and 1 cm. wide, but mostly somewhat smaller, petiolules slender, about 2 mm. long. Flowers reddish, small, numerous, short-pedicellate, in nearly sessile, axillary racemes; pods strongly curved, 1-1.5 cm. long, thinly appressed-pubescent.

Tongatapu: *Mosley*; weed in plantation at Nualei, Oct. 29, 1951, *Hürlimann 35*; in clearing, Hufangalupe, near Vaini village, Feb. 26, 1953, *Yuncker 15062*.

'Eua: along trail between Pangai village and Fuai, Mar. 25, 1953, *Yuncker 15481*.

Lifuka: roadside between Pangai village and eastern side of island, Apr. 27, 1953, *Yuncker 15757*.

Vava'u: *Crosby*.

Niuafou'u: roadside near Futu, Jan. 7, 1952, *Hürlimann 653*.

A common clearing and waste-area weed throughout Tonga. Pantropic.

I. anil L. in Hemsley's and Burkill's lists.

Tongan name: 'akauveli.

Indigofera tinctoria Linnaeus, Sp. Pl., 751, 1753.

Erect, slightly pubescent, suffrutescent plant, up to 2 m. tall. Leaves pinnate, leaflets opposite, nine to 13, up to 2.5 cm. long, obovate-oblong. Flowers reddish, in rather lax, sessile, axillary racemes; pods straight or nearly so, spreading to reflexed, up to 3 cm. long.

'Eua: *Lister*.

Infrequent. A tropical American species now of widespread distribution in warm countries.

Genus **Tephrosia** Persoon

Tephrosia purpurea (Linnaeus) Persoon, Syn. Pl. 2: 329, 1807.

Silky-pubescent, much-branched, somewhat shrubby plant, with ascending stems up to 50 cm. or more tall. Leaves alternate, odd-pinnate, leaflets oblong-subspatulate, emarginate, base acute, up to 2.5 cm. long and 1 cm. wide, petiolules about 1 mm. long. Flowers small, commonly white, short-pedicellate, in terminal or leaf-opposed, racemose clusters; pods about 4 cm. long, straight, halves twisted when open.

Tongatapu: *Forster*.

Nomuka: in clearing along road encircling island between sea and central lake, Apr. 30, 1953, *Yuncker 15809*.

Kao: in clearing on lower slope, May 6, 1953, *Yuncker 15869*.

Vava'u: *Crosby*; near upper rim of steep seaside cliff above Leimatua, May 20, 1953, *Yuncker 16065*.

Niuaotupapu: near edge of mountain ridge above Hihifo, Dec. 5, 1951, *Hürlimann 344*.

A common weed in waste areas throughout Tonga. Southern Asia, Malaya, and Australia to Polynesia.

Tongan names: *kavahuhu*, *kavahuhu 'uta*, *kavahuhu tahi*, *kavahuhu veli*.

An extract of the root is used to poison fish.

Genus **Sesbania** Scopoli

Sesbania grandiflora (Linnaeus) Persoon, Syn. Pl. 2: 316, 1807.

Tree, up to 12 m. tall. Leaves alternate, even-pinnate, long and narrow, leaflets of 20-40 pairs, oblong, obtuse, mucronate, up to 3.5 cm. long. Flowers few, up to 9 cm. long, white, in few-flowered, axillary racemes; pods linear, pendulous, somewhat curved, 20-60 cm. long and 7-8 cm. wide.

Vava'u: *Crosby*.

Infrequent. From India through Malaya, Australia, and the Philippines to Polynesia. Widely planted.

Genus **Zornia** J. F. Gmelin**Zornia diphylla** (Linnaeus) Persoon, Syn. Pl. 2: 318, 1807.

Glabrous, slender, wiry, spreading or ascending herb. Leaves two-foliolate, alternate, leaflets oblique-lanceolate, acute, up to 2.5 cm. long, stipules lanceolate. Flowers small, yellow, hidden by persistent bracts which are about 1 cm. long and spurred at base; pod of two to six prickly, round segments, about 2 mm. wide.

Vava'u: *Crosby*.

Infrequent. Pantropic.

Genus **Desmodium** Desvaux**Desmodium heterocarpum** (Linnaeus) de Candolle, in DC. Prodr. 2: 337, 1825.

Shrubby plant, up to 1 or 2 m. tall, stem pubescent when young. Leaves alternate, trifoliolate, leaflets obovate, obtuse, base wedge-shaped, terminal leaflet largest, up to 6 cm. or more long and 3 cm. wide, pubescent beneath. Flowers purple, about 5-8 mm. long, in terminal and axillary racemes; pod up to 3 cm. or more long, pubescent, four- to eight-jointed.

'Eua: *Lister*; in open grassy area near center of island, Mar. 20, 1953, *Yuncker 15372*; in open grazing area on western slope of eastern ridge, Apr. 6, 1953, *Yuncker 15654*.

Kao: in clearing on rocky slope, May 6, 1953, *Yuncker 15871*.

Vava'u: *Crosby*.

Niuafu'ou: near upper rim of main central crater, May 16, 1953, *Yuncker 16012*.

Frequent throughout Tonga. From tropical Africa and southern Asia through Malaya and Australia to Fiji and Polynesia.

D. polycarpum DC. in Hemsley's and Burkill's lists.

Tongan name: *ngingie 'uta*.

Desmodium triflorum (Linnaeus) de Candolle, in DC. Prodr. 2: 334, 1825.

Branching, prostrate, slender-stemmed, somewhat hairy herb. Leaves three-foliolate, alternate, leaflets commonly 5-8 mm. long, terminal leaflet largest, elliptic or elliptic-obovate, obtuse, base narrowed to short petiolule, stipules lanceolate, brown, acuminate. Flowers purplish, about 6 mm. long, solitary or two or three, axillary, pedicels slender, about 1 cm. long; pods about 1 cm. long, of three to six joints.

'Eua: along trail above Fuai plantation, Apr. 5, 1953, *Yuncker 15644*.

Niuafu'ou: in soil pockets on old lava flows on way to upper rim of main crater, May 16, 1953, *Yuncker 16007*.

Occasional. Pantropic.

Tongan name: *kihikihi*.

Desmodium procumbens (Miller) A. S. Hitchcock, Missouri Bot. Gard., Rept. 4: 76, 1893.

Erect, mostly glabrous herb, up to 1.5 m. tall. Leaves trifoliolate, alternate, leaflets ovate-oblong to lanceolate, obtuse, terminal leaflet larger than laterals, up to 6 cm. long. Flowers

yellowish-green, commonly paired, in axillary and terminal racemes, pedicels long and slender; the pod 1 cm. or less long, slender, four- to six-jointed, spirally twisted.

Vava'u: *Crosby*. Infrequent.

A tropical American species now pantropic in distribution.

D. spirale DC. in Burkill's list.

Desmodium umbellatum (Linnaeus) de Candolle, in DC. Prodr. 2: 325, 1825.

Shrub or small tree, up to 3 or 4 m. tall, young branches silky-hairy. Leaves alternate, trifoliate, leaflets oblong-ovate, obtuse or acutish, base obtuse, terminal leaflet larger than laterals, up to 10 cm. long and 7 cm. wide, soft-pubescent. Flowers white, fragrant, about 1 cm. long, on short pedicels in terminal and axillary, umbellate clusters; pod pubescent, three- to six-jointed, segments oval-oblong.

Tongatapu: on small island in lagoon northeast of Fatai, Oct. 30, 1951, *Hürlimann 70*; in strand thicket, east of Nuku'alofa, Mar. 7, 1953, *Yuncker 15215*; in strand thicket, Sopu, west of Nuku'alofa, May 30, 1953, *Yuncker 15299*.

Lifuka: in seaside thicket north of Pangai village, Apr. 25, 1953, *Yuncker 15736*.

Vava'u: *Crosby*.

Tafahi: near shore below township of Tafahi, Dec. 13, 1951, *Hürlimann 500*.

Niutopotapu: on edge of mountain range above Vaipoa, Dec. 5, 1951, *Hürlimann 358*.

Frequent in strand thickets throughout Tonga. Tropical Asia, Malaya, Australia, and Polynesia.

Tongan names: *lala tahi*, *lala 'uta*.

Desmodium uncinatum (Jacquin) de Candolle, in DC. Prodr. 2: 331, 1825, *vel aff.*

Erect, branching, slightly pubescent, subwoody plant, up to 1 m. or more tall. Leaves alternate, three-foliate, leaflets elliptic or elliptic-ovate, acute, base narrowly obtuse, up to 4 or 5 cm. long and 2.5 cm. wide, terminal leaflet larger than laterals. Flowers white or slightly creamy, about 8 mm. long, on slender pedicels about 5 mm. long, in terminal racemes up to 15 cm. or more long.

'Eua: in sandy soil, edge of Ohonua village on western side of island, Apr. 2, 1953, *Yuncker 15609*.

The species of this alliance have been very much confused in herbaria and in literature, as Schubert points out [Field Mus. Nat. Hist., Bot. 13(3): 435, 1943]; our specimen agrees with the weed passing under this name in the Hawaiian Islands, but its nomenclature must be reexamined.

Genus *Alysicarpus* Necker

Alysicarpus nummularifolius (Linnaeus) de Candolle, in DC. Prodr. 2: 353, 1825.

Low, spreading, prostrate, branched, subglabrous herb, stems up to 1 m. or more long.

Leaves simple, alternate, elliptic-subovate, oblong, or lanceolate, apex rounded, obtuse, base obtuse or subcordulate, up to 2 cm. or more long, petioles slender, about 1 cm. long. Flowers purplish, about 6 mm. long, short-pedicellate, in rather dense, short, terminal racemes up to 3 cm. long; pods crowded, 1-2 cm. long, jointed, rugose.

Lifuka: on slope of roadside ditch between Pangai village and southern end of island, Apr. 28, 1953, *Yuncker 15788*.

Vava'u: on moist soil bank near pier at Neiafu, May 24, 1953, *Yuncker 16155*.

Occasional as a weed in waste areas. A weed of the Old World tropics, now widespread in warm countries.

Tongan name: *akataha hina*.

Genus *Uraria* Desvaux

Uraria lagopodioides (Linnaeus) Desvaux, Soc. Linn. Paris, Mém. 4: 309, 1826.

Low, trailing, branching, pubescent herb, stems up to 50 cm. or more long. Leaves one- or three-foliate, alternate, leaflets round-ovate, or broadly elliptic, terminal leaflet much larger than laterals, apex rounded, obtuse or slightly emarginate, base obtuse or cordulate, up to 4 cm. long and 3 cm. wide but commonly smaller, firm, veiny, stipules linear-lanceolate. Flowers purplish, in very compact, ovoid or oblong, pubescent terminal racemes; pod jointed, segments orbicular-ovate, smooth.

Tongatapu: *Home*.

'Eua: *Lister*.

Nomuka: in sandy soil along road encircling island, Apr. 30, 1953, *Yuncker 15805*.

Vava'u: *Crosby*.

Tafahi: roadside between township of Tafahi and landing place Faihavanui, Dec. 15, 1951, *Hürlimann 544*.

Niuatoputapu: on path on mountain range east of Vaipoa, Dec. 5, 1951, *Hürlimann 367*.

Occasional as a weed in plantations and waste areas throughout Tonga. From India and southern China through Malaya to Australia, the Philippines, and Polynesia.

U. lagopoides DC. in Burkill's list.

Tongan name: *iku'ipusi*.

Genus *Dalbergia* Linnaeus f.

Dalbergia candenatensis (Dennstedt) Prain, Asiatic Soc. Bengal, Jour. 70(2): 49, 1901.

Branching, somewhat pubescent shrub, up to 2 m. or more tall. Leaves alternate, pinnate, leaflets elliptic or elliptic-obovate, apex rounded, base narrowed and obtuse or acutish, up to 5 cm. long or more and 2.5 cm. wide, petiolules scarcely 5 mm. long. Flowers white,

about 7 mm. long, short-pedicellate, in few-flowered, short, axillary, racemose clusters; pods 2 cm. or more long, thin, red brown.

Tongatapu: edge of mangrove swamp, Nuku'alofa, *Setchell and Parks 15326*.

Nomuka: in thicket along road encircling island, Apr. 30, 1953, *Yuncker 15839*.

Vava'u: *Crosby*.

Occasional in strand thickets. India, southern China, New Guinea, Australia, Mariana and Caroline Islands, Philippines, Fiji, and other islands.

Probably the *D. monosperma* Dalz. of Burkill's list.

Tongan name: *moho*.

The seeds, which are said to be poisonous, are used as beads.

Genus *Derris* Loureiro

Derris trifoliata Loureiro, Fl. Cochinchinensis, 433, 1790.

Glabrous, scandent shrub, with rather large, scattered lenticels, climbing to 5 m. or more high. Leaves alternate, odd-pinnate, leaflets three to seven, elliptic or oblong-subovate, acuminate, base obtuse, variable in size, up to 10 cm. or more long and 4 cm. wide, somewhat glossy, petiolules 5-8 mm. long. Flowers white to rose, up to 1 cm. long on short, slender pedicels in axillary, racemose, or paniculate clusters; pods one- to two-seeded, conspicuously veiny, subrhomboid to broadly oblong, up to 5 cm. long and 3 cm. wide.

Tongatapu: *U.S. Expl. Exped.*; toward beach near Fatai, Oct. 30, 1951, *Hürlimann 51*; in thicket near the beach, Sopa, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15015*.

Vava'u: *Crosby*.

Occasional near the beach. Tropical Africa, Asia, Malaya, Australia, and Polynesia.

D. uliginosa Benth. in Hemsley's and Burkill's lists.

Tongan name: *kavahaha*.

The stem fibers are strong and are used for cordage. An extract of the roots is used as fish poison.

Genus *Inocarpus* Forster

Inocarpus edulis J. R. and G. Forster, Char. Gen. Pl., 66, 1776.

Rather large tree, up to 12 m. or more tall. Leaves alternate, oblong to elliptic-lanceolate, entire, obtuse or bluntly pointed, base cordate, coriaceous, pinnately nerved, strongly venulose, coriaceous, up to 30 cm. or more long and 10 cm. wide, petioles stout, scarcely 1 cm. long. Flowers yellowish white, 1 cm. or more long, sessile, in spicate, pubescent clusters; fruit fleshy, rounded, 6 cm. or more long, edible.

Tongatapu: *Gracffe*; *Mosley*; in plantation near Nualei, Nov. 1, 1951, *Hürlimann 118*; in forested area near Lavengatonga village, Mar. 6, 1953, *Yuncker 15180*.

'Eua: *Lister*; in open woods along trail between Pangai village and Fuai, Mar. 25, 1953, *Yuncker 15484*.

Nomuka: along road encircling island, Apr. 30, 1953, *Yuncker 15830*.

Lifuka: side of road north of Pangai village, Apr. 25, 1953, *Yuncker 15740*.

Vava'u: *Crosby*; in clearing near coastal cliff along eastern side of island, below Houma village, May 22, 1953, *Yuncker 16128*.

Tafahi: beside road between township of Tafahi and landing place Faihavanui, Dec. 15, 1951, *Hürlimann 566*.

Niuatoputapu: on main mountain ridge above Vaipoa, to the east, Dec. 5, 1951, *Hürlimann 357*; plain southeast of Falehau, Dec. 7, 1951, *Hürlimann 380*.

Frequent throughout Tonga, Malaysia and Polynesia.

Tongan name: *ifi*; varietal names, *ifi mea*, *ifi 'ui*, *monosivai*.

The timber is strong and is used for general construction work, tool handles, tapa pounders, wooden drums, banana shooks, and so on. The fruit is edible.

For a discussion of the reasons for using *I. edulis* as the correct name of this species rather than *I. fagiferus* (Parkinson) Fosberg, see Merrill (Chron. Bot. 14: 347, 1954).

Genus **Abrus** Linnaeus

Abrus precatorius Linnaeus, Syst., ed. 12, 472, 1767.

Subwoody, twining vine with slender, glabrous branches with long internodes. Leaves even-pinnate, alternate, leaflets subsessile, commonly 20 to 30, oblong, obtuse and slightly emarginate, base obtuse or cordulate, about 2 cm. long and 6 mm. wide. Flowers small, red or white, several, on very short, swollen, knoblike, terminal or axillary branches; pods several-seeded, seeds handsome, bright red with base black, shiny.

Tongatapu: *U.S. Expl. Exped.*

Lifuka: in seaside thicket toward northern end of island, Apr. 25, 1953, *Yuncker 15724*.

Kao: in thicket, margin of abandoned plantation, May 6, 1953, *Yuncker 15951*.

Vava'u: *Crosby*; in thicket near sea below Houma village, May 22, 1953, *Yuncker 16125*.

Niufo'ou: in thicket in an interlaval "island" on way to upper rim of main central crater, May 16, 1953, *Yuncker 16002*.

Niuatoputapu: on edge of mountain range above Vaipoa, Dec. 5, 1951, *Hürlimann 353*.

Frequent in thickets throughout Tonga. A tropical Asiatic species now pantropic in distribution.

Tongan names: *matamoho*, *moho*.

The seeds are used for necklaces and other ornamentation.

Genus **Clitoria** Linnaeus**Clitoria ternatea** Linnaeus, Sp. Pl., 753, 1753.

Slender, twining vine, young growth somewhat pubescent. Leaves alternate, odd-pinnate, leaflets mostly five or seven, oval-ovate, obtuse, base acutish, 2-4 cm. long and up to 4 cm. wide, petiolules about 2 mm. long. Flowers mostly solitary in leaf axils, vivid blue with white center, up to 5 cm. long; the pods up to 5 cm. or more long, pubescent, flat, sharp-beaked, seeds greenish mottled with brown.

'Eua: *Lister*.

Nomuka: in thicket near sea along road above village, Apr. 30, 1953, *Yuncker 15810*.

Occasional. Widely cultivated in tropical countries as an ornamental.

Tongan name: *paipa*.

Genus **Glycine** Linnaeus**Glycine tabacina** Benthani, Fl. Australiensis 2: 244, 1864.

Slender, somewhat pubescent vine. Leaves trifoliate, leaflets on lower leaves round-ovate or oblong, usually obtuse, those on upper leaves ovate-lanceolate to almost linear and usually acute, 2-5 cm. long. Flowers small, on very short pedicels, distant, in slender, elongated racemes; pod straight, 2-2.5 cm. long.

Vava'u: *Crosby*.

Australia.

Genus **Erythrina** Linnaeus**Erythrina crista-galli** Linnaeus, Mantissa 1: 99, 1767.

Tree, up to 10 m. or more tall, broad-topped. Leaves alternate, trifoliate, long-petiolate, leaflets oval-oblong or somewhat ovate, acute at both ends, up to 8 cm. or more long and 3 cm. wide, petioles and often main nerves with recurved prickles. Flowers bright red, about 4 cm. long, on slender pedicels up to 4 cm. or more long, in large, racemose clusters up to 30 cm. or more long.

Tongatapu: in dooryard in Nuku'alofa as an ornamental, Mar. 7, 1953, *Yuncker 15198*.

Infrequent ornamental. A tropical American tree now widely cultivated.

Tongan name: *ngatae*.

Erythrina fusca Loureiro, Fl. Cochinchinensis, 427, 1790.

Tree, up to 10 m. tall, the trunk with large conical protuberances, branchlets and petioles with scattered prickles. Leaves trifoliate, leaflets oblong or elliptic-oblong, acute or obtuse, up to 15 cm. long. Flowers dark red, in large racemose clusters up to 20 cm. long; pod subcylindrical, up to 25 cm. long and about 1.5 cm. wide.

'Eua: *Lister*.

Infrequent. India, Indo-China, Malaya, and Polynesia.

E. ovalifolia Roxb. in Hemsley's list.

Erythrina variegata Linnaeus var. **orientalis** (Linnaeus) Merrill, Interpret. Herb. Amboin., 276, 1917.

Small to medium-sized, more or less spiny tree. Leaves alternate, trifoliate, long-petiolate, leaflets broadly triangular-ovate or rhombic, acute to acuminate, base truncate or acutish, up to 15 cm. long and nearly as wide, lower leaflets somewhat oblique, with prominent glands below base of petiolules. Flowers bright red, numerous, in dense, racemose clusters; pod up to 25 cm. or more long, seeds dark red.

Tongatapu: *U.S. Expl. Exped.*; in fence row near village of Niutoua, Mar. 2, *Yuncker 15115*.

'Eua: *Lister*; roadside near center of island, Mar. 19, 1953, *Yuncker 15364*.

Vava'u: in thicket near Houma village, May 22, 1953, *Yuncker 16136*.

Tafahi: near road between township of Tafahi and landing place Faihavanui, Dec. 15, 1951, *Hürlimann 543*.

Frequent throughout Tonga, often planted for use as living fence posts. India to Polynesia.

Tongan name: *ngatae*.

The trunks are used for making canoes, for general building purposes, and for banana shooks and the like.

Genus **Strongylodon** Vogel

Strongylodon lucidus (Forster f.) Seemann, Fl. Vit., 61, 1865.

Rather coarse, climbing, woody vine. Leaves alternate, three-foliate, leaflets glabrous, oval-ovate, entire, acuminate, base obtuse, three-nerved from base, midrib branched upward, lateral leaflets somewhat oblique, up to 10 cm. long and 6 cm. wide. Flowers red, beaked; pods flattened, thick, smooth, 10 cm. long and 5 cm. wide, seeds one or two, round, black.

'Eua: in southern part of eastern ridge near summit above Vaingana, Nov. 13, 1951, *Hürlimann 269*.

Infrequent. From Ceylon to the Hawaiian Islands.

Genus **Mucuna** Adanson

Mucuna gigantea (Willdenow) de Candolle, in DC. Prodr. 2: 405, 1825.

Rather slender, high-climbing, glabrous vine. Leaves alternate, three-foliate, long-petiolate, leaflets oval-ovate, lower two obliquely inequilateral, acuminate, base truncate or cordulate, up to 15 cm. or more long and 10 cm. wide, three-nerved from base, midrib branched upward, turning black upon drying. Flowers greenish, about 4 cm. long, long-pedicellate, in long-pedunculate, axillary, paniculate clusters; pods oblong, flattened, margin two-winged, covered with stinging hairs, up to 15 cm. or more long, seeds large, flattened, round or almost square.

Tongatapu: in forest tree along road between Lavengatonga village and sea, Mar. 6, 1953, *Yuncker 15187*.

'Eua: *Lister*.

Nomuka: in thicket near sea along road encircling island, Apr. 30, 1953, *Yuncker 15804*.

Lifuka: climbing in thicket near sea north of Pangai village, Apr. 25, 1953, *Yuncker 15737*.

Vava'u: *Crosby*.

Niuafou: roadside between Futu and the great lake, Jan. 7, 1952, *Hürlimann 656*.

Niuatoputapu: south of Matavai toward the coast, Jan. 2, 1952, *Hürlimann 646*.

Frequent in strand thickets throughout Tonga. India to Polynesia.

Tongan name: *pa'anga'ae kuma*.

Genus *Galactia* P. Browne

Galactia tenuiflora (Willdenow) Wight and Arnott, Prodr. Fl. Penins. Ind. Or., 206, 1834, *vel aff.*

Slender, vinelike, herbaceous plant, stems up to 1 m. or more long, spreading, more or less pubescent, hairs somewhat reflexed. Leaves three-foliolate, alternate, leaflets elliptic, oblong-elliptic or subobovate, obtuse, base acutish, up to 3 cm. or more long, slightly pubescent beneath, lateral leaflets slightly obliquely inequilateral, the petioles slender. Flowers solitary or paired, short-pedicellate, up to about 8 mm. long, in loose, racemose clusters, corolla bluish; pods 3 cm. long and 5 mm. wide, thin, twisted when open.

Tongatapu: creeping on coral cliffs near sea, flowers blue purple, near village of Vaini, Feb. 26, 1953, *Yuncker 15061*.

'Eua: in grazing area near village of Ohonua, on western side of island, flowers bluish lavender, Apr. 2, 1953, *Yuncker 15621*.

Tongan name: *kihikihi lanumata*.

These specimens do not precisely agree with the Indian type of *Glycine tenuiflora* Willdenow but the differences may be minor, and this is probably the plant known as *G. tenuiflora* in New Caledonia. We find no record of the species farther east than New Caledonia (A. C. Smith).

Genus *Pueraria* de Candolle

Pueraria lobata (Willdenow) Ohwi, Tokyo Sci. Mus., Bull. 18: 16, 1947.

Coarse, densely brown-hairy, trailing or somewhat twining vine with large tuberous roots. Leaves trifoliolate, long-petiolate, leaflets ovate, acuminate, base truncate, up to 15 cm. or more long and 12 cm. wide, terminal leaflet commonly shallowly lobed, lateral leaflets obliquely inequilateral, sometimes shallowly lobed. Flowers about 2 cm. long, purplish lilac, in large, axillary, spikelike clusters; pod 6 cm. or more long, densely hairy.

Tongatapu: climbing in thicket near Lavengatonga village, Mar. 6, 1953, *Yuncker 15176*.

'Eua: *Lister*: in open grassy area at summit of eastern ridge, Mar. 30, 1953, *Yuncker 15556*.

Lifuka: in thicket near north end of island, May 11, 1953, *Yuncker 15984*.

Vava'u: *Crosby*.

Niutopotapu: on edge of mountain ridge above Vaipoa, Dec. 5, 1951, *Hürlimann 354*.

Frequent in thickets throughout Tonga. Southeastern Asia and Malaya to Polynesia. Now widely grown as an ornamental and as a forage crop.

Tongan names: *aka, akataha, fuc'acpuaka*.

This plant is said to be especially relished by swine. Parts of it are used in medicines, and the roots may be eaten in times of food scarcity.

Genus **Canavalia** de Candolle

Canavalia ensiformis (Linnaeus) de Candolle, in DC. Prodr. 2: 404, 1825.

Subglabrous, subwoody vine. Leaves alternate, trifoliate, leaflets ovate or oblong-ovate, acuminate, base rounded, obtuse, up to 15 cm. long and 6 cm. wide. Flowers pink, subsessile, reflexed, in long, axillary, spikelike racemose clusters; pod about 15 cm. long and 2 cm. wide, flat.

Vava'u: *Crosby*.

A tropical American species now widespread in warm countries.

Canavalia maritima (Aublet) Thouars, in Jour. Bot. Desv. 1: 80, 1813.

Rather coarse, herbaceous vine. Leaves alternate, trifoliate, leaflets rather thick, sub-orbicular, subovate or subobovate, obtuse, base rounded, obtuse to acute, up to 12 cm. or more long and nearly as wide, pubescent, hairs appressed. Flowers about 2 cm. long, short-pedicellate, in long-pedunculate axillary racemes, corolla pink; pods up to 10 cm. long, broadly linear, seeds brown.

'Eua: *Lister*.

Lifuka: in thicket along road to north of Pangai village, Apr. 25, 1953, *Yuncker 15714*.

Kao: in thicket, border of old plantation, May 6, 1953, *Yuncker 15958*.

Occasional throughout Tonga. A tropical American species now widely disseminated in tropical countries.

Probably the *C. obtusifolia* (Lam.) DC. of Hemsley's list.

Tongan name: *lautolu'uta*.

Canavalia microcarpa (de Candolle) Piper, Biol. Soc. Washington, Proc. 30: 177, 1917.

Rather coarse, herbaceous vine. Leaves alternate, leaflets ovate, acuminate, base rounded, obtuse, up to 15 cm. long and 8-10 cm. wide. Flowers purplish or pinkish, up to 3 or 4 cm. long, short-pedicellate, few, on rather long, axillary peduncles; pods thick, three-angled on one edge, up to 12 cm. long and about 5 cm. wide, pointed, seeds ovoid, flattened, brown.

Tongatapu: *U.S. Expl. Exped.*

Southeastern Asia and Malaya to Polynesia.

C. ensiformis (L.) DC. var. *turgida* Hemsl. in Hemsley's list [?].

Canavalia sericea A. Gray, U.S. Expl. Exped., Bot. 1: 440, 1854.

Trailing or climbing, densely silky-pubescent vine. Leaves alternate, trifoliolate, leaflets rounded-ovate to subobovate, obtuse or slightly emarginate, base acutish or obtuse, up to 9 cm. long and nearly as wide. Flowers about 3 cm. long, short-pedicellate, in axillary, racemose clusters, corolla rose-colored; pod flattened, up to about 14 cm. long, one edge three-ridged.

Tongatapu: in strand thicket, near Vaini village, Feb. 26, 1953, *Yuncker 15050*; seaward side of strand thicket above Niutoua village, Mar. 2, 1953, *Yuncker 15143*; pioneering on sand, outer edge of seaside vegetation, near Blow Hole area below Houma village, June 1, 1953, *Yuncker 16220*.

'Eua: seaward margin of strand thicket, Apr. 1, 1953, *Yuncker 15597*.

Nomuka: strand thicket above village, Apr. 30, 1953, *Yuncker 15808*.

Lifuka: spreading on sand just above high-tide limit along eastern shore of island, Apr. 27, 1953, *Yuncker 15758*.

Frequent along the outer edge of the strand vegetation throughout Tonga. Polynesia.

Tongan name: *fue tahi veveli*.

Genus **Phaseolus** Linnaeus**Phaseolus adenanthus** G. W. F. Meyer, Prim. Fl. Esseq., 239, 1818.

Slender, glabrous, or somewhat pubescent, twining, herbaceous vine. Leaves alternate, trifoliolate, leaflets firm, oblong-ovate or ovate, acute, base obtuse or acutish, up to 14 cm. long and 6-7 cm. wide, three-nerved from base, midrib branched upward. Flowers up to 3 cm. long, white tinged with purple, short-pedicellate, in long-pedunculate, axillary, racemose clusters, flowers few and approximated near end of peduncle; pods linear, recurved, flat, up to 10 cm. long and 1 cm. wide.

Tongatapu: *Moseley*.

Vava'u: *Crosby*; climbing in thicket along road west of Leimatua village, northwest of Neiafu, May 19, 1953, *Yuncker 16021*.

Occasional. Pantropic.

Tongan name: *fue 'uta*.

Phaseolus aureus Roxburgh, Hort. Beng., 55, 1814; Fl. India, ed. 2, 3: 297, 1832.

Erect or climbing herb, stems furrowed and brown-pilose. Leaves alternate, trifoliolate, leaflets broadly ovate, subrhomboid or suborbicular, rather thin, short-acute, stipules large, ovate. Flowers comparatively small, yellow, in clusters of four to six, at end of stout, villos peduncles; pod nearly cylindrical, up to 6-8 cm. long, somewhat curved, seeds nearly round, small, green or golden.

Vava'u: *Barclay*.

Rather widely cultivated as a vegetable or forage plant.

P. mungo L. in Hemsley's list [?].

Phaseolus semierectus Linnaeus, Mantissa 1: 100, 1767.

Erect, branching, subwoody, pubescent plant, up to 1.5 m. tall, hairs more or less reflexed, branches rather long. Leaves alternate, trifoliolate, leaflets narrowly ovate or

oblong-ovate, acute at both ends, up to 6 or 7 cm. long and 3 cm. wide, pubescent. Flowers about 1.5 cm. long, short-pedicellate, in long-pedunculate, terminal and axillary racemose clusters, corolla purplish or dark red; pods appressed-pubescent, up to 10 cm. long and 4 mm. wide, the halves strongly twisted when opened, seeds numerous.

Tongatapu: weed in open areas on plantations, Nualei, Oct. 29, 1951, *Hürlimann 30*; in waste area near Navutoka village, Feb. 27, 1953, *Yuncker 15097*; in waste area near sea, Sopu, west of Nuku'alofa, May 30, 1953, *Yuncker 15296*.

'Eua: in old clearing near Ohonua village, Apr. 2, 1953, *Yuncker 15626*.

Frequent as a weed in waste areas throughout Tonga. A tropical American weed now pantropic in distribution.

Genus *Vigna* Savi

Vigna marina (Burmam) Merrill, Interpret. Herb. Amboin., 285, 1917.

Prostrate, subglabrous, long-trailing vine. Leaves alternate, trifoliolate, leaflets round-ovate or suborbicular, apex rounded, base obtuse, up to 8 cm. long and 6 cm. wide, three-nerved from base, midrib branched upward, lateral leaflets somewhat oblique. Flowers 1.5-2 cm. long, short-pedicellate, in few-flowered racemose clusters on axillary peduncles up to 15 cm. or more long, corolla yellow; pods slender, up to 5 cm. or more long.

Tongatapu: along shore below Fu'amotu, Nov. 3, 1951, *Hürlimann 132*; pioneering in sand along seaward margin of strand vegetation, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15009*.

'Eua: *Lister*; just above high-tide level, Lokupo, Mar. 27, 1953, *Yuncker 15530*.

Lifuka: outer edge of vegetation zone near upper tidal limit, north of Pangai village, Apr. 25, 1953, *Yuncker 15720*.

Tafahi: on shore below township of Tafahi, Dec. 13, 1951, *Hürlimann 498*.

Niuaotupapu: near shore in Falehau, Dec. 18, 1951, *Hürlimann 617*.

Common along the sandy beaches throughout Tonga. Pantropic.

Tongan names: *lautolu*, *lautolu hina*, *lautolu tahi*.

The leaves are used in medicines.

Genus *Dolichos* Linnaeus

Dolichos lablab Linnaeus, Sp. Pl., 725, 1753.

Vigorous, finely pubescent, twining vine. Leaves alternate, trifoliolate, leaflets broadly triangular-ovate, lateral leaflets oblique, acuminate, base obtuse, three-nerved from base, midrib branched upward, up to 15 cm. long and nearly as wide, petioles up to 15 cm. or more long. Flowers about 1.5 cm. long, on slender pedicels up to 1 cm. long, in long, terminal and axillary, long-pedunculate, racemose clusters, corolla white; pods flattened, curved, up to about 10 cm. long.

Tongatapu: roadside near Nualei, Nov. 1, 1951, *Hürlimann 115*; *Moseley*.

Vava'u: *Crosby*; in roadside thicket between Mataika and Feletoa villages, May 19, 1953, *Yuncker 16019*; in thicket near margin of Ngofe swamp on southwestern side of island, May 19, 1953, *Yuncker 16025*.

Occasional throughout Tonga. Widely disseminated in warm countries.

Tongan name: *pini'ae puaka*.

The seeds are said to be poisonous unless cooked.

Peanuts (*Arachis hypogaea* L.), garden beans (*Phaseolus* spp.), peas (*Pisum sativum* L.), and soybeans [*Glycine max* (L.) Merrill] are cultivated as plantation and garden crops.

FAMILY OXALIDACEAE

Genus *Oxalis* Linnaeus

Oxalis corniculata Linnaeus, Sp. Pl., 435, 1753.

Small, creeping, pubescent herb, stems ascending to 15 cm. or more. Leaves palmately compound, leaflets three, obcordate, about 1 cm. long, ciliate. Flowers yellow, in two- to six-flowered umbels, pedicels slender, 1 cm. or more long, on axillary peduncles; capsule cylindrical, up to 12 mm. or more long.

Tongatapu: *Moseley*; on rocks near sea, near Vaini, Feb. 26, 1953, *Yuncker 15052*; strand terrace near Houma, Oct. 28, 1951, *Hürlimann 15*.

'Eua: along path crossing high plateau of eastern ridge above Fuai, Nov. 9, 1951, *Hürlimann 201*; along open trail in forest near center of the island, Apr. 5, 1953, *Yuncker 15647*.

A common plantation and waste-area weed throughout Tonga. Pantropic.

Tongan name: *kihikihiki*. The leaves are used in preparing medicines.

Genus *Averrhoa* Linnaeus

Averrhoa carambola Linnaeus, Sp. Pl., 428, 1753.

Small tree, up to about 6 m. tall. Leaves alternate, odd-pinnate, leaflets elliptic, acuminate, base acute, up to 6 cm. long and 3 cm. wide, petiolules scarcely 5 mm. long. Flowers red and white, small, in small, axillary clusters; fruit greenish yellow, waxy, up to 10 cm. or more long, strongly five-angled, fleshy, edible.

Tongatapu: in garden in Nuku'alofa, Mar. 7, 1953, *Yuncker 15220*.

Of recent introduction. A tropical American plant now widely cultivated for its fruit.

FAMILY RUTACEAE

Genus *Fagara* Linnaeus

Fagara pinnata (J. R. and G. Forster) Engler, in Nat. Pflanzenfam. 3(4): 119, 1896.

Tree up to 12 m. tall. Leaves alternate, even-pinnate, leaflets two to five pairs, entire, somewhat obliquely elliptic, acuminate, base shorter on one side, acute, up to 7-8 cm. long and 3 cm. wide, pinnately nerved, midrib nearer shorter side. Flowers in axillary, branching clusters up to 15 cm. long; fruit about 1 cm. long, dehiscent, one-seeded, seed black.

Vava'u: *Crosby*; Talau hill, 120 m. alt., *MacDaniels 1093*; in forest near Leimatua village, May 19, 1953, *Yuncker 16045*.

Occasional. Also in Fiji, Norfolk Island, and [?] New Caledonia.

Zanthoxylum blackburnia Benth. in Burkill's list.

Tongan name: *ake*.

Genus **Evodia** J. R. and G. Forster

Evodia hortensis J. R. and G. Forster, Char. Gen. Pl., 14, pl. 7, 1776 (as *Euodia hortensis*).

Small tree, up to 4 m. or more tall. Leaves alternate, one- or three-foliolate, up to 24 cm. long and 4-6 cm. wide but mostly smaller, elliptic, obtuse or acute, base acute. Flowers small, white, in rather large, paniculate cluster; fruit obliquely subglobose, scarcely 5 mm. long.

This species is represented in Tonga by the following two forms:

f. **hortensis**

Leaves one- or three-foliolate, leaf blades mostly 3 to 4 times as long as wide.

Tongatapu: near Kologa, *Setchell and Parks 15361*; *Forster*.

'Eua: in forest on lower terrace along shore on way to Ha'aluma, Apr. 1, 1953, *Yuncker 15582*.

Vava'u: *Moore 499*; near Talau Hill, *MacDaniels 1100*; along trail on way to summit of Talau, west of Neiafu, May 23, 1953, *Yuncker 16150*.

f. **simplicifolia** (Rechinger) K. Schumann, ex Lauterbach, Engler Bot. Jahrb. **55**: 232, 1918.

Leaves one-foliolate, leaflet blades mostly 9 to 15 times as long as wide.

Tongatapu: near Nuku'alofa, *Setchell and Parks 15175*; *Forster*; in trail-side thicket near Nualei, Mar. 9, 1953, *Yuncker 15231*; in thicket near Nualei, Nov. 1, 1951, *Hürlimann 109*.

'Eua: *Lister*; plateau and Houma district, *Parks 16189*.

Lifuka: in thicket near coast north of Pangai village, Apr. 25, 1953, *Yuncker 15713*.

Vava'u: *Crosby*; *Harvey*.

Tafahi: in forest near shore below township of Tafahi, Dec. 13, 1951, *Hürlimann 502*. Without definite locality, *McKern 44, 112*.

Both forms of the species are occasional throughout Tonga and are widespread in the Pacific.

Both forms are known to the Tongans as *uhi*. The name *uhi lau koka* was also given for f. *hortensis*.

The leaves and bark are used in medicines and in scenting coconut oil. For a discussion of this as well as other members of the Rutaceae in Tonga, Fiji, and Samoa, see A. C. Smith (Jour. Arnold Arboretum 32:226-255, 1951).

Genus **Acronychia** J. R. and G. Forster

Acronychia niueana St. John, B. P. Bishop Mus., Bull. 178: 67, fig. 3, 1943.

Shrub or small tree, up to 5 m. tall. Leaves opposite, simple, oval, obtuse or retuse, base acute, up to 20 cm. long and 10 cm. wide, minutely glandular-dotted, fragrant, petiole up to 4 cm. long. Flowers very small, white, numerous, in compound, axillary, cymose clusters; fruit subglobose, 5-7 mm. in diameter.

Tongatapu: *Setchell and Parks 15184*; near Fangahina, *Setchell and Parks 15466*; in thicket, near Vaini village, Feb. 26, 1953, *Yuncker 15047*.

Infrequent. Also in Niue.

Tongan name: *ahivao*.

Genus **Micromelum** Blume

Micromelum minutum (Forster f.) Seemann, Viti, 434, 1862.

Small tree up to 4 or 5 m. tall, the branches puberulent. Leaves pinnate, the leaflets up to 12 or more, alternate, ovate-lanceolate, acuminate, the base oblique, up to 10 cm. or more long and 7 cm. wide but mostly smaller, the petiolules about 5 mm. long. Flowers very small, white, fragrant, puberulent, in many-flowered, terminal and axillary, paniculate clusters.

Tongatapu: *Forster; Moseley*; in thicket near Vaini village, Feb. 26, 1953, *Yuncker 15048*; forest, second strand terrace below Fu'amotu, Nov. 3, 1951, *Hürlimann 138, 141*.

'Eua: *Lister*; along road between Ohonua and Pangai, Nov. 8, 1951, *Hürlimann 146*.

Nomuka: in thicket on seaward side of road encircling island between sea and inland lake, Apr. 30, 1953, *Yuncker 15814*.

Lifuka: in seaside thicket north of Pangai village, Apr. 25, 1953, *Yuncker 15748*; in thicket at northern end of island near Lifuka end of the interisland causeway, May 11, 1953, *Yuncker 15983*.

Vava'u: *Crosby*; on forested slope leading down to Lake Anovai, May 19, 1953, *Yuncker 16044*.

Tafahi: fog forest below top of Piu 'o Tafahi, alt. 590 m., Dec. 10, 1951, *Hürlimann 435*.

Frequent throughout Tonga. From southern Asia through Malaya to Polynesia.

M. pubescens Blume var. *glabrescens* Oliv. in Hemsley's and Burkill's lists.

Tongan names: *takafalu, takafalu hina*.

Genus **Citrus** Linnaeus

Citrus maxima (Burmann) Merrill, Interpret. Herb. Amboin., 296, 1917.

Tree up to 10 m. tall, branches spiny, twigs compressed, green. Leaves elliptic or ovate-oblong, entire, apex retuse, up to 10-12 cm. long, the petioles obovate-winged. Flowers white, fragrant, several, in short, axillary racemes; the fruit up to 15 cm. or more in diameter, the rind thick, the pulp yellow or reddish, rather dry, scarcely edible.

Occasional in forests and thickets throughout Tonga. Not seen in cultivation.

C. decumana L. of Hemsley's list.

Tongan name: *moli tonga*.

Oranges (*moli kai*), limes (*laima*), citrons, mandarins (*moli peli*), kumquats, grapefruit (*moli kalepi*), and lemons (*leman*) are cultivated. Lemons are often found growing naturally. A number of large fruiting trees occur in the forest above Fuai plantation on the island of 'Eua. *Moli uku*, a form producing inedible fruit sometimes used for washing hair, was reported but not seen.

FAMILY SIMAROUBACEAE

Genus **Suriana** Plumier

Suriana maritima Linnaeus, Sp. Pl., 284, 1753.

Shrub or small tree up to 3 m. or more tall, the younger parts and leaves finely pubescent. Leaves alternate but closely spaced, simple, linear-spatulate, very shortly acutish, gradually narrowed to short petiole, up to about 3 cm. long and 3-5 mm. wide. Flowers yellow, in subterminal, racemose clusters, petals about 8 mm. long; capsule five-parted, pubescent.

Tongatapu: forming thicket near beach below Fu'amotu village, Mar. 4, 1953, *Yuncker 15193*.

'Eua: in sandy soil just above high-tide limit, Ha'aluma, Apr. 1, 1953, *Yuncker 15594*.

Lifuka: *Harvey*; in thin soil on rocky cliff along northern end of island, May 11, 1953, *Yuncker 15982*.

Islets near Vava'u: *Crosby*.

Niuatoputapu: on coral sand, coast south of Matavai, Dec. 26, 1951, *Hürlimann 628*.

Common in strand thickets on most of the islands of Tonga. Pantropic.

Tongan name: *ngingie*.

FAMILY BURSERACEAE

Genus **Canarium** Linnaeus

Canarium harveyi Seemann, Fl. Vit., 35, 1865.

Tree up to 12 m. or more tall. Leaves alternate, pinnate, leaflets oval-oblong or ovate, entire, somewhat glossy, acuminate, base rounded, obtuse, up to 15 cm. long, pinnately

nerved, with numerous fine, anastomosing nervules, petiolules up to 2.5 cm. long, petiole 5-7 cm. or more long. Flowers small, greenish orange, in branching, terminal clusters; fruit ovoid, drupaceous, 2 cm. or more long, seed edible.

'Eua: *Lister*; in thinly forested area back of Pangai village, on way to Fuai, Mar. 25, 1953, *Yuncker 15487*; in forest on eastern ridge above Fuai, alt. 150 m., Nov. 9, 1951, *Hürlimann 193*.

Vava'u: *Harvey*; *Crosby*; in forest at upper rim of coastal cliff along northwest coast, May 25, 1953, *Yuncker 16181*.

Occasional. Also known on Niue Island.

Tongan name: 'ai.

Canarium samoense Engler, in DC. Monogr. Phanerog. 4: 134, 1883.

Large tree, up to 14 m. or more tall, bark and wood somewhat fragrant. Leaves alternate, pinnate, leaflets elliptic-lanceolate, acuminate, base acute, margin minutely uneven, pinnately nerved.

Kao: on steep rocky slope in open forest, about 180 m. alt., Apr. 30, 1953, *Yuncker 15966*.

This specimen is sterile and the report, which is new for Tonga, should be considered provisional. Also in Samoa.

Tongan name: *makai*.

The timber is used for canoe construction and in general building; the fragrant parts, for scenting oil.

Genus *Garuga* Roxburgh

Garuga floribunda Decaisne, Mus. Hist. Nat. Paris, Nouv. Ann. 3: 477, 1834.

Tree, up to 8 or 10 m. or more tall. Leaves alternate, hairy, pinnate, leaflets elliptic-ovate-lanceolate, acuminate, base rounded, somewhat inequilaterally oblique, crenate-serrate, up to 13 cm. or more long and 5 cm. wide, pinnately nerved, petiolules scarcely 5 mm. long, petioles up to 8 cm. or more long. Flowers small, numerous, in paniculate clusters up to 15 cm. or more long, inflorescence parts puberulent; fruit 1 cm. or more thick.

Tongatapu: forest margin, below Niutoua village, Mar. 2, 1953, *Yuncker 15114*; near Nuku'alofa, 1926, *Setchell and Parks 15313*.

'Eua: clearing near Ohonua village, Apr. 2, 1953, *Yuncker 15634*.

Lifuka: near dwelling, Pangai village, Apr. 28, 1953, *Yuncker 15794*.

Vava'u: *Crosby 291*; in open forest near eastern coast below Houma village, May 22, 1953, *Yuncker 16129*.

Occasional throughout Tonga. Widespread from the Philippines and Java to Samoa, but not recorded from Fiji. Lam (Jard. Bot. Buitenzorg, Bull. III, 12: 329, 1932) indicates that *G. pacifica* Burkill (Linn. Soc. Bot., Jour. 35: 30, 1901) is to be reduced to the widespread *G. floribunda*.

Tongan name: *manau*.

The timber is used in general construction work.

FAMILY MELIACEAE

Genus **Xylocarpus** Koenig**Xylocarpus granatum** Koenig, Naturf. 20: 2, 1784.

Tree, up to 8 m. or more tall. Leaves alternate, pinnate, leaflets coriaceous, elliptical, apex rounded, obtuse, base obliquely acute, entire, pinnately nerved, petiolules about 5 mm. long. Flowers four-parted, up to nearly 1 cm. wide, in terminal, paniculate clusters, corolla white, tubular, calyx spreading; fruit globose, about 4 cm. in diameter.

Tongatapu: open forest near sea, Sopu, west of Nuku'alofa, May 30, 1953, *Yuncker 16213*; small island in lagoon north of Fatai, Oct. 30, 1951, *Hürlimann 67*; shore of lagoon south of Ma'ofanga, Nov. 23, 1951, *Hürlimann 316*.

Vava'u: along shore of lagoon, Vaihoi, near Leimatua, May 26, 1953, *Yuncker 16197*.

Occasional near mangrove swamps. From India and Ceylon through Malaysia to Polynesia.

Tongan name: *ickileki*.

Xylocarpus moluccensis (Lamarck) M. Roemer, Syn. Hesper., 124, 1846.

Small tree, up to 4 or 5 m. tall. Leaves alternate, pinnate, leaflets ovate, coriaceous, bluntly pointed, base obliquely rounded but abruptly acute at sessile base, up to 12 cm. or more long and 7 cm. wide, entire, pinnately nerved.

Tongatapu: in seaside thicket, Sopu, west of Nuku'alofa, May 30, 1953, *Yuncker 16214*.

'Eua: *Lister*.

Vava'u: *Crosby*.

Occasional near the shore. India to Madagascar and through Malaysia to Fiji and Polynesia.

Carapa moluccensis Lam. in Hemsley's and Burkill's lists.

Genus **Vavaea** Bentham**Vavaea amicorum** Bentham, Hook. London Jour. Bot. 2: 212, 1843.

Tree, up to 5 or 6 m. tall. Leaves obovate or elliptic-obovate, apex rounded, base acute to decurrent, up to 15-17 cm. or more long and 8 cm. wide, pubescent, at least along midrib, pinnately nerved, areolate-venulose, petiole rather slender, up to 4 cm. long. Flowers small, pubescent, corolla white, on short pedicels, in cymose, long-pedunculate, axillary, and terminal clusters; fruit globose, about 1 cm. in diameter.

Tongatapu: *Forster; Mosley; Gracffe; Lister; Setchell and Parks; MacDaniels*; thicket along road, near Vaini village, Feb. 26, 1953, *Yuncker 15046*; forest toward coast near Fatai, Oct. 30, 1951, *Hürlimann 54*; near Nualei, Dec. 26, 1951, *Hürlimann 685*.

'Eua: *Parks; Banks and Solander; Cartwright; McKern*; in thicket near the center of the island, Mar. 18, 1953, *Yuncker 15327*; edge of forest above

Fuai plantation, Mar. 19, 1953, *Yuncker 15353*; on limestone cliff facing sea near summit of eastern ridge, Lokupo district, Apr. 8, 1953, *Yuncker 15674*; near eastern ridge cliff, alt. 220 m., Nov. 9, 1951, *Hürlimann 202*.

Kao: in open forest on lower slope, May 6, 1953, *Yuncker 15971*.

Vava'u: *Barclay; Crosby; MacDaniels*; in thicket on cliff near sea below Houma village, May 22, 1953, *Yuncker 16126*.

Frequent throughout Tonga. Limited to Fiji and Tonga.

Tongan names: *ahivao, takafalu'uli*.

Genus *Melia* Linnaeus

Melia azedarach Linnaeus, Sp. Pl., 384, 1753.

Small tree. Leaves alternate, twice-pinnate, leaflets ovate, acuminate, base acute, serrate, opposite, up to 5 cm. or more long, glabrous. Flowers numerous, small, in loose axillary panicles, fragrant, showy, corolla violet or lavender; fruit fleshy, subglobose, yellow, about 1.5 cm. in diameter.

'Eua: *Lister*; grove east of road between villages of Pangai and Ohonua, Apr. 2, 1953, *Yuncker 15631*.

Vava'u: *Crosby*.

Presumably introduced as an ornamental but occasionally adventive. A Chinese species widely planted in warm countries.

Tongan name: *sita*.

The wood is of some use for handicraft work.

Genus *Dysoxylum* Blume

Dysoxylum forsteri (Jussieu) C. de Candolle, in DC. Monogr. Phanerog. 1: 507, 1878.

Tree, up to 10 m. or more tall, young growth puberulent glabrescent. Leaves alternate, even-pinnate, up to 50 cm. or more long, leaflets oblong-elliptic or elliptic-lanceolate, acuminate, base inequilaterally oblique, up to 12 cm. long and 4-5 cm. wide, petiolules 2-3 mm. long. Flowers mostly less than 1 cm. long, sessile or short-pedicellate, in compound, racemose, axillary clusters, peduncle finely pubescent; fruit subglobose, about 2 cm. in diameter, brown with whitish scurfy patches.

Tongatapu: *Gracffe; Setchell and Parks; MacDaniels*; open forest near village of Niutoua, Mar. 2, 1953, *Yuncker 15117*.

'Eua: *Parks*; open forested area on seaward side of main road between villages of Pangai and Ohonua, Apr. 2, 1953, *Yuncker 15632*.

Nomuka: clearing on lakeward side of road encircling island, Apr. 30, 1953, *Yuncker 15860*.

Vava'u: *Barclay; Crosby*; about 1 mile along road leading to coastal cliff above Ha'alaulufuli, May 21, 1953, *Yuncker 16111*.

Frequent throughout Tonga in open forested areas. Also in Niue.

D. richii (A. Gr.) DC. *sensu* Hemsley's list and Yuncker (B. P. Bishop Mus., Bull. 178: 71, 1943), not DC.

Tongan name: *mo'ota*.

The plant parts when crushed have a somewhat disagreeable odor said to resemble that of fruit bats (flying foxes). The leaves are used medicinally and an extract of the leaves is used for wetting tapas to cover the body "in cases of weakness." The wood is used in making canoes and banana shooks and for general building purposes.

Dysoxylum tongense A. C. Smith, U.S. Nat. Herb., Contrib. 30: 509, 1952.

Large tree, up to 10 m. or more tall, branchlets stout and with large, rounded leaf scars. Leaves even-pinnate, up to 25 cm. or more long, leaflets elliptic-ovate, acute, base obliquely inequilateral, up to 15 cm. long and 8 cm. wide, glabrous, pinnately nerved, petiolules about 1 cm. long. Flowers small, sessile, in axillary, paniculate clusters up to 12-14 cm. long, parts of inflorescence puberulent, corolla greenish white.

'Eua: *Parks*; in forest above Fuai plantation, Mar. 18, 1953, *Yuncker 15316*; edge of forest near center of island, Mar. 18, 1953, *Yuncker 15336*; Mar. 19, 1953, *Yuncker 15366*; Apr. 7, 1953, *Yuncker 15662*.

So far as I know, this species is restricted to 'Eua Island above about 100 m. altitude.

Tongan name: *mo'ota kula*.

The wood is used in handicraft work.

Genus *Aglaia* Loureiro

Aglaia heterotricha A. C. Smith, U.S. Nat. Herb., Contrib. 30: 486, 1952.

Tree with slender branches, branchlets, petioles, and lower leaflet surface scaly-hairy. Leaves odd-pinnate, leaflets seven, elliptic, up to 25 cm. long and 10 cm. wide, obtuse, base obtuse or acute, petiolules up to 17 mm. or more long, petiole 15-20 cm. long, conspicuously swollen at base. Flowers about 2 mm. long, on slender, short pedicels, in freely branched, axillary, paniculate clusters, the stamen filaments united into a pilose tube.

'Eua: central plateau, June or July 1926, *Parks 16305*, type collection. Known only from 'Eua.

Aglaia saltatorum A. C. Smith, U.S. Nat. Herb., Contrib. 30: 483, 1952.

Shrub or tree, up to 10 m. tall, twigs and young parts pubescent, hairs brown, stellate. Leaves odd-pinnate, leaflets mostly seven, essentially opposite, elliptic or oblong-elliptic, apex acute or rounded, base inequilateral, obtuse or acute, up to 15 cm. long and 8 cm. wide, pinnately nerved. Flowers small, about 2 mm. long, numerous, in rather large, axillary, paniculate clusters; fruit subglobose or ellipsoidal, about 2 cm. long, brown, stellately pubescent.

Tongatapu: *Setchell and Parks; McKern*; in seaside forest below village of Niutoua, Mar. 2, 1953, *Yuncker 15138*.

'Eua: in rich forest above Fuai plantation, Mar. 18, 1953, *Yuncker 15313*.

Nomuka: above village in clearing near sea, Apr. 30, 1953, *Yuncker 15857*.

Lifuka: along road north of Pangai village, Apr. 25, 1953, *Yuncker 15738*.

Vava'u: *Crosby*.

Niutopotapu: on coral soil near dwelling, Jan. 2, 1952, *Hürlimann 649*.

Rather frequent throughout Tonga. Also in Fiji and Niue.

Aglaia sp. in Burkill's list.

Tongan name: *langakali*.

The flowers are used for leis and for scenting oil.

For a discussion of the Fijian, Samoan, and Tongan members of the Meliaceae, see A. C. Smith (U.S. Nat. Herb., Contrib. 30: 469-522, 1952).

FAMILY DICHAPETALACEAE

Genus *Dichapetalum* Thouars

Dichapetalum vitiense (Seemann) Engler, in Engler and Prantl, Nat. Pflanzenfam. 3(4): 348, 1897.

High-climbing, woody vine, the young twigs puberulous. Leaves alternate, elliptic-subovate or subobovate, acuminate, base rounded, obtuse or acute, sometimes inequilateral, entire, up to 15 cm. or more long and 7 cm. wide, pinnately nerved, finely venulose as viewed by transmitted light. Flower buds yellow-hairy; fruit obovoid, 1-2 cm. in diameter, densely puberulent.

'Eua: canyon of Lakatoha River near Ohonua, Nov. 10, 1951, *Hürlimann* 247.

Vava'u: in forest near summit of ridge, Mo'ungalafa, May 27, 1953, *Yuncker* 16203; near Neiafu, Aug. 1926, *Setchell and Parks* 15654.

Infrequent. Also in Fiji.

Tongan name: *tuamca*.

Said to be poisonous.

FAMILY EUPHORBIACEAE

Genus *Phyllanthus* Linnaeus

Phyllanthus niruri Linnaeus, Sp. Pl., 981, 1753.

Branching, slender-stemmed, glabrous plant, up to 30 cm. or more tall, subwoody at base. Leaves alternate, along very slender branches, paler beneath, oblong-subspatulate, somewhat oblique, obtuse, base subacute, up to about 1 cm. long and 3 or 4 mm. wide, subsessile on very short petioles. Flowers very small, white, pendent beneath branches on short, slender, axillary pedicels; fruit small, depressed-globose.

Tongatapu: ballast weed, *Setchell and Parks* 15329.

Lifuka: in sandy soil, clearing near beach north of Pangai village, Apr. 25, 1953, *Yuncker* 15719.

Niuaotuputu: in cultivated area above Hihifo toward mountain range, alt. 30 m., Dec. 5, 1951, *Hürlimann* 329.

Occasional. A pantropic weedy plant.

Phyllanthus simplex Retzius, Observ. Bot. 5: 29, 1789.

Slender, glabrous, branching plant, up to 60 cm. tall, slightly woody at base. Leaves numerous, alternate, elliptic-oblong, acutish with a short, mucronate tip, up to about 2 cm.

long and 6 mm. wide, subsessile. Flowers very small, solitary, on slender, axillary pedicels; capsule small, subglobose, three-parted.

Tongatapu: *Cook*; waste area near village of Niutoua, Mar. 2, 1953, *Yuncker 15125*.

'Eua: *Lister*; in open area near edge of forest above Fuai plantation, Mar. 19, 1953, *Yuncker 15339*.

Tafahi: along road between township of Tafahi and landing place Faihavanui, alt. 70 m., Dec. 15, 1951, *Hürlimann 527*.

Niutopotapu: roadside between Falehau and the southeast coast, alt. 10 m., Dec. 7, 1951, *Hürlimann 397*.

Frequent throughout Tonga. Southern Asia and Malaysia to Micronesia and Polynesia.

Genus *Glochidion* Forster

***Glochidion concolor* Mueller-Argoviensis, Linnaea 32: 62, 1863.**

Tree, up to 7-8 m. or more tall, branchlets slender, glabrous. Leaves alternate, two-ranked, elliptic, acuminate, base acute, up to 10-12 cm. long and 4-5 cm. wide, paler beneath, pinnately nerved, entire, petiole up to 5 mm. long. Flowers small, on pedicels up to 5 mm. long, in several-flowered, axillary fascicles; fruit depressed-oblate, grooved.

'Eua: margin of forest near center of island, Mar. 19, 1953, *Yuncker 15363*; in open forest north of Fuai plantation, Apr. 5, 1953, *Yuncker 15648*.

Lifuka: in thicket near sea, north of Pangai village, Apr. 25, 1953, *Yuncker 15729*.

Vava'u: side of trail on way to summit of Talau, west of Neiafu, May 23, 1953, *Yuncker 16148*.

Rather frequent throughout Tonga. Also in Fiji.

Tongan name: *malolo*.

An extract of the leaves is used in preparing medicines.

***Glochidion ramiflorum* Forster f., Fl. Ins. Australia, Prodr., 361, 1786.**

Medium to large tree, up to 18 m. tall, branchlets glabrous. Leaves alternate, two-ranked, elliptic, acuminate, base acute, up to 12-14 cm. long and 6 cm. wide, entire, petiole about 5 mm. long, narrowly winged by decurrent blade margins. Flowers small, on slender pedicels up to 1 cm. long, in few-flowered, axillary fascicles; fruit depressed-oblate, grooved.

Tongatapu: in swampy area near village of Navutoka, Feb. 25, 1953, *Yuncker 15071*; along trail through thicket below Nualei village, Mar. 9, 1953, *Yuncker 15233*.

'Eua: *Lister*; in moist ravine forest near center of island, Mar. 18, 1953, *Yuncker 15321*.

Nonuka: in thicket near sea along road encircling island, Apr. 30, 1953, *Yuncker 15862*.

Lifuka: in thicket near beach, along coast north of Pangai village, Apr. 25, 1953, *Yuncker 15717*.

Vava'u: *Crosby*.

Niuafo'ou: thicket just above upper margin of recent lava flow, May 16, 1953, *Yuncker 15989*.

Frequent throughout Tonga. New Hebrides eastward to [?] Samoa.

Phyllanthus ramiflorus Muell. Arg. in Hemsley's list and *P. ramiflorus* var. *genuinus* Muell. Arg. in Burkill's list.

Tongan names: *malolo*, *misikoka*.

The leaves and bark are used in preparing medicines.

For a discussion of the taxonomic status and distribution of *G. concolor* and *G. ramiflorum* see Croizat (*Sargentia* 1: 47, 1942).

Genus *Bischofia* Blume

Bischofia javanica Blume, Bijdr. Fl. Java, 1168, 1826.

Tree, up to 10 m. or more tall, branchlets and leaves glabrous. Leaves alternate, three-foliate, leaflets ovate-elliptic, acuminate, base acute, up to 15 cm. long and 8 cm. wide, crenate-dentate, terminal leaflet long-stalked, lateral leaflets on petiolules 1-1.5 cm. long. Flowers small, dioecious, numerous, in axillary, paniced racemose clusters; fruit globose, fleshy, up to about 1 cm. in diameter.

Tongatapu: *Moseley*; thicket near Hufangalupe, Feb. 26, 1953, *Yuncker 15042*; near dwellings, Ma'ofanga, Nov. 23, 1951, *Hürlimann 313*; near Nualei, Dec. 26, 1951, *Hürlimann 677*.

'Eua: in forested area near center of island, Mar. 18, 1953, *Yuncker 15313*; in forest along creek above Fuai, alt. 90 m., Nov. 8, 1951, *Hürlimann 164*.

Nomuka: thicket near shore of lake, along road encircling island, Apr. 30, 1953, *Yuncker 15856*.

Lifuka: in thicket between road and beach, north of Pangai village, Apr. 25, 1953, *Yuncker 15715*.

Vava'u: *Crosby*; in thicket along road between Houma village and sea, May 22, 1953, *Yuncker 16122*.

Common throughout Tonga. India, China, and Malaysia to Polynesia.

[?] Including *B. leptopoda* Muell. Arg. *sensu* Hemsley's list.

Tongan name: *koka*.

The bark furnishes a dye used in coloring tapa; the stems are used for posts and so forth.

Genus *Claoxylon* Jussieu

Claoxylon parvicoccum Croizat, *Sargentia* 1: 49, 1942.

Tree up to 8 m. or more tall, the branchlets and leaves glabrous. Leaves alternate, elliptic-ovate, acuminate, the base acute to long-cuneate, 12-15 cm. or more long and 5-8 cm. wide, sharply crenately toothed, pinnately nerved, the petiole up to 8 cm. or more long. Flowers unisexual, in slender, spicate clusters.

'Eua: *Parks 16262* [cited by Croizat]; forested area near center of island, Mar. 18, 1953, *Yuncker 15322*.

Infrequent. Also in Fiji.

Genus *Macaranga* Thouars

Macaranga harveyana (Mueller-Argoviensis) Mueller-Argoviensis, in DC. Prodr. 15(2): 998, 1866.

Small, soft-wooded, dioecious tree, up to 8 m. or more tall, branchlets stout, pithy. Leaves alternate, peltate, round-ovate, acuminate, very shallowly toothed or entire, paler and golden glandular-dotted beneath, about eight-nerved from petiole, midrib branched upward, up to 20 cm. or more long and 18 cm. wide, commonly somewhat smaller, petioles up to 15 cm. or more long, stipules lanceolate, long-acuminate, up to 2 cm. long. Flowers small, in axillary, paniculate-racemose clusters; fruit depressed-globose, soft-spiny, about 1 cm. in diameter.

Tongatapu: *Moseley*; thicket along road near Vaini village, Feb. 26, 1953, *Yuncker 15053* (male), *15065* (female).

'Eua: *Lister*; margin of old plantation between Pangai village and Fuai, Mar. 25, 1953, *Yuncker 15482*.

Lifuka: thicket near northern end of island near Lifuka end of interisland causeway, May 11, 1953, *Yuncker 15980*.

Kao: lower margin of forest near old plantation, May 6, 1953, *Yuncker 15960*.

Vava'u: *Crosby*; in clearing on slope above the lagoon at Vaihoi, May 26, 1953, *Yuncker 16200*.

Tafahi: forest along path to Piu 'o Tafahi, alt. 150 m., Dec. 10, 1951, *Hürlimann 406*.

Frequent throughout Tonga, Fiji, Niue, and Samoa to the Society Islands.

Tongan name: *loupata*.

The timber is used for house construction, handicraft work, banana shooks, and other purposes; the leaves, for covering *umu* (ovens), for wrapping fish, and in medicines used for stomach disorders in infants.

Macaranga seemanii (Mueller-Argoviensis) Mueller-Argoviensis, in DC. Prodr. 15(2): 999, 1866.

Tree up to 18 m. tall, branchlets and petioles subglabrous. Leaves alternate, broadly ovate, long-acuminate, base rounded, peltate 2.5-7.5 cm. from margin, six- to eight-nerved from petiole, glandular beneath, nerves beneath puberulent, up to 30 cm. long and 22 cm. wide but commonly somewhat smaller, petiole up to 18 cm. long, stipules oblong-lanceolate, up to 4 cm. long and 1 cm. wide. Flowers small, in axillary, paniculate clusters up to 12 cm. long; fruit smooth, glandular.

Tongatapu: *Cook*; *U.S. Expl. Exped.*

Infrequent. Also in Fiji.

Genus *Acalypha* Linnaeus***Acalypha boehmerioides*** Miquel, Fl. Ind. Bat., Suppl., 459, 1860.

Small, finely pubescent, semi-woody plant, branching from base, up to 60 cm. or more tall but mostly somewhat shorter. Leaves alternate, ovate, acute, the base obtuse or acutish, three- or five-nerved from base, midrib branched upward, up to 3 cm. or more long and 2.5 cm. wide, crenate, nerves often reddish, petiole slender, up to 3 cm. long. Flowers small, greenish, in spicate, axillary clusters.

Vava'u: *Crosby*.

Niuaotupu: south of Falehu toward southeast coast, Dec. 7, 1951, *Hürlimann 396*.

Occasional as a weed. Malaysia to Polynesia.

Tongan name: *hongohongo*.

Acalypha grandis Bentham, in Hook. London Jour. Bot. 2: 232, 1843.

Shrub or small tree up to 4 m. or more tall, young branches canescent-pubescent. Leaves alternate, broadly ovate, acuminate, base rounded, obtuse or cordate, coarsely dentate, up to 15 cm. or more long, minutely pellucid-dotted, palmately nerved, petiole mostly 5-12 cm. long. Inflorescences unisexual, male spikes 7-12 cm. or more long, female spikes usually much longer; capsule pubescent.

Tongatapu: *Home*.

Samoa, Fiji, and probably westward to Malaysia.

Acalypha hispida Burmann f., Fl. India, 303, pl. 61, fig. 1, 1768.

Shrub, up to 2 m. tall, branches pubescent. Leaves alternate, ovate, toothed, up to 10 cm. or more wide, acuminate. Flowers in red, cylindrical, axillary catkins up to 20 cm. or more long.

Introduced ornamental, occasional in villages. An East Indian species now widely cultivated in warm countries.

Acalypha insulana Mueller-Argoviensis, Flora 47: 439, 1864, var. *insulana*.

Rather densely spreading-pilose shrub up to 5 m. or more tall. Leaves alternate, ovate, elliptic or lanceolate, two or more times longer than wide, acuminate, base subcordate to acute, pinnately nerved, petiole up to 7 cm. long. Inflorescences spicate, unisexual, bracts dentate, hairy; fruit densely hairy.

Tongatapu: *Moseley*.

Infrequent. Fiji and presumably westward, at least to New Guinea.

Acalypha repanda Mueller-Argoviensis, Flora 47: 439, 1864, var. *repanda*.

Shrub up to 5 m. tall, young branches puberulent. Leaves alternate, elliptic or elliptic-ovate, acuminate, base rounded, obtuse or cordulate, up to 15-20 cm. or more long and 9-10 cm. wide, pinnately nerved, crenulate, petiole up to 7 cm. or more long. Flowers very small, in axillary, spicate clusters.

'Eua: in deep forest near summit of eastern ridge, Mar. 30, 1953, *Yuncker 15560*.

Infrequent. New Guinea eastward to Samoa.

Acalypha wilkesiana Mueller-Argoviensis, in DC. Prodr. 15(2): 817, 1866.

Shrub, up to 2 m. or more tall, branches pubescent. Leaves mostly ovate, serrate, up to 20 cm. or more long and 15 cm. wide, acuminate, pubescent, mottled with various shades of red, yellow, and bronzy green. Flowers monoecious, small, on slender, axillary spikes up to 15 cm. or more long.

Introduced ornamental, frequently used as a hedge plant. Widely cultivated in warm countries. Although the type is from Fiji, the actual origin of the species is questionable.

Tongan name: *kalakala 'apusi*.

Genus **Ricinus** Tournefort**Ricinus communis** Linnaeus, Sp. Pl., 1007, 1753.

Large, coarse, semi-woody, glabrous shrub or small tree with spreading, hollow branches. Leaves alternate, round-ovate in outline, peltate, mostly deeply palmately five- to nine-lobed, lobes sharply acuminate, serrate, up to 20 cm. or more long and as wide, palmately nerved, petiole about as long as blade. Flowers monoecious, small, in large terminal or axillary paniculate clusters; capsules three-seeded, spiny, seeds about 1 cm. long, smooth, variegated.

Tongatapu: *Moseley*; edge of old plantation near Niutoua village, Mar. 2, 1953, *Yuncker 15110*.

'Eua: in waste area near village of Ohonua, Apr. 2, 1953, *Yuncker 15618*.

Vava'u: *Crosby*.

Occasional in waste areas throughout Tonga. A native of the Old World, now pantropic in distribution.

Tongan name: *lepo*.

The leaves are used for wrapping shellfish.

Genus **Aleurites** Forster**Aleurites moluccana** (Linnaeus) Willdenow, Sp. Pl. 4: 590, 1805.

Tree up to 10 m. or more tall, branches, leaves and inflorescence brown-stellate-scurfy. Leaves light green, alternate, ovate or ovate-lanceolate, acute, base truncate or cordulate, entire, or palmately three- or five-lobed, lobes triangular, acute, three- to five-nerved from base, midrib branched upward, up to 20 cm. or more long and 15 cm. wide but mostly somewhat smaller, petiole as long as or longer than blade. Flowers small, greenish yellow or white, in large, many-flowered, terminal, paniculate clusters; fruit about 5 cm. in diameter when mature, subglobose.

Tongatapu: *Moseley*; *Forster*; margin of coastal forest, near Vaini village, Feb. 26, 1953, *Yuncker 15058*.

'Eua: *Lister*; along trail between Pangai village and Fuai, Mar. 25, 1953, *Yuncker 15460*; toward eastern ridge, near Fuai, alt. 60 m., Nov. 8, 1951, *Hürlimann 157*.

Lifuka: about midisland along road between Pangai village and east coast, Apr. 27, 1953, *Yuncker 15754*.

Vava'u: *Crosby*; in thicket along road near sea below the village of Houma, May 22, 1953, *Yuncker 16135*.

Frequent throughout Tonga. Southern Asia and Malaysia to Polynesia.

Tongan name: *tuitui*.

An extract of the bark is used for dyeing, and oil obtained from the fruit is used in a number of ways.

Genus *Jatropha* Linnaeus

Jatropha curcas Linnaeus, Sp. Pl., 1006, 1753.

Glabrous shrub or small tree up to 5 or 6 m. tall. Leaves alternate, round-ovate, three- or five-lobed, lobes acuminate, base cordate with broad sinus, palmately seven-nerved, midrib and lateral nerves strongly branched upward, 15 cm. or more long and as wide, petiole commonly longer than blade. Flowers greenish-white, 6-8 mm. wide, in axillary, pedunculate, cymose clusters; capsule up to 3 cm. long.

Tongatapu: in thicket near village of Niutoua, Mar. 2, 1953, *Yuncker 15116*.

'Eua: in thicket near Ohonua, Apr. 2, 1953, *Yuncker 15637*.

Lifuka: along road about midisland between Pangai village and eastern side of island, Apr. 27, 1953, *Yuncker 15774*.

Vava'u: *Crosby*.

Frequent throughout Tonga. A tropical American species now of pantropic distribution.

Tongan name: *fiki*.

Often grows in rows about plantations, along roads, and other places where it is used as living fence posts. An extract of the leaves is used in preparing medicines.

Jatropha multifida Linnaeus, Sp. Pl., 1006, 1753.

Shrubs or small tree up to about 6 m. tall. Leaves nearly round in outline but deeply divided into seven to 11 lobes, the lobes entire or incised, glabrous. Flowers bright red, in compound, cymose clusters.

Tongatapu: *Setchell and Parks 15548*.

Occasional in villages. A native of tropical America, now widely planted as an ornamental.

Tongan name: *fiki papalangi*.

Genus *Manihot* Tournefort

Manihot esculenta Crantz, Inst. Rei Herb. 1: 167, 1766.

Glabrous, half-woody, shrubby plant, up to about 2 m. tall. Leaves alternate, paler beneath, deeply palmately parted into three to seven lanceolate, entire, acuminate divisions, up to 20 cm. or more long and about as wide. Flowers monoecious, about 2 cm. wide, yellowish-green or reddish, in few-flowered, axillary, paniculate clusters, often not developing; fruit subglobose, about 1.5 cm. in diameter, ridged.

Cultivated throughout the group for its edible roots. A tropical American species now of pantropic cultivation.

Tongan name: *manioko*. The following varieties are recognized:

Manioko falaoa: stem is pale green, the tuber white.

Manioko hina: stem and leaves are pale green; the skin of the tuber is brown without, pink within.

Manioko koka'anga: stem is dark red, the leaves dark violet, the skin of the tuber is red; the tuber is bitter unless properly prepared and is used to prepare an adhesive paste.

Manioko leka hina: stem and leaves are pale green, the tuber white.

Manioko leka kula: stem is light brown, the petiole red, and the skin of the tuber dark red.

Genus *Codiaeum* Jussieu

Codiaeum variegatum (Linnaeus) Blume, Bijdr. Fl. Java, 606, 1825.

Densely branched, glabrous shrub. Leaves alternate, varying greatly in shape and size, commonly entire, sometimes interrupted or twisted, pinnately nerved, mostly acuminate, variegated green, red, pink, yellow, and white. Flowers small, monoecious, in axillary, racemose clusters.

'Eua: *Lister*.

Tafahi: in cemetery beneath the township of Tafahi, alt. 30 m., Dec. 17, 1951, *Hürlimann* 594.

Cultivated as an ornamental throughout Tonga. Pantropic.

Genus *Croton* Linnaeus

Croton storckii Seemann, Bonplandia 10: 297, 1862.

Shrub with sparse, stellate pubescence glabrescent. Leaves alternate, ovate, short-acuminate, base rounded, bi-glandular, up to 10 cm. long and 5 cm. wide, the petiole up to 2.5 cm. long. Flowers small, in terminal, racemose clusters up to 5 cm. long.

Vava'u: *Crosby* 150.

Also in Fiji.

C. microtiglium Burkill (Linn. Soc. Bot., Jour. 35: 54, 1901). See also the note by A. C. Smith (B. P. Bishop Mus., Bull. 141: 83, 1936).

Genus *Excoecaria* Linnaeus

Excoecaria agallocha Linnaeus, Syst., ed. 10, 1288, 1759.

Tree up to 10 or 12 m. tall, the latex white, adhesive, irritating. Leaves alternate, glabrous, oval or oval-obovate, acutish or rounded and retuse, base obtuse to acutish, bi-glandular, up to 8 cm. or more long and 6-7 cm. wide, pinnately nerved, lateral nerves slender and inconspicuous, petiole up to 2 cm. long. Flowers monoecious, small, male flowers in many-flowered, axillary spikes up to 5 cm. or more long, female flowers in axillary racemes up to 3 or 4 cm. long; capsules subglobose, about 5 mm. in diameter.

Tongatapu: *Cook*; *Home*; in thicket, Sopa, Feb. 25, 1953, *Yuncker* 15025; in swampy area near Navutoka village, Feb. 27, 1953, *Yuncker* 15072; near Fatai toward sea, Oct. 30, 1951, *Hürlimann* 62.

'Eua: in strand thicket near Lokupo, Mar. 27, 1953, *Yuncker 15531*.

Nomuka: along shore of large central lake, Apr. 30, 1953, *Yuncker 15829*.

Lifuka: on cliff overlooking eastern shore, Apr. 27, 1953, *Yuncker 15763*.

Vava'u: *Crosby*; in thicket near sea below Houma village, May 22, 1953, *Yuncker 16123*.

Common in thickets near sea throughout Tonga. India, China, and Malaysia to Polynesia.

Tongan name: *feta'anu*.

Genus **Homalanthus** Jussieu

Homalanthus nutans (Forster) Pax, in Engler and Prantl, Nat. Pflanzenfam. 3(5): 96, 1890.

Rather small, glabrous tree, up to about 6 m. tall. Leaves alternate, triangular-ovate, acute at both ends, paler beneath, up to about 10 cm. long and about as wide but mostly somewhat smaller, pinnately nerved, petioles slender and mostly longer than blade. Flowers monoecious, male flowers small, greenish, in long, axillary spikes, female flowers on long, axillary pedicels; fruit pyramidal, about 8 mm. in diameter.

Tongatapu: *Forster*.

'Eua: *Lister*; edge of forest just above Fuai plantation, Mar. 18, 1953, *Yuncker 15318*; thin forest near center of island, Mar. 19, 1953, *Yuncker 15356*, Apr. 7, 1953, *Yuncker 15663*; thicket above village of Houma, Mar. 26, 1953, *Yuncker 15491*.

Vava'u: *Barclay*; *Crosby*; in clearing near upper rim of limestone coastal cliff on eastern side of island below Ha'alaufuli, May 22, 1953, *Yuncker 16089*.

Tafahi: in thicket on slope above township of Tafahi, alt. 50 m., Dec. 15, 1951, *Hürlimann 519*.

Niuatoputapu: in forest near Hihifo, alt. 30 m., Dec. 5, 1951, *Hürlimann 332*.

Occasional throughout Tonga. New Caledonia and New Hebrides to Society Islands.

H. pedicellatus Benth. in Hemsley's and Burkill's lists.

Tongan name: *fonuamamala*.

Genus **Euphorbia** Linnaeus

Euphorbia atoto Forster f., Fl. Ins. Australia, Prodr., 36, 1786.

Erect to sprawling, branching, subshrubby plant sometimes up to about 1 m. tall. Leaves opposite, oval, oval-obovate, oval-ovate, or oblong-subspatulate, obtuse, base cordately obliquely inequilateral, light green above, whitened beneath, entire, up to 3 cm. long and 2 cm. wide, petioles about 2 mm. long. Flowers small, white, numerous, in small, branching, terminal clusters.

Tongatapu: *Cook*; *Forster*; rocky cliff near sea, near Vaini, Feb. 26, 1953, *Yuncker 15054*; sandy soil below Navutoka village, Feb. 27, 1953, *Yuncker 15095*.

'Eua: *Lister*; coral rocks near sea near Lokupo, Mar. 27, 1953, *Yuncker 15522*; sandy soil near shore just above high-tide limit toward southern end of island near Ha'aluma, Apr. 1, 1953, *Yuncker 15593*.

Nomuka: sand along road encircling island, Apr. 30, 1953, *Yuncker 15815*.

Lifuka: sandy soil, thicket near beach north of Pangai village, Apr. 24, 1953, *Yuncker 15705*; rock crevices near high-tide limit along eastern shore of island, Apr. 27, 1953, *Yuncker 15759*.

Vava'u: *Crosby*; on limestone rocks along upper rim of seaside cliff, above Leimatua village, May 20, 1953, *Yuncker 16073*.

Tafahi: on loose sand near shore below township of Tafahi, Dec. 13, 1951, *Hürlimann 497*.

Niuatoputapu: on loose sand near shore, Hihifo, Dec. 6, 1951, *Hürlimann 371*.

Common in sandy soil and on limestone rocks near the shore throughout Tonga. India, southeastern Asia, Australia, and Philippines to Polynesia.

Tongan names: *kavahuhu*, *kavahuhu lalahi*, *kavahuhu tahi*, *kihikihi tahi*, *ngingie'uta*.

Euphorbia chamissonis Boissier, in DC. Prodr. 15(2): 14, 1866.

This species was reported by Burkill on the basis of a collection made by Crosby, but it has been impossible to verify the report.

Euphorbia hirta Linnaeus, Sp. Pl., 454, 1753.

Low, branching, widely spreading, densely hairy herb. Leaves opposite, elliptical, acute, base obliquely acute, serrulate, up to 3 cm. long and 1 cm. wide, green or reddish, paler beneath, petioles 2-3 mm. long. Flowers very small, greenish, in small, dense, branching, axillary clusters.

Tongatapu: *Mosley*; in sandy area near beach below Navutoka village, Feb. 27, 1953, *Yuncker 15103*; weed in manihot plantation, near Nualei, Oct. 29, 1951, *Hürlimann 42*.

'Eua: in waste areas about Fuai plantation, Mar. 22, 1953, *Yuncker 15421*.

Vava'u: *Crosby*.

Tafahi: weed in open area, Dec. 15, 1951, *Hürlimann 528*.

Niuatoputapu: in grass lawn in Hihifo, Dec. 5, 1951, *Hürlimann 328*.

Frequent as a plantation and waste-area weed throughout Tonga. Pan-tropic.

E. pilulifera L. in Hemsley's and Burkill's lists.

Euphorbia obliqua Endlicher, Prodr. Fl. Norf., 85, 1833.

This species was reported in Hemsley's list on the basis of a collection made by Forster on Tongatapu. However, it has been impossible to verify this report.

Euphorbia prostrata Aiton, Hort. Kew. 2: 136, 1789.

Low, prostrate, widely spreading, slender-stemmed herb. Leaves small, opposite, oval-ovate, obtuse, base obtusely obliquely inequilateral, serrulate. Flowers minute, in small axillary clusters.

Tongatapu: in sandy waste area, Navutoka village, Feb. 27, 1953, *Yuncker 15090*.

'Eua: in waste area near center of island, Apr. 5, 1953, *Yuncker 15645*.

Frequent as a lawn weed about dwellings and in waste areas throughout Tonga. Pantropic.

Euphorbia pulcherrima Willdenow, ex Klotz, in Otto and Dietrich, Allgem. Gartenz. 2: 27, 1834.

Erect, glabrous, branching, soft-wooded shrub, up to 2 m. or more tall. Leaves elliptical or elliptic-ovate, acute, entire or sinuate-toothed or lobed, pubescent, up to 25 cm. or more long and 15 cm. wide, on petioles up to about 8 cm. long, upper leaves near inflorescence commonly lanceolate and bright red. Flowers comparatively small and inconspicuous, yellow and reddish green.

Cultivated throughout Tonga as an ornamental. A native of Mexico now widely cultivated in warm countries.

Tongan name: *lave'imoa*.

Euphorbia ramosissima Hooker and Arnott, Bot. Beechey Voy., 69, 1832.

Small, subwoody plant with short, thickened, decumbent stems and numerous, slender, ascending branches. Leaves oval-ovate, obtuse, base obliquely rounded, cordulate, up to 1 cm. long, entire, petiole about 2 mm. long. Flowers small, white, in small, axillary clusters.

'Eua: *Lister*.

Vava'u: *Crosby*.

Tafahi: on rocks near shore, Fakafafa moe Tauloto, Dec. 17, 1951, *Hürli-mann 609*.

Occasional. Also in Fiji and Niue.

Includes *E. sparmannii* Boiss. of Hemsley's list.

Genus **Breynia** Forster**Breynia nivosa** (Bull) Small, Torrey Bot. Club, Bull. 37: 516, 1910.

Shrub or small tree with glabrous, spreading, two-ranked branches. Leaves alternate, two-ranked, oval-ovate, entire, variegated with yellow and red, obtuse or abruptly pointed, petioles short, stipules very small, triangular-acute. Flowers monoecious, small, green, on short, axillary pedicels.

Occasional as a hedge plant in villages. A species of the south Pacific now widely cultivated as an ornamental in warm countries.

Genus **Securinega** Jussieu

Securinega samoana Croizat, B. P. Bishop Mus., Bull. 184: 45, 1945.

Small to medium-sized tree up to 10 m. tall. Leaves alternate, elliptic or elliptic-subobovate, glabrous, acuminate, base subacute, pinnately nerved, nerves six to eight on each side, up to 12 cm. or more long and 6 cm. wide, on petioles scarcely 1 cm. long. Flowers white, very small, numerous, on pedicels about 5 mm. long, in axillary clusters; fruit black.

Tafahi: in forest along road between township of Tafahi and landing place at Faihavanui, alt. 100 m., Dec. 15, 1951, *Hürlimann* 562.

Niuatoputapu: in forest, slope of ridge above Hihifo, alt. 60 m., Dec. 5, 1951, *Hürlimann* 339.

Known in Tonga from only the northernmost islands. Samoa.

Tongan name: *poumuli*.

The timber is very hard and is used for various purposes, including house construction.

FAMILY ANACARDIACEAE

Genus **Mangifera** Linnaeus

Mangifera indica Linnaeus, Sp. Pl., 200, 1753.

Large, dense, round-topped tree. Leaves alternate, simple, oblong-lanceolate, acute, coriaceous and somewhat shiny, pinnately nerved, midrib prominent, young leaves often reddish, petioles up to 5 cm. or more long. Flowers small, yellowish white, in large, terminal panicles; fruit a fleshy, edible drupe with a large, compressed, fibrous stone.

Tongatapu: roadside south of Ma'ofanga, Nov. 23, 1951, *Hürlimann* 320.

Introduced for its fruit and common about villages throughout Tonga, this tree grows spontaneously in thickets, along roadsides, and so forth. A tropical Asiatic species now cultivated in tropical regions throughout the world.

Tongan name: *mango*. The following varieties are recognized:

Mango kaimata: fruit is sweet and edible before it is fully ripened. Various forms of this variety are based on the size of the fruit.

Mango kalasini: fruit has an odor resembling kerosene.

Mango lesi: fruit is of medium size and of the best quality. Three or four forms of this variety are recognized.

Mango nui: fruit is very large.

Genus **Spondias** Linnaeus

Spondias dulcis Parkinson, Jour. Voyage, Endeavour, 39, 1773.

Medium to large, stiff-branched tree, up to 15 m. or more tall. Leaves alternate, odd-pinnate, leaflets commonly 11 to 15, oval-lanceolate or oblong, acuminate, base acute, remotely finely toothed, up to 8 cm. or more long and 2.5 cm. wide. Flowers small, numerous, whitish, in large, paniculate clusters; the fruit yellow, oval-obovate, up to 7 cm. or more long, fleshy, edible.

Tongatapu: *Forster; U.S. Expl. Exped.*; in forest near Nualei, south of Nuku'alofa, Mar. 9, 1953, *Yuncker 15244*; near house, Ma'ofanga, Nov. 23, 1951, *Hürlimann 311*.

'Eua: *Lister*; in Ohonua village, Apr. 2, 1953, *Yuncker 15636*.

Of early introduction. Malaysia to Polynesia.

Tongan name: *vi*.

The timber is used for general building purposes, and large trunks are used for dugout canoes.

Genus *Pleiogynium* Engler

Pleiogynium solanderi (Benthani) Engler, in DC. Monogr. Phanerog. 4: 255, 1883.

Medium to large tree up to 10 m. or more tall. Leaves alternate, odd-pinnate, leaflets seven to nine, obliquely elliptic or elliptic-ovate, acuminate, base acute and narrowly decurrent on petiolules, up to 10 cm. or more long, pinnately nerved, petiolules mostly scarcely 1 cm. long. Flowers small, densely clustered on rather short, axillary clusters; fruit turbinate, about 2.5 cm. in diameter, broadly grooved.

'Eua: margin of forest near center of island, Mar. 18, 1953, *Yuncker 15332*; in seaward forest on terrace above Houma village, Mar. 26, 1953, *Yuncker 15507*.

Vava'u: *Crosby*; on seaward face of coastal cliff above Ha'alaufuli, May 21, 1953, *Yuncker 16114*.

Occasional. From tropical Australia to Polynesia.

Tongan name: *tangato*.

An excellent timber tree.

Genus *Rhus* Linnaeus

Rhus taitensis Guillemain, Ann. Sci. Nat. Bot. II, 7: 361, 1837.

Medium to large forest tree with young parts more or less puberulent. Leaves large, alternate, odd-pinnate, leaflets up to 19 or more, oblong, bluntly pointed, base obliquely inequilateral, up to 10 cm. or more long, short-petiolulate. Flowers small, white, numerous, in large, terminal, compound clusters 30 cm. or more long.

Tongatapu: *U.S. Expl. Exped.*; open forest near Vaini village, Feb. 26, 1953, *Yuncker 15066*; forest, terrace below Fu'amotu, Nov. 3, 1951, *Hürlimann 139*.

'Eua: *Lister*; open forest near center of island, Mar. 19, 1953, *Yuncker 15365*.

Lifuka: clearing near center of island, infrequent, Apr. 27, 1953, *Yuncker 15773*.

Kao: lower margin of slope forest, May 6, 1953, *Yuncker 15972*.

Vava'u: *Crosby*.

Niuatoputapu: in forest, top of mountains above Hihifo, alt. 100 m., Dec. 5, 1951, *Hürlimann 346*.

Frequent throughout Tonga. Philippines to Polynesia.

Tongan name: *tavahi*.

The timber is used for general construction purposes, banana shooks, and so on; the leaves, in medicines.

FAMILY CELASTRACEAE

Genus *Gymnosporia* Wight and Arnott

Gymnosporia vitiensis (A. Gray) Seemann, Fl. Vit., 40, 1865.

Scrambling, much-branched shrub or small tree up to 4 m. tall, the twigs angled. Leaves alternate, oval, obtuse or subacute, base wedge-shaped, minutely toothed, up to 8 or 9 cm. long and 5 cm. wide, pinnately nerved, petioles up to 1 cm. long. Flowers white, about 5 mm. wide, five-parted, on slender pedicels in the axils of small, fimbriate-ciliate bracts, in terminal or axillary, paniculate clusters; fruit three-celled, red, seeds red.

Tongatapu: *Nelson*.

'Eua: *Lister*; sea-facing side of limestone cliff near summit of eastern ridge, Apr. 8, 1953, *Yuncker 15675*; forest near center of island, Apr. 6, 1953, *Yuncker 15651*; seaward terrace above village of Honuma, Mar. 26, 1953, *Yuncker 15502*; little valley on eastern ridge, plateau above Fuai, Nov. 9, 1951, *Hürlimann 189*.

Nomuka: along road encircling island between sea and inland lake, Apr. 30, 1953, *Yuncker 15834*.

Vava'u: *Crosby*; seaward face of limestone coastal cliff above Leimatua, May 20, 1953, *Yuncker 16056*; upper rim of steep seaside cliff above Ha'alaufuli, May 21, 1953, *Yuncker 16086*; sprawling on side of rocky cliff near sea below Houma village, May 22, 1953, *Yuncker 16132*.

Common and widely distributed throughout Tonga. Fiji and eastward in Polynesia to Samoa, Society Islands, and the Marquesas.

Tongan name: *olamaka*.

The long, pliable branches are used in making chairs.

FAMILY ICACINACEAE

Genus *Citronella* D. Don

Citronella samoensis (A. Gray) Howard, Jour. Arnold Arboretum 21: 475, 1940.

Tree with diffuse top, up to 6 m. or more tall. Leaves leathery, glossy, oval-ovate, acuminate, base acute, entire, up to 15 cm. or more long and 8 cm. wide, pinnately nerved, lateral nerves submarginally loop-connected, petioles 1-2 cm. long, canaliculate. Flowers small, in few-flowered clusters in a terminal racemose cluster up to 15 cm. long; fruit ellipsoidal, about 2-3 cm. long, black.

'Eua: on way from Fuai plantation to eastern ridge, Nov. 9, 1951, *Hürlimann 170*; in forested area near center of island, Mar. 18, 1953, *Yuncker 15335*; edge of forest near center of island, Mar. 19, 1953, *Yuncker 15343*.

In Tonga, apparently restricted to 'Eua. Also found in Samoa.

Villaresia samoensis Benth. and Hook. in Hemsley's and Burkill's lists.

Tongan names: *tutuna*, *olavai*.

The fruit is said to be relished by birds.

FAMILY SAPINDACEAE

Genus *Cardiospermum* Linnaeus

Cardiospermum halicacabum Linnaeus, Sp. Pl., 336, 1753.

Climbing, tendril-bearing, slender, herblike vine. Leaves alternate, biternate, up to 8 cm. or more long, deltoid in outline, leaflets ovate-lanceolate, toothed or lobed, petiolules about 1 cm. long. Flowers about 3 mm. wide, in few-flowered, solitary, axillary clusters, corolla white, peduncles up to 6 or 8 cm. long; fruit about 1 cm. in diameter, obovoid, papery, seeds black.

Vava'u: *Haracy*; *Crosby*.

Niuaotoputapu: cemetery between Hihifo and Vaipoa, alt. 5 m., Dec. 18, 1951, *Hürlimann 626*.

Infrequent. Pantropic.

Genus *Allophylus* Linnaeus

Allophylus timorensis (de Candolle) Blume, Rumphia 3: 130, 1847.

Small tree, up to 5 m. or more tall. Leaves alternate, three-foliolate, leaflets elliptical, acute at both ends, up to 15 cm. or more long and 7 cm. wide, pinnately nerved, margin entire or slightly irregular. Flowers greenish white, very small, fasciculate, in loose, axillary, racemose clusters; fruit ovoid.

Tongatapu: *Homc*.

Vava'u: upper rim of seaside cliff along northwestern side of island, May 25, 1953, *Yuncker 16169*; near shore of lagoon, Vaihoi, May 26, 1953, *Yuncker 16194*.

Occasional. Formosa, Malaysia, and Philippines to Micronesia and Samoa.

A. cobbe Blume in Hemsley's and in Burkill's lists.

Genus *Pometia* Forster

Pometia pinnata J. R. and G. Forster, Char. Gen. Pl., 109, fig. 55, 1776.

Medium to large tree, up to 10 m. or more tall. Leaves pinnate, alternate, the leaflets up to 14 or more, oblong, acuminate, base rounded, cordate, up to 18 cm. or more long and 8 cm. wide, diminishing in size toward base of leaf, pinnately nerved, nerves prominent, nearly glabrous, subsessile. Flowers small, greenish, in large, terminal, paniculate clusters; the fruit subglobose, up to 5 cm. in diameter, edible, brownish when mature.

Tongatapu: *Forster*; forest near village of Niutoua, Mar. 2, 1953, *Yuncker 15168*.

'Eua: open forest along trail between Pangai village and Fuai, Mar. 25, 1953, *Yuncker 15486*.

Vava'u: *Crosby*.

Niuatoputapu: near township of Vaipoa, on road to Falehau, alt. 5 m., Dec. 7, 1951, *Hürlimann 377*.

Occasional throughout Tonga, Malaya, New Guinea, and Polynesia.

Tongan name: *tava*.

Varieties are recognized under the following names: *tava kula*, *tava moli*, *tava toua*.

The timber is used in house construction, for tapa pounders, for banana shooks, and so on; the fruit is sometimes eaten; and the bark is used in medicine for "stomach troubles."

Genus *Guioa* Cavanilles

Guioa lentiscifolia Cavanilles, *Icones Descr. Pl.* 4: 50, pl. 373, 1797.

Small tree 3-5.5 m. tall, young twigs, leaves, and so forth puberulent. Leaves alternate, pinnately compound, leaflets varying in number, apex rounded, obtuse to acute, base narrowed and decurrent on very short petiolule, up to 6 cm. long and 3 cm. wide but mostly smaller, pinnately nerved, midrib prominent, lateral nerves slender, submarginally loop-connected. Flowers small, white, in terminal and axillary, paniculate clusters; fruit strongly lobed, up to 2 cm. wide.

'Eua: seaward margin of forest on terrace above village of Houma on northwestern side of island, alt. about 160 m., Mar. 26, 1953, *Yuncker 15503*; thicket, edge of forest above Fuai plantation, near center of island, Mar. 29, 1953, *Yuncker 15545*.

Vava'u: near upper rim of seaside cliff above Ha'alaufuli on northeastern side of island, alt. about 120 m., May 21, 1953, *Yuncker 16106*.

Tongan name: *'olive*.

The cited specimens certainly appear to represent the endemic described and illustrated by Cavanilles and further briefly discussed by Radlkofer (Sitzber. Math.-Phys. Kl. Akad. Wiss. München 9: 608, 1879; Pflanzenr. 98 [IV. 165]: 1158, 1933). It may be noted that Radlkofer defines *Guioa* as having squamate petals, but Cavanilles gives no indication of this character in his description or plate, and the material now dissected (*Yuncker 15503*) shows the petals to be esquamate. As *G. lentiscifolia* is the genotype, a revision of Radlkofer's circumscription is a matter for the future monographer to consider. Actually, on the basis of other characters, the many species now referred to *Guioa* seem correctly placed, but less dependence upon petal characters may be indicated. Possibly this is the species listed by Hemsley (Linn. Soc. Bot., Jour. 30: 172, 1894) and Burkill (op. cit. 35: 33, 1901) as *Guioa glauca*

(Labillardière) Radlkofer; but that species is apparently limited to New Caledonia, in spite of Radlkofer's inclusion in its synonymy of the mysterious Tongan "*Guaiacum dubium* Forst. f."

Guaiacum dubium Forst. f. (Fl. Ins. Australia, Prodr., 32, 1786) was originally described as "Foliis coniugatis oblongolanceolatis obtusis." Fortunately a photograph of Forster's specimen in the British Museum (Natural History) is available, through the kindness of Dr. G. Taylor, and it indicates that the very poor specimen is a mixture. The detached fruits seem to represent a species of *Guioa*, very likely *G. lentiscifolia*, whereas the leaves (mostly detached) apparently do not represent Sapindaceae. For the time being, no alternative suggestion can be made. The name may thus be rejected under Article 76 of the International Code (1952). Certainly the epithet should not be used to replace either *G. lentiscifolia* or *G. glauca* (A. C. Smith).

Genus *Elattostachys* Radlkofer

Elattostachys falcata (Seemann) Radlkofer, Sapindaceen Höll.-Ind., 42, 1877.

Large forest tree. Leaves alternate, pinnate, leaflets 10 or more, falcately lanceolate, acuminate, base obliquely inequilateral, entire, up to 15 cm. long and 5 cm. wide, somewhat coriaceous, petiolules up to about 1 cm. long. Flowers white, small, in terminal or axillary, paniculate clusters.

Tongatapu: *Moseley*; open forest, roadside below village of Niutoua, Mar. 2, 1953, *Yuncker 15120*; in coastal forest near Ha'akame village, Mar. 12, 1953, *Yuncker 15270, 15277*.

'Eua: in forest above Fuai plantation, near center of island, Mar. 18, 1953, *Yuncker 15315*.

Kao: open forest on steep, rocky slope, May 6, 1953, *Yuncker 15898*.

Vava'u: *Crosby*; near upper rim of steep seaside cliff, above Ha'alaufuli, May 21, 1953, *Yuncker 16100*.

Niufo'ou: forest, slope above great lake, toward Futu, alt. 20 m., Jan. 7, 1952, *Hürlimann 669*.

Tafahi: forest, below township of Tafahi toward Hou, alt. 20 m., Dec. 17, 1951, *Hürlimann 583*.

Frequent throughout Tonga in forested areas. Also in Fiji, Niue, and Samoa.

Ratonia falcata Seem., and probably also as *R. stipitata* Benth., in Hemsley's list.

Tongan name: *ngatata*.

The tree furnishes a good timber for general construction purposes, for banana shooks, for handicraft work, and other objects.

Genus **Arytera** Blume

Arytera brackenridgei Radlkofer, Sitzber. Math.-Phys. Kl. Acad. Wiss. München 9: 555, 1879.

Small tree. Leaves pinnate, leaflets oblong-elliptic or obovate, subacuminate, up to 18 cm. long and 8 cm. or more wide, pinnately nerved, drying thin and yellowish green, with minute peltate scales, petiolules about 5 mm. long. Flowers unisexual, numerous, small, in axillary panicles up to 15 cm. or more long; fruit up to 2 or 3 cm. long, hairy within.

Vava'u: *Crosby*.

Also in Fiji.

Genus **Dodonaea** Linnaeus

Dodonaea viscosa Jacquin, Enum. Pl. Carib., 18, 1760.

Shrub or small tree, up to 3 m. or more tall. Leaves simple, alternate, narrowly lanceolate or oblanceolate, acute at both ends, up to 15 cm. or more long and 3 cm. wide, somewhat viscid, subsessile or on short, winged petioles. Flowers small, greenish yellow, in lax, terminal or axillary, paniculate clusters; fruit papery, 15-20 mm. in diameter, inflated, two- to four-winged, the wings membranous, veiny, glabrous, orange to brown.

Kao: edge of forest on steep rocky slope, May 6, 1953, *Yuncker 15870; 15875*.

Vava'u: *Harvey; Crosby*; just below upper rim on seaward face of limestone coastal cliff on northern side of island above Leimatua, May 20, 1953, *Yuncker 16074*.

Occasional. Widely distributed in warm countries.

Genus **Harpullia** Roxburgh

Harpullia mellea Lauterbach, Engler Bot. Jahrb. 41: 229, 1908.

Tree, 8-10 m. or more tall. Leaves alternate, pinnately compound, leaflets oval-oblong, obtusely pointed, base acute, up to 15 cm. long and 5-7 cm. wide, glabrous, thin, petiolules less than 1 cm. long. Flowers about 1.5-2 cm. wide, yellowish green, on pedicels up to 2 cm. long, in loose, axillary panicles; fruit leathery, bilobed, about 4 cm. wide, red or orange outside, pinkish within, each cell containing a large, black, glossy seed.

'Eua: in ravine a short distance to the northeast of Ohonua village, Apr. 2, 1953, *Yuncker 15627*.

Infrequent. Also in Fiji and Samoa.

The wood is used in handicraft work.

FAMILY BALSAMINACEAE

Genus **Impatiens** Linnaeus

Impatiens balsamina Linnaeus, Sp. Pl., 938, 1753.

Erect, branching herb up to about 60 cm. tall. Leaves lanceolate, serrate, acuminate. Flowers on short axillary pedicels, variously colored, irregular, spurred, commonly doubled; capsule large, hairy.

Introduced ornamental. Frequent about dwellings and cemeteries. Occasional as an escape in waste areas. An African species now of worldwide cultivation.

Tongan name: *polosomo*.

FAMILY RHAMNACEAE

Genus *Rhamnella* Miquel

Rhamnella vitiensis (Benthani) A. C. Smith, Torrey Bot. Club, Bull. **70**: 544, 1943.

"A small, gnarled tree, up to 3 m. or more tall. Leaves oval. Flowers axillary, the petals pale yellow."

Vava'u: *Crosby*.

Infrequent. From Queensland and New Guinea eastward to Tonga.

Rhamnus vitiensis Benth. in Burkill's list.

Tongan name: *taka*.

Genus *Colubrina* L. C. Richard

Colubrina asiatica (Linnaeus) Brongniart, Ann. Sci. Nat. **10**: 369, 1827.

More or less sprawling shrub, or sometimes a small tree up to 3 or 4 m. tall. Leaves simple, alternate, ovate, acuminate, base rounded or subcordate, crenate-dentate, up to 8 cm. or more long and 5 cm. wide, palmately three-nerved, midrib branched upward, nearly glabrous, petioles about 1 cm. long. Flowers small, yellowish green, on slender pedicels, in small, axillary, short-pedunculate, cymose clusters; fruit subglobose, 6-8 mm. in diameter, greenish.

Tongatapu: in seaside thicket along road west of Nuku'alofa, Mar. 7, 1953, *Yuncker 15214*; near Navutoka village, Feb. 27, 1953, *Yuncker 15094*; near beach eastward of Ma'ofanga, Oct. 29, 1951, *Hürlimann 19*.

'Eua: *Lister*; near sea, above Ohonua village, Apr. 2, 1953, *Yuncker 15619*.

Nomuka: margin of thicket on lakeward side of road encircling island, May 30, 1953, *Yuncker 15836*.

Lifuka: seaside thicket toward northern end of island, Apr. 24, 1953, *Yuncker 15703*.

Vava'u: *Crosby*; upper rim of seaside cliff northeast of Leimatua, May 20, 1953, *Yuncker 16059*.

Niuatoputapu: plain south of Falehau, Dec. 7, 1951, *Hürlimann 382*.

Frequent near the shore throughout Tonga. From Africa and India eastward to Polynesia.

Tongan name: *filho'a*.

The bark and the leaves lather when rubbed in water and may be used as a soap substitute.

Genus **Alphitonia** Reissek

Alphitonia zizyphoides (Solander) A. Gray, U.S. Expl. Exped., Bot. 1: 278, pl. 22, 1854.

Medium to large tree with young branches brown-tomentose. Leaves alternate, elliptic-lanceolate, acute, base rounded, obtuse or acutish, up to 15 cm. or more long and 5 cm. wide, pinnately nerved, nerves prominent, bright green above, whitened-tomentose beneath, petioles 1-2 cm. long. Flowers small, whitish, numerous, in branching, axillary, and terminal, cymose clusters; fruit about 5 mm. in diameter, purplish.

Tongatapu: *U.S. Expl. Exped.; Home*; forest near sea, vicinity of Niu-toua village, Mar. 2, 1953, *Yuncker 15121*.

'Eua: *Lister*; summit of eastern ridge above Fuai, Nov. 9, 1951, *Hürlimann 199*; open forest near center of island, Mar. 19, 1953, *Yuncker 15360*.

Nomuka: clearing along road encircling island between sea and central lake, Apr. 30, 1953, *Yuncker 15819*.

Lifuka: roadside, between Pangai village and southern end of island, Apr. 28, 1953, *Yuncker 15784*.

Kao: lower margin of slope forest, May 6, 1953, *Yuncker 15962*.

Vava'u: *Crosby*; upper slope of Talau, west of Neiafu, May 24, 1953, *Yuncker 16153*.

Tafahi: along road from township of Tafahi toward Taihavanui, Dec. 15, 1951, *Hürlimann 567*.

Frequent throughout Tonga. From Sumatra and the Philippines eastward to Polynesia.

A. excelsa Reiss. in Hemsley's and Burkill's lists.

Tongan name: *toi*.

This tree provides an excellent grade of timber useful in construction work and for dugout canoes, poi pounders, banana shooks, and the like. The bark is used in preparing medicines, and the leaves may be used as a soap substitute.

FAMILY ELAEOCARPACEAE

Genus **Elaeocarpus** Linnaeus

Elaeocarpus tonganus Burkill, Linn. Soc. Bot., Jour. 35: 29, 1901.

Medium-sized tree up to 10 m. or more tall. Leaves alternate, elliptic or elliptic-ovate, acuminate, base acutish or obtuse, crenulate, up to 12 cm. or more long and 6 cm. wide, pinnately nerved, petiole slender, up to 4 or 5 cm. long. Flowers less than 1 cm. long, in simple, mostly axillary racemes up to 5 cm. or more long, pedicels up to 1.5 cm. long, inflorescence silky-hairy; fruit ellipsoidal, up to 1.5 cm. long.

'Eua: in forest near summit of eastern ridge, Mar. 30, 1953, *Yuncker 15554* [a juvenile specimen, presumably this species].

Vava'u: *Crosby 15* [type]; edge of forest above Leimatua, May 20, 1953, *Yuncker 16055*; on steep slope leading to lagoon at Vaihoi, below Leimatua, May 26, 1953, *Yuncker 16183*.

Niuafu'ou: in interlava "island" on way to upper rim of main crater, May 16, 1953, *Yuncker 16003*.

Also known from Niue and Samoa. There is no authentic record of *E. cassinoides* A. Gray from Tonga, as reported by Hemsley and it should be dropped from the list of Tongan plants, according to A. C. Smith (U.S. Nat. Herb., Contrib. 30: 536, 1953).

Tongan names: *langakali vao*, *ma'ama'alava*, *olamaka*, *tautau'amanu*.

FAMILY TILIACEAE

Genus *Corchorus* Tournefort

Corchorus torresianus Gaudichaud, Voy. Freycinet Bot., 477, 1830.

Shrublike, up to 1 m. tall, densely white-stellate-pubescent. Leaves alternate, obovate, apex rounded, narrowed downward to base, which is very narrowly obtuse, serrate about the upper half, up to 4 cm. long and 2.5 cm. wide, palmately three-nerved, midrib strongly pinnately branched upward, petiole scarcely 1 cm. long. Flowers about 2 cm. in width, in terminal or lateral, few-flowered, pedunculate, subumbellate clusters, corolla yellow; fruit up to 2.5 cm. long, grooved-cylindrical, pointed, densely covered with erect, rigid, stellate-pubescent hairs.

Lifuka: very rocky shore just above high-tide limit at north end of island, May 11, 1953, *Yuncker 15985*.

A new record for Tonga, where it appears to be rare. Also found on Rota Island and on Lau in the Fiji group.

Genus *Grewia* Linnaeus

Grewia crenata (J. R. and G. Forster) Schinz and Guillaumin, in Sarasin and Roux, Nova Caledonia 179, 1921.

Small tree or shrub. Leaves alternate, ovate to elliptic-lanceolate, acuminate, base rounded, cordulate, up to 15 cm. or more long and 6 cm. wide, but mostly somewhat smaller, palmately three-nerved, midrib strongly pinnately branched upward, finely crenately serrate, petiole scarcely 1 cm. long. Flowers greenish-white, about 1 cm. wide, in axillary, pedunculate, umbellate clusters; fruit 1 cm. or less wide, four-lobed.

Tongatapu: *Forster; Mosley*; open thicket near sea below Vaini village, Feb. 26, 1953, *Yuncker 15069*; thicket near Fu'amotu village, June 5, 1953, *Yuncker 16238*.

'Eua: *Lister*; forest near center of island, Mar. 18, 1953, *Yuncker 15320*.

Nomuka: clearing along road encircling island, Apr. 30, 1953, *Yuncker 15835*.

Lifuka: seaside thicket north of Pangai village, Apr. 25, 1953, *Yuncker 15732*.

Vava'u: *Crosby*; upper plain near rim of seaside cliff above Ha'alafuli, May 21, 1953, *Yuncker 16104*.

Frequent throughout Tonga. Also in Fiji, Samoa, and the Society Islands.

G. mallocoeca L. f. in Hemsley's and Burkill's lists.

Tongan name: *fo'ui*.

The timber is used for banana shooks and the bark fibers for cordage.

Grewia prunifolia A. Gray, U.S. Expl. Exped., Bot. 1: 199, 1854.

Shrub. Leaves alternate, ovate or lanceolate, acuminate, base rounded, 5-8 cm. long, finely serrulate, three-nerved from base, midrib pinnate above, glabrous, petioles scarcely 1 cm. long. Flowers one to three on short, axillary peduncles, less than 1 cm. wide; fruit four-lobed, somewhat hirsute.

Tongatapu: *Moseley*. Also in Fiji.

Genus **Triumfetta** Linnaeus

Triumfetta bartramia Linnaeus, Syst., ed. 10, 1044, 1759.

Densely stellate-hairy, half-woody, branching, shrublike plant up to 2 m. or more tall. Leaves alternate, round-ovate, mostly three-lobed, lobes acuminate, serrate, base rounded, cordulate, up to 8 cm. or more long and 7 cm. wide, palmately five- to seven-nerved, petiole slender, up to 6 cm. or more long. Flowers small, yellow, in compact, axillary fascicles; fruit subglobose, about 5 mm. in diameter, covered with hooked bristles.

Tongatapu: waste area near Blow Hole area below Houma village, June 1, 1953, *Yuncker 16218*.

Lifuka: old plantation near southern end of island, Apr. 28, 1953, *Yuncker 15786*.

Vava'u: *Crosby*.

Tafahi: plantation above township of Tafahi, alt. 70 m., Dec. 15, 1951, *Hürlimann 526*.

Frequent as a plantation and waste-area weed throughout Tonga. Pan-tropic.

T. rhomboidea Jacq. in Burkill's list.

Tongan names: *mo'osipo*, *mo'osipo enge'enya*.

Triumfetta procumbens Forster f., Fl. Ins. Australia, Prodr., 35, 1786.

Prostrate, semi-woody plant with long, trailing, densely stellate-pubescent branches. Leaves simple, alternate, round-ovate in outline, rounded-cordate at base, commonly three-lobed, lobes obtuse, crenate-serrate, up to 6 cm. or more long and as wide, palmately five- to seven-nerved, petioles as long as or exceeding blade. Flowers about 1 cm. long, yellow, in axillary, pedunculate, umbellate clusters, fruit globose, about 12 mm. in diameter, covered with pubescent bristles.

Tongatapu: *Mathews*; *Home*; *Graefe*; in sand near sea below village of Fu'amotu, Mar. 4, 1953, *Yuncker 15165*; on sand at upper edge of beach below steep cliff near Haveluliku village, June 3, 1953, *Yuncker 16234*.

'Eua: pioneering in sand, margin of seaside thicket just above high-tide limit, Ha'aluma, Apr. 1, 1953, *Yuncker 15601*.

Vava'u: *Crosby*.

Tafahi: on shore below township of Tafahi, Dec. 13, 1951, *Hürlimann 492*.

Frequent throughout Tonga on sandy soil near the shore. From the Seychelles through Malaya to the Mariana Islands and Polynesia.

Tongan name: *mo'osipo*.

FAMILY MALVACEAE

Genus **Malvastrum** A. Gray

Malvastrum coromandelianum (Linnaeus) Garcke, *Bonplandia* 5: 297, 1857.

Herbaceous or semi-woody, widely branching, shrublike plant up to 1 m. or more tall, appressed-pubescent with four-rayed hairs. Leaves alternate, ovate-lanceolate, acute at both ends, serrate, up to 4 cm. or more long and 2 cm. wide, palmately three-nerved, midrib branched upward, petiole slender, mostly 1 cm. or more long. Flowers salmon yellow, short-pedicellate, in axillary and terminal clusters.

Tongatapu: near village of Fu'amotu, Mar. 4, 1953, *Yuncker 15162*.

A rather common roadside and waste-area weed throughout Tonga. Pantropic.

Tongan name: *te'ekosi*.

Genus **Sida** Linnaeus

Sida acuta Burmann f., *Fl. India*, 147, 1768.

Shrubby, freely branching plant up to 1 m. or more tall, foliage yellowish green, young growth and lower leaf surface more or less stellate-pubescent. Leaves lanceolate, acute, base narrowed, obtuse or cordulate, up to 7.5 cm. or more long and 2 cm. wide, serrate, palmately three-nerved, midrib branched upward, petioles up to about 5 mm. long, the stipules linear-subulate, up to 12 mm. long. Flowers yellow, about 1.3 cm. in diameter, solitary or paired, axillary or terminal.

Nomuka: along road encircling island, Apr. 30, 1953, *Yuncker 15802*.

Lifuka: in roadside ditch toward north end of island, May 11, 1953, *Yuncker 15977*.

Vava'u: *Crosby*.

A rather common waste-area weed throughout Tonga. Pantropic.

S. carpinifolia L. f. in Burkill's list.

Tongan name: *te'ekosi*.

Sida cordifolia Linnaeus, *Sp. Pl.*, 684, 1753.

Erect, subshrubby, densely pubescent plant, up to 1 m. tall. Leaves ovate, obtuse or acutish, base cordate, up to 6 or 7 cm. long and 6 cm. wide, palmately five- to seven-nerved, dentate. Flowers about 1.5 cm. wide, on slender pedicels, crowded on short, axillary branches simulating leafy racemes, corolla yellow.

Nomuka: in sandy soil along ridge near sea above village, Apr. 30, 1953, *Yuncker 15803*.

Infrequent. An Old World native now of pantropic distribution.

Sida rhombifolia Linnaeus, Sp. Pl., 684, 1753.

Widely branching, somewhat shrubby, more or less stellate-scurfy plant, up to 1 m. or more tall. Leaves alternate, elliptic or rhombic to subspatulate, acute or obtusish, base wedge-shaped, very narrowly obtuse at petiole, serrate above middle, up to 8 cm. long and 2.5 cm. wide, petiole mostly scarcely 5 mm. long. Flowers solitary, on slender, axillary pedicels up to 5 cm. or more long, 1.5 cm. wide, corolla yellow, carpels eight to 10, subulate-beaked.

Tongatapu: side of trail, near Niutoua village, Mar. 2, 1953, *Yuncker 15118*.

'Eua: *Lister*; weed in grazing area near center of island, Mar. 22, 1953, *Yuncker 15430*; side of trail above Fuai plantation, Mar. 28, 1953, *Yuncker 15540, 15543*.

Vava'u: *Crosby*.

Tafahi: path from township of Tafahi to Faihavanui, alt. 100 m., Dec. 15, 1951, *Hürlimann 545*.

A common roadside and waste-area weed throughout Tonga. Pantropic. This species probably includes *S. microphylla* Cav. of Hemsley's and Burkill's lists. According to T. H. Kearney, *S. microphylla* Cav. is the basonym of *S. rhombifolia* var. *microphylla* (Cav.) Mast. who described it as having "small elliptic" leaves, and they so appear in Cavanilles' illustration (*Dissertationes*, pl. 12, fig. 2, 1790). Certain specimens of, presumably, *S. rhombifolia* have leaves scarcely at all rhombic.

Sida samoensis Rechinger, Repert. Sp. Nov. 4: 228, 1907.

Small, prostrate or spreading-ascending, stellate-pubescent herb. Leaves alternate, ovate, obtuse at both ends, 1-1.5 cm. long and 6-8 mm. wide, palmately three-nerved, serrate, petioles slender, 3-5 mm. long. Flowers solitary, on slender, axillary pedicels 2-3 cm. long.

Vava'u: grassy area near upper rim of limestone coastal cliff on northern side of island above Leimatua, May 20, 1953, *Yuncker 16071*.

Locally abundant. Also in Samoa.

Tongan name: *te'ckosi*.

Sida spinosa Linnaeus, Sp. Pl., 683, 1753.

Soft pubescent herb up to 1 m. tall. Leaves alternate, ovate-lanceolate or oblong, acute, base rounded, obtuse or subcordulate, up to 5 cm. or more long and 3 cm. wide, serrate, petiole slender, up to 2 cm. or more long. Flowers solitary or in axillary and terminal panicle clusters; fruit five-carpellate, ovoid, each carpel two-beaked.

Tongatapu: *U.S. Expl. Exped.*

A tropical American species of wide dissemination in temperate and tropical regions.

Genus **Urena** Linnaeus**Urena lobata** Linnaeus, Sp. Pl., 692, 1753.

Shrubby, stellate-pubescent plant up to about 1 m. tall. Leaves simple, alternate, ovate or round-ovate, acute at both ends or rounded-cordate at base, obscurely three-lobed,

irregularly toothed, up to 8 cm. or more long and as wide, stellate-pubescent, petioles up to 5 cm. or more long. Flowers on short axillary pedicels, corolla white to pink; fruit about 1 cm. wide, the five segments covered with barbed spines, burlike.

Tongatapu: *U.S. Expl. Exped.*; along forest trail near Niutoua village, Mar. 2, 1953, *Yuncker 15136*.

'Eua: in clearing near center of island, Mar. 24, 1953, *Yuncker 15434*.

Vava'u: *Harvey; Crosby*.

Frequent as a roadside and waste-area weed. An Indo-Malaysian species now pantropic.

Hemsley lists *U. morifolia* DC. for Tonga on the authority of de Candolle and cites no collections. This is now considered to be a synonym of *U. sinuata* Linnaeus which is now treated as a synonym of *U. lobata*.

Tongan name: *mo'osipo*.

The leaves are used in medicines.

Genus **Hibiscus** Linnaeus

Hibiscus abelmoschus Linnaeus, Sp. Pl., 693, 1753.

Hirsute, subwoody plant, up to about 1 m. tall. Leaves alternate, broadly ovate in outline, up to 12 cm. long and about as wide, base cordate, palmately three- to five-lobed, lobes acute to acuminate, toothed, petioles about as long as the blade. Flowers 5 cm. or more wide, solitary, on axillary pedicels up to 5 cm. or more long, corolla yellow with an orange or red center; capsule oblong, pointed, 5 cm. or more long, hirsute, splitting into five sections.

'Eua: *Lister*; scattered plants in undergrowth of old coconut plantation near Ha'aluma, Apr. 1, 1953, *Yuncker 15585*.

Vava'u: *Barclay; Crosby*; in wet, marshy edge of Ngofe swamp, on southwestern side of island, May 20, 1953, *Yuncker 16030*.

Occasional in waste areas. India to Malaya and Polynesia.

Tongan names: *loa, fau'ingo*.

The seeds furnish a dye used in decorating tapas, and various parts of the plant are used in preparing medicines.

Hibiscus rosa-sinensis Linnaeus, Sp. Pl., 694, 1753.

Shrub up to 3 m. or more tall. Leaves simple, alternate, ovate, acute, base obtuse or subacute, up to 15 cm. or more long and 12 cm. wide, dentate, palmately five-nerved, petiole up to about 5 cm. long. Flowers up to 12 or 15 cm. wide, on slender, elongate axillary pedicels near ends of branches, various shades of red.

Cultivated about villages as an ornamental. Occasionally adventive. An Asiatic species now cultivated in warm countries throughout the world.

Hibiscus schizopetalus (Masters) Hooker f., *Curtis's Bot. Mag.* III, 36: pl. 6524, 1880.

Glabrous shrub up to about 3 m. or more tall. Leaves alternate, ovate-elliptical, acute, dentate. Flowers solitary, pendulous on long pedicels at ends of slender, drooping branches, petals much dissected, reflexed, coral red.

Occasional in villages as an ornamental. A native of tropical Africa now widely cultivated in warm countries.

Hibiscus syriacus Linnaeus, Sp. Pl., 695, 1753.

Erect, branching, glabrous shrub 2 m. or more tall. Leaves rhombic-ovate, alternate, lower ones often three-lobed, toothed, acute to acuminate. Flowers up to 8 cm. wide, red or purplish, solitary in leaf axils on current season's growth; fruit ovoid, up to 2.5 cm. long.

Introduced ornamental. Occasional. A Chinese species now of worldwide cultivation in tropical and temperate countries.

Hibiscus tiliaceus Linnaeus, Sp. Pl., 694, 1753.

Tree up to 8 m. or more tall with glabrous or somewhat pubescent, spreading branches. Leaves round-ovate, abruptly acuminate, base deeply cordate with a narrow sinus, up to 15 cm. or more long and nearly as wide, palmately seven- to nine-nerved, glabrescent above, paler and densely stellate-pubescent beneath, petioles up to 12 or 15 cm. long. Flowers up to 10 cm. wide, on short, axillary and terminal pedicels, corolla yellow with darker eye, turning salmon red; capsule pubescent, five-celled, several-seeded, seeds glabrous.

Tongatapu: thicket near beach, Sopa, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15027*.

'Eua: *Lister*; in thin forest below Fuai plantation, near center of island, Mar. 19, 1953, *Yuncker 15358*.

Lifuka: in seaside thicket just above high-tide limit, north of Pangai village, Apr. 25, 1953, *Yuncker 15742*.

Vava'u: *Harvey; Crosby*.

Tafahi: coastal forest, below township of Tafahi, Dec. 13, 1951, *Hürlimann 490*.

Frequent throughout Tonga, usually near the shore. Pantropic.

Tongan name: *fau*.

The bark fibers are used in making cordage, mats, *tauvale*, kava filters, and so forth. The wood is used in general construction work and fences; the bark and young leaves, in the treatment of skin diseases.

Genus **Thespesia** Solander

Thespesia populnea (Linnaeus) Solander, ex Correa, Mus. Nat. Hist. Nat. Paris, Ann. 9: 290, 1807.

Medium-sized, round-topped tree, the young branches brown-scurfy. Leaves simple, alternate, somewhat fleshy, ovate, acuminate, base cordate with an open sinus, entire or rarely somewhat lobed, palmately five- to seven-nerved, up to 12 cm. or more long and 10 cm. wide, petioles up to 10 cm. or more long. Flowers up to 8 or 10 cm. wide, solitary, on stout, axillary pedicels, corolla yellow with reddish center, changing to purple with age; capsules depressed-globose, about 2.5 cm. in diameter, seeds 10, hairy.

Tongatapu: seaside thicket near Niutoua village, Feb. 27, 1953, *Yuncker 15107*.

'Eua: *Lister*; deep ravine northeast of Ohonua village, Apr. 2, 1953, *Yuncker 15629*.

Lifuka: near sea north of Pangai village, Apr. 25, 1953, *Yuncker 15746*.

Vava'u: *Crosby*.

Tafahi: coastal forest, near Hou, alt. 5 m., Dec. 17, 1951, *Hürlimann 586*.

Frequent near the shore throughout Tonga. Pantropic.

Tongan name: *milo*.

The leaves and fruit are used in preparing medicines. The timber takes a good polish, is durable under water, and is used in construction and handicraft work.

Genus *Gossypium* Linnaeus

Gossypium brasiliense Macfayden, Fl. Jamaica 1:72, 1837.

Semi-shrubby, branching plant, up to 1.5 m. or more tall. Leaves alternate, round-ovate in outline, three- to five-lobed, lobes entire, on long petioles. Involucral bracts cordate, lacinate, acuminate, seeds numerous, covered with long, white fibers.

Vava'u: *Crosby*.

Introduced and occasional in villages. Pantropic.

Tongan name: *vavae*.

Hibiscus manihot Linnaeus, called *pelc* by the Tongans, is cultivated for its young growth, which is used as a green vegetable.

FAMILY BOMBACACEAE

Genus *Ceiba* Medikus

Ceiba pentandra (Linnaeus) Gaertner, Fruct. et Semin. Pl. 2:244, pl. 133, fig. 1, 1791.

Medium to large, glabrous, soft-wooded tree with smooth or short-spiny bark and whorled, spreading branches. Leaves palmately compound, leaflets five to nine, elliptic to oblanceolate, entire, of various sizes, acuminate, petioles long. Flowers white or pinkish, petals pubescent, up to 2.5 cm. long; capsules up to 15 cm. long, seeds numerous, silky-hairy.

Introduced and now occasional in villages and along roadsides throughout the group.

The silky seed fibers are used as a filling for pillows and cushions. Probably of tropical American origin; now pantropic.

Tongan name: *vavae*.

FAMILY STERCULIACEAE

Genus *Melochia* Linnaeus

Melochia aristata A. Gray, U.S. Expl. Exped., Bot. 1:193, 1854.

Small tree, up to 4 m. or more tall. Leaves alternate, ovate, acute, base rounded, obtuse or abruptly acute, up to 12 cm. or more long and 8 cm. wide, palmately five- to seven-nerved, midrib branched upward, crenately toothed, petiole slender, up to 8 cm. or more

long. Flowers about 1 cm. wide, in compound, many-flowered, axillary cymes, corolla white in center, shading to rose outward; capsule ovoid, deeply five-lobed, carpels opening apically. All parts of the plant stellate-pubescent.

Tongatapu: *Forster*.

Vava'u: *Barclay; Harvey; Crosby*; in thicket near Ngofe swamp, May 19, 1953, *Yuncker 16029*.

Niuatoputapu: scrubby forest, mountain ridge above Vaipoa, alt. 100 m., Dec. 14, 1951, *Hürlimann 362*; coastal forest between Hihifo and Vaipoa, Dec. 14, 1951, *R. Hingano (Hürlimann 627)*.

Infrequent. Also in Samoa.

M. odorata L. f. in Hemsley's and Burkill's lists.

Tongan names: *fukofuka, mako*.

The wood is light and is used for making floats for fish nets and also for firewood.

Genus *Waltheria* Linnaeus

Waltheria americana Linnaeus, Sp. Pl., 673, 1753.

Densely hairy, small, shrubby plant. Leaves alternate, oval-ovate, blunt or acutish, base rounded, cordulate, downy-pubescent, serrate, up to 8 cm. long, nerves prominent. Flowers small, in dense, axillary clusters, corolla yellow; capsules small, two-valved.

Vava'u: *Crosby*.

Infrequent. A tropical American weedy plant now of wide distribution in tropical countries.

Genus *Kleinhovia* Linnaeus

Kleinhovia hospita Linnaeus, Sp. Pl., ed. 2, 1365, 1763.

Tree, up to about 15 m. tall, young branches pubescent. Leaves alternate, broadly ovate, acuminate, base truncate or cordate, up to 15-20 cm. long and 15 cm. wide, entire, essentially glabrous, palmately five- to seven-nerved, midrib branched upward, petioles up to 8-10 cm. or more long. Flowers about 1 cm. long, in terminal or axillary panicles up to 30 or 40 cm. long, pedicels jointed at about middle, narrow sepals longer than pink or rose-colored petals, pubescent; capsules about 2 cm. long, membranous, inflated, obovate, five-parted, seeds usually one in each carpel, globose.

Vava'u: *Crosby*; edge of clearing along road about 3 miles northwest of Neiafu, May 20, 1953, *Yuncker 16083*.

Infrequent. From tropical Africa and India through Malaya to Polynesia.

Tongan name: *fukofuka*.

The wood is used for building purposes.

Genus *Sterculia* Linnaeus

Sterculia fanaiho Setchell, Carnegie Inst. Washington, Pub. 20: 69, fig. 13A, 1924.

Tree up to 8 m. or more tall. Leaves alternate, broadly elliptic-ovate, abruptly short-acuminate, base rounded, cordate, entire, up to 20 cm. or more long and 12 cm. wide, pal-

mately five-nerved, midrib strongly pinnate above, nerves pale and prominent beneath, petiole up to 9 cm. or more long.

Niuafou: inner slope of main crater above central lake, May 16, 1953, *Yuncker 16013*.

A new record for Tonga, where it is apparently rare. The type is from Samoa.

Tongan name: *fanakio*.

Genus *Heritiera* Dryander

Heritiera littoralis Dryander, in Aiton Hort. Kew 3: 546, 1789.

Tree up to 15 m. or more tall. Leaves alternate, oblong- to elliptic-ovate, obtuse or acute, base rounded, obtuse or cordulate, up to 20 cm. long and 14 cm. wide, glabrous above, densely covered beneath with silvery white scales, entire, petiole 1-4 or sometimes 8 cm. long. Flowers numerous, in paniculate, axillary clusters up to 15 cm. long, corolla campanulate, yellowish green; fruit woody, shining, boat-shaped, up to 6 cm. long.

Tongatapu: *U. S. Expl. Exped.; Nelson*; in seaside thicket, Sopu, west of Nuku'alofa, May 30, 1953, *Yuncker 16217*.

Kao: rocky slope in open forest, May 6, 1953, *Yuncker 15949*.

Vava'u: *Crosby*; shore of lagoon, Vaihoi, below Leimatua, May 26, 1953, *Yuncker 16201*.

Occasional. From tropical Africa and India through Malaya to Polynesia.

Tongan name: *mamea*.

FAMILY GUTTIFERAE

Genus *Calophyllum* Linnaeus

Calophyllum inophyllum Linnaeus, Sp. Pl., 513, 1753.

Medium to large, hard-wooded tree. Leaves simple, opposite, oval, subobovate or subovate, apex rounded, obtuse, sometimes emarginate or acutish, the base acute, up to 15 cm. or more long and 8 cm. wide, entire, leathery, glossy, pinnately nerved, midrib stout, lateral nerves fine, very numerous, parallel, petioles 1-2 cm. long, stout, canaliculate. Flowers about 2 cm. in width, in axillary, racemose clusters, corolla waxy white, stamens numerous; fruit globose, about 3-4 cm. in diameter, flesh thin, one-seeded.

Tongatapu: in thicket near beach, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15024*.

'Eua: in forest near center of island, Mar. 18, 1953, *Yuncker 15326*; in open forest near village of Ohonua, Apr. 2, 1953, *Yuncker 15638*.

Lifuka: near beach along southern end of island, Apr. 28, 1953, *Yuncker 15792*.

Vava'u: *Crosby*.

Niuafou: coastal forest, alt. 10 m., Jan. 7, 1952, *Hürlimann 652*.

Frequent on the lower terraces and near the sea throughout Tonga. Eastern Africa and India through Malaya to Polynesia.

Tongan names: *feta'u, tamanu*.

This strong and durable wood is used in house construction and other building purposes, and sections of the trunk are used to make large kava bowls. The oil from the seeds is used medicinally.

Calophyllum vitiense Turrill, Linn. Soc. Bot., Jour. **43**: 17, 1915.

Tree, up to 10 m. or more tall, stems to 35 cm. in diameter. Leaves opposite, oblong-elliptic, obtuse or acute, base acute-decurrent, up to 13 cm. or more long and 5 cm. wide, leathery, glossy, entire, pinnately nerved, midrib prominent, lateral nerves very slender, numerous, parallel, petiole 1-2 cm. long, canaliculate. Flowers about 1.5 cm. wide, in racemose, axillary clusters, corolla pink, stamens numerous; fruit subglobose, 2 cm. or more in diameter, outer flesh pink when young.

'Eua: margin of forest near summit of eastern ridge, Mar. 24, 1953, *Yuncker 15435*; forest near center of island, Mar. 18, 1953, *Yuncker 15326*.

Kao: in forest on steep, rocky slope, May 6, 1953, *Yuncker 15883*.

Occasional. Also in Fiji and the Solomon Islands.

No differences of consequence are apparent among these specimens and the numerous Fijian collections referred to *C. vitiense*, except that the latter have white flowers. This species, not otherwise recorded from Tonga, is probably the one listed by Hemsley (Linn. Soc. Bot., Jour. **30**: 169, 1894) as *C. spectabile* and by Burkill (op. cit. **35**: 27, 1901) as *Calophyllum* sp. (A. C. Smith).

Tongan name: *tamanu*.

The timber is strong and hard and is used for building purposes.

Genus **Garcinia** Linnaeus

Garcinia myrtifolia A. C. Smith, Jour. Arnold Arboretum **31**: 315, 1950.

Glabrous tree, up to 7 m. or more tall, the trunk up to 25 cm. in diameter. Leaves elliptic or subovate, up to 14 cm. long and 7 cm. wide, obtuse or short-acute, base rounded, abruptly acute-decurrent, subcoriaceous, pinnately nerved, midrib prominent, lateral nerves numerous, very slender, petiole stout, canaliculate, about 1 cm. long. Flowers mostly solitary, on axillary pedicels about 1 cm. long; fruit ellipsoidal, about 2 cm. in diameter, with an apical crownlike thickening.

'Eua: edge of forest near center of island, Mar. 20, 1953, *Yuncker 15381*.

Kao: in forest on steep, rocky slope, May 6, 1953, *Yuncker 15908, 15955*.

Occasional.

These interesting specimens are clearly referable to the supposed Fijian endemic, of which at least three other Fijian collections have been noted since its description (A. C. Smith).

Tongan name: *feto'omaka*.

The bark is used for scenting oil.

Garcinia pseudoguttifera Seemann, Fl. Vit., 40, 1865.

Tree, up to 6 m. or more tall. Leaves opposite, obovate, apex rounded, emarginate, base acute-decurrent, up to 7 cm. or more long and 5 cm. wide, coriaceous, pinnately

nerved, midrib prominent, lateral nerves very fine, numerous, petiole up to about 2 cm. long. Flowers about 1 cm. wide, in few-flowered, axillary, cymose clusters, petals red, stamens numerous.

Vava'u: near village of Mataika, north of Neiafu, May 27, 1953, *Yuncker 16204*. Believed to be a new record for Tonga. Frequent in Fiji.

Tongan name: *mo'onia*.

***Garcinia sessilis* (Forster) Seemann, Viti, 433, 1862.**

Tree, up to 8 m. tall. Leaves opposite, elliptical, acute at both ends, entire, up to 11 cm. or more long and 6 cm. wide, pinnately nerved, lateral nerves very slender, petiole up to about 1 cm. long. Flowers coral or salmon red, sessile, axillary, about 1 cm. wide, four-parted, fragrant.

Tongatapu: *Nelson*; in open forest below Lavengatonga village, Mar. 6, 1953, *Yuncker 15177*.

'Eua: *Lister*; in second-growth forest, near Pangai village, Mar. 25, 1953, *Yuncker 15464*.

Nomuka: open area along road encircling island, Apr. 30, 1953, *Yuncker 15864*.

Vava'u: near Houma village, May 22, 1953, *Yuncker 16118*.

Occasional throughout Tonga. Also in Fiji and Samoa.

Tongan name: *heilala*.

The flowers are used in leis; the leaves, for medicines.

FAMILY VIOLACEAE

Genus ***Melicytus*** Forster

***Melicytus ramiflorus* J. R. and G. Forster, Char. Gen. Pl., 124, 1776.**

Shrub or small tree up to 5 m. tall and 15 cm. in diameter. Leaves alternate, elliptic or elliptic-subobovate, acute at both ends, minutely crenate, up to 15 cm. or more long and 7 cm. wide, pinnately nerved, finely venulose-areolate by transmitted light, petiole about 1 cm. long. Flowers greenish white, 3-6 mm. wide, on slender pedicels somewhat longer than flowers, in few-flowered, umbellate clusters.

'Eua: *Lister*; dark, moist forest of ravine north of Fuai plantation, near center of island, Mar. 19, 1953, *Yuncker 15349*. In Tonga, known only from 'Eua. Also grows in New Zealand and on Norfolk Island.

Tongan name: *pualiki*.

Genus ***Agatea*** A. Gray

***Agatea violaris* A. Gray, U.S. Expl. Exped., Bot. 1: 89, pl. 7, 1854.**

Shrublike, climbing woody plant. Leaves alternate, elliptic or elliptic-subobovate, acuminate, base rounded, obtuse, up to 10 cm. or more long and 5 cm. wide, entire, red-glandular dotted by transmitted light, petioles slender, up to about 2 cm. long. Flowers numerous, in paniculate or racemose, terminal or axillary clusters, petals ciliate.

'Eua: in deep forested ravine north of Fuai plantation, near center of

island, Mar. 19, 1953, *Yuncker 15348*. This collection is sterile and the identification is somewhat tentative though believed to be correct. This is believed to be the first report of this Fijian species for Tonga where it is apparently very infrequent.

Tongan name: *kavahaha*.

FAMILY FLACOURTIACEAE

Genus *Xylosma* Forster f.

Xylosma bryanii A. C. Smith, Torrey Bot. Club, Bull. **70**: 545, 1943.

Low, scrambling or trailing shrub. Leaves alternate, obovate, or elliptic-obovate, apex rounded, base acute or obtuse, firm, margin revolute, petiole scarcely 5 mm. long. Flowers in short, axillary, few-flowered racemose clusters.

Lifuka: scrambling over rocks on seaside cliff, eastern side of island, flowers greenish, Apr. 27, 1953, *Yuncker 15765*.

Apparently rare in Tonga.

Tongan name: *unuoi*.

This species, previously known only from the type collection obtained on the island of Ongea in southern Lau, Fiji, is an interesting addition to the known Tongan flora. Apparently the specimens from Niue (*Yuncker 9732, 9853*) listed as *X. orbiculatum* (J. R. and G. Forster) Forster f. by Yuncker (B. P. Bishop Mus., Bull. **178**: 86, 1943) also represent *X. bryanii*. In the sense of Sleumer's revision (Notizbl. Bot. Gart. Berlin **14**: 288-297, 1938), *X. orbiculatum* is the species with larger leaves rounded at the base that is fairly frequent in Tonga. *X. bryanii* having been based on a pistillate specimen, the following notes from the new material are of interest:

Leaf blades occasionally up to 4 × 3 cm.; staminate inflorescences four- to eight-flowered, rachis sometimes up to 7 mm. long; pedicels at anthesis 2.5-5 mm. long; inner sepals sometimes up to 3 × 3.5 mm.; disk yellow, about 0.5 mm. high, crenulate into 12-14 angular lobes; stamens 30-40, the longest filaments about 4 mm. long, anthers ellipsoid, about 0.7 mm. long. (A. C. Smith.)

Xylosma orbiculatum (J. R. and G. Forster) Forster f., Fl. Ins. Australia, Prodr., **72**, 1786.

Small to medium-sized tree, up to 10 m. or more tall. Leaves alternate, ovate to orbicular, obtuse or acutish, base rounded, abruptly short-acute at petiole, entire or minutely toothed, up to 10-12 cm. long and as wide but mostly somewhat smaller, petiole about 1 cm. long. Flowers dioecious, small, perianth greenish, pubescent, on slender pedicels up to 5 mm. long, in axillary, racemose clusters.

Tongatapu: *U.S. Expl. Exped.*; in thicket near sea below Fu'amotu village, Mar. 4, 1953, *Yuncker 15167*; in forest along road between Lavengatonga village and sea, Mar. 6, 1953, *Yuncker 15186*; in open forest near Lavengatonga village, Mar. 6, 1953, *Yuncker 15190*; in thicket near sea below Haveliku village, June 3, 1953, *Yuncker 16235*.

'Eua: *Lister*; in forest near center of island, Mar. 19, 1953, *Yuncker 15351*; edge of forest, Fuai, near center of island, Mar. 19, 1953, *Yuncker 15362*; margin of forest near summit of eastern ridge, Mar. 24, 1953, *Yuncker 15436*; near shore near Ha'aluma, Apr. 1, 1953, *Yuncker 15589*.

Vava'u: *Crosby*; margin of forest above Feletoa village, May 19, 1953, *Yuncker 16021*; top of seaside cliff above Ha'alaufuli, May 21, 1953, *Yuncker 16087*; on seaward face of the limestone coastal cliff below Ha'alaufuli, May 21, 1953, *Yuncker 16095, 16102*; upper rim of seaside limestone cliff on the northwestern side of the island, May 25, 1953, *Yuncker 16177*.

Frequent throughout Tonga. Also in Fiji and southeastern Polynesia.

Tongan names: *filimoto, olamaka, kakala'uli*.

The timber is used in some house construction.

Genus **Flacourtia** L'Héritier

Flacourtia rukam Zollinger et Morren, Syst. Verz., 33, 1854.

Small or medium-sized tree up to 8 m. or more tall. Leaves simple, alternate, up to 15 cm. long and 8 cm. wide, elliptic-ovate, crenate, attenuately acuminate, base acute, on petioles scarcely 1 cm. long. Flowers small, greenish; fruit green, about 1 cm. long.

Niuatoputapu: secondary forest, base of range above Hihifo, alt. 40 m., Dec. 5, 1951, *Hürlimann 336*.

Infrequent. Dutch East Indies, Carolines, Niue, Samoa.

Genus **Homalium** Jacquin

Homalium vitiense Benthani, Linn. Soc. Bot., Jour. 4: 36, 1860.

Hemsley (Linn. Soc. Bot., Jour. 30: 178, 1895) lists a collection of this species made by *Lister* on 'Eua. It has been assumed that this species is a Fijian endemic. The species of the genus are difficult to separate and, not having the *Lister* collection for study, I have not been able to verify its identity.

FAMILY PASSIFLORACEAE

Genus **Passiflora** Linnaeus

Passiflora edulis Sims, Curtis's Bot. Mag. 45: pl. 1989, 1818.

Glabrous, tendril-bearing vine. Leaves alternate, broadly ovate in outline, deeply palmately three-lobed, lobes serrate, sharply acute, sinus rounded, petioles mostly about 2 cm. long, with pair of conspicuous glands near base of blade. Flowers axillary, about 5 cm. wide, purplish white; fruit globose, about the size of a small egg, rind hard, pulp edible.

'Eua: trailing on ground in open area in Mua village, Apr. 7, 1953, *Yuncker 15666*.

A tropical American species widely disseminated in warm countries as an ornamental. It sometimes escapes and becomes established.

Tongan name: *vaine tonga*.

Passiflora foetida Linnaeus, Sp. Pl., 959, 1753.

Prostrate or climbing, weak-stemmed, glandular-pubescent, herbaceous vine. Leaves ovate or ovate-cordate in outline, up to 10 cm. long, three-lobed, lobes acute, petiole mostly 2-3 cm. long, with lacinate stipules, divisions filiform. Flowers about 3 cm. in diameter, white to lavender, involucre three-parted, divisions finely divided; fruit ovoid, 2-3 cm. long, red, edible.

Tongatapu: in thicket between Fu'amotu village and sea, Mar. 4, 1953, *Yuncker 15159*.

Nomuka: climbing in thicket on lake side of road encircling island between sea and central lake, Apr. 30, 1953, *Yuncker 15807*.

Lifuka: climbing over shrubbery in roadside thicket north of Pangai village, Apr. 25, 1953, *Yuncker 15727*.

Frequent throughout Tonga. A tropical American species now of pantropic distribution.

Tongan name: *vaine 'initia*.

Passiflora laurifolia Linnaeus, Sp. Pl., 956, 1753.

Glabrous, woody, tendril-bearing vine. Leaves alternate, elliptic-oblong, acuminate, base rounded or subcordate, entire, up to 20 cm. or more long and 6 cm. wide, petioles up to 2.5 cm. long. Flowers up to 10 cm. wide, white with red spots; fruit yellow, 3-5 cm. long, edible.

Tongatapu: climbing in trees in thicket near sea along road to east of Nuku'alofa, Mar. 7, 1953, *Yuncker 15212*.

Occasional. A tropical American species now pantropic in distribution.

Tongan name: *vaine 'ae kuma*.

Passiflora maliformis Linnaeus, Sp. Pl., 956, 1753.

Glabrous, woody, tendril-bearing vine. Leaves alternate, ovate-elliptical, acuminate, base rounded or subcordate, up to 15 cm. or more long and 8 cm. wide, three- to five-nerved from near base, midrib strongly branched upward, rather thin, petioles 3-5 cm. long, with two glands near middle. Flowers solitary, axillary, purplish, on peduncles 5 cm. or more long; fruit globose, about 5 cm. long, greenish yellow, edible.

Tongatapu: climbing in thicket, Hufangalupe, near Vaini, Feb. 26, 1953, *Yuncker 15041*.

'Eua: in thicket along trail between Pangai and Fuai, Mar. 25, 1953, *Yuncker 15479*.

Tafahi: forest above township of Tafahi, alt. 50 m., Dec. 15, 1951, *Hürli-mann 518*.

Occasional. A tropical American species now widely distributed in tropical countries.

Tongan name: *vaine kai*.

Passiflora quadrangularis Linnaeus, Syst., ed. 10, 1248, 1759.

Glabrous, robust, tendril-bearing, herbaceous vine with four-angled and winged stems. Leaves alternate, broadly oval-ovate, abruptly short-acuminate, mucronate, base rounded, cordate, entire, up to 15 cm. or more long and about as wide, pinnately nerved, petioles up

to 5 cm. long, with several prominent glands, stipules ovate, acute, about 4 cm. long. Flowers large, axillary, purplish, fragrant; fruit oblong, up to nearly 30 cm. long, yellowish green, rind 2 cm. or more thick, central cavity filled with numerous seeds, each surrounded by juicy, edible pulp.

'Eua: on trellis near dwelling in Pangai village, Apr. 7, 1953, *Yuncker 15665*.

Occasional in cultivation. A tropical American species now widely cultivated in tropical countries for its fruit.

Tongan name: *pasione*.

***Passiflora samoensis* Exell, Jour. Bot. 63: 203, 1925.**

Glabrous, tendril-bearing vine. Leaves alternate, broadly ovate or rounded-cordate in outline, palmately three-lobed, with rounded sinus and cuspidate lobes, up to 10 cm. or more long, palmately three-nerved, petioles up to 8 cm. or more long, with a pair of glands near base of blade. Flowers axillary, solitary, greenish to red or yellow, calyx and corolla segments linear, gynophore about 2.5 cm. long, pedicel with two or three filiform appendages near middle.

Kao: covering weeds and shrubs in open area on lower slope, May 6, 1953, *Yuncker 15942*.

Infrequent. Also in Niue and Samoa.

***Passiflora subpeltata* Ortega, Nov. Rar. Pl. Horti Matritensis 6: 78, 1798.**

Glabrous, weak-stemmed, tendril-bearing, herbaceous vine. Leaves alternate, broadly ovate in outline, deeply three-lobed, lobes oblong, obtuse, entire, sinus acutish, somewhat glaucous beneath, palmately five-nerved, petiole slender, up to 4 or 5 cm. long, with two to four small glands. Flowers white, 3 cm. or more wide; fruit green to yellow, subglobose, 3-4 cm. in diameter, stalked.

Tongatapu: in thicket, near Vaini village, Feb. 26, 1953, *Yuncker 15055*.

Locally rather common. A tropical American species now widely distributed in warm countries.

Tongan name: *vaine 'ae kuma*.

Hemsley (Linn. Soc. Bot., Jour. 30: 178, 1895) lists a collection by Cook as *Disemma caerulescens* Seem. and states: "This differs very slightly from New Zealand and Fijian species, and a revision of the group would probably result in the reduction of some of the forms described as species; therefore, I forbear giving it a name under *Passiflora*, of which *Disemma* is now generally regarded as a section." The Cook specimen has not been examined, and no further information relative to the present status of this plant has been found.

FAMILY CARICACEAE

Genus *Carica* Linnaeus

***Carica papaya* Linnaeus, Sp. Pl., 1036, 1753.**

Mostly unbranched, treelike plant, up to 4 m. or more tall, stems thick, soft-wooded, latex milky. Leaves clustered near top, round in outline, large, deeply palmately seven- or nine-lobed, the lobes in turn acuminate toothed and lobed, petioles long. Flowers

polygamous-dioecious, white or cream-colored, fragrant, female flowers sessile, axillary, male flowers smaller, in loose, paniculate clusters, on long, axillary peduncles; fruit green to yellow, of various shapes, up to 20 cm. or more long, flesh red orange, central cavity lined with small, round, black seeds.

Commonly cultivated in villages and plantations throughout the group and frequent as an escape. A tropical American plant now cultivated as a food plant in most warm countries.

Tongan name: *lesi*. The following varieties are distinguished:

Lesi 'initia: there are two forms of this variety, one with long fruit, the other with short, oval fruit.

Lesi meleni: the flesh is pink and not as sweet as the other varieties.

Lesi tonga: there are two forms of this variety, one with long fruit, the other with short, oval fruit.

FAMILY LYTHRACEAE

Genus **Pemphis** Forster

Pemphis acidula J. R. and G. Forster, Char. Gen. Pl., 68, pl. 34, 1776.

Low, sprawling, silky-pubescent shrub. Leaves opposite, lanceolate or elliptic-spatulate, acutish, up to about 2.5 cm. long and 6 mm. wide, entire, subsessile, crowded. Flowers solitary, axillary, about 15 mm. wide, petals white, membranous; fruit turbinate, about 6 mm. long.

Tongatapu: on coral rocks near shore, near Niutoua village, Mar. 2, 1953, *Yuncker 15132*.

'Eua: *Lister*; on coral rocks along strand at Lokupo, Mar. 27, 1953, *Yuncker 15524*.

Lifuka: scrambling over rocks along shore, Apr. 27, 1953, *Yuncker 15766*.

Vava'u: *Crosby; Harvey*.

Niuatoputapu: toward southeast coast near Falehau, Dec. 7, 1951, *Hürli-mann 386*.

Frequent on rocks and cliffs along the shore throughout Tonga. From eastern Africa and tropical Asia eastward to Polynesia.

Tongan name: *ngingie*.

Genus **Lagerstroemia** Linnaeus

Lagerstroemia indica Linnaeus, Syst., ed. 10, 1076, 1759.

Shrub up to 3 m. or more tall, twigs somewhat quadrangular. Leaves alternate, elliptic or elliptic-subobovate, obtuse or acute, up to about 5 cm. long, subsessile. Flowers about 3 cm. wide, petals suborbicular, clawed, pink to lavender, in terminal or axillary paniculate clusters.

Introduced ornamental which is occasional in villages. A Chinese species now widely cultivated in warm countries.

FAMILY THYMELAEACEAE

Genus *Phaleria* Jack

Phaleria acuminata (A. Gray) Gilg, in Engler and Prantl, Nat. Pflanzenfam. 3(6a): 225, 1894.

Small tree, up to 3 m. or more tall, entirely glabrous. Leaves elliptic-ovate, acuminate, base rounded, obtuse, up to 15 cm. or more long and 6 cm. wide, somewhat papery, pinnately nerved, lateral nerves slender and submarginally loop-connected, petiole scarcely 1 cm. long, canaliculate. Flowers in terminal clusters, tubular, up to 3 cm. long, white; the fruit ovoid, about 1 cm. long.

Tongatapu: *Forster; Nelson.*

'Eua: *Lister.*

Vava'u: near upper rim of seaside cliff above Ha'alaufulu, May 21, 1953, *Yuncker 16109.*

Occasional. Also in Fiji and Samoa.

Leucosmia acuminata A. Gray in Hemsley's list.

Phaleria disperma (Forster f.) Baillon, *Adansonia* 11: 318, 1875.

Tree, up to 6-8 m. tall. Leaves opposite, oval-oblong, abruptly acuminate, base rounded, obtuse, entire, up to 15 cm. long and 8 cm. wide, glabrous, subcoriaceous, pinnately nerved, petiole scarcely 1 cm. long, reddish, canaliculate. Flowers fragrant, in terminal, compact, several-flowered clusters, tubular, tube up to 5 cm. long, glabrous, lobes four, spreading to about 1 cm. in width, hairy, white; fruit ovoid, up to 2 cm. long.

Tongatapu: in thicket along strand below Navutoka village, Feb. 27, 1953, *Yuncker 15104*; in seaside thicket near Haveluliku, June 3, 1953, *Yuncker 16230*; in thicket, margin of cemetery, near Fu'amotu village, June 5, 1953, *Yuncker 16245.*

'Eua: *Lister*; in Ohonua village, Apr. 2, 1953, *Yuncker 15628.*

Lifuka: on cliff overlooking eastern coast, Apr. 27, 1953, *Yuncker 15761.*

Niutopotapu: coastal forest near Vaipoa, Dec. 7, 1951, *Hürlimann 376.*

Occasional on cliffs and in thickets. Sometimes planted as an ornamental. Also in Fiji and Samoa.

Leucosmia burnettiana Benth. in Hemsley's list.

Tongan name: *huni*. The leaves and flowers are used in making leis.

Genus *Wikstroemia* Endlicher

Wikstroemia rotundifolia (Forster) Decaisne, Jacquemont Voy., l'Inde 4 (Bot.): 146, 1844.

Shrub, up to 2 or 3 m. tall, twigs puberulent. Leaves opposite, elliptic, oval or oval-subovate, rounded, obtuse or slightly retuse or acutish, base obtuse, up to 5.5 cm. long and 3.5 cm. wide, pinnately nerved, light green above, paler beneath, petiole 1-2 mm. long, pubescent. Flowers several, yellow, tubular, tube about 1 cm. long, sparsely pubescent without, on pubescent terminal and axillary peduncles about 1 cm. long; fruit ovoid, about 5 mm. long, red.

Tongatapu: *Nelson*.

'Eua: *Lister*; in thicket at margin of forest near center of island, Mar. 19, 1953, *Yuncker 15341*.

Nomuka: in thicket on seaward side of road encircling island, Apr. 30, 1953, *Yuncker 15822*.

Lifuka: in thicket along road between Pangai village and southern end of village, Apr. 28, 1953, *Yuncker 15782*.

Kao: in opening of slope forest, between rocks, May 6, 1953, *Yuncker 15939*.

Vava'u: *Crosby*; on upper rim of seaside cliff northeast of Leimatua on northern side of island, May 20, 1953, *Yuncker 16066*.

Frequent throughout Tonga. Endemic.

Tongan name: *lala vao*.

An extract of the root is used as a physic.

FAMILY PUNICACEAE

Genus *Punica* Linnaeus

Punica granatum Linnaeus, Sp. Pl. 472, 1753.

Shrub up to about 2 m. tall, branchlets often spinelike at tip. Leaves opposite, entire, mostly elliptic or oblong, up to 8 cm. long and 1.5 cm. wide, glabrous, obtuse or acutish, base wedge-shaped, petiole short, winged. Flowers axillary, showy, 3-4 cm. wide, petals scarlet, stamens numerous; fruit up to 6 cm. or more thick, very juicy, edible, rind leathery.

Introduced and occasional in villages. A native of Persia, now widely cultivated as an ornamental and for its refreshing fruit.

Tongan name: *pomikanite*.

FAMILY BARRINGTONIACEAE

Genus *Barringtonia* Forster

Barringtonia asiatica (Linnaeus) Kurz, Asiatic Soc. Bengal, Jour. 45(2): 131, 1876.

Large, round-topped tree, up to 8 m. or more tall. Leaves alternate, clustered toward ends of branches, obovate, apex rounded, base wedge-shaped, entire, up to about 30 cm. long, somewhat coriaceous, sessile or subsessile on very short petioles. Flowers large, calyx commonly two-parted, sepals concave, obtuse, persistent on fruit, corolla four-parted, white, early deciduous, stamens numerous, pink and white, on pedicels up to 3 cm. or more long, in terminal, racemose clusters; fruit four-angular, pyramidal, about 8 cm. long, fibrous, buoyant, seed large.

Tongatapu: *Forster*; *Moseley*; near Ha'akame village, Mar. 12, 1953, *Yuncker 15285*.

'Eua: in open forest on terrace, seaward side of coastal cliff, along trail down to Lokupo, Mar. 27, 1953, *Yuncker 15539*.

Lifuka : in thicket near sea, north of Pangai village, Apr. 25, 1953, *Yuncker 15753*; on low cliff along eastern side of island, Apr. 21, 1953, *Yuncker 15771*.

Vava'u: *Crosby*; in seaside forest below Houma village, May 22, 1953, *Yuncker 16137*.

Tafahi : in forest between township of Tafahi and landing place, Tafe, Dec. 13, 1951, *Hürlimann 504*.

Frequent near shore throughout Tonga. A southern Asiatic species extending to the Philippines and Polynesia.

B. butonica Forst. in Hemsley's list and *B. speciosa* L. f. in Burkill's list.

Tongan name: *futu*.

The timber is used for house construction, banana shooks, and so forth; the trunks, for dugout canoes; and the bark, as a fish poison.

FAMILY RHIZOPHORACEAE

Genus *Rhizophora* Linnaeus

Rhizophora mangle Linnaeus, Sp. Pl., 443, 1753.

Round-topped, much-branched tree, sometimes up to 10 m. tall, bearing many, pendent, aerial roots which form an impenetrable entanglement. Leaves opposite, elliptic or obovate-elliptic, apex blunt and often slightly notched, base acute and decurrent on petiole, up to 10-12 cm. long and 6-7 cm. wide, somewhat leathery, pinnately nerved, midrib stout, lateral nerves slender. Flowers few, four-parted, about 2 cm. wide, yellow, in simple, axillary, cymose clusters, seed usually germinating while on tree, producing a radicle up to 30 cm. long.

Tongatapu: forming a grove on the tidal flat at Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15023*; May 30, 1953, *Yuncker 16206*.

Nomuka: along shore of large central lake, Apr. 30, 1953, *Yuncker 15847*.

Vava'u: along shore below Houma village, May 22, 1953, *Yuncker 16130*; along shore of lagoon, Vaihoi, near Leimatua village, May 26, 1953, *Yuncker 16185*.

Occasional throughout Tonga. Tropical America and westward to Fiji, Samoa, and Tonga, where it seems to meet but remain distinct from the following species.

Tongan name: *tongolci*.

The timber is durable and used in a variety of ways; the roots are used in house construction; the sap, for dyeing.

Rhizophora mucronata Lamarck, Encycl. Méth. 6: 189, 1804.

This species closely resembles the preceding, differing chiefly in having sharply pointed leaves.

Vava'u: *Harvey*; *Crosby*.

Infrequent. A species of the Old World tropics extending into Polynesia.

Genus **Bruguiera** Lamarck**Bruguiera conjugata** (Linnaeus) Merrill, Philippine Jour. Sci. **9C**: 118, 1914.

Small tree similar in habit to *Rhizophora*, up to 4 m. or more tall. Leaves alternate, elliptic, acuminate, base decurrent along petiole, up to 12 cm. or more long and 4-5 cm. wide, coriaceous, somewhat glossy, finely pinnately nerved, petiole up to 4 cm. or more long. Flowers greenish yellow, solitary, axillary, about 3 cm. long, calyx lobes very narrowly lanceolate, acute, usually 10, up to 1.5 cm. long; fruit included in calyx tube, seed germinating on tree and forming an elongated radicle.

Nomuka: along shore of central lake, Apr. 30, 1953, *Yuncker* 15828.

Vava'u: *Crosby*.

Occasional near shore but less frequent than *Rhizophora*. From tropical Asia through Malaya to Polynesia.

B. rheedii Blume in Hemsley's list and *B. gymnorhiza* Lam. in Burkill's list.

Tongan names: *tongo*, *tongo ta'ane*.

The hard and durable wood is used in many ways, and an extract of the flowers furnishes a dye.

FAMILY COMBRETACEAE

Genus **Terminalia** Linnaeus**Terminalia catappa** Linnaeus, Mantissa 1: 128, 1767.

Medium to large tree with whorled, horizontal branches. Leaves clustered toward ends of branches, obovate, obtuse or abruptly acute, base narrowing, narrowly and abruptly obtuse at petiole, entire, up to 25 cm. or more long and 15 cm. wide, pinnately nerved, petioles short and stout. Flowers small, greenish white, in axillary, spikelike clusters near ends of branches; fruit oval, flattened, two-edged, greenish to red, up to about 5 cm. long, flesh thin and edible.

Tongatapu: *U.S. Expl. Exped.*; in open forest near Nualei, Mar. 9, 1953, *Yuncker* 15246; in seaside thicket below Ha'akame village, Mar. 12, 1953, *Yuncker* 15286.

'Eua: in seaward forest on terrace above Houma village, Mar. 26, 1953, *Yuncker* 15506.

Lifuka: roadside near north end of island, Apr. 25, 1953, *Yuncker* 15752.

Tafahi: shore, northeast coast north of Fakafafa moe Tauloto, Dec. 17, 1951, *Hürlimann* 601.

Niuatoputapu: forest on plain southeast of Falehau, alt. 5 m., Dec. 7, 1951, *Hürlimann* 385.

Frequent throughout Tonga, commonly near the shore. From tropical Asia eastward to Polynesia; naturalized in America.

Tongan name: *telie*.

The timber is used for construction purposes, canoes, banana shooks, and so forth; the leaves, for medicine; and the fruit, as food.

Terminalia litoralis [*fide* Index Kewensis] Seemann, Fl. Vit., 94, 1865.

Small tree, up to 6 m. or more tall. Leaves clustered near ends of branches, obovate, apex rounded to slightly emarginate, base narrowly obtuse, entire, pinnately nerved, up to 15-18 cm. long and 10-12 cm. wide. Flowers white, small, in narrow, elongated, racemose, axillary clusters; fruit ellipsoidal, up to 2.5 cm. long, somewhat angled but scarcely ridged.

Terminalia litoralis var. **litoralis**.

Branches, leaves, and inflorescence parts glabrous.

Tongatapu: in strand forest below the village of Fu'amotu, Mar. 4, 1953, *Yuncker 15171*.

Nomuka: in thicket near the central lake, along the road encircling the island between the sea and the central lake, Apr. 30, 1953, *Yuncker 15852*.

Terminalia litoralis var. **tomentella** Hemsley, Linn. Soc. Bot., Jour. 30: 177, 1895, *nomen nudum*.—Burkill, Linn. Soc. Bot., Jour. 36: 37, 1901.

Young branches, petioles, peduncles, pedicels, and lower leaf surface tomentulose.

Tongatapu: in thicket near shore, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15017, 15021*, May 30, 1953, *Yuncker 15300*.

'Eua: *Lister*: seaward margin of forest on terrace above Houma village, Mar. 26, 1953, *Yuncker 15494*.

Lifuka: *Harvey*.

Vava'u: *Harvey*.

On the basis of the material collected and observed in the field, variety *tomentella* is more common than variety *litoralis*. The species is variable and the status of variety *tomentella* is somewhat questionable. It is frequent in seaside thickets throughout the group. This species also occurs in Fiji and other parts of Polynesia.

Tongan name: *telic'amanu*.

The wood is used to some extent in house construction.

Genus **Lumnitzera** Willdenow**Lumnitzera littorea** (Jack) Voigt, Hort. Suburb. Calcut., 39, 1845.

Small, glabrous tree, up to 5 m. or more tall. Leaves alternate, crowded toward the ends of the branches, spatulate, the apex rounded, emarginate, the base cuneate, entire, up to about 8 cm. long, faintly pinnately nerved, subsessile on very short petioles. Flowers about 1 cm. or less wide and 1-2 cm. long, subsessile, in terminal or subterminal, loose, spikelike clusters, the calyx green, the corolla bright red; the fruit ellipsoidal, crowned with the calyx, 2 cm. or more long.

Tongatapu: *U.S. Expl. Exped.*; in seaside thicket, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15020*, May 30, 1953, *Yuncker 16208*.

'Eua: *Lister*.

Locally distributed in Tonga. Along the coasts from tropical Asia to Australia and Polynesia.

Tongan name: *hangale*.

Genus *Quisqualis* Linnaeus*Quisqualis indica* Linnaeus, Sp. Pl., ed. 2, 556, 1762.

A tropical Asiatic vine widely planted for ornamental purposes. Occasional about dwellings in Tonga.



FIGURE 12.—Sinkhole on central plateau of 'Eua island. Much of the "bush" is *Psidium guajava*.

FAMILY MYRTACEAE

Genus *Psidium* Linnaeus*Psidium guajava* Linnaeus, Sp. Pl., 470, 1753 (fig. 12).

Shrub or small tree, up to 3 m. or more tall, young branches quadrangular, pubescent. Leaves simple, opposite, oval-elliptic or oblong, apex rounded, base obtuse or acutish, up to 12 cm. or more long and 6 cm. wide, rather thick, pubescent beneath, prominently pinnately nerved, petiole up to about 1 cm. long. Flowers about 2.5 cm. wide, axillary, corolla white; fruit size of a small lemon, yellow, flesh pink when ripe, fragrant, edible.

Tongatapu: in thicket along road near village of Niutoua, Mar. 2, 1953, *Yuncker 15112*.

Occasional to frequent throughout Tonga; rather large colonies grow on 'Eua. It appears to be spreading in Tonga and promises to become a pernicious weed. A tropical American species of relatively recent introduction.

Tongan name: *kuava*.

The fruit is used as food.

Genus **Decaspermum** Forster

Decaspermum fruticosum J. R. and G. Forster, Char. Gen. Pl., 74, pl. 37, 1776.

Pubescent shrub, up to 2 m. or more tall. Leaves opposite, lanceolate or lance-ovate, acute to acuminate, base acute, decurrent on petiole, entire, up to 4 cm. long and 2 cm. wide, pale-glandular-dotted beneath, pinnately nerved, lateral nerves very slender. Flowers about 1 cm. wide, terminal and axillary on small, reduced, axillary branches, corolla white; fruit about 4-5 mm. in diameter, black.

Tongatapu: *U.S. Expl. Exped.; Graeffe.*

'Eua: *Lister*; in thicket at summit of eastern ridge, Mar. 30, 1953, *Yuncker 15555.*

Kao: in margin of lake near summit, about 990 m. alt., May 6, 1953, *Yuncker 16256.*

Vava'u: *Crosby.*

Occasional at upper altitudes throughout Tonga. Occasionally used as an ornamental shrub. Southern Asia, Malaya, and Australia to Polynesia.

Nelitris fruticosa A. Gray and [?] *N. forsteri* Seem. in Hemsley's and Burkill's lists.

Tongan name: *nukonuka.*

Genus **Eugenia** Linnaeus

Eugenia rariflora Bentham, Hook. London Jour. Bot. 2: 221, 1843.

Low shrub or small tree, up to 4 m. tall. Leaves opposite, elliptic-ovate or elliptic-obovate, obtuse or acutish, base acute, up to 7 cm. or more long and 4-5 cm. wide, entire, glossy above, paler beneath, petioles mostly 2-4 mm. long. Flowers axillary or terminal, corolla white; fruit subspherical, 10 mm. or more in diameter, red.

Tongatapu: *Home*; in dense forest near sea, below village of Lavengatonga, Mar. 6, 1953, *Yuncker 16192.*

'Eua: *Lister.*

Vava'u: *Crosby*; in thicket along the upper rim of the seaside cliff above Ha'alaufuli, May 21, 1953, *Yuncker 16099.*

Occasional throughout Tonga. Pacific islands.

E. rariflora f. *parviflora* Hemsl. in Hemsley's list.

Genus **Syzygium** Gaertner

Syzygium amicum (A. Gray) C. Mueller, Walpers Ann. Bot. Syst. 4: 839, 1857.

Shrub or small to medium-sized tree with terete branches. Leaves subacuminate, base cuneate, pinnately nerved, lateral nerves obvious. Inflorescences axillary and terminal, open, usually no longer than subtending leaves, flowers white, fruit purplish.

Tongatapu: *Cook; Forster; Home.*

Also in Fiji. For a discussion of this species see Lily M. Perry (Jour. Arnold Arboretum 31: 363-364, 1950).

Syzygium clusiaefolium (A. Gray) C. Mueller, Walpers Ann. Bot. Syst. 4: 839, 1857.

Tree, up to 8 m. or more tall. Leaves opposite, oval or oval-obovate, apex rounded, obtuse to short-acute, base acute to cuneate, up to 15 cm. long and 8 cm. wide, coriaceous, entire, pinnately nerved, lateral nerves numerous, very slender, joining with a submarginal nerve, petiole about 1 cm. long, canaliculate. Flowers small, numerous, in large, open, paniculate clusters, borne on trunk and larger branches; fruit ovoid, up to 1 cm. or more in diameter, dark purple, edible.

Tongatapu: swampy area between village of Navutoka and sea, Feb. 27, 1953, *Yuncker 15085*.

'Eua: in open forest near center of island, Mar. 19, 1953, *Yuncker 15386*.

Kao: in forest on rocky slope, May 6, 1953, *Yuncker 15907*.

Vava'u: *Crosby*; near upper rim of seaside cliff above Ha'alaufuli, May 21, 1953, *Yuncker 16108*.

Niuafou'u: inner slope of main crater, facing large central lake, May 16, 1953, *Yuncker 16005*.

Rather frequent throughout the group. Also in Niue and Samoa.

Eugenia clusiaefolia A. Gr. in Hemsley's list, *vide* Burkill.

Syzygium corynocarpum (A. Gray) C. Mueller, Walpers, Ann. Bot. Syst. 4: 839, 1857.

Shrub or small tree, up to 7 m. or more tall. Leaves opposite, elliptic or oblong-elliptic, bluntly acuminate, base acute, up to 14 or 15 cm. long and 5 cm. wide but mostly smaller, pinnately nerved, lateral nerves slender and submarginally loop-connected, paler on lower surface, petioles 5 mm. long, canaliculate. Flowers sessile or subsessile; fruit elongated, beaked.

Tongatapu: *Home*; in open forested area near village of Niutoua, Mar. 2, 1953, *Yuncker 15166*.

'Eua: in open forest along trail between Pangai village and Fuai, Mar. 25, 1953, *Yuncker 15469*.

Nomuka: in clearing near road encircling island, Apr. 30, 1953, *Yuncker 15833*.

Vava'u: *Crosby*.

Occasional throughout Tonga. Also in Fiji and Samoa.

Tongan name: *hehca*.

The timber is used for construction purposes; the fruit is eaten and used for leis; and the leaves and bark are used in medicines.

Syzygium cumini (Linnaeus) Skeels, U.S. Dept. Agric., Bur. Pl. Ind., Bull. 248: 25, 1912.

Shrub or medium to large tree. Leaves opposite, oblong to oval, obtuse or acute, 8-14 cm. long and 3-6 cm. wide, rather thick and shining, pinnately nerved. Flowers

white, about 1.5 cm. wide, in branching, cymose clusters on trunk or on twigs below leaves; fruit dark red to nearly black, up to 5 cm. in diameter, crowned with persistent calyx, edible.

Tongatapu: *Cartwright*.

Cultivated [?]. Indo-Malaya region generally. Widely cultivated in warm countries.

Eugenia jambolana Lam. in Hemsley's list.

Syzygium dealatum (Burkill) A. C. Smith, comb. nov.

Eugenia dealata Burkill, Linn. Soc. Bot., Jour. **35**: 37, 1901.

'Eua: tree about 6-7 m. tall, trunk about 15 cm. in diameter, fruit one-seeded, with thin pericarp, collected on seaward margin of cliff forest above village of Houma on northeastern side of island, alt. about 180 m., Mar. 26, 1953, *Yuncker 15508*.

Tongan name: *jekikavao*.

The cited specimen agrees very well with the description of *Eugenia dealata*, which, following the interpretation of generic lines currently used by Merrill and Perry and others, is herewith transferred to *Syzygium*. This Tongan species, of which one of the cotypes was collected on 'Eua, seems well marked by its winged young branchlets with intermediate raised subsidiary angles below each petiole base; the broadly elliptic-obovate leaves are coriaceous and short-petioled, and the infructescence is compact, with a few subsessile globose-ellipsoid fruits less than 2 cm. long.

In the cited publication Burkill described two other Tongan species of *Eugenia* (*E. crosbyi* and *E. samoensis*), but the disposition of the binomials should doubtless await more careful study of the group.

Syzygium jambos (Linnaeus) Alston, Handb. Fl. Ceylon, Suppl. **6**: 115, 1931.

Glabrous tree, up to about 10 m. tall. Leaves opposite, lanceolate, acuminate, the base acute, up to 18 cm. or more long and 4 cm. wide, pinnately nerved, lateral nerves loop-connected to form a submarginal nerve 2-3 mm. from margin, petiole 5-7 mm. long. Flowers white to red, in terminal, racemose clusters; fruit nearly round, 3-5 cm. in diameter, white to red, fragrant, edible.

Vava'u: along roadside west of Houma village, May 22, 1953, *Yuncker 16116*.

Infrequent; apparently of recent introduction. A native of Indo-Malaya, now widely cultivated in warm countries.

Tongan name: *fekika papalangi*.

Syzygium malaccense (Linnaeus) Merrill and Perry, Jour. Arnold Arboretum **19**: 215, 1938.

Medium to large tree, up to 10 m. or more tall. Leaves opposite, oval- or elliptic-oblong, acuminate, base acutish, up to 25 cm. or more long and 12 cm. wide, pinnately nerved, lateral nerves submarginally loop-connected, petiole stout, about 1 cm. long.

shallowly canaliculate. Flowers large, red, on pedicels 1 cm. or less long, in lateral or terminal, racemose clusters; fruit obovoid, 7 cm. or more in diameter, fleshy, red, one-seeded, edible.

Tongatapu: *U.S. Expl. Exped.*; in open woods near village of Laven-gatonga, Mar. 6, 1953, *Yuncker 15178*; in open woods near sea below village of Fatai, Mar. 10, 1953, *Yuncker 15265*.

'Eua: in open forest on sea-facing terrace along trail descending to Lokupo, Mar. 27, 1953, *Yuncker 15529*.

Nomuka: in clearing along road encircling island, Apr. 30, 1953, *Yuncker 15858*.

Lifuka: on limestone cliff along eastern side of island near middle, Apr. 27, 1953, *Yuncker 15772*; margin of plantation near north end of island, May 6, 1953, *Yuncker 15988*.

Vava'u: *Crosby*.

Frequent throughout Tonga. A native of Indo-Malaya, now widely grown in warm countries.

Tongan name: *fekika kai*.

The timber is used for construction work; the fruit, as food; and the bark and leaves, in medicines.

Syzygium neurocalyx (A. Gray) Christophersen, B. P. Bishop Mus., Bull. 154: 27, 1938.

Shrub or small tree, up to about 4 m. tall. Leaves opposite, oval-oblong or sub-ovate, obtuse, base rounded, truncate or cordulate, up to 18 cm. long and 8 cm. wide, pinnately nerved, lateral nerves submarginally loop-connected, paler beneath, petioles scarcely 5 mm. long, stout. Flowers large, sessile, solitary or in terminal and axillary, headlike clusters, calyx tube ribbed.

Tongatapu: in open forest below Nualei, Mar. 9, 1953, *Yuncker 15247*. This specimen is sterile and only tentatively referred to this species with which it agrees well in its vegetative characters.

Infrequent. Also in Fiji and Samoa.

Tongan name: *koli*.

The fruit is used in leis.

Syzygium richii (A. Gray) Merrill and Perry, *Sargentia* 1: 77, 1942.

Medium to large tree, up to 8 m. or more tall. Leaves opposite, oval or oval-sub-ovate, abruptly pointed, base rounded, cordulate, up to 25 cm. or more long and 14 cm. wide, coriaceous, pinnately nerved, lateral nerves submarginally loop-connected. Flowers large, in large, branching, axillary clusters, petals four, white, early deciduous, stamens many, long, yellow; fruit ovoid, red.

Tongatapu: in forest near the sea below the village of Niutoua, Mar. 2, 1953, *Yuncker 15140*; in seaside thicket, Blow Hole area near Houma village, June 5, 1953, *Yuncker 16246*.

Nomuka: near sea along road encircling island, Apr. 30, 1953, *Yuncker 15813*.

Vava'u: *Harvey*.

Frequent near the shore throughout Tonga. Also in Fiji.

Tongan name: *heavula*.

The timber is used for handicraft work.

Genus *Metrosideros* Banks

Metrosideros collina (J. R. and G. Forster) A. Gray, U.S. Expl. Exped., Bot. 1: 558, fig. 68, 1854.

Shrub or small tree, up to 15 m. or more tall. Leaves opposite, variable in shape, elliptic, ovate, or suborbicular, obtuse or acute, base rounded, acute, or cordate, about 6 cm. long and 3 cm. wide, or sometimes up to 10 cm. long, pinnately nerved, midrib strong, lateral nerves slender and submarginally united, petiole about 5 mm. long. Flowers subsessile or sessile, in terminal and axillary, cymose clusters of three to five flowers, red or yellow.

Tongatapu: *Beechey*.

Vava'u: *Harvey*.

Infrequent. Throughout Polynesia.

M. polymorpha Gaudichaud in Hemsley's list.

Genus *Eucalyptus* L'Héritier

Eucalyptus spp.

Occasional specimens of introduced, unidentified species of *Eucalyptus* were noted on Tongatapu.

FAMILY MELASTOMACEAE

Genus *Melastoma* Burmann

Melastoma denticulatum Labillardière, Sertum Austro-Caledonicum 1: 65, pl. 64, 1824.

Branched, spreading shrub, up to 2 m. tall. Leaves simple, opposite, ovate or ovate-lanceolate, acuminate, base rounded, obtuse or acute, up to 10 cm. long and 3 cm. wide, palmately five-nerved, the three inner nerves prominent, leaves and twigs covered with stiff, flat, setose, appressed hairs, petiole up to about 1 cm. long. Flowers pinkish white, 1-2 cm. wide, clustered at ends of branches, calyx densely covered with appressed, scabrous hairs.

'Eua: *Lister*; on sides of old sinkhole along trail near center of island, Mar. 20, 1953, *Yuncker 15373*.

Kao: at margin of upper forest limit, about 480 m. alt., May 6, 1953, *Yuncker 15905*.

Occasional on the higher islands. Also in New Caledonia, Fiji, and Society Islands.

Tongan name: *pesikuku*.

Genus **Memecylon** Linnaeus**Memecylon harveyi** Seemann, Fl. Vit., 85, 1865.

Small, glabrous tree, up to 6 m. or more tall. Leaves somewhat coriaceous, opposite, elliptic, acuminate, base acute, up to 10 cm. or more long and 4 cm. wide, entire, pinnately nerved, lateral nerves very slender, petiole scarcely 1 cm. long. Flowers four-parted, axillary; fruit globose, one-seeded, about 1 cm. in diameter, crowned by calyx.

'Eua: *Lister*; in forest near center of island, Apr. 5, 1953, *Yuncker 15649*; Mar. 20, 1953, *Yuncker 15380*.

Vava'u: *Crosby*; *Harvey*; in forest on upper rim of limestone coastal cliff on northwestern side of island, May 25, 1953, *Yuncker 16173*.

Occasional. Endemic.

Tongan names: *vitahi*, *malamala'a toa*.

FAMILY ONAGRACEAE

Genus **Jussiaea** Linnaeus**Jussiaea erecta** Linnaeus, Sp. Pl., 388, 1753.

Erect, branched herb, stem green to reddish, longitudinally ridged, ciliate. Leaves alternate, linear-lanceolate, acute at both ends, up to 7 cm. long and 1 cm. wide, pinnately nerved, subsessile or on short petioles. Flower buds four-angled, peduncle about 1.5 cm. long, calyx tube about 2 cm. long, four-lobed, corolla yellow, petals four, spreading; capsule cylindrical, longitudinally ridged, ascending.

Tongatapu: moist area along road near Navutoka village, Feb. 27, 1953, *Yuncker 15070*.

'Eua: in marshy margin of waterhole on upper grazing plain near center of island, Mar. 24, 1953, *Yuncker 15447*.

Occasional in moist areas. India, southern China, Borneo, Philippines, and Polynesia.

Tongan name: *loa ano*.

The plant produces a dye used to color pandanus leaves for weaving.

FAMILY ARALIACEAE

Genus **Mertya** Forster**Mertya macrophylla** (Richard) Seemann, Bonplandia 10: 294, 1862.

Rather small, slender tree, up to 5-7 m. tall. Leaves alternate, simple, clustered toward ends of branches, elliptic-oblancheolate, acute at both ends, up to 50 cm. or more long and 12-15 cm. wide, pinnately nerved, petioles stout, 5-8 cm. long. Flowers dioecious, greenish, in capitate clusters, in large, branching, terminal inflorescences.

Tongatapu: *U.S. Expl. Exped.*

'Eua: *Lister*; in thicket on limestone outcrop on sea-facing cliff near summit of eastern ridge, above Fuai, Apr. 8, 1953, *Yuncker 15688*.

Vava'u: *Crosby*; in forest on slope above Anovai Lake, May 18, 1953, *Yuncker 16050*; near upper edge of seaside cliff along northwestern side of island, May 25, 1953, *Yuncker 16181*.

In forests and thickets, usually on seaside cliffs. Also in Samoa.

Tongan name: *kulukulu*.

The large leaves are used for wrapping fish.

Genus *Polyscias* Forster

Polyscias multijuga (A. Gray) Harms, in Engler and Prantl, Nat. Pflanzenfam. 3(8): 45, 1894.

Small tree with thick, pithy stems and branches, up to 5 m. tall. Leaves pinnate, leaflets 9-13, oval-oblong, acuminate, base more or less inequilaterally obtuse, entire, up to 15 cm. or more long and 6 cm. wide, pinnately nerved, petioles vaginate and winged toward base, clasping. Flowers very small, numerous, in large, branching, axillary clusters, up to 60 cm. or more long.

Tongatapu: in dense thicket near shore, Blow Hole area, near Houma village, June 1, 1953, *Yuncker 16227*.

'Eua: *Lister*.

Locally abundant. Also on Niue Island.

Panax multijugum Benth. and Hook. f. in Hemsley's list.

Tongan name: *tanetane*.

Genus *Nothopanax* Miquel

Nothopanax fruticosum (Linnaeus) Miquel, Fl. Ind. Bat. 1(1): 765, 1856.

Glabrous shrub, up to 3 m. or more tall. Leaves decompose, up to 30 cm. or more long, leaflets quite variable in form, often more or less lanceolate, often lacinated and spiny-toothed, up to 10 cm. long, terminal leaflet usually largest, often with white margins. Flowers small, greenish white, in small umbels, forming large, terminal, paniculate clusters; fruit flattened, ribbed.

Tongatapu: *Home*.

A tropical Asiatic plant of frequent cultivation in Polynesia as an ornamental. The various forms have been given varietal names.

Reported by Hemsley in his list as *Panax fruticosum* L.

Nothopanax guilfoylei (Cogniaux and Marché) Merrill, Philippine Jour. Sci. 7C: 242, 1912.

Shrub or small tree up to 3 m. or more tall, with abruptly ascending branches. Leaves alternate, odd-pinnate, green with white margins, leaflets coarsely sharp-toothed, mostly five or seven, terminal leaflet largest, petiole clasping stem. Flowers and fruit rare, in terminal, racemose clusters.

An introduced ornamental, commonly planted in hedges or about dwellings. Pantropic. This species occurs in a number of varieties showing differences in the character of the leaflets, two or three of which were noted in Tonga.

Tongan names for the different varieties: *tanetane*, *tanetane tamaline*, *tanetane kau'uli*, *tanetane maelieti*.

FAMILY UMBELLIFERAE

Genus *Centella* Linnaeus

Centella asiatica (Linnaeus) Urban, in Martius Fl. Brasil. 11(1): 287, 1879.

Low, prostrate, silky-hairy herb, widely spreading by slender, runnerlike stems, rooting at nodes. Leaves clustered at nodes, orbicular-ovate, rather thick, crenately toothed, base deeply cordate, petioles long. Flowers very small, white or pinkish, nearly sessile, in axillary, few-flowered, headlike umbels; fruit round, compressed, ribbed.

Tongatapu: in sand, along strand, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15010*; in sandy soil just above high-tide limit, in thicket near Fu'amotu village, Mar. 4, 1953, *Yuncker 15146*.

'Eua: *Lister*; in an eroded area near ridge forest, on eastern side of island. Mar. 24, 1953, *Yuncker 15448*.

Kao: in open alpine area above upper forest limit, about 950 m. alt., May 6, 1953, *Yuncker 15941*.

Vava'u: *Barclay*; *Crosby*.

Tafahi: township of Tafahi to landing place Faihavanui, alt. 100 m., Dec. 15, 1951, *Hürlimann 539*.

Found throughout Tonga as a frequent plantation and waste-area weed. Pantropic.

Hydrocotyle asiatica L. in Hemsley's and Burkill's lists.

Tongan name: *tono*.

The leaves are used medicinally, as poultices, for one thing.

Genus *Apium* Linnaeus

Apium leptophyllum (Persoon) F. Mueller, ex Bentham, Fl. Australiensis 2: 372, 1866.

Erect, glabrous herb. Leaves alternate, divided into numerous, filiform divisions. Flowers minute, white, in terminal or leaf-opposed, few-flowered umbels; the fruit very small, ovate, compressed, ribbed.

Tongatapu: weedy area between Fu'amotu village and sea, Mar. 4, 1953, *Yuncker 15155*.

'Eua: grassy area near center of island, Mar. 22, 1953, *Yuncker 15413*.

Vava'u: *Crosby*.

Occasional throughout Tonga as a plantation and waste-area weed. A common weed of tropical and subtropical America, now widespread in the Pacific area.

Of this family, carrots (*Daucus carota* L. var. *sativa* DC.), parsnips (*Pastinaca sativa* L.), and celery (*Apium graveolens* L. var. *dulce* DC.) are cultivated to some extent as food crops.

FAMILY MYRSINACEAE

Genus **Maesa** Forskål

Maesa tongensis Mez, in Engler, Pflanzenr. 9 (IV. 236) : 43, 1902.

Shrub or small tree, branches sometimes somewhat scandent, up to 3 m. or more tall. Leaves alternate, elliptic-obovate, apex rounded, base obtuse to acute, up to 12 cm. long and 8 cm. wide, margin entire or uneven, pinnately nerved, nerves, petioles and twigs reddish, petiole up to 2-3 cm. long. Flowers small, in axillary, racemose or paniculate clusters; fruit subglobose, pointed, about 3 mm. in diameter, white.

Tongatapu: climbing in thicket near sea below Fu'amotu village, June 5, 1953, *Yuncker 16244*; roadside, Vahe, *Setchell and Parks 15434*.

'Eua: on seaward terrace of coastal cliff, in thicket along trail down to Lokupo, Mar. 27, 1953, *Yuncker 15527*; on seaward-facing limestone cliff, summit of the eastern ridge, Apr. 8, 1953, *Yuncker 15686*.

Occasional.

Tongan name: *puataukanave*.

M. nemoralis A. DC. and *M. zitiensis* Seem. were included in Hemsley's list, and the former also in Burkill's list. *M. nemoralis* was described from a New Hebrides collection, and there is some doubt as to its occurrence in Tonga. *M. zitiensis* is referred by Mez to synonymy under *M. persicifolia*, a common and presumably Fijian endemic. It appears rather doubtful, therefore, that it occurs in Tonga.

Maesa sp. [?]

Scandent shrublike plant, climbing in thicket. Leaves oval-ovate, acuminate, base obtuse, up to 12 cm. long and 8 cm. wide, thin, entire, pinnately nerved, nerves reddish, petioles about 1 cm. long, slender. Flowers and fruit lacking.

'Eua: in shrubby thicket in opening in forest near "Smoky Hole" above Fuai plantation, Mar. 31, 1953, *Yuncker 15572*.

Tongan name: *tuamea*.

Genus **Discocalyx** Mez

Discocalyx listeri (Stapf) Mez and Stapf, Pflanzenr. 9 [IV. 236] : 212, 1902.

Glabrous shrub up to 2 m. tall. Leaves alternate, oblong or oblanceolate, up to 15 cm. long and 4-5 cm. wide, obtuse, base narrowed, pinnately nerved, petiole up to 2 cm. long. Flowers small, in terminal panicles.

'Eua: *Lister*.

Presumably endemic to 'Eua. Only the type is cited by Mez.

Ardisia listeri Stapf in Hemsley's list.

FAMILY PLUMBAGINACEAE

Genus **Plumbago** Linnaeus**Plumbago capensis** Thunberg, Prodr. Fl. Cap., 33, 1794.

Smooth shrub with long, slender, furrowed branches, often somewhat scandent in trees or shrubs. Leaves oblong, obtuse, narrowing to short petiole. Flowers light blue, clustered near ends of branches, corolla tubular with spreading lobes, tube up to about 3 cm. long, calyx with glandular hairs.

Cultivated in villages as an ornamental. A South African species now widely cultivated in warm climates.

FAMILY SAPOTACEAE

Genus **Burckella** Pierre**Burckella richii** (A. Gray) H. J. Lam, Blumea 6: 592, 1952.

Tree, up to 15 m. tall, trunk 35-75 cm. in diameter, latex milky. Leaves clustered toward ends of branches, elliptic or elliptic-obovate, apex rounded or bluntly pointed, base acute to cuneate, firm, entire, pinnately nerved, lateral nerves slender, up to 14 or 15 cm. long and 6 or 7 cm. wide but mostly smaller, petiole mostly 1-5 cm. long. Flowers white, 1-2 cm. wide, attractive, on pedicels up to 2 cm. or more long, in terminal fascicles; fruit ellipsoidal, up to 3.5 cm. long and 2.5 cm. thick, one-seeded, short-stipitate, smooth, apiculate with thickened style base about 5 mm. long.

Tongatapu: near village of Niutoua on eastern side of island, Mar. 2, 1953, *Yuncker 15126*; in open area near Mua village toward eastern end of island, June 3, 1953, *Yuncker 16237*.

Nomuka: in thicket on lake side of road encircling island between sea and central lake, Apr. 30, 1953, *Yuncker 15859*.

Lifuka: edge of Pangai village, Apr. 28, 1953, *Yuncker 15789*.

Tonga, without other locality, *U.S. Expl. Exped.* (US 653903).

In making this combination, Lam cited only the type (U.S. Expl. Exped.: US 65307), which is from Tongatapu. This specimen is quite identical in foliage with those cited above, but the single flower now available seems to be underdeveloped. The relationship of *B. richii* to the more recently described *B. microphylla* H. J. Lam and van Olden (*B. P. Bishop Mus., Bull.* 154: 34, pl. 1, *B.*, 1938) should be investigated in the light of the new collections. *B. microphylla* is mentioned as occurring in Samoa and Tonga, the type specimen being from Vava'u and a second Tongan specimen, from Tongatapu. Significantly, the Tongan name is given as *kau*. On the basis of the original description and plate, *B. microphylla* may not be separable from *B. richii*. (A. C. Smith.)

Genus **Planchonella** Pierre

Planchonella costata (Endlicher) Pierre var. **vitiensis** H. J. Lam, *Blumea* 5: 7, 1942.

Tree, up to 8 m. or more tall. Leaves alternate, elliptic-obovate, apex rounded, obtuse, base acute, entire, up to 18 or 20 cm. long and 12-15 cm. wide, pinnately nerved, lateral nerves slender, somewhat coriaceous, entire, petiole about 2 cm. long. Flowers small, in axillary clusters; fruit globose, five-carpellate, fleshy, up to 2 or 3 cm. in diameter.

Tongatapu: in seaside forest near Lavengatonga village, Mar. 6, 1953, *Yuncker 15191*; in seaside thicket below Haveluliku village, June 3, 1953, *Yuncker 16236*.

'Eua: open forest near sea, Ha'aluma, Apr. 1953, *Yuncker 15591*.

Nomuka: edge of clearing along road encircling island, Apr. 30, 1953, *Yuncker 15838*.

Lifuka: in thicket near sea to north of Pangai village, Apr. 25, 1953, *Yuncker 15750*.

Vava'u: along upper rim of coastal limestone cliff on northwestern side of island, May 25, 1953, *Yuncker 16180*; on narrow terrace of steep seaside cliff above Ha'alaulufuli, May 21, 1953, *Yuncker 16113*.

Frequent near the sea throughout Tonga. New Hebrides, Fiji to Society, and Austral Islands.

For the complicated synonymy of this entity, which involves various binomials based on Tongan plants, see Lam (*Blumea* 5: 5, 1942).

Tongan names: *ahikaulolo, kakala'uli, kalaka*.

Planchonella membranacea H. J. Lam, *Blumea* 5: 11, fig. 3, 1942, *vel aff.*

Tree, up to 5 m. tall or more, trunk about 10 cm. in diameter. Leaves alternate, clustered toward ends of branches, obovate or elliptic-obovate, acuminate, base acute, up to 30 cm. long and 12 cm. wide, pinnately nerved, areolate-venulose, coriaceous, entire, petiole about 3-4 cm. long.

'Eua: in forest on upper seaward terrace, above village of Houma on northwestern side of island, alt. about 160 m., Mar. 26, 1953, *Yuncker 15501*; in forest southeast of Fuai plantation along trail to "Smoky Hole," alt. about 250 m., Mar. 31, 1953, *Yuncker 15574* [young sterile tree about 3.5 m. tall, trunk about 5 cm. in diameter].

The cited specimens, both from young and sterile plants, strongly suggest *P. membranacea*, known only from the type collection, from the island of Vanua Mbalavu, in northern Lau, Fiji. In indument of young parts and in leaf-venation the agreement is excellent, but the Tongan specimens have slightly longer petioles and thicker leafblades that are a trifle broader than those of the type collection. (A. C. Smith.)

Tongan name: *kakala'uli*.

Genus **Chrysophyllum** Linnaeus**Chrysophyllum cainito** Linnaeus, Sp. Pl., 192, 1753.

Tree, up to 20 m. tall, twigs golden-brown-puberulent. Leaves distichous, elliptic to elliptic-oblong, sharply acute or obtuse, base acute, entire, pinnately nerved, lateral nerves very slender, shiny dark green above, silky pubescent and golden brown beneath, the petioles 1-2 cm. long. Flowers greenish to yellow or purplish, numerous, in axillary fascicles; fruit subglobose, up to 8 or 10 cm. in diameter, subjuicy, seeds brown, about 2 cm. long.

Tongatapu: edge of Fatai village, Mar. 10, 1953, *Yuncker 15260* (only specimen seen).

A tropical American species now widely distributed in warm countries.

Genus **Manilkara** Adanson**Manilkara dissecta** (Linnaeus f.) Dubard, Mus. Colon. Marseille, Ann. III, 3: 13, 1915.

Tree, up to 10 m. or more tall, young branches somewhat gummy. Leaves clustered toward ends of branches, elliptic-obovate or ovate, up to 10 cm. long, silky-white-pubescent beneath, the petioles comparatively long. Flowers scarcely 1 cm. long, in pedunculate, axillary clusters; fruit fleshy, up to 2.5 cm. long.

Tongatapu: tree about 6 m. tall, stem about 35 cm. in diameter, flowers white, fruit small, red, wood hard, used for posts, in sandy soil in Navutoka village on northeastern side of island, Feb. 10, 1954, *H. T. Ha'angana* [*Yuncker 16281*].

Tongan name: *ngesi*.

The cited specimen agrees very well with the description by H. J. Lam (Blumea 4: 325, 1941), wherein the Tongan-Samoan element of the species is referred to var. *typica* Maas Geester., a designation which, under the 1952 Code, will be replaced by var. *dissecta*, in case the view prevails that var. *pancheri* (Baill.) Maas Geester. is actually conspecific. The species is typified by a Tongan specimen collected by Forster and is also recorded from Tongatapu on the basis of a U.S. Exploring Expedition specimen; we have not located the latter in the National Herbarium, but Lam has cited a duplicate from the Kew herbarium. The species is apparently infrequent in Tonga. (A. C. Smith.)

FAMILY EBENACEAE

Genus **Diospyros** Linnaeus**Diospyros ellipticifolia** (Stokes) Bakhuisen var. **elliptica** (Forster) Fosberg, Torrey Bot. Club, Bull. 65: 611, 1938.

Tree with elliptic, obtuse leaves, dull and venulose above.

Tongatapu: *Forster*.

'Eua: *Lister*.

Vava'u: *Harvey*.

Niuatoputapu: range above Hihifo, alt. 100 m., Dec. 12, 1951, *Hürlimann* 345; forest, coastal flat south of Falehau, Dec. 28, 1951, *Hürlimann* 642.

Southeastern Asia, Malaysia, New Caledonia to Samoa.

Maba elliptica Forst. in Hemsley's and Burkill's lists.

Diospyros ferrea (Willdenow) Bakhuizen, Gard. Bull. Straits Settlement. 7: 162, 1932.

Tree up to 6 m. or more tall. Leaves alternate, coriaceous, glossy, somewhat hairy or glabrate, elliptic, ovate, or elliptic-subobovate, the apex rounded or slightly pointed, base acute or obtusish, up to 8 cm. long and 4 cm. wide, petiole scarcely 5 mm. long. Flowers small, greenish yellow, three-parted, hairy, in small, axillary, branching clusters; fruit orange, red, or purple, elliptical or globose, up to 1 cm. or more in diameter, edible.

Tongatapu: in forested area between Niutoua village and the sea, Mar. 2, 1953, *Yuncker* 15124.

'Eua: *Lister*; in seaward margin of forest above Houma village, Mar. 26, 1953, *Yuncker* 15493.

Nomuka: in thicket near shore of central lake, Apr. 30, 1953, *Yuncker* 15842.

Lifuka: in thicket near sea, north of Pangai village, Apr. 25, 1953, *Yuncker* 15735.

Vava'u: in thicket near sea below Houma village, May 22, 1953, *Yuncker* 16131; at summit of Talau, west of Neiafu, May 23, 1953, *Yuncker* 16144.

Frequent throughout Tonga. India and Ceylon eastward to the Hawaiian Islands.

Maba buxifolia (Rottb.) Pers. in Hemsley's list.

Tongan name: *kanume*.

The wood is used in handicraft work and the bark in preparing medicines.

Diospyros lateriflora (Hiern) Bakhuizen, Jard. Bot. Buitenzorg, Bull. III, 15: 8, in key, 1936.

Tree, up to 7 m. or more tall. Leaves alternate, entire, elliptic-ovate, coriaceous, glossy, up to 16 cm. or more long and 9 cm. wide, apex rounded or bluntly acute, base acute, pinnately nerved, petiole scarcely 1 cm. long. Flowers small, hairy, in small, compact, axillary clusters; fruit elliptical, pubescent, up to 4 cm. long.

Tongatapu: in open forest below Nualei village, Mar. 9, 1953, *Yuncker* 15236.

'Eua: in open forest about center of island, Mar. 19, 1953, *Yuncker* 15355.

Lifuka: in seaside thicket near southern end of island, Apr. 28, 1953, *Yuncker* 15777.

Vava'u: *Crosby*.

Occasional throughout Tonga; also in Fiji.

Maba lateriflora Hiern of Burkill's list.

Tongan name: *mapa*.

The fruit is used in leis.

Diospyros samoensis A. Gray, Am. Acad. Arts Sci., Proc. 5: 326, 1862.

Tree, up to 10 m. or more tall. Leaves alternate, coriaceous, glossy, entire, elliptic-ovate, acute at both ends, up to 15 cm. or more long and 6 cm. wide, pinnately nerved, glabrous, petiole scarcely 1 cm. long. Flowers solitary or in small axillary clusters, corolla fleshy, cream color; fruit subglobose, 1 cm. or more in diameter.

'Eua: seaward margin of forest on terrace above village of Houma, Mar. 26, 1953, *Yuncker 15495, 15496*; in forest on seaward terrace along trail descending to Lokupo, Mar. 27, 1953, *Yuncker 15521*.

Kao: in open forest on steep rocky slope, May 6, 1953, *Yuncker 15967*.

Vava'u: in open forest on slope leading to lagoon below Leimatua, May 26, 1953, *Yuncker 16191*.

Niuafu'ou: inner margin of big crater mouth between Futu and great lake, alt. 60 m., Jan. 7, 1952, *Hürlimann 661*.

Tafahi: forest below top of Piu 'o Tafahi, alt. 590 m., Dec. 12, 1951, *Hürlimann 461*.

Niuatoputapu: forest, range above Vaipoa, alt. 105 m., Dec. 5, 1951, *Hürlimann 352, 361*.

Occasional on the higher islands. Also in Fiji and Samoa.

Tongan names: *tutuna, kakala'uli, koliva'o*.

The timber is considered excellent as firewood.

FAMILY OLEACEAE

Genus **Linociera** Swartz**Linociera** sp.

Tree, up to about 8 m. tall. Leaves opposite or essentially so, elliptic-oblong, attenuate, base cuneate, up to about 15 cm. long and 6 cm. wide, glabrous, entire, pinnately nerved with prominent midrib, petioles up to about 1.5 cm. long. Flowers small, white, four-parted, very fragrant, in small, axillary and terminal, lilac-like clusters.

Vava'u: *Crosby*.

Tafahi: Tafahi to landing place, Tafe, alt. 5 m., Dec. 13, 1951, *Hürlimann 509*.

Infrequent. Also in Niue.

L. pauciflora C. B. Clarke in Burkill's list. It appears unlikely that the plants of Tonga and Niue can represent this species, the type of which was from Penang and which probably does not extend into the Pacific area. The Tongan specimens need further study to determine their status. For a discussion of this question see A. C. Smith (Torrey Bot. Club, Bull 70: 548-549, 1943).

Genus **Jasminum** Linnaeus**Jasminum didymum** Forster f., Fl. Ins. Australia, Prodr., 3, 1786.

High-climbing woody vine. Leaves opposite, three-parted, leaflets ovate, acute, base acute or obtusish, terminal leaflet up to 7 cm. or more long and 5 cm. wide, lateral leaflets

somewhat smaller, three- to five-nerved from base, midrib branched upward, somewhat leathery. Flowers white, about 1 cm. long, very fragrant, in branching, many-flowered, axillary or terminal cymose clusters; fruit subglobose, about 1 cm. in diameter, becoming black.

Tongatapu: *Graeffe*; climbing to top of tall forest tree, below village of Lavengatonga, Mar. 6, 1953, *Yuncker 15194*.

'Eua: *Lister*.

Vava'u: *Crosby*.

Niuafou'u: in thicket in "island" in old lava flow, along way to upper rim of main crater, May 16, 1953, *Yuncker 16004*.

Niuatoputapu: forest, top of ridge east of Vaipoa, alt. 150 m., Dec. 5, 1951, *Hürlimann 365*.

Occasional throughout Tonga. From Java to Philippines, New Caledonia, and Polynesia.

Tongan name: *tutu'uli*.

The juice of the fruit may be used as an ink substitute.

Jasminum simplicifolium Forster f., Fl. Ins. Australia, Prodr., 3, 1786.

Woody, trailing or climbing vine, with many, slender, glabrous branches. Leaves simple, opposite, ovate, acute, base obtuse, entire, up to about 10 cm. long and 4.5 cm. wide, petioles up to about 1.5 cm. long. Flowers white, fragrant, about 2 cm. wide, in axillary, branching, cymose clusters; fruit black.

Tongatapu: *Forster; Moseley*; in thicket along coast, near Fu'amotu village, Mar. 4, 1953, *Yuncker 15148*.

'Eua: *Lister*.

Nomuka: climbing in tree in thicket between inland lake and sea, Apr. 30, 1953, *Yuncker 15840*.

Vava'u: *Crosby*.

Occasional throughout the group. From the Solomon Islands, Australia, and the New Hebrides to Fiji and Polynesia.

Tongan name: *tutu'uli*.

The juice of the fruit may be used as an ink substitute.

FAMILY LOGANIACEAE

Genus ***Geniostoma*** Forster

Geniostoma calcicola A. C. Smith, Sargentia 1: 99, 1942.

Small tree, up to 4 or 5 m. tall, with four-angled twigs; twigs, petioles, and nerves on lower leaf surface brown-hairy. Leaves opposite, elliptic-oblong or ovate, subacute, base rounded and obtuse or acutish, entire, up to 8 cm. long and 4 cm. wide, pinnately nerved, petiole about 5 mm. long. Flowers very small, greenish white, on slender pedicels, in few-flowered, axillary, cymose clusters; fruit ovoid, 5-8 mm. long.

'Eua: edge of forest near center of island, Mar. 29, 1953, *Yuncker 15379*; seaward margin of forest on the terrace above Houma village, Mar. 26, 1953, *Yuncker 15505*.

Vava'u: along top of limestone coastal cliff above Leimatua, May 20, 1953, *Yuncker 16057*.

Occasional. Also in Fiji.

Hemsley, in his list, refers a collection by Lister from 'Eua to *Geniostoma crassifolium* Benth. A. C. Smith (loc. cit.) implies that the Tongan plants of this relationship may be referable to *G. calcicola* rather than *G. crassifolium*, but a revision of the Pacific species is needed for a final decision.

? *Geniostoma fleischmannii* Reching, Repert. Sp. Nov. 7: 17, 1909.

Shrub or small tree with four-angled twigs, essentially glabrous. Leaves opposite, oblong-elliptic, acute at both ends, up to 8-10 cm. long, entire, pinnately nerved, petiole about 1 cm. long. Flowers very small, greenish white, in axillary, cymose clusters; fruit ellipsoidal, up to about 1 cm. long.

Tongatapu: near beach below village of Niutoua, Mar. 2, 1953, *Yuncker 15111*.

Kao: on rocky slope in open forest, May 6, 1953, *Yuncker 15900*.

Occasional. Also in Samoa.

Geniostoma rupestre J. R. and G. Forster, Char. Gen. Pl., 24, pl. 12, 1776.

Glabrous shrub or small tree, up to 3 m. or more tall. Leaves opposite, oblong-elliptic, obtuse or acutish, base acute, up to 10-12 cm. long and 5-6 cm. wide, pinnately nerved, petiole scarcely 1 cm. long. Flowers very small, white, in small, branching, axillary, cymose clusters; fruit ovoid, pointed, 5-8 mm. long.

Tongatapu: *Nelson; Graeffe*; in seaside thicket below Ha'akame village, Mar. 12, 1953, *Yuncker 15284*.

Nomuka: seaside thicket along road encircling island between sea and inland lake, Apr. 30, 1953, *Yuncker 15821*.

Vava'u: *Crosby; Barclay*.

Rather frequent throughout Tonga in thickets. Also in New Caledonia, Fiji, and eastward to Society Islands.

? *Geniostoma vitiense* Gilg and Benedict, Engler Bot. Jahrb. 56: 542, 1921.

Small tree, up to 5 m. or more tall, young twigs puberulent. Leaves opposite, ovate, ovate-lanceolate, or oblong-elliptic, acute at both ends, entire, up to 12 cm. long and 4 cm. wide, pinnately nerved, sparsely pubescent beneath, petiole scarcely 1 cm. long. Flowers very small, greenish white, in axillary, branching, cymose clusters; fruit ovoid, about 5 mm. long.

Lifuka: between Pangai village and southern end of island, near sea, Apr. 28, 1953, *Yuncker 15787*.

Vava'u: near upper rim of seaside cliff above Ha'alaufuli, May 21, 1953, *Yuncker 16101*.

Also in Fiji.

The genus *Geniostoma* is in need of revision, and some of the specimens listed are only tentatively identified as indicated.

The Tongans, so far as I learned, do not distinguish between the different species but call all of them *te'epilo'amaui*.

The bark when bruised, and the flowers, have a disagreeable odor; they are used in medicines.

Genus *Fagraea* Thunberg

Fagraea berteriana A. Gray, Linn. Soc. Bot., Jour. 1: 98, 1857.

Medium to large tree. Leaves simple, opposite, oval-obovate, the apex rounded, obtuse, base cuneate, entire, rather thick, pinnately nerved, midrib stout, lateral branches slender and obscure, up to 15 cm. or more long and 8 cm. wide, petiole up to 2.5 cm. long. Flowers fleshy, very fragrant, nearly 5 cm. wide, in axillary, cymose clusters, corolla white turning yellow, tubular, the tube up to 5 cm. long; fruit ellipsoidal, about 3 cm. long, bright red when ripe.

Tongatapu: *Moseley*; in thicket near village of Nualei, Mar. 9, 1953, *Yuncker 15245*.

'Eua: *Lister*, in open forested area near center of island, Mar. 18, 1953, *Yuncker 15334*.

Vava'u: *Crosby*.

Tafahi: fog forest, former mouth of volcano Piu 'o Tafahi, alt. 580 m., Dec. 11, 1951, *Hürlimann 440*.

Frequent in open forests throughout Tonga. From New Caledonia, Fiji and Samoa to the Marquesas.

Tongan name: *pua*.

The flowers are used in leis.

FAMILY APOCYNACEAE

Genus *Melodinus* Forster

Melodinus vitiense Rolfe, Jour. Bot. 21: 201, 1883.

Woody, vinelike plant. Leaves opposite, elliptic, apex bluntly pointed, base acute, up to 9 cm. or more long and 4 cm. wide, rather thick, glossy above, pinnately nerved, lateral nerves slender and submarginally loop-connected, petioles about 5 mm. long. Flowers about 6-8 mm. long, short-pedicellate, in axillary and terminal, short-pedunculate, few-flowered clusters, corolla tubular, yellow.

Tongatapu: *Forster; Nelson*.

'Eua: *Lister*; in open forest near center of island, Mar. 19, 1953, *Yuncker 15359*; climbing in thicket along trail on terrace of seaside cliff above Houma village, Mar. 26, 1953, *Yuncker 15498*.

Vava'u: *Crosby*.

Occasional. New Caledonia and Fiji.

M. scandens Forst. in Hemsley's list.

Genus **Allamanda** Linnaeus

Allamanda cathartica Linnaeus var. **hendersonii** (Bull) Bailey and Rafill, Standard Cycl. Hort. 1: 247, 1914.

Woody, vinelike shrub. Leaves opposite or in whorls of three or four, elliptical to sub-ovate, abruptly acuminate, entire, thick and somewhat coriaceous, midrib prominent, petiole very short. Flowers in axillary and terminal, racemose clusters, corolla yellow, trumpet-shaped, up to 7 cm. or more long, with broad, spreading, rounded lobes; fruit a prickly capsule.

Introduced and cultivated for its large and handsome flowers. Frequent in villages. A South American species, now widely cultivated in warm countries.

Genus **Plumeria** Linnaeus

Plumeria acuminata Aiton, Hort. Kew, ed. 2, 2: 70, 1811.

Small, soft-wooded, glabrous tree with thick, spreading branches. Leaves alternate, clustered near ends of branches, elliptic-oblong, acuminate-cuspidate, up to 40 cm. or more long and 6-8 cm. wide, pinnately nerved, midrib prominent, lateral nerves loop-connected near margin, glabrous, petiole stout, up to 6 cm. or more long. Flowers very fragrant, in terminal, cymose clusters, corolla cream or yellowish white, salverform, lobes obovate, longer than tube.

Introduced ornamental. Frequent in villages. A tropical American species now widely cultivated in warm countries.

Tongan name: *kalosipani*.

Plumeria rubra Linnaeus, Sp. Pl., 209, 1753.

Shrub or small tree similar to *P. acuminata* but with pink or red flowers.

An introduced ornamental. Occasional in villages. A tropical American species now widely cultivated in warm countries though usually less frequent than the preceding.

Genus **Alstonia** R. Brown

Alstonia reineckeana Lauterbach, Engler Bot. Jahrb. 41: 233, 1908.

Shrub or small tree up to 3 m. or more tall, with milky latex. Leaves opposite, oval-oblong, acute at both ends, up to 16 cm. or more long and 7 cm. wide, pinnately nerved, petiole 1-2 cm. long. Flowers on slender pedicels in spreading, pedunculate, axillary clusters, corolla tubular, white, about 1 cm. long; fruit paired, curved, acute, orange-colored.

'Eua: margin of forest near center of island, Mar. 19, 1953, *Yuncker 15342*.

Vava'u: near upper rim of seaside cliff, above Ha'alafuli, May 21, 1953, *Yuncker 16110*.

Occasional. Also in Samoa and Fiji.

Genus **Catharanthus** G. Don**Catharanthus roseus** (Linnaeus) G. Don, Gen. Syst. 4: 95, 1838.

Perennial herb, stem up to 50 cm. or more tall. Leaves opposite, oblong, apex rounded, tipped with a short point, base acute, up to 8 cm. long and 2-3 cm. wide. Flowers in pairs, axillary, corolla white, pink, or white with a red center, puberulent without, salverform, tube up to 3 cm. long; fruit paired follicles, up to 3 cm. long, puberulent.

Tongatapu: roadside near Nuku'alofa, Mar. 10, 1953, *Yuncker 16259*.

'Eua: *Lister*.

Frequent about villages and cemeteries as an ornamental throughout the group. Also naturalized along roadsides and waste areas. A tropical American species of worldwide distribution.

Vinca rosea L. in Hemsley's and Burkill's lists.

Parts of the plant are used in the preparation of medicines.

Tongan names: *lolie, valeti*.

Genus **Ervatamia** (A. de Candolle) Stapf**Ervatamia orientalis** (R. Brown) Turrill, Linn. Soc. Bot., Jour. 43: 32, 1915.

Small tree, up to 5 m. or more tall, with white latex. Leaves rather thin, elliptical, acute at both ends, up to 15 cm. or more long and 6 cm. wide, glabrous, entire, pinnately nerved, petiole 1-2 cm. long. Flowers in axillary or terminal clusters, corolla white, tubular; fruits orange, paired, podlike, divergent.

Tongatapu: *Nelson*; in open forest between village of Niutou and sea, Mar. 2, 1953, *Yuncker 15123*.

'Eua: *Lister*.

Vava'u: *Crosby*.

Niuatoputapu: Falehau, alt. 5 m., Dec. 18, 1951, *R. Hinango (Hürlimann 622)*.

Occasional. Fiji to the Society Islands and Samoa.

Tabernaemontana orientalis R. Br. in Hemsley's and Burkill's lists.

Tongan name: *te'ete'emanu*.

Genus **Alyxia** R. Brown**Alyxia bracteolosa** Rich, ex A. Gray, Am. Acad. Arts Sci., Proc. 5: 332, 1862.

Woody vine, with white latex. Leaves in whorls of three, oblong-elliptic, apex rounded or bluntly short-pointed, base cuneate, entire, up to 12 cm. long and 3 cm. wide, pinnately nerved, lateral nerves slender and obscure, petiole scarcely 1 cm. long, canaliculate, narrowly margined by decurrent blade margins.

Tongatapu: *Nelson*.

'Eua: climbing in forest on sea-facing terrace along trail to Lokupo, Mar. 27, 1953, *Yuncker 15515*.

Occasional. Also in Fiji and Samoa.

Tongan name: *kulu*.

The leafy branches are used in making leis.

Alyxia scandens (Forster f.) Roemer and Schultes, Syst. 4: 440, 1819.

Similar to *A. stellata* in growth habit, but leaves commonly opposite and petioles about 10 mm. long.

'Eua: *Lister*.

Infrequent. Eastward to Tuamotu Islands.

Alyxia stellata (Forster f.) Roemer and Schultes, Syst. 4: 439, 1819.

Shrub, commonly more or less scandent with long slender branches. Leaves in whorls of three, or less frequently opposite, elliptical, apex bluntly pointed, base acute, mostly less than 5 or 6 cm. long and 1-2 cm. wide, finely and obscurely pinnately nerved, glossy, glabrous, subsessile, petioles mostly scarcely 5 mm. long. Flowers less than 1 cm. long, in axillary cymes, corolla tubular, cream- or orange-colored; fruit about 1 cm. long, ellipsoid or ovoid, longitudinally lined, black when mature.

Tongatapu: *Forster; Nelson; Moseley*; swampy area between Navutoka village and sea, Feb. 27, 1953, *Yuncker 15074*.

'Eua: *Lister*; along trail to eastern ridge, above Fuai plantation, Mar. 21, 1953, *Yuncker 15394*; limestone cliff facing sea, near summit of eastern ridge, Lokupo District, Apr. 8, 1953, *Yuncker 15673*.

Nomuka: in thicket near inland lake along road encircling island, Apr. 30, 1953, *Yuncker 15846*.

Lifuka: near cemetery, south of Pangai village, Apr. 29, 1953, *Yuncker 15778*.

Kao: margin of forest on lower slope, May 6, 1953, *Yuncker 15892*.

Vava'u: *Crosby*; in thicket near rim of seaside cliff above Ha'alaufuli, May 21, 1953, *Yuncker 16097*.

Tafahi: forest, township of Tafahi to Piu 'o Tafahi, alt. 150 m., Dec. 10, 1951, *Hürlimann 405*.

Niuatoputapu: ridge above Hihifo, alt. 100 m., Dec. 5, 1951, *Hürlimann 347*; forest, end of ridge toward Falehau, alt. 100 m., Dec. 5, 1951, *Hürlimann 368*.

Frequent throughout Tonga, Marquesas, Society, and Austral Islands westward to New Caledonia and perhaps farther west.

Tongan name: *maile*.

The fragrant, long, slender stems and leaves are much used in leis.

Genus **Ochrosia** Jussieu**Ochrosia oppositifolia** (Lamarck) K. Schumann, in Engler and Prantl, Nat. Pflanzenfam. 4(2): 156, 1895.

Medium-sized tree, up to 9 or 10 m. tall, latex milky. Leaves opposite, oval-obovate or oval, apex very abruptly short-pointed, base cuneate-decurrent, up to 25 cm. long and 10 cm. wide, rather thick, smooth, entire, pinnately nerved, lateral nerves slender, the petiole up to 3-4 cm. long, narrowly ridged by decurrent blade margins. Flowers small, fragrant, in axillary and terminal, many-flowered, cymose clusters, on peduncles 7-8 cm. or more long, corolla white, scarcely 1 cm. long; fruit commonly paired, 5 cm. or more long.

Tongatapu: *Nelson*; near Niutoua village, Mar 2, 1953, *Yuncker 15141*.
 'Eua: in forest on seaward side of cliff above Houma village, Mar. 26, 1953,
Yuncker 15509.

Kao: lower margin of forest near an old plantation, May 6, 1953, *Yuncker 15969*.

Vava'u: *Crosby*.

Occasional throughout Tonga at low altitudes. Philippines, Micronesia, and New Caledonia east to the Societies and Marquesas.

O. parviflora (Forst.) Hemsl. in Hemsley's and Burkill's lists.

Tongan name: *fao*.

The wood is used for construction work and the leaves to wrap fish for baking. The seeds are edible.

Genus *Bleekeria* Hasskarl

Bleekeria vitiensis (Markgraf) A. C. Smith, Torrey Bot. Club, Bull. 70: 549, 1943.

Tree up to 7 m. or more tall, latex white. Leaves whorled, elliptic-oblancoelate, acute, base cuneate-decurrent, up to 12 cm. or more long and 3 cm. wide, pinnately nerved, lateral nerves very slender, somewhat coriaceous, petiole about 1 cm. long, ridged by decurrent blade margins. Flowers white, in axillary cymose clusters; fruit compressed-elliptic, in pairs, about 4 cm. long and 2 cm. wide.

Vava'u on upper rim of seaside cliff above Ha'alaufuli on northeastern side of island, alt. about 120 m., May 21, 1953, *Yuncker 16107*.

Tongan name: *toto hina*.

The cited specimen, with both flowers and fruits, does not differ essentially from the specimens listed by Markgraf as *Excavatia vitiensis* (B. P. Bishop Mus., Bull. 141: 127, fig. 66, *b, c*, 1936) from the Lau Islands of Fiji. A probable record of this species in Tonga was noted by Burkill (Linn. Soc. Bot., Jour. 35: 46, 1901) as *Ochrosia elliptica* Labill., a species properly known as *Bleekeria elliptica* (Labill.) Koidz. and perhaps occurring no farther east than the larger islands of Fiji. (A. C. Smith.)

Genus *Cerbera* Linnaeus

Cerbera manghas Linnaeus, Sp. Pl., 208, 1753.

Small tree, up to 7 m. or more tall. Leaves simple, entire, glossy, spirally and closely arranged, lanceolate or obovate-lanceolate, acuminate, base acute-decurrent, up to 20-30 cm. long and 5-8 cm. wide, petiole 2-3 cm. long, narrowly winged by decurrent blade margins. Flowers in long-pedunculate, branching, terminal clusters, corolla salverform, white with yellow throat, 3 cm. or more wide, aromatic; fruit oval or elliptical, large, smooth, black when ripe.

Tongatapu: *Mosley*; in thicket along strand below Navutoka village, Feb. 27, 1953, *Yuncker 15106*.

Nomuka: near road encircling island a short distance above village, Apr. 30, 1953, *Yuncker 15867*.

Lifuka: in thicket along road to north of Pangai village, Apr. 25, 1953, *Yuncker 15730*.

Vava'u: *Crosby*.

Niukatoputapu: coastal forest between Vaipoa and Hihifo, alt. 5 m., Dec. 18, 1951, *Hürlimann 624*.

Frequent in thickets at low altitudes. Tropical Asia, Malaya, Australia, and Polynesia.

C. odollam Gaertn. in Hemsley's and Burkill's lists.

Tongan name: *toto*.

Genus **Thevetia** Linnaeus

Thevetia peruviana (Persoon) Merrill, Philippine Jour. Sci. **9C**: 130, 1914.

Small to medium-sized, glabrous tree. Leaves numerous, crowded, alternate, linear-lanceolate, acute, glossy sessile, entire, mostly 12-15 cm. long. Flowers mildly fragrant, in few-flowered, terminal, cymose clusters, corolla yellow, funnel-form, about 6 cm. long; fruit subspherical.

Introduced ornamental; occasional in villages. A tropical American species now widely cultivated in warm countries.

Genus **Nerium** Linnaeus

Nerium oleander Linnaeus, Sp. Pl., 209, 1753.

Shrub or small tree with young growth finely pubescent. Leaves commonly in whorls of three, narrowly oblong-lanceolate, sharply acute, coriaceous, up to 10 cm. or more long, midrib prominent, lateral nerves numerous, fine. Flowers showy, in terminal cymose clusters; follicles elongated.

Introduced ornamental; frequent in villages. A south European species now widely cultivated in warm countries. The flowers range from white to deep red.

Tongan name: *lolic*.

FAMILY ASCLEPIADACEAE

Genus **Asclepias** Linnaeus

Asclepias curassavica Linnaeus, Sp. Pl., 215, 1753.

Slender, erect, usually simple, glabrous herb, up to 1 m. or more tall. Leaves opposite, narrowly lanceolate, acuminate, base wedge-shaped, up to 12 cm. or more long and 2 cm. wide, pinnately nerved. Flowers in axillary and terminal umbels, pedicels up to 5 cm. long, calyx green, corolla red or purple, reflexed, corona yellow; follicles narrowly ellipsoidal, up to about 8 cm. long, seeds silky-tufted.

Tongatapu: *Moseley*; clearing near beach, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15003*.

'Eua: *Lister*; grazing area near center of island, Mar. 22, 1953, *Yuncker 15427*; weed in banana plantation, Fuai, Nov. 10, 1951, *Hürlimann 229*.

Vava'u: *Crosby*.

A common waste-area weed throughout Tonga. A native of the West Indies now pantropic in distribution.

Tongan names: *tu'ulapepe, vavae kona, loupcpc*.

Genus **Tylophora** R. Brown

Tylophora brackenridgei A. Gray, Am. Acad. Arts Sci., Proc. 5: 334, 1862.

Slender, high-climbing, subwoody vine. Leaves opposite, ovate-cordate, abruptly acuminate, mucronate, base cordate, up to about 12 cm. long and 8 cm. wide, entire, palmately five-nerved, midrib branched upward. Flowers yellowish, on very slender pedicels 1 cm. or more long, umbellate, in divaricately branching, cymose clusters; follicles subcylindrical, up to 12 cm. or more long and 6 mm. thick, in pairs, reflexed.

'Eua: climbing in tree, along trail above Fuai Plantation, Mar. 24, 1953, *Yuncker 15451, 15664*.

Infrequent. Also occasional in Fiji.

Genus **Hoya** R. Brown

Hoya australis R. Brown, in Trail, Hort. Soc., Trans. 7: 28, 1827.

Woody, high-climbing vine with milky latex. Leaves opposite, thick and fleshy, variable in shape, rounded, elliptical, or subobovate, apex from rounded-obtuse to acuminate, base rounded, obtuse or narrowing and acute, up to 15 cm. long and 10 cm. wide, pinnately nerved, petioles 1-3 cm. long. Flowers wheel-shaped, in axillary, umbellate clusters; follicles elongated, pointed.

Tongatapu: *U.S. Expl. Exped.*; climbing in trees of seaside forest, below village of Fu'amotu, Mar. 4, 1953, *Yuncker 15169*; trailing on ground and climbing in trees, coastal forest near Ha'akame village, Mar. 12, 1953, *Yuncker 15271*.

'Eua: *Lister*; climbing in tree in forest along trail to summit of central part of eastern ridge, Mar. 30, 1953, *Yuncker 15569, 15570*.

Kao: climbing in tree, in forest on rocky slope, May 6, 1953, *Yuncker 15881*; climbing in tree near lower margin of slope forest, May 6, 1953, *Yuncker 15973*.

Vava'u: *Crosby*.

Frequent in forested areas throughout Tonga. Said to flower very infrequently. From Polynesia and Fiji westward to the New Hebrides and Australia.

Tongan name: *laumatolu*.

FAMILY CONVOLVULACEAE

Genus *Aniseia* Choisy

Aniseia martinicensis (Jacquin) Choisy, Soc. Phys. Hist. Nat. Genève, Mém. 8: 66, 1838.

Medium to large, high-climbing, herbaceous, more or less pubescent vine. Leaves oblong or lanceolate, apex rounded or obtuse, mucronate, narrowing to base. Flowers small, in long-stalked, axillary clusters, corolla white, densely pubescent on outside, sepals unequal.

'Eua: *Lister*.

Infrequent. A tropical American species now pantropic.

Ipomoea martinicensis G. F. W. Mey. in Hemsley's list.

Genus *Merremia* Dennstaedt

Merremia dissecta (Jacquin) Hallier f., Engler Bot. Jahrb. 16: 552, 1893.

Slender, twining, herbaceous vine, stem pubescent with rather long, erect hairs. Leaves suborbicular in outline, up to 8 or 10 cm. in diameter, five- to seven-parted, divisions oval or lanceolate in outline, coarsely toothed or pinnatifid, narrowly acuminate, petioles as long as or longer than blades, pubescent. Flowers axillary, long-pedunculate, corolla white with a purple throat, funnelform, up to 5 cm. wide, sepals enlarged in fruit.

Niuafo'ou: climbing in thicket on upper rim of main central crater, May 16, 1953, *Yuncker 16001*. A new record for Tonga.

Very infrequent in Tonga. A tropical American species now pantropic in distribution.

Merremia peltata (Linnaeus) Merrill, Interpret. Herb. Amboin., 441, 1917.

Coarse, semi-woody, twining, glabrous vine. Leaves alternate, ovate-peltate, up to 20 cm. or more long and nearly as wide, abruptly acuminate, margin entire or somewhat undulate, nerves prominent and often reddish. Flowers white or yellowish, in axillary, pedunculate, corymbose clusters, corolla funnel-shaped, up to 6 cm. long.

'Eua: climbing over trees and shrubs, edge of forest near center of island, Mar. 20, 1953, *Yuncker 15382*; *Lister*.

Vava'u: *Crosby*; climbing in thicket along road near Leimatua village, May 26, 1953, *Yuncker 16186*.

Rather frequent throughout Tonga. Southeastern Asia to Australia and Polynesia.

Ipomoea peltata Choisy in Hemsley's and Burkill's lists and also *I. nymphocacfolia* Blume in Burkill's list.

Tongan name: *fue mea*.

Genus *Ipomoea* Linnaeus

Ipomoea alba Linnaeus, Sp. Pl., 161, 1753.

Rather coarse, twining, herbaceous vine. Leaves round-ovate, acuminate, base deeply cordate, up to 15 or 18 cm. long and nearly as wide, petiole equaling or exceeding blade.

Flowers one to three on a long, axillary peduncle, calyx lobes with an awl-like tip up to 1 cm. or more long, corolla tubular with broadly spreading limb, up to 10 cm. or more long, white.

Tongatapu: in roadside thicket near Nuku'alofa, 1926, *Setchell and Parks 15610*.

Vava'u: climbing in thicket near shore of lagoon at Vaihoi, May 26, 1953, *Yuncker 16193*.

Infrequent. A tropical American species now widely distributed in warm countries.

I. bona-nox L. in Hemsley's and Burkill's lists.

Ipomoea batatas (Linnaeus) Poiret, in Lamarck, *Encycl. Méth.* 6: 14, 1804.

Smooth, creeping, herbaceous vine, forming large, edible, root tubers. Leaves alternate, deltoid-ovate, variously lobed but commonly with two prominent basal lobes, acute, petiole slender and longer than blade. Flowers purplish red.

The tubers represent an important item in the diet of the Tongans and are cultivated throughout Tonga. A South American species now pantropic in distribution.

Tongan name: *kumala*. The following varieties are distinguished:

Fa'afonua: stem and leaves are pubescent; flesh of tuber, firm and pink.

Finau: leaves are large, light green; tuber often nodose, white.

Kumala 'cua: leaves are large; tuber, white but purplish toward center.

Kumala kula: stem is greenish red; skin of tuber, red.

Kumala lesi: stem is greenish red; skin of tuber, red.

Kumala vai: stem is green; skin of tuber, pink.

Lokoloka: leaves are large, thin, round; skin of tuber, pale, flesh purplish.

Mosec hina: stem is light green; leaves, large; skin of tuber, pale.

Mosec kula: leaves are large, round, purplish; skin of tuber, pale.

Palatca.

Silika: stem is dark green; skin of tuber, pink.

Tai: skin of tuber, pale.

Taiko: young leaves are purplish; skin of tuber, yellowish.

Tongamai: stem is light green; skin of tuber, pale.

Ipomoea cairica (Linnaeus) Sweet, *Hort. Brit.*, 287, 1827.

Glabrous, slender, twining, branched vine. Leaves broadly ovate in outline, 6 cm. or more long and about as wide, five- to seven-divided, divisions elliptic-lanceolate, acuminate, petioles slender, as long as blade. Flowers narrowly campanulate, 5-6 cm. long, corolla deep lavender, paler outside.

Tongatapu: climbing over shrubbery in low, waste area near Nuku'alofa, Mar. 7, 1953, *Yuncker 15201*.

Vava'u: in roadside thicket between villages of Faletoa and Leimatua, Mar. 20, 1953, *Yuncker 16054*.

Occasional as an escape from cultivation. A tropical Asiatic species now widely distributed.

Tongan name: *maile miniti*.

Ipomoea congesta R. Brown, Prodr. Fl. Nov. Hollandiae, 485, 1810.

Pubescent, twining, herbaceous vine. Leaves round-ovate, abruptly acuminate, base rounded, deeply cordate with open sinus, up to 12 or 14 cm. long and nearly as wide, about nine-nerved from base, midrib branched upward, pubescent on both sides, petiole as long as or longer than blade. Flowers short-pedicellate, in long-pedunculate, axillary fascicles, corolla pale blue, funnellform, about 6 cm. long, limb spreading to about 5 or 6 cm., sepals narrowly lanceolate, acuminate.

Tongatapu: *Nelson; Moseley*; in thicket near Vaini village, Feb. 26, 1953, *Yuncker 15040*; in thicket between village of Ha'akame and sea, Mar. 12, 1953, *Yuncker 15273*; in thicket near Haveluliku village, June 3, 1953, *Yuncker 16231*.

'Eua: in thicket along trail from Pangai village to Fuai, Mar. 25, 1953, *Yuncker 15478*.

Vava'u: *Crosby*.

Frequent in thickets throughout Tonga. Formosa to tropical Australia and Polynesia.

Ipomoea gracilis R. Brown, Prodr. Fl. Nov. Hollandiae, 484, 1810.

Slender, glabrous, twining, herbaceous vine. Leaves deltoid-ovate, obtuse or acute, mucronate, base cordate with broad sinus, up to about 5 cm. long and nearly as wide, entire or somewhat irregular, seven-nerved from base, midrib branched upward. Flowers solitary or few in branching, axillary clusters, pedicel about 2 cm. long, peduncle shorter, corolla funnellform with spreading limb, about 3 cm. long, lavender with deeper lavender center.

Tongatapu: *Moseley*.

'Eua: climbing over shrubs in thicket on seaward-facing limestone cliff, summit of eastern ridge, Apr. 8, 1953, *Yuncker 15685*.

Kao: climbing in thicket at lower margin of slope forest, May 6, 1953, *Yuncker 15965*.

Vava'u: *Crosby*.

Niufo'ou: climbing in thicket along upper rim of main central crater, May 16, 1953, *Yuncker 15996*.

Tafahi: above township of Tafahi, alt. 70 m., Dec. 15, 1951, *Hürlimann 525*.

Frequent throughout Tonga. Tropical Asia through Malaysia to Australia and Polynesia.

I. denticulata Choisy in Hemsley's and Burkill's lists.

Tongan name: *fue*.

Ipomoea hederifolia Linnaeus, Syst., ed. 10, 925, 1759.

Slender, branching, nearly glabrous, twining vine. Leaves ovate-cordate, acute, mucronate, basal sinus wide, marginally more or less coarsely dentate or sub-lobed, up to 5 or 6 cm. or more long and 4 cm. wide, seven-nerved from base, midrib branched upward, petiole slender, as long as blade. Flowers few to several, in branching, long-pedunculate, axillary clusters, corolla red, attractive, 3-4 cm. long, tubular, limb flaring to about 2 cm. wide, calyx lobes long-pointed.

Tongatapu: *Moseley*.

'Eua: *Lister*.

Vava'u: *Crosby*; climbing over weeds and shrubs in thicket along road near Leimatua village, May 19, 1953, *Yuncker 16022*.

Common in roadside thickets and waste areas throughout Tonga. An American species now pantropic in distribution.

I. coccinea L. in Hemsley's and Burkill's lists.

***Ipomoea pes-caprae* (Linnaeus) Sweet, Hort. Suburb. London, 35, 1818.**

Glabrous, succulent, creeping vine, the stems extending up to 5 or 10 m. long, rooting at nodes. Leaves suborbicular, apex notched or two-lobed, base rounded to cordate, 7-8 cm. long and as wide or sometimes wider than long, areolate-veiny, petioles sometimes longer than blade. Flowers in branching clusters on long, axillary peduncles, corolla purplish red, about 4 or 5 cm. long, funnellform, calyx lobes ovate, mucronate.

Tongatapu: *Moseley*; pioneering in sand just above high-tide zone along the beach near Lavengatonga village, Mar. 6, 1953, *Yuncker 15189*.

Eua: *Lister*; along seaward margin of strand vegetation, Ha'aluma, Apr. 1, 1953, *Yuncker 15600*.

Lifuka: at the outer margin of the strand vegetation, beach north of Pangai village, Apr. 24, 1953, *Yuncker 15707*.

Vava'u: *Crosby*.

Niufo'ou: along the sandy shore of the large lake in the main crater, May 16, 1953, *Yuncker 16015*.

Common along the strand throughout Tonga. Pantropic.

Tongan name: *fue tahi*.

***Ipomoea tiliacea* (Willdenow) Choisy, in DC. Prodr. 9: 375, 1845.**

Glabrous or sparingly pubescent, twining, herbaceous vine. Leaves ovate, membranous, acute, base cordate with open sinus, entire or irregular, up to 6 or 8 cm. long and nearly as wide, petioles as long as or longer than blade. Flowers in few- to several-flowered, axillary, pedunculate clusters, corolla funnellform, pink with a darker eye, 3 or 4 cm. long, the sepals rounded, aristate.

'Eua: in thicket near sea, Ha'aluma, Apr. 1, 1953, *Yuncker 15587*.

Lifuka: in shrubbery near road north of Pangai village, Apr. 25, 1953, *Yuncker 15723*; in thicket above Pangai village, May 10, 1953, *Yuncker 15798*.

Rather frequent. Also in Fiji. A tropical American species now widespread in tropical countries.

Tongan name: *fue hina*.

***Ipomoea tuba* (Schlechtendal) G. Don, Gen. Syst. 4: 271, 1838.**

Coarse, glabrous, twining, sub-herbaceous vine. Leaves round-ovate, acuminate, mucronate, base rounded, deeply cordate with open sinus, margin entire or slightly undulate, up to 15 cm. long and about as wide, seven- to nine-nerved from base, midrib branched upward, areolate-venulose, petiole up to 8 cm. or more long. Flowers on bracteate pedicels about 2 cm. long, commonly in pairs on an elongate, axillary peduncle, corolla white, tubular, about 10 cm. long, calyx lobes oval, obtuse.

'Eua: in thicket along strand just above high-tide limit, Ha'aluma, Apr. 1, 1953, *Yuncker 15596*.

Lifuka: along road in thicket near sea below Pangai village, Apr. 28, 1953, *Yuncker 15776*.

Occasional throughout Tonga. Pantropic.

Possibly the *I. grandiflora* Lam. of Burkill's list. Burkill also included *Ipomoea phylloneura* Baker in his list on the basis of a Crosby collection from Vava'u. This is a Brazilian species and there is some question regarding the accuracy of Burkill's determination.

Tongan names: *fue hina, fue lalahi*.

Genus *Operculina* S. Manso

Operculina turpethum (Linnaeus) S. Manso, Enum. Subst. Brazileiras, 16, 1836.

Subglabrous, herbaceous vine with prominently two- to four-angled or winged stems. Leaves broadly ovate, acute to acuminate, base rounded, truncate or commonly cordate with a broad sinus, entire, up to 15 cm. long and nearly as wide, petioles nearly as long as blade. Flowers in long-pedunculate, few-flowered, axillary clusters, pedicels bracteate, 5 cm. or more long, corolla campanulate, 4-5 cm. long, limb about as wide, white, sepals ovate, acute, pubescent.

Tongatapu: *Forster; Nelson*.

Vava'u: *Crosby*.

Occasional throughout Tonga. Tropical East Africa to tropical Asia, Australia and eastward to Polynesia.

Ipomoea turpethum (L.) R. Br. in Hemsley's and Burkill's lists.

Genus *Argyreia* Loureiro

Argyreia nervosa (Burm. f.) Bojer, Hort. Mauritianus, 244, 1837.

Rather coarse, twining, subwoody vine, with exception of upper leaf surface, completely clothed with grayish or whitish soft pubescence. Leaves broadly ovate, acute or acuminate, base rounded, cordate with broad sinus, up to 20 cm. or more long and nearly as wide, entire, petioles 10 cm. or more long. Flowers short-pedicellate, crowded in several-flowered clusters at end of a stout, axillary peduncle up to 20 cm. or more long, corolla up to 6 cm. long, campanulate or tubular, pubescent, purplish, paler without.

'Eua: climbing in thicket, margin of forest near center of island, Mar. 19, 1953, *Yuncker 15340*.

A native of southern Asia. Pantropic.

Genus *Stictocardia* Hallier f.

Stictocardia tiliifolia (Desrousseau) Hallier f., Engler Bot. Jahrb. 18: 159, 1894.

Nearly glabrous, twining, herbaceous vine. Leaves round-ovate, abruptly acuminate, the base rounded, cordate with open sinus, up to about 15 cm. long and about as wide,

entire, petiole as long as blade. Flowers mostly solitary, axillary, corolla funnelform, lavender or purplish with a darker eye, 6-8 cm. long, limb nearly as wide, sepals suborbicular, obtuse.

Tongatapu: June 1, 1926, *Setchell and Parks 15176*.

Vava'u: climbing in roadside thicket near village of Leimatua, May 20, 1953, *Yuncker 16052*.

Infrequent. Pantropic.

Argyrcia tiliaefolia Wight in Burkill's list.

Tongan name: *pula vaine*.

FAMILY BORAGINACEAE

Genus *Cordia* Linnaeus

Cordia aspera Forster f., Fl. Ins. Australia, Prodr., 18, 1786.

This species was reported for Tonga in Hemsley's list on the basis of collections made by Forster and by Nelson, presumably on Tongatapu. Nothing has been found, however, regarding the present status of this species or its distribution. Hemsley gives the distribution as Fiji and Samoa. Burkill, in his list, extends it westward in Australia. A. C. Smith reports a United States Exploring Expedition collection so determined from Tongatapu in the National Herbarium.

Cordia subcordata Lamarck, Tabl. Encycl. 1: 421, 1791.

Small to large tree with spreading branches, up to 8 m. or more tall. Leaves alternate, simple, ovate, the base rounded, obtuse or acute, the margin slightly wavy, up to 15 cm. or more long, the petiole up to 5 cm. long. Flowers bright orange, the corolla funnel-shaped, crepy, about 3-5 cm. long, in few-flowered, axillary or terminal clusters; the fruit ovoid, 2-3 cm. long, one-seeded.

Tongatapu: in seaside thickets near shore, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15022*; May 30, 1953, *Yuncker 16216*.

Lifuka: *Harvey*: in thicket near shore north of Pangai village, Apr. 25, 1953, *Yuncker 15749*.

Vava'u: *Crosby*.

Probably on all of the islands. From Indo-Malaysia and northern Australia to Polynesia.

Tongan name: *puataukanave*.

Genus *Messerschmidia* Hebenstreit

Messerschmidia argentea (Linnaeus f.) Johnston, Jour. Arnold Arboretum 16: 164, 1935.

Widely branching shrub or small tree up to 4 m. or more tall, young growth brittle and densely whitish- or buff-pubescent. Leaves alternate, clustered near ends of branches, obovate to spatulate, obtuse or acute, base wedge-shaped, entire, up to 20 cm. long and 8

cm. wide, densely silvery hairy. Flowers small, very numerous, white, sessile, in large, branching, long-pedunculate, scorpioid-cymose clusters; fruit round, four-parted, about 7 mm. in diameter.

Tongatapu: *Forster*; seaward margin of coastal forest fringe, below village of Niutoua on eastern side of island, Mar. 2, 1953, *Yuncker 15130*.

'Eua: *Lister*; along outer margin of seaside thicket, Lokupo, on north-eastern side of island, Mar. 27, 1953, *Yuncker 15538*.

Lifuka: in thicket just above upper tidal limit along beach north of Pangai village, Apr. 24, 1953, *Yuncker 15712*.

Vava'u: *Crosby*.

Rather frequent near shore throughout Tonga. From tropical Asia through Malaysia to Australia and Polynesia.

Tournefortia argentea L. f. in Hemsley's list.

Tongan name: *touhuni*.

FAMILY VERBENACEAE

Identifications of the Verbenaceae are by H. N. Moldenke.

Genus *Lantana* Linnaeus

***Lantana camara* Linnaeus var. *aculeata* (Linnaeus) Moldenke, *Torreya* 34: 9, 1934.**

Scabrous-pubescent shrub, up to 4 m. or more tall, armed with short, recurved prickles. Leaves simple, opposite, ovate, acute at both ends, up to 7 cm. or more long and 4-5 cm. wide, pinnately nerved, crenate, petioles about 1 cm. long. Flowers 5-7 mm. long, several, in compact, headlike clusters, on axillary peduncles up to about as long as leaves, corolla tubular, yellow or orange, turning purplish.

Tongatapu: in thicket near shore, about 2 km. west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15002*.

'Eua: in thicket near center of island, Mar. 22, 1953, *Yuncker 15426*.

Occasional. A tropical American species now pantropic in distribution, especially this thorny variety.

Tongan name: *talatala*.

The brush is sometimes used to support yam vines.

Genus *Stachytarpheta* Vahl

***Stachytarpheta urticaefolia* (Salisbury) Sims, *Curtis's Bot. Mag.* 43: pl. 1848, 1816.**

Subherbaceous plant up to about 1 m. tall, widely branching. Leaves opposite, oval-ovate, acute, base cuneate-decurrent, serrate, up to 8 cm. or more long and 4 cm. wide, pinnately nerved, smooth or slightly hairy, petioles winged by blade margins. Flowers numerous, sessile, in groove-like depressions in a spike-like rachis up to 50 cm. or more long, corolla deep blue, opening successively from base upward and quickly deciduous.

Tongatapu: in sandy soil near beach below Navutoka village, Feb. 27, 1953, *Yuncker 15105*.

A common roadside and waste-area weed throughout Tonga. Widespread in tropical countries.

Tongan name: *iku'ikuma*.

Genus *Duranta* Linnaeus

Duranta repens Linnaeus, Sp. Pl., 637, 1753.

Shrub up to 4 m. or more tall, twigs sparsely hairy, sometimes spiny. Leaves opposite or in whorls, oval, acute at both ends, 5-8 cm. or more long and 2 cm. wide, obscurely toothed above middle. Flowers tubular, about 8 mm. long, blue, on short pedicels, in axillary and terminal panicle clusters; fruit about 6 mm. long, orange.

'Eua: in margin of forest on terrace above village of Houma, Mar. 26, 1953, *Yuncker 15499*. This specimen obviously an escape.

Infrequently cultivated ornamental in Tonga. A tropical American species widely cultivated in warm countries as an ornamental.

Tongan name: *'olive*.

Genus *Premna* Linnaeus

Premna obtusifolia R. Brown, Prodr. Fl. Nov. Hollandiae, 512, 1810.

Shrub or dwarf tree, the young growth puberulent. Leaves opposite, oblong-ovate, obtuse or abruptly acute, base obtuse or cordulate, up to 8 cm. long and 5 cm. wide, crenate-serrate, petiole mostly less than 1 cm. long. Flowers small, greenish, in terminal, branching clusters; fruit globose, about 3 mm. in diameter.

'Eua: on western slope of eastern ridge in dry, open areas, Mar. 24, 1953, *Yuncker 15438*.

Occasional. Malaya, Philippines, tropical Australia to Polynesia.

Tongan name: *volovalu*.

Premna taitensis Schauer var. *rimatarensis* F. B. H. Brown, B. P. Bishop Mus., Bull. 130: 248, 1935.

Shrub or small tree up to 5 m. or more tall, stems nearly glabrous. Leaves opposite, ovate, acute or obtuse, base obtuse or cordate, up to 10 cm. long and 6 cm. wide, glabrous or nearly so above, subglabrous below except woolly vein axils, petioles 2-3 cm. long. Flowers small, greenish white, in terminal, puberulent panicles; fruit globose, about 6 mm. in diameter.

Tongatapu: in swampy area between Navutoka village and sea, Feb. 27, 1953, *Yuncker 15076*.

'Eua: *Lister*; in thin forest along trail to summit of eastern ridge above Fuai, Mar. 20, 1953, *Yuncker 15376*.

Nomuka: in thicket on lake side of road encircling island, Apr. 30, 1953, *Yuncker 15850*.

Lifuka: in thicket near sea north of Pangai village, Apr. 25, 1953, *Yuncker 15741*.

Kao: in open forest near old plantation on lower slope, May 6, 1953, *Yuncker 15970*.

Vava'u: *Crosby; Harvey*; along upper edge of coastal limestone cliff above Leimatua, May 25, 1953, *Yuncker 16079*.

Frequent in thickets throughout Tonga. Fiji eastward to the Marquesas.

All of the material collected is referable to this variety and it is believed to be the same plant listed by Hemsley and Burkill as *P. taitensis* Schau.

Tongan name: *volovalo*.

The leaves are used in preparing medicines.

Genus *Vitex* Linnaeus

***Vitex trifolia* Linnaeus var. *bicolor* (Willdenow) Moldenke**, Known Geogr.

Distrib. Verb., 79, 1942.

Shrub or small tree up to 3 m. tall, twigs densely tomentose. Leaves opposite, mostly palmately five-compound, leaflets elliptic-lanceolate, acuminate, base acute, lateral leaflets smaller than terminal one, up to 10 cm. long and 3 cm. wide, pinnately nerved, dark above, lower surface densely white-tomentose. Flowers about 5 mm. long, lilac or lavender, short-pedicellate, in large, branching, axillary or terminal, tomentose, paniculate clusters.

Tongatapu: *Forster; Mosley*; in thicket near sea, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15011*.

Nomuka: in thicket on seaward side of road encircling island, Apr. 30, 1953, *Yuncker 15801*.

Vava'u: *Crosby*.

Occasional throughout Tonga. From eastern Africa and India through Malaysia to Polynesia.

Presumably the *V. trifolia* L. of Hemsley's and Burkill's lists.

Genus *Faradaya* F. v. Mueller

***Faradaya amicorum* (Seemann) Seemann**, Jour. Bot. 3: 258, 1865.

Woody, vinelike shrub climbing in trees. Leaves simple, opposite, ovate or elliptic-obovate, abruptly short-acuminate, base acute, up to 25 cm. or more long and 15 cm. wide, pinnately nerved, petiole 3-4 cm. long. Flowers large, white, showy, in terminal panicles, corolla long-tubular, with four-parted limb; fruit up to four, one-seeded, woody nutlets.

Tongatapu: *Banks and Solander*; in forest below Nualei, climbing in tree, Mar. 9, 1953, *Yuncker 15242*.

'Eua: *Lister*; climbing in tree, edge of forest near the center of the island, Mar. 19, 1953, *Yuncker 15368*.

Vava'u: *Harvey; Barclay; Crosby.*

Occasional in wooded areas throughout Tonga.

Clerodendron amicomum Seem. of Hemsley's and Burkill's lists.

Genus *Clerodendrum* Linnaeus

Clerodendrum buchanani (Roxburgh) Walpers var. ***fallax*** (Lindley) Bakhuizen in Lam and Bakhuizen, *Jard. Bot. Buitenzorg, Bull. III, 3: 92* [as "*Clerodendron*"], 1921.

Soft-hairy, herbaceous or sub-shrubby plant, up to 1 m. or more tall. Leaves opposite, round-ovate, abruptly short-acuminate, base rounded, cordate, sinus open, up to 20 cm. or more long and nearly as wide, shallowly and irregularly toothed, densely pubescent, five- to seven-nerved from base, midrib branching upward, petiole up to 20 cm. or more long. Flowers in large, terminal, cymose clusters, calyx teeth 1-1.5 mm. long, corolla tubular, about 2.5 cm. long, all parts of inflorescence scarlet.

'Eua: side of trail between Pangai and Fuai, Mar. 19, 1953, *Yuncker 15352*.

Vava'u: in thicket on seaside cliff below Houma village, May 22, 1953, *Yuncker 16127*.

Occasional in open, waste areas. From Java to Fiji and eastward to the Society Islands.

Tongan name: *amo'ula*.

Clerodendrum inerme (Linnaeus) Gaertner, *Fruct. et Semin. Pl. 1: 271*, 1788.

Trailing or scrambling, glabrous shrub. Leaves simple, opposite, lanceolate-elliptic or oval, acuminate, base acute, up to 12 cm. long and 7 cm. wide but mostly smaller, pinnately nerved, petioles 1-2 cm. long, leaf scars prominently somewhat raised. Flowers in few-flowered, axillary, cymose clusters, peduncles up to 3-4 cm. long, corolla narrowly tubular, up to about 3 cm. long, white, stamens exserted, purple; fruit drupe-like, separating into four, woody nutlets.

Tongatapu: *Moseley*; in strand forest below Fu'amotu village, Mar. 4, 1953, *Yuncker 15170*; in strand thicket, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15018*.

'Eua: *Lister*; in thicket on seaward terrace near shore, Lokupo, Mar. 27, 1953, *Yuncker 15526*.

Nomuka: in thicket near sea, along road encircling island, Apr. 30, 1953, *Yuncker 15844*.

Lifuka: on cliffs along eastern side of island, Apr. 27, 1953, *Yuncker 15760*.

Vava'u: *Harvey; Crosby.*

Frequent near the shore throughout Tonga. India, through Malaya to Polynesia.

Tongan name: *tutuhina*.

FAMILY LABIATAE

Genus *Teucrium* Linnaeus

Teucrium inflatum Swartz, Prodr. Veg. Ind. Occ., 88, 1788.

Erect, square-stemmed, densely pubescent herb. Leaves opposite, ovate-lanceolate, serrate, acuminate, up to 8 cm. or more long and 2.5 cm. wide. Flowers pale lavender, short-pedicellate, in few-flowered whorls in narrow, terminal and axillary, spikelike clusters, calyx densely pubescent, somewhat inflated.

Tongatapu: *Forster; Graeffe.*

Vava'u: *Barclay; Crosby.*

A tropical American species widely distributed in the Pacific area.

Genus *Leucas* R. Brown

Leucas flaccida R. Brown, Prodr. Fl. Nov. Hollandiae, 505, 1810.

Herbaceous or slightly woody plant, up to 60 cm. tall, somewhat decumbent at base and rooting from lower nodes, finely retrorsely pubescent. Leaves opposite, elliptic-ovate, obtuse or acutish, base acute, up to 2.5 cm. or more long, crenate, densely pubescent, petioles about 7 mm. long. Flowers small, white, subsessile, in dense, axillary clusters.

'Eua: *Lister*; steep limestone ravine wall near Ohonua village, Apr. 2, 1953, *Yuncker 15611.*

Nonuka: crevices and soil pockets in rocks just off shore of central lake, Apr. 30, 1953, *Yuncker 15841.*

Vava'u: *Crosby*; near top of seaward face of steep coastal cliff above Leimatua, May 20, 1953, *Yuncker 16062.*

Occasional on rocky cliffs and in similar places throughout Tonga. Also in Niue and Samoa.

Genus *Leonurus* Linnaeus

Leonurus sibiricus Linnaeus, Sp. Pl., 584, 1753.

Branching, square-stemmed, pubescent herb, up to 60 cm. or more tall. Leaves opposite, deeply divided into lanceolate, toothed lobes, base acute, long-petiolate. Flowers about 12 mm. long, red or purplish, numerous, sessile, in compact, whorled, axillary clusters, calyx lobes aristate-tipped; fruit four-parted, truncated nutlets.

Tongatapu: in waste area near Niutoua village, Mar. 2, 1953, *Yuncker 15119.*

'Eua: weed in plantation yard, Fuai, Mar. 22, 1953, *Yuncker 15423.*

Occasional as a dooryard and waste-area weed. A native of Asia now widely spread in temperate and tropical countries.

Genus *Salvia* Linnaeus

Salvia occidentalis Swartz, Prodr. Veg. Ind. Occ., 14, 1788.

Erect to spreading or decumbent, more or less pubescent herb, with slight swellings above each node. Leaves opposite, ovate, acute at both ends, serrate, up to 4 cm. long and 2.5 cm. wide, petioles up to 2 cm. long. Flowers blue, in terminal and axillary, spikelike, racemose clusters.

Nomuka: margin of thicket along road encircling island between sea and inland lake, Apr. 30, 1953, *Yuncker 15816*.

Lifuka: roadside ditch between Pangai village and southern end of island, Apr. 28, 1953, *Yuncker 15780*.

Vava'u: along road between Mataika and Feletoa, northwest of Neiafu, May 20, 1953, *Yuncker 16053*.

Occasional as a plantation and waste-area weed throughout Tonga. A tropical American plant now widespread in warm countries.

Tongan name: *te'ekosi totolo*.

Salvia coccinea Jussieu, Murray, Soc. Reg. Sci. Gott. Comm. 1: 86, 1778.

Freely branching, hairy herb, up to about 60 cm. tall. Leaves ovate, acute or obtuse, base truncate or subcordate, up to 5 cm. or more long, crenate-serrate, petioles rather slender. Flowers bright red or pink, corolla puberulent, about twice as long as calyx.

Vava'u: *Crosby*.

A tropical American species rather widespread as a weed in waste areas.

S. pseudo-coccinea Jacq. in Burkill's list.

Tongan name: *te'ekosi*.

Genus *Coleus* Loureiro

Coleus amboinicus Loureiro, Fl. Cochinchinensis, 372, 1790.

Low, densely pubescent, aromatic herb. Leaves opposite, ovate, acute or obtusish, base cuneate, up to 12 cm. or more long and 9 cm. wide, coarsely toothed, finely pubescent on both sides, petiole up to 5 cm. or more long. Flowers pale lavender, on short, slender pedicels, in whorls in a terminal, interrupted, racemose cluster.

Tongatapu: garden, Nuku'alofa, 1926, *Setchell and Parks 15414*; in border of plantation near Nualei village, Mar. 9, 1953, *Yuncker 15232*.

Nomuka: sandy soil near sea below village, Apr. 30, 1953, *Yuncker 15861*.

Lifuka: roadside north of Pangai village, May 10, 1953, *Yuncker 15797*.

Frequent as a waste-area and roadside weed throughout Tonga. From India and Malaya to Polynesia.

Tongan names: *pasiolo, kaloni*.

The plants are extremely aromatic. The leaves are added to the water for washing clothes to perfume them and are used for scenting oil.

Coleus blumei Bentham, Labiat. Gen. and Sp., 56, 1832.

Erect, tender, square-stemmed, brown-pubescent herb, up to about 1 m. tall. Leaves opposite, ovate, crenate, up to 15 cm. long, acute, often dark red above, red and green beneath, petioles long and slender. Flowers light blue, subsessile, in whorls on an elongated terminal spike.

Frequent as an ornamental about dwellings, in cemeteries, and so forth. Occasional specimens were noted as escapes along roadsides. An East Indian species now of worldwide cultivation.

Genus **Ocimum** Linnaeus**Ocimum basilicum** Linnaeus, Sp. Pl., 597, 1753.

Free branching, square-stemmed, pubescent, aromatic herb, up to 60 cm. or more tall. Leaves opposite, oval-ovate, acute at both ends, up to 3 cm. or more long, finely toothed, minutely dotted, petiole slender. Flowers short-pedicellate, nodding, in interrupted, terminal spikes, calyx bilabiate, purplish, membranous, veiny, with suborbicular, acute upper lip and aristate lower lip, corolla white or essentially so; fruit of four dry nutlets, which become mucilaginous when wet.

Tongatapu: *Home*.

'Fua: *Lister*.

Vava'u: *Crosby*.

From tropical Asia to Polynesia.

Ocimum gratissimum Linnaeus, Sp. Pl., 1197, 1753.

Sub-shrubby, up to 3 m. or more tall. Leaves ovate-elliptical, pointed at both ends, up to 10 cm. long and 4 cm. wide, coarsely crenate-serrate, usually pubescent, petioles up to 5 cm. long. Flowers closely verticillate, on slender pedicels up to 3 mm. or more long, in spicate clusters up to 15 cm. long.

Tongatapu: *Moseley*.

Introduced. Tropical Africa, Ceylon, and the East Indies.

FAMILY SOLANACEAE

Genus **Physalis** Linnaeus**Physalis angulata** Linnaeus, Sp. Pl., 183, 1753.

Erect, glabrous, branching herb with angular stems, up to 80 cm. or more tall. Leaves alternate, elliptic-ovate, acuminate, base ovate, irregularly toothed or entire, up to 8 cm. or more long and 4-5 cm. wide. Flowers on slender, axillary pedicels about 1 cm. long, 5-6 cm. long, corolla yellow, fruit fleshy, about 1 cm. in diameter, enclosed by inflated, ovoid calyx, up to about 3 cm. long.

Tongatapu: weed in plantation near village of Lavutoka, Feb. 27, 1953, *Yuncker 15098*.

An occasional plantation weed. A tropical American species now of wide distribution as a weed in warm countries.

Tongan name: *polo pa*.

The leaves are used in preparing medicines.

Physalis minima Linnaeus, Sp. Pl., 183, 1753.

Low, much-branched, somewhat sprawling herb. Leaves mostly alternate, oval-ovate, acute at both ends, up to about 6 cm. long and 3 cm. wide, margin entire or somewhat wavy, petioles slender, nearly as long as leaves. Flowers solitary, axillary, corolla yellow with a darker center; fruit berrylike, enclosed in papery, inflated, baglike calyx.

'Fua: weed in margin of old plantation, along trail between Pangai village and Fuai, Mar. 25, 1953, *Yuncker 15463*.

Vava'u: *Crosby*.

Occasional as a plantation weed. Pantropic.

Tongan name: *polo pa*.

Physalis peruviana Linnaeus, Sp. Pl., ed. 2, 1670, 1763.

Widely branching, pubescent herb, up to 50 cm. or more tall. Leaves alternate, ovate, apex acuminate, base rounded or cordate, irregularly sinuate-toothed, up to 12 cm. or more long and 9 cm. wide, petioles up to 4 cm. long. Flowers solitary, axillary, pedicels slender, 1-2 cm. long, corolla yellow with a brownish-purple center; berry yellow, many-seeded, enclosed in a veiny, inflated, parchmentlike case about 3 cm. in diameter.

Tongatapu: *Moseley*; in plantation near Navutoka village, Feb. 27, 1953, *Yuncker 15087*.

Vava'u: *Crosby*.

Occasional as a plantation weed. A South American plant now widely distributed in warm countries as a weed.

Tongan name: *ku'usi*.

The leaves are used in preparing medicines.

Genus **Capsicum** Linnaeus

Capsicum frutescens Linnaeus, Sp. Pl., 189, 1753.

Strongly branched, sub-shrubby plant, up to about 1.5 m. tall. Leaves alternate, ovate-lanceolate, acuminate, base acute, entire or slightly undulate, smooth or slightly pubescent, petioles mostly 1-2 cm. long. Flowers small, white, solitary or paired, axillary, pedicels about 2 cm. long; fruit erect, ovoid, about 2.5 cm. long, bright red when ripe, very pungent when eaten.

Tongatapu: *Moseley*; in waste area near Hufangalupe, Feb. 26, 1953, *Yuncker 15037*.

'Eua: *Lister*; in a small clearing in forest near center of island, Mar. 19, 1953, *Yuncker 15354*.

Vava'u: *Crosby*.

Occasional throughout Tonga. A tropical American species now pantropic.

Tongan names: *polo, polo fifisi*.

The fruit is used as a food flavoring.

Genus **Solanum** Linnaeus

Solanum amicum Benthams, Hook. London, Jour. Bot. 2: 227, 1843.

Shrub, the branches sulcate. Leaves ovate, obscurely angular-sinuate, glabrate above, reticulate-veiny beneath; nerves, petiole and raceme branches rough-tomentose. Racemes lateral, many-flowered, calyx five-toothed, corolla deeply five-parted, lobes lanceolate, acute.

Tongatapu: *Forster; Nelson*.

Vava'u: *Barclay; Crosby*.

No specimens of this or of the following species were found. They are included on the basis of Hemsley's and Burkill's reports. Pacific Islands.

Solanum forsteri Seemann, Jour. Bot. 1 : 207, 1863.

Herbaceous, hairy glabrescent annual plant. Leaves ovate, acuminate, entire or sinuate-dentate, base cordate or attenuate into petiole. Cymes three- to six-flowered, calyx lobes ovate, acute, corolla puberulent without; berry globose, smooth.

Vava'u: *Barclay; Crosby.*

Easter Island, Tahiti.

Solanum nigrum Linnaeus, Sp. Pl., 186, 1753.

Glabrous or slightly pubescent, widely branching herb, up to about 80 cm. tall. Leaves alternate, elliptic-ovate, acute at both ends, entire or somewhat sinuate, petioles mostly 1-2 cm. long. Flowers small, white, in long-stalked, axillary, umbellate clusters; fruit small, fleshy, globose, black when ripe.

Tongatapu: weed in plantation below village of Ha'akame, Mar. 12, 1953, *Yuncker 15272.*

Frequent throughout Tonga as a plantation weed. A European species now widely distributed as a weed in temperate and tropical countries.

S. oleraceum Dunal in Hemsley's list.

Tongan name: *polo kai.*

Solanum uporo Dunal, in DC. Prodr. 13: 138, 1852.

Sub-shrubby herbaceous plant, up to 2 m. or more tall, stems glabrous or nearly so. Leaves elliptic or ovate, acuminate, base acute to cuneate, up to 15 cm. or more long and 8 cm. wide, entire or slightly sinuate, petioles up to 3 cm. long. Flowers in branching, axillary clusters, corolla yellowish white, about 1 cm. wide, stellate-pubescent on outside; fruit up to 2 cm. or more in diameter, ovoid or subglobose, fleshy, bright red.

Tongatapu: in thicket near sea on eastern side of island near Niutoua village, Mar. 2, 1953, *Yuncker 15131.*

'Eua: *Lister;* in thicket along road between Mua and Ha'aluma, Apr. 1, 1953, *Yuncker 15584.*

Vava'u: *Barclay.*

Occasional. Tahiti, Rarotonga.

Tongan name: *polo tonga.*

The leaves are used in the preparation of medicines.

Solanum verbascifolium Linnaeus var. **auriculatum** (Aiton) Kuntze, Rev. Gen. Pl. 1: 455, 1891.

Small, densely pale-pubescent tree, up to 8 m. tall. Leaves alternate, elliptic-lanceolate, acuminate, base acute, pinnately nerved, nerves conspicuous and submarginally loop-connected, up to 30 cm. long and 9 cm. wide, petiole 2-5 cm. long, with large, auriculate, stipule-like bracts at the base. Flowers about 2 cm. wide, in dense, many-flowered, long-pedunculate terminal, paniculate clusters, corolla lavender.

Tongatapu: in thicket near Vaini village, Feb. 26, 1953, *Yuncker 15043.*

'Eua: *Parks 16086;* open margin of forest above Fuai plantation near center of island, Mar. 18, 1953, *Yuncker 15325.*

Nomuka: in thicket along road encircling island, Apr. 30, 1953, *Yuncker 15818.*

In thickets and open second-growth forests and waste areas throughout Tonga. A Brazilian species.

Tongan name: *pula*.

Solanum viride R. Brown, Prodr. Fl. Nov. Hollandiae, 445, 1810.

Sub-shrubby plant, up to 2 m. tall. Leaves ovate, acute, rounded to decurrent at base, up to 12 cm. long and 5 cm. wide, entire or slightly sinuate, essentially glabrous, petiole up to 3 cm. long. Flowers on pedicels about 2 cm. in length, in terminal or axillary, cymose clusters, on peduncles up to about 1 cm. long, corolla white, stellate-pubescent without; fruit ovoid or subspherical, up to 2 cm. long, red.

Tongatapu: *Nelson*.

Australia.

Solanum vitiense Seemann, Fl. Vit., 176, pl. 36, 1866.

Tree, up to 9 m. or more tall. Leaves alternate, elliptic, acute at both ends, up to 30 cm. or more long and 10 cm. wide, pinnately nerved, entire.

Vava'u: on seaside cliff above Ha'alaufuli, May 21, 1953, *Yuncker 16103*.

Believed to be a new record for Tonga, where the species seems to be rare. It is fairly frequent in Fiji and Samoa.

Tongan name: *puko*.

Genus **Brugmansia** Linnaeus

Brugmansia arborea (Linnaeus) Steudel, Nomencl. Bot., ed. 2, 1: 230, 1840.

Small, pubescent, treelike plant up to 60 cm. or more tall, young branches subherbaceous, green. Leaves alternate or subopposite, ovate to lanceolate, acute, base truncate or cordate, essentially entire, pubescent, varying much in size, up to 25 cm. long and 12 cm. wide but mostly smaller, petiole up to 10 cm. long. Flowers solitary, up to about 25 cm. long, corolla funnelform, white, pubescent on outside.

Vava'u: *Crosby*.

Occasional in villages. An American species of wide cultivation as an ornamental.

Datura arborea L. in Burkill's list.

Genus **Lycium** Linnaeus

Lycium sandwicense A. Gray, Am. Acad. Arts Sci., Proc. 6: 44, 1863.

Low, sprawling shrub with yellowish-gray bark and stiff, pointed branches. Leaves sessile, usually clustered on rounded, knoblike nodal projections, up to 2.5 cm. long and 6-8 mm. wide, obovate-spatulate, succulent, nerves scarcely evident. Flowers solitary in leaf axils, four-parted, corolla white or bluish; berry red, obovoid-globose, about 1 cm. long.

Tongatapu: hollows among wind- and spray-swept rocks, Houma, 1926, *Setchell and Parks 15604*. This specimen is sterile, but it agrees well with this species in its vegetative characters.

Rare; a native of Hawaii; also known from Juan Fernandez and Rapa.

Genus *Datura* Linnaeus***Datura stramonium*** Linnaeus, Sp. Pl., 179, 1753.

Coarse, hollow-stemmed, weedy plant, divaricately branched, up to 1.5 m. tall. Leaves ovate, acute at both ends, alternate, up to 20 cm. long, coarsely toothed, petiole rather long. Flowers 8-10 cm. long, corolla white or pale violet, funnelform, gradually widening upward; capsule ovoid, up to 5 cm. long, spiny.

Vava'u: *Crosby*.

Infrequent. An Asiatic species of worldwide distribution as a weed in temperate and tropical countries.

Genus *Cestrum* Linnaeus***Cestrum diurnum*** Linnaeus, Sp. Pl., 191, 1753.

Shrub, up to 3 or 4 m. tall. Leaves alternate, elliptic-oblong, acute at both ends, up to 10 cm. long and 3 cm. wide, glabrous, petiole about 1 cm. long. Flowers about 1.5 cm. long, glabrous, in cymose clusters on axillary peduncles up to 5 cm. or more long, very fragrant, calyx tube obscurely toothed, corolla lobes short, blunt, recurved; berry ellipsoidal to sub-spherical, about 1 cm. long, purple black when ripe.

Lifuka: in thicket, edge of plantation along road north of Pangai village, Apr. 24, 1953, *Yuncker 15710*.

Vava'u: along street leading to wharf in Neiafu, May 22, 1953, *Yuncker 16138*.

Cultivated as an ornamental and occasional as an escape. A West Indian species, now widely planted as an ornamental in warm countries.

Tongan name: *vaitohi*.

Genus *Nicotiana* Linnaeus***Nicotiana fragrans*** Hooker, Bot. Mag. 81: pl. 4865, 1855, var. ***fragrans***.

Low plant with short, prostrate, woody stems up to 1 cm. thick. Leaves clustered at ends of stems, obovate-spatulate, apex rounded, base cuneate-decurrent, up to 10 cm. or more long and 4 cm. wide, pubescent, petiole winged by decurrent leaf-blades. Flowers white, on erect stalks up to 30 cm. tall.

Tongatapu: in soil pockets on perpendicular face of seaside cliff, Fanga-veha, on southern coast of island, June 7, 1953, *Yuncker 16252*. (Identified by T. H. Goodspeed.)

Very rare in Tonga. Known also from the Isle of Pines, New Caledonia, and from Lifu in the Loyalties.

Nicotiana tabacum Linnaeus, Sp. Pl., 180, 1753.

Erect, glandular-pubescent herb, up to 1 m. or more tall. Leaves alternate, oval, obtuse to acuminate, base rounded, clasping the stem. Flowers mostly 3-5 cm. long, glandular-pubescent, in terminal, panicle clusters, corolla tubular, pink or red; capsules many-seeded.

Tongatapu: near dwelling in Nualei village, Mar. 9, 1953, *Yuncker 15235*. Occasional about dwellings and in plantations. A tropical American plant, now widely planted for its use as tobacco.

Tongan name: *tapaka*.

The tomato (*Lycopersicon esculentum* Miller), the potato (*Solanum tuberosum* Linnaeus), and the eggplant (*S. melongena* Linnaeus var. *esculentum* Nees) are cultivated to some extent as food crops. Many varieties of petunia (*Petunia hybrida* Vilmorin) are grown for ornament.

FAMILY SCROPHULARIACEAE

Genus *Lindernia* Allioni

Lindernia crustacea (Linnaeus) F. Mueller, Census, 97, 1882.

Small, much-branched herb, 10-20 cm. tall, stems angled and slightly winged along ridges. Leaves opposite, ovate, acute at both ends, serrate, up to about 1 cm. long, sparsely pubescent, petiole very short. Flowers 5-8 mm. long, pale lavender, solitary on rather long, slender, axillary pedicels; capsule obovate-elliptical, compressed, about 3 mm. wide.

Kao: on thin rocky soil in open alpine area, alt. 600-700 m., May 6, 1953. *Yuncker 15925, 15930*.

Vava'u: *Crosby*.

Infrequent. A native of the Old World tropics; now of wide distribution in warm climates of both hemispheres.

Genus *Russelia* Jacquin

Russelia equisetiformis Schlechtendal and Chamisso, Linnaea 6: 377, 1831.

Semi-shrubby plant, up to about 1 m. tall, with longitudinally ridged, green stems, and numerous verticillately arranged, drooping branches. Leaves very small, linear or awl-shaped, whorled. Flowers about 2.5 cm. long, in lax, terminal clusters, corolla tubular, red.

Occasional in villages. A Mexican species, now widely cultivated in warm countries as an ornamental.

FAMILY BIGNONIACEAE

Genus *Stenolobium* D. Don

Stenolobium stans (Linnaeus) D. Don, Edinb. Philos. Jour. 9: 88, 1823.

Large shrub, about 4 m. tall. Leaves opposite, pinnate, leaflets five to 13, narrowly elliptic, up to 10 cm. or more long and 3 cm. wide, serrate, acuminate, base cuneate, sessile, pinnately nerved. Flowers in large, terminal, paniculate clusters, corolla up to 5 cm. long, yellow, narrowly bell-shaped, ornamental; fruit narrow, up to about 10 cm. long.

Tongatapu: near dwelling in Nuku'alofa, Mar. 7, 1953. *Yuncker 15200*.

An American species, now widely planted as an ornamental in warm countries.

Genus **Spathodea** Beauvois

Spathodea campanulata Beauvois, Fl. Oware 1: 47, 1804.

Large, handsome tree. Leaves odd-pinnate, opposite, leaflets mostly 11 to 17, ovate or oval, 5-10 cm. long, acuminate, petiolules about 3 mm. long. Flowers up to about 10 cm. long, in terminal, racemose clusters, calyx hairy, opening along one side, boat-shaped, curving upward, nearly as long as irregular, campanulate, orange-red corolla; capsules flattened, 15 cm. or more long, seeds with a wide, parchmentlike wing.

Occasional in villages. A tropical African species widely planted in warm countries as an ornamental.

FAMILY GESNERIACEAE

Genus **Cyrtandra** Forster

Cyrtandra listeri Hemsley, Linn. Soc. Bot., Jour. 30: 213, 1894.

Small shrub, up to 1 m. tall, young growth somewhat fleshy and densely rusty pubescent. Leaves opposite, broadly ovate, acute at both ends, crenulate, up to 15 cm. or more long, pinnately nerved, petioles 2 cm. or more long. Flowers 1 cm. or more long, on pedicels about 1 cm. long, in axillary cymose clusters, corolla white, tubular, bilabiate.

'Eua: *Lister* (type collection); on very steep, seaward-facing, limestone cliff of eastern ridge, Apr. 8, 1953, *Yuncker 15690*.

Kao: in open alpine area near summit, alt. about 825 m., May 6, 1953, *Yuncker 15935*.

Occasional on exposed, rocky areas on the higher islands. Endemic.

FAMILY ACANTHACEAE

Genus **Thunbergia** Linnaeus

Thunbergia alata Bojer, ex Sims, Bot. Mag. 52: pl. 2591, 1825.

Herbaceous or slightly woody, retrorsely pubescent vine with angular stems. Leaves opposite, ovate-lanceolate, hastate, acute, cuspidate, somewhat irregularly repand-toothed, palmately nerved. Flowers mostly solitary, on axillary pedicels up to 5 cm. long, subtended by two large bracts, corolla creamy white or buff with dark purple throat; capsule beaked.

Occasional in villages. A tropical African species now widely cultivated as an ornamental.

Thunbergia fragrans Roxburgh, Fl. Coronandel 1: 47, pl. 67, 1795.

Slender, low-climbing vine. Leaves opposite, lanceolate to triangular-ovate or hastate, margin irregularly toothed, apex cuspidate, up to 8 cm. or more long, palmately five- to seven-nerved, petioles slender, up to 4 cm. or more long, not winged. Flowers solitary axillary, on elongated pedicels, corolla white, with a narrow tube 2 or 3 cm. long, and wide-spreading limb.

Vava'u: in roadside thicket near Ta'anea village, May 21, 1953, *Yuncker 16084*.

An ornamental plant, occasionally escaping. From India to Australia, the Philippines and eastward to Polynesia. Widely cultivated.

Genus **Hemigraphis** Nees

Hemigraphis reptans (Forster) T. Anderson, ex Hemsley, Voy. Challenger Rept., Bot. 1(3) : 173, 1884.
Tongatapu: *Moseley*.

No specimen of this Malaysian species was seen. It is included doubtfully only on the authority of Hemsley's list.

Genus **Asystasia** Blume

Asystasia gangetica (Linnaeus) T. Anderson, in Thwaites, Enum. Pl. Zeylaniae, 235, 1858-1864.

Trailing, subwoody or herbaceous, pubescent plant, stems ascending to 30-50 cm. or sometimes clambering in taller plants. Leaves opposite, ovate, acute at both ends, entire, up to 4-6 cm. long. Flowers white or faintly violet tinted, narrowly campanulate, about 2-3 cm. long, short-pedicellate, in narrow, elongated, racemose clusters up to 15 cm. or more long; capsule club-shaped.

Lifuka: in roadside ditch north of Pangai village, May 10, 1953, *Yuncker 15796*.

Occasional. From tropical Africa and Asia through Malaysia. Widely cultivated as an ornamental, not infrequently escaping.

Genus **Graptophyllum** Nees

Graptophyllum insularum (A. Gray) A. C. Smith, Sargentia 1: 118, 1942.

Shrub, up to 2 m. or more tall. Leaves opposite, oblong, elliptic or ovate-oblong, acute at both ends, entire, up to 8-10 cm. long and 4 cm. wide, pinnately nerved. Flowers dark red, tubular or narrowly subcampanulate, 2-3 cm. long, on pedicels less than 1 cm. long, in terminal and axillary, few-flowered, cymose clusters; capsule club-shaped.

'Eua: *Lister*; sea-facing limestone cliff near summit of eastern ridge, Apr. 8, 1953, *Yuncker 15676*.

Lifuka [?]: *Harvey*.

Vava'u: in thicket along upper rim of limestone cliff below Ha'alaufuli, May 21, 1953, *Yuncker 16093*.

Usually found on limestone cliffs at 150-250 m. altitude. Also in Fiji.

Eranthemum insularum A. Gray in Hemsley's list. Also, *Graptophyllum siphonostena* F. Muell. in Hemsley's and Burkill's lists. For a discussion of the synonymy of this species see A. C. Smith (*loc. cit.*).

Graptophyllum pictum (Linnaeus) Griffith, Notulae Pl. Asiatic. 4: 139, 1854.

Shrub up to about 2 m. tall. Leaves opposite, elliptic-ovate, acute to acuminate, entire, commonly irregularly marked with red or yellow along midrib. Flowers about 4 cm. long, in short, axillary or terminal clusters, corolla red or purplish, tubular, irregular.

Occasional in villages. A species of the Old World tropics now widely grown as an ornamental.

Genus **Beloperone** Nees

Beloperone guttata Brandegee, Univ. Calif. Pub., Bot. 4: 278, 1912.

Weak-stemmed plant, much branched and somewhat woody toward base, stems usually thickened and purplish above nodes. Leaves opposite, elliptic-ovate, acute at both ends, about 4-6 cm. long, pubescent on both sides, petiole 1-2 cm. long. Flowers in axils of cordate, overlapping bracts of a terminal, curving spike up to 10 cm. long, corolla narrow, up to about 3 cm. long, two-lipped to near middle, white with dark spots on lower lip.

Frequent about dwellings. A Mexican species, now widely cultivated as an ornamental.

FAMILY PLANTAGINACEAE

Genus **Plantago** Linnaeus

Plantago lanceolata Linnaeus, Sp. Pl., 113, 1753.

Low, stemless, weedy plant. Leaves clustered at crown, lanceolate or oblanceolate, acute, silky-hairy, parallel-nerved, up to 15 cm. or more long, entire. Flowers very small, greenish, numerous, in axils of greenish-brown bracts, in compact spikes mostly less than 5 cm. long, on slender, finely grooved peduncles up to 30 cm. or more long; capsule ovoid, circumscissile.

Tongatapu: weed in dooryard, Nuku'alofa, Mar. 7, 1953, *Yuncker 15203*.

Occasional as a dooryard and waste-area weed throughout the group. A European weed of wide distribution.

Tongan name: *filohako*.

Plantago major Linnaeus, Sp. Pl., 112, 1753.

Low, essentially stemless, somewhat pubescent, weedy herb. Leaves clustered at crown, somewhat fleshy, oval or broadly rounded, obtuse or acutish, base cuneate, coarsely toothed, up to 12 cm. or more long and 7 cm. wide, parallel-nerved, petioles longer than blade, narrowly winged by decurrent blade margins. Flowers small, green, numerous, in a narrow spike about 10 cm. or more long, peduncle up to 15 cm. or more long; capsule small, ovoid, circumscissile.

Tongatapu: in low moist area near Navutoka village, Feb. 27, 1953. *Yuncker 15077*.

'Eua: in sandy soil of old coconut plantation near Ha'aluma, Apr. 1, 1953. *Yuncker 15602*.

Vava'u: *Crosby*.

Occasional as a plantation and waste-area weed throughout Tonga. A European weed of wide distribution.

Tongan names: *filo*, *flomatolu*.

FAMILY RUBIACEAE

Genus *Bikkia* Reinwardt

Bikkia tetrandra (Forster f.) A. Richard, Soc. Hist. Nat. Paris, Mém. 5: 231, 1834 (reprint Mém. Fam. Rub., 151, "1829").—A. Gray, Am. Acad. Arts Sci., Proc. 4: 307, 1859.—K. Schumann, in Engler and Prantl, Nat. Pflanzenfam 4 (4): 20, 1891.

Portlandia tetrandra Forster f., Fl. Australium Prodr., 15, 1786.

Hofmania (*sic*) *amicorum* Sprengel, Syst. Veg. 1: 416, 1825.

Bikkia australis de Candolle, in DC. Prodr. 4: 405, 1830.

Bikkia australis var. *forsteriana* de Candolle, in DC. Prodr. 4: 405, 1830.

Bikkia forsteriana Brongniart, Soc. Bot. France, Bull. 13: 42, 1866.

Bikkia hombromiana Brongniart, Soc. Bot. France, Bull. 13: 13, 1866.

Shrub or small tree, often somewhat sprawling. Leaves opposite, glabrous, oval-obovate, entire, up to 15 cm. or more long and 8 cm. wide, obtuse, petioles stout, up to 3 cm. long, the stipules connate, forming a short, apiculate cup. Flowers handsome, solitary in upper leaf axils, on pedicels about 1 cm. long, corolla tubular, tube up to 15 cm. long, white; capsule about 2.5 cm. long.

We are indebted to E. D. Merrill for pointing out that the plant of the Tongan-Fijian region that has been known as *Bikkia grandiflora* Reinwardt (see Hemsley in Linn. Soc. Bot., Jour. 30: 180, 1895; Burkill, op. cit. 35: 40, 1901; A. C. Smith in B. P. Bishop Mus., Bull. 141: 135, 1936; and Yuncker, op. cit. 178: 110, 1943) differs from that species in its much smaller and differently shaped calyx lobes. Although I have not seen Forster's type, there seems no doubt that my plant is *Portlandia tetrandra* Forster f., based on a collection from Niue. The combination in *Bikkia* has been made by at least two authors since Richard, under the impression that it was new. These conclusions are based upon examination of the pertinent literature in connection with the following specimens. (A. C. Smith, who also supplied the distribution data below.)

Fiji: Nangingia (Denham Island), west of Kandavu, *B. E. Parham 2656* (A); Fulanga: *A. C. Smith 1205* (GH, US, etc.).

Tongatapu: *Setchell and Parks 15366* (GH, US); on sea-facing cliffs near village of Niutoua on eastern side of island, Mar. 2, 1953, *Yuncker 15133* (US).

'Eua: sprawling over seaside cliff, Ha'aluma at southwestern end of island, Apr. 1, 1953, *Yuncker 15595* (US).

Lifuka: sprawling over seaside cliff on eastern side of island, Apr. 27, 1953, *Yuncker 15764* (US).

Vava'u: *Harvey, 1855* (GH).

Niue: *Yuncker 9584* (not seen, ACS), *10058* (A).

Tongan name: *sialectafa*.

Genus **Badusa** A. Gray

Badusa corymbifera (Forster f.) A. Gray, Am. Acad. Arts Sci., Proc. 4: 308, 1860.

Shrub, 2-3 m. tall, stems pithy, glabrous. Leaves opposite, elliptic-subobovate, acute or abruptly acuminate, base acute, up to 12 or 13 cm. long and 5 cm. wide, entire, pinnately nerved, petioles 1-2 cm. long, shallowly canaliculate and narrowly ridged by decurrent blade margins, the stipules connate. Flowers on slender pedicels in axillary and terminal, corymbose clusters, corolla tubular, limb spreading to about 2 cm. in width, purplish without, white within, calyx lobes broadly ovate, apiculate; capsules about 8 mm. long.

Tongatapu: *Forster*.

'Eua: *Lister*; on sea-facing limestone cliff near summit of eastern ridge, Lokupo District, Apr. 8, 1953, *Yuncker 15671*.

Vava'u: *Crosby*; along upper rim of limestone cliff on eastern side of island above Ha'alaufuli, May 21, 1953, *Yuncker 16090, 16092*; summit of Talau, west of Neiafu, May 23, 1953, *Yuncker 16139*.

Occasional throughout Tonga. New Hebrides, Fiji.

Tongan name: *tetefa*.

Genus **Hedyotis** Linnaeus

Hedyotis biflora (Linnaeus) Lamarck, Tabl. Encycl. 1: 272, 1791.

Low, more or less spreading, much-branched subherbaceous plant, up to 30 cm. or more tall, stems quadrangular in cross section. Leaves elliptic or ovate, acute or acuminate, base narrowed to petiole, up to 3 cm. long and 1.5 cm. wide, petiole scarcely 1 cm. long. Flowers 3-4 mm. long, on filiform pedicels in open paniculate, cymose cluster, corolla tubular, fruit subglobose, about 2-3 mm. long, seeds numerous.

Tongatapu: *Forster*; *Nelson*; *Moseley*.

'Eua: *Lister*.

Tropical Asia, Malaysia, Micronesia, Fiji, and Polynesia.

Oldenlandia paniculata L. in Hemsley's list.

Hedyotis foetida (Forster f.) J. E. Smith, in Rees' Cyclop. 17(2), 1811.

Low, sprawling shrublike plant, up to 30-40 cm. or occasionally 1-2 m. tall, stem glabrous, four-angled. Leaves opposite, elliptic, up to 8 or 10 cm. long but mostly 4-6 cm. and 1-2 cm. wide, acute, base cuneate, entire, petioles scarcely up to 1 cm. long, narrowly ridged by decurrent blade margins, stipules connate. Flowers numerous, white or pale pink, with an unpleasant odor, 5-8 mm. long, in long-pedunculate, axillary and terminal, lax, cymose clusters.

Tongatapu: *Forster*; *Gracff*; pockets of soil on limestone rocks along shore just above high-tide limit, below Ha'akame village, Mar. 12, 1953, *Yuncker 15280*.

'Eua: crevices of sea-facing limestone cliff near summit of the eastern ridge, Apr. 8, 1953, *Yuncker 15672*.

Vava'u: *Crosby*; near upper ridge of seaward face of limestone coastal cliff above Leimatua, May 20, 1953, *Yuncker 16070*.

Frequent on rocky seaside cliffs throughout Tonga, Micronesia, New Caledonia, and Fiji eastward to the Austral Islands.

Oldenlandia foetida Forst. f. in Hemsley's and Burkill's lists.

Genus **Neonauclea** Merrill

Neonauclea forsteri (Seemann) Merrill, Washington Acad. Sci., Jour. 5: 540, 1915.

Glabrous tree, up to 6 m. or more tall. Leaves opposite, elliptic-subobovate, obtusely pointed, base acute, up to 20 cm. long and 13 cm. wide, entire, pinnately nerved, petiole up to 5 cm. long. Flowers small, coalesced in bristly, headlike, terminal cluster.

'Eua: *Lister*; in forest near summit of eastern ridge at about middle of island, Mar. 24, 1953, *Yuncker 15454*.

Infrequent. Philippines, Polynesia.

Nauclea forsteri Seem. in Hemsley's list.

Genus **Mussaenda** Linnaeus

Mussaenda raiateensis J. W. Moore, B. P. Bishop Mus., Bull. 102: 44, 1933.

Shrub or small tree, up to 10 m. tall, branchlets pubescent. Leaves elliptic or ovate, acuminate, base acute, up to 25 cm. or more long and 10 cm. wide, densely pubescent on both sides, entire, pinnately nerved, petiole densely pubescent, up to 2 cm. or more long, stipules narrowly lanceolate, up to 1 cm. long. Flowers few to several, on slender pedicels in terminal, wide-spreading clusters, corolla yellow orange, tubular, up to about 1.5 cm. long, limb spreading to about 1 cm. in width, one lobe of calyx becoming foliaceous, up to 7 cm. or more long and 5 cm. wide, yellowish white, parallel-nerved; fruit ellipsoidal, 1-1.5 cm. long, green with brownish lenticel-like spots.

Tongatapu: *Forster*; *Graeffe*; along Hala Loto, *Setchell and Parks 15490*.

'Eua: *Lister*; western edge of plateau, *Parks 16200*; in open forest near center of island, Mar. 20, 1953, *Yuncker 15371, 15384*.

Kao: on rocky slope in open forest, May 6, 1953, *Yuncker 15891*.

Vava'u: *Crosby*; in thicket on upper seaward face of coastal cliff above Leimatua, May 20, 1953, *Yuncker 16078*.

Frequent throughout Tonga, New Hebrides and Fiji eastward to the Society Islands. *M. frondosa* L. in Hemsley's and Burkill's lists.

Tongan name: *monomono'ahina*.

Genus **Tarenna** Gaertner

Tarenna sambucina (Forster f.) Durand, in Drake, Illus. Fl. Ins. Maris Pacific 6: 190, 1890.

Shrub or tree up to about 8 m. tall, young stems quadrangular, glabrous or microscopically puberulent. Leaves opposite, elliptic or elliptic-ovate, acute at both ends, up to 20 cm. or more long and 9 cm. wide, entire, pinnately nerved, petiole up to 2 or 3 cm. long, stipules connate. Flowers numerous, in large, terminal, cymose clusters, corolla yellowish or white, funnellform; fruit globose, about 5 mm. in diameter.

Tongatapu: *Forster*; in thicket below Nualei village, Mar. 9, 1953, *Yuncker 15238*.

'Eua: *Lister*; in open forest near center of island, Mar. 18, 1953, *Yuncker 15328*; in forest along trail to "Smoky Hole" above Fuai, Mar. 31, 1953, *Yuncker 15573*.

Lifuka: in thicket along road near south end of island, Apr. 28, 1953, *Yuncker 15781*.

Kao: in lower forest margin, May 6, 1953, *Yuncker 15963*.

Vava'u: *Crosby*; in thicket along summit of seaside cliff below village of Houma, May 22, 1953, *Yuncker 16120*.

Niufo'ou: in thicket a short distance above upper limit of recent lava flows, May 16, 1953, *Yuncker 15997*.

Frequent throughout Tonga. Micronesia and New Caledonia eastward to Tuamotu Islands.

Tongan names: *manonu, takafalu*.

The bark is used in the preparation of medicines.

Genus **Randia** Linnaeus

Randia cochinchinensis (Loureiro) Merrill, Am. Philos. Soc., Trans. **24** (2): 365, 1935.

Glabrous shrub, 1-2 m. tall. Leaves opposite, elliptic or elliptic-ovate, acute, base acute-decurrent, up to 15 cm. long and 6 cm. wide, pinnately nerved, petiole ridged by decurrent blade margins, about 1 cm. long, stipules small, connate. Flowers white, in branching, axillary clusters up to 4-5 cm. or more long; fruit red, obovoid, 5-8 mm. long, crowned by calyx.

Tongatapu: *Mosley*.

Vava'u: *Harvey; Barclay; Crosby*; in thicket on upper rim of seaside cliff above Ha'alaufuli, May 21, 1953, *Yuncker 16098*; along trail leading to summit of Talau, west of Neiafu, May 23, 1953, *Yuncker 16143*.

Occasional. Tropical Asia, Malaysia, Micronesia, and Polynesia.

R. coffeoides Benth. and Hook. in Hemsley's and Burkill's lists.

Randia crosbyi Burkill, Linn. Soc. Bot., Jour. **35**: 41, 1901.

Small tree, up to 4 m. or more tall. Leaves opposite, elliptic or oblong-elliptic, acute or short-acuminate, base oblique, obtuse or acutish, glabrous, entire, up to 15-18 cm. long and 6 cm. wide, pinnately nerved, petiole up to 1 cm. long. Flowers few, small, on slender pedicels up to 1-1.5 cm. long, in small, axillary clusters; fruit globose, about 1 cm. in diameter, crowned by pubescent calyx.

Vava'u: *Crosby 76*; in thicket along upper rim of seaside cliff on north-western side of island, May 25, 1953, *Yuncker 16172*.

Infrequent. Endemic.

Genus **Gardenia** Ellis**Gardenia jasminoides** Ellis, Roy. Soc. Philos., Trans. **51**(2) : 935, 1761.

Shrub, 1-2 m. or more tall. Leaves opposite, elliptic-obovate, bluntly short-pointed, base cuneate, up to 5 cm. or more long and 2.5 cm. wide, somewhat glossy, petiole very short, winged by decurrent blade margins. Flowers large, fragrant, solitary in the leaf axils, calyx angled or winged, corolla white, turning yellowish, tube about 5 cm. long; fruit ovoid, many-seeded.

Tongatapu: near dwelling in Fatai village, Mar. 10, 1953, *Yuncker 15257*.

Occasional as an ornamental shrub. A native of China now widely cultivated.

Tongan name: *siale matalatau*.

The flowers are used in leis.

Gardenia taitensis de Candolle, in DC. Prodr. **4** : 380, 1830.

Large shrub or small tree up to 4 m. or more tall. Leaves opposite, elliptic-obovate, obtusely short-pointed, base acute to cuneate, up to 13 cm. long and 7 cm. wide, pinnately nerved, petiole very short, winged by decurrent blade margins. Flowers white, very fragrant, corolla lobes about 4 cm. long, spreading, equaling tube, solitary, axillary; fruit globose, about 2.5 cm. in diameter, longitudinally ridged.

Tongatapu: *Forster; Gracffe*; in thicket along trail between village of Ha'akame and sea, Mar. 12, 1953, *Yuncker 15281*.

'Eua: *Lister*; in Pangai village, Mar. 25, 1953, *Yuncker 15480*.

Rather frequent in villages and occasionally in thickets. Polynesia and Fiji.

Tongan name: *siale tonga*.

The flowers are used for leis, the scenting of oil, and so on.

Genus **Canthium** Lamarck**Canthium barbatum** (Forster f.) Seemann, Fl. Vit., 132, figs. 2, 3, 1866.

Glabrous shrub or small tree, up to 5 m. tall. Leaves opposite, oval, oblong-oval-ovate, or oval-subobovate, abruptly short-acuminate, base acute, decurrent, up to 15 cm. long and 9 cm. wide, but mostly smaller, pinnately nerved, petiole scarcely up to 1 cm. long. Flowers about 8 mm. long, corolla tube narrow, limb spreading to about 5 mm. in width, white turning yellow, on pedicels 1-1.5 cm. long, in few-flowered, umbel-like or paniculate clusters on axillary, peduncle-like stalks about 2 mm. or more long; fruit obcordate, compressed, about 1 cm. long and as wide, red.

Tongatapu: *Forster*; in thicket near Vaini village, Feb. 26, 1953, *Yuncker 15045*; in forest near Niutoua village, Mar. 2, 1953, *Yuncker 15128*; in seaside thicket, Blow Hole area near Houma village, June 1, 1953, *Yuncker 16221*; in seaside thicket below Haveluliku village, June 3, 1953, *Yuncker 16232*.

'Eua: *Lister*; seaward margin of ridge forest above village of Houma, Mar. 26, 1953, *Yuncker 15492*; in seaward margin of forest on terrace on north-western side of island, Mar. 26, 1953, *Yuncker 15504*.

Nomuka: in thicket near shore of central lake, Apr. 30, 1953, *Yuncker 15843*.

Kao: in forest on steep rocky slope, May 6, 1953, *Yuncker 15906*; lower margin of slope forest, May 6, 1953, *Yuncker 15964*.

Vava'u: *Crosby*.

Common in thickets near the coast throughout Tonga, Micronesia, Fiji, Society Islands, Austral Islands, Pitcairn, and Henderson Island.

Tongan name: *olamaka*.

Canthium odoratum (Forster f.) Seemann, Fl. Vit., 132, 1866.

Shrub or small tree up to 3 or 4 m. tall. Leaves opposite, elliptic, obtusely pointed, base acute-decurrent, up to 7 cm. or more long and 4 cm. wide, petiole about 5 mm. long, ridged by decurrent blade margins. Flowers small, corolla tube 1-2 mm. long, white, fragrant, on short pedicels in cymose, axillary clusters; fruit obcordate, 5-8 mm. wide, green to black when mature.

'Eua: edge of forest on seaward side, above Houma village, Mar. 26, 1953, *Yuncker 15500*; on sea-facing limestone cliff near summit of eastern ridge, Apr. 8, 1953, *Yuncker 15670*.

Vava'u: *Crosby*.

Occasional. New Caledonia and New Hebrides eastward to Pitcairn and Henderson Islands.

Canthium sessilifolium A. Gray, Am. Acad. Arts Sci., Proc. 4: 39, 1860.

Rather low, scrambling shrub, branches twiggy and with very short internodes. Leaves opposite, oval-orbicular, obtuse or slightly pointed, base truncate, up to 2 cm. or more long and nearly as wide, petiole about 1 mm. long. Flowers white, fragrant, on slender, axillary pedicels up to about 1 cm. long, corolla tube slender, about 12 mm. long, limb spreading to about 8 mm. in width.

'Eua: on seaward-facing limestone cliff near summit of eastern ridge, Apr. 8, 1953, *Yuncker 15684*.

Scarce.

This collection permits an extension of range of a supposed Fijian endemic, which is uncommon even in Fiji. We have seen material of it only from Vanua Levu and the Lau Islands of Vanua Mbalavu and Fulanga. (A. C. Smith.)

Genus **Guettarda** Linnaeus

Guettarda speciosa Linnaeus, Sp. Pl., 991, 1753.

Tree, up to 8 m. or more tall. Leaves opposite, obovate, apex rounded, obtuse, or slightly pointed, base obtuse or acutish, up to 20 cm. or more long and 12 cm. wide, but mostly much smaller, petioles 2-3 cm. or sometimes more long. Flowers densely pubescent, in rather compact, cymose clusters on long, axillary peduncles, corolla tube up to 4 cm. long, limb spreading 2-3 cm. in width, calyx cupulate, truncate; fruit globose, 2-3 cm. in diameter.

Tongatapu: *Cook*; in thicket near sea, along road to east of Nuku'alofa, Mar. 7, 1953, *Yuncker 15210*; in seaside thicket, Sopa, west of Nuku'alofa, May 30, 1953, *Yuncker 16215*.

'Eua: *Lister*.

Lifuka: in seaside thicket north of Pangai village, Apr. 25, 1953, *Yuncker 15747*; in seaside thicket near southern end of island, Apr. 28, 1953, *Yuncker 15790*.

Kao: on lower rocky slope in clearing, May 6, 1953, *Yuncker 15878*.

Vava'u: *Crosby; Harvey*.

Niuafou'u: near shore of central crater lake, May 16, 1953, *Yuncker 16011*.

Common near the shore throughout Tonga. An Indo-Malaysian strand species extending into Polynesia.

Tongan name: *puopua*.

The wood is used for general construction work, banana shooks, and so forth; the bark, in preparing medicines; and the flowers, to perfume oils.

Genus *Timonius* de Candolle

Timonius polygamus (Forster f.) Robinson, Am. Acad. Arts Sci., Proc. 45: 394, 1910.

Shrub, about 2 m. or more tall. Leaves opposite, obovate, apex rounded, obtuse or slightly pointed, base acute or obtusish, rather thick, glossy above, up to 10 cm. or more long and 5 cm. wide, pinnately nerved, petiole scarcely 5 mm. long. Flowers white, pubescent, solitary or several in cymose clusters on rather long, axillary peduncles; fruit subglobose, about 1 cm. long, crowned with calyx.

Vava'u: *Crosby*; along upper edge of limestone coastal cliff above Leimatua, May 25, 1953, *Yuncker 16075*.

Occasional. Eastern Fiji to the Tuamotus and Henderson Island.

T. forsteri DC. in Burkill's list.

Genus *Coffea* Linnaeus

Coffea arabica Linnaeus, Sp. Pl., 172, 1753.

Shrub or small tree, about 2-3 m. tall. Leaves opposite, oblong-elliptic to subobovate, glossy, acuminate, base acute, glabrous, pinnately nerved, petiole about 1 cm. long. Flowers white, fragrant, short-pedicellate, in axillary clusters; fruit ovoid, red, two-seeded.

Tongatapu: in plantation below Nualei village, Mar. 9, 1953, *Yuncker 15226*.

Occasional in villages or plantations. A tropical African species now widely grown in tropical countries.

Tongan name: *kofi*.

Genus *Ixora* Linnaeus

Ixora calcicola A. C. Smith, sp. nov. (fig. 13).

Frutex ad 1.5 m. altus, ramulis glabris teretibus rugulosis cinereis apices versus circiter 2 mm. diametro; stipulis libreis glabris circiter 4 mm. longis e basi late ovato in aristam rigidam ad 2 mm. longam angustatis, pilis supra cicatricibus castaneis circiter 1 mm. longis; foliis glabris, petiolis semiteretibus rugulosis 3-6 mm. longis, laminis papyraceis

olivaceis late ellipticis, (3.5-) 5-9.5 cm. longis, (2.5-) 4-6.7 cm. latis, basi rotundatis vel late obtusis vel interdum subacutis, apice obtuse breviter cuspidatis, margine integris, costa supra plana vel prominula subtus elevata, nervis secundariis utrinsecus 9-11 patentibus anastomosantibus et rete venularum utrinque prominulis; inflorescentiis terminalibus 3-floris basi bracteis binis foliaceis papyraceis subtentis, bracteis ovatis, 22-25 (-40) mm. longis, 20-28 (-37) mm. latis, raro minoribus, basi rotundatis vel subcordatis, apice obtuse cuspidatus vel obtusis, nervis prominulis; pedicellis teretibus inconspicuis 1-1.5 mm. longis; calyce oblongo sub anthesi circiter 3 mm. longo et apice 2 mm. diametro, limbo papyraceo erecto circiter 1.2 mm. longo intus pilis pallidis ad 0.3 mm. longis sericeo 4-dentato, den-



FIGURE 13.—*Ixora calcicola*, Yuncker 16091, isotype, in herbarium of DePauw University.

tibus circiter 0.3 mm. longis; corolla hypocrateriformi glabra, tubo ad 1.5 mm. diametro circiter 23 mm. longo, lobis 4 oblongo-ellipticis 14-15 mm. longis 6-7 mm. latis apice acutis; staminibus exsertis glabris, filamentis ligulatis 1-2 mm. longis, antheris lanceolatis 7-8 mm. longis acutis; stylo exserto gracillimo inferne pilis pallidis circiter 0.4 mm. longis parce villosis, stigmatibus carnosius complanatis 2.5-3 mm. longis; fructibus subglobosis 8-9 mm. diametro.

Vava'u: shrub about 1.5 m. tall, flowers white, fruit black, in outer margin of thicket along upper rim of limestone cliff on eastern side of island below Ha'alaufuli, alt. about 120 m., May 21, 1953, *Yuncker 16091* (type in U.S. Nat. Herb., nos. 2128541 and 2157728).

The closest relative of the new species (section *Phylleilema*) seems to be *I. bracteata* Cheeseman, of Rarotonga; my concept of this is based on the

original description and *Wilder 751*, from the type locality. The new species differs from *I. bracteata* in having its leaves with shorter petioles and proportionately broader blades, in its stipules being shorter and more abruptly aristate, in having its calyx strictly glabrous rather than puberulent without, and in its subglobose rather than long-ellipsoid fruit. Fosberg (B. P. Bishop Mus., Occ. Papers 13: 265-275, 1937) has discussed several of the species of section *Phylleilema* growing in southeastern Polynesia, including *I. bracteata*. This species and *I. fragrans* (Hooker and Arnott) A. Gray seem to be the closest allies of our new species, but *I. fragrans* is far removed geographically and has a corolla tube only 12-14 mm. long. As Fosberg remarks, the species of this alliance are difficult to delimit at present. The new Tongan species is not closely allied to anything I have seen from Fiji or Tonga.

Ixora finlaysoniana Wallich, Cat. no. 6166, 1828.

Small tree, about 4 m. tall. Leaves opposite, obovate or oblanceolate, obtuse, base cuneate, up to 15 cm. long and 5 cm. wide, rather thick, petiole stout, scarcely 1 cm. long, ridged by decurrent blade margins. Flowers numerous, in compact, terminal and axillary, cymose clusters, calyx deeply cleft, corolla tube very slender, about 3 cm. long, limb spreading to about 1 cm. or more, white, fragrant.

Lifuka: roadside near north end of island, May 11, 1953, *Yuncker 15986*. Presumably an escape from cultivation.

Ceylon.

Ixora samoensis A. Gray, Am. Acad. Arts Sci., Proc. 4: 40, 1858.

Glabrous shrub or small tree, up to 4 m. tall. Leaves opposite, elliptic, acute or obtuse at both ends, 10 cm. or more long and 4 cm. wide, pinnately nerved, petiole scarcely 1 cm. long, stipules long-aristate-subulate, calyx teeth subulate, corolla glabrous.

'Eua: *Lister*; in forest along trail to summit of eastern ridge, Mar. 30, 1953, *Yuncker 15557*.

Vava'u: *Crosby* [?].

Infrequent. Also in Samoa.

Probably the same as *I. samoensis* var. *glabricalyx* Burk. in Burkill's list.

Tongan name: *hunivao*.

Ixora yunckeri A. C. Smith, sp. nov. (fig. 14).

Frutex vel arbor ad 4 m. alta, ramulis glabris teretibus cinereis vel brunneis apices versus 1-3 mm. diametro; stipulis liberis papyraceis 3-4 mm. longis glabris e basi ovato aristatis, pilis paucis castaneis ad 1 mm. longis supra cicatricibus relictis; foliis glabris, petiolis brevibus supra sulcatis 1-3 (-4) mm. longis, laminis subcoriaceis vel papyraceis in sicco olivaceis ellipticis, 3-5 cm. longis et 1.5-3 cm. latis (interdum 2-7 × 1-4 cm.), basi acutis et in petiolum decurrentibus, apice late obtusis vel subacutis, margine integris incrassatis leviter recurvatis, costa supra leviter subtus valde elevata, nervis secundariis utrinsecus 5-8 patentibus anastomosantibus utrinque prominulis, rete venularum immerso vel inconspicue prominulo; inflorescentiis terminalibus 3-floris, basi bracteis binis foliaceis subtentis, bracteis orbiculari-ovatis, 13-27 mm. longis, 12-21 mm. latis, basi rotundatis vel



FIGURE 14.—*Ixora yunckeri*, Yuncker 15377, paratype, in herbarium of DePauw University.

subcordatis, apice plerumque late obtusis; floribus sessilibus vel pedicellis crassis inconspicuis ad 1 mm. longis; calyce oblong-ellipsoideo sub anthesi 3-3.5 mm. longo et 2-2.5 mm. diametro, extus glabro, limbo erecto 1-1.2 mm. longo intus pilis ad 0.5 mm. longis dense sericeo inconspicue 4-dentato; corolla hypocrateriformi glabra, tubo circiter 2 mm. diametro 17-19 mm. longo, lobis 4 patentibus elliptico-oblongis 10-11 mm. longis 5-6 mm. latis acutis manifeste nervatis; disco inconspicuo annulari-pulvinato circiter 1 mm. diametro et 0.2 mm. alto; staminibus exsertis glabris, filamentis ligulatis 2-2.5 mm. longis, antheris lanceolato-oblongis 6-8 mm. longis callosa-apiculatis; stylo gracili exserto praeter partem distalem pilis pallidis ad 0.8 mm. longis copiose villosa, stigmatibus cornosis complanatis 2-3 mm. longis; fructibus subglobosis 5-8 mm. diametro in sicco ruguloso calycis limbo inconspicuo coronatis.

'Eua: shrub about 1 m. tall, flowers white, near top of seaward face of limestone cliff of eastern ridge, about middle of island, alt. about 220 m., Apr. 8, 1953, *Yuncker 15677* (type in U.S. Nat. Herb., nos. 2128463 and 2157725); tree about 4 m. tall, trunk about 5 cm. in diameter, flowers white, fruit white, two-seeded, on edge of forest above Fuai plantation near center of island, alt. about 240 m., Mar. 20, 1953, *Yuncker 15377*.

The new species (of the section *Phylleilema*) is most closely allied to two Fijian species, *I. vitiensis* A. Gray and *I. nandarivatensis* Gillespie, being distinguished from both by the sum of several rather minor characters. Most obviously, the new species differs from its Fijian relatives in its smaller and thicker leaves, usually with obtuse apices; in having its inflorescence bracts of thicker texture, less obviously nerved, and obtuse rather than cuspidate-acuminate at apex; in its larger corolla as to the comparatively stout tube (about 2 mm. rather than 1-1.5 mm. in diameter) and the large, acute, comparatively coarsely nerved lobes; in its larger anthers; and in the somewhat denser indument of its style and the inner surface of its calyx limb. Although the two cited specimens from 'Eua agree excellently in their flowers, number 15377 has its leaves slightly larger and thinner and with more obvious venation than those of the type, and a similar difference in texture is noted for the bracts.

Genus *Psychotria* Linnaeus

Psychotria carnea (G. Forster) A. C. Smith, B. P. Bishop Mus., Bull. 141: 151, 1936.

Glabrous shrub. Leaves opposite, oblong-elliptic, acute at both ends, up to 15 cm. or more long and 5 cm. wide, pinnately nerved, lateral nerves submarginally loop-connected, petiole slender, 2-4 cm. long, laterally ridged by the decurrent blade margins.

Tongatapu: *Forster; Nelson; Graeffe; U.S. Expl. Exped.*

'Eua: *Lister*; along trail in forest on way to upper eastern ridge, Mar. 30, 1953, *Yuncker 15558*.

Vava'u: *Harvey*.

P. amicomum Benth. and Hook. in Hemsley's list.

Occasional. Also in Fiji and Samoa.

Psychotria insularum A. Gray, Am. Acad. Arts Sci., Proc. 4: 45, 1860.

Shrub or small tree, up to about 2 m. tall. Leaves opposite, elliptic, acuminate, base acutely decurrent, up to 14 cm. or more long and 6.5 cm. wide, pubescent beneath along nerves, pinnately nerved, petioles 1-2 cm. long, laterally ridged by the decurrent blade margins. Flowers white, on slender pedicels up to 1 cm. long, in axillary, cymose clusters, corolla tubular, about 1 cm. long, the fruit 6-8 mm. long, ribbed.

Tongatapu: *U.S. Expl. Exped.*

Kao: edge of forest near old abandoned plantation on lower slope, May 6, 1953, *Yuncker 15959*.

Vava'u: *Crosby*.

Occasional. Also in Samoa.

Psychotria kaoensis A. C. Smith, sp. nov. (fig. 15).

Arbor circiter 4.5 m. alta praeter corollam intus et filamenta ubique glabra, ramulis gracilibus teretibus; stipulis papyraceis maturitate 3.5-4.5 mm. longis inferne in vaginam 1-2 mm. longam connatis, partibus liberis oblongis leviter bilobatis, mox caducis; petiolis gracilibus 6-13 mm. longis superne anguste alatis, foliorum laminis papyraceis in sicco olivaceis oblongo-lanceolatis, (5-) 6-8 cm. longis, (1.5-) 2-3.3 cm. latis, basi attenuatis et in petiolum decurrentibus, apice subacutis, margine integris et anguste recurvatis, costa supra paullo subtus valde elevata, nervis secundariis utrinsecus 7-9 patentibus leviter curvatis marginem versus obscure anastomosantibus utrinque prominulis, rete venularum immerso vel supra leviter prominulo; inflorescentia terminali cymosa 2- vel 3-plo trichotome divisa sub anthesi et fructu 3-4 cm. longa, e basi 3-partita vel breviter pedunculata, pedunculo ad 2.5 mm. longo, ramulis gracilibus 1-2 cm. longis; floribus 2-4 apicem ramulorum versus aggregatis, pedicellis gracilibus sub anthesi et fructu 2-8 mm. longis; calyce obconico-cupuliformi limbo incluso 2-2.5 mm. longo et apice diametro, limbo tenui suberecto 0.8-1 mm. longo truncato vel obscure 5-denticulato; corolla subcarnosa sub anthesi infundibulari 8-9 mm. longa, intus faucibus pilis pallidis ad 0.5 mm. longis copiose barbellata, lobis tubum subaequantibus 5 (rara 6) oblongis circiter 1.5 mm. latis intus dense puberulis apice cucullatis sub anthesi patentibus; disco annulari-pulvinato conspicuo 0.7-0.8 mm. alto; staminibus 5 (raro 6), filamentis brevibus vel subnullis dense pilosis, antheris oblongis circiter 1.5 mm. longis utroque obtusis; stylo quam corolla brevior filiformi superne incrassato in lobos complanatos breviter bifido; fructibus ellipsoideo-obovoideis circiter 10 mm. longis et 7-8 mm. latis, basi angustatis, calycis limbo persistente coronatis, pericarpio carnoso, pyrenis semi-ovoideis circiter $9.5 \times 5 \times 2.5$ mm., basi acutis, apice anguste truncatis, ventre levibus, dorso inconspicuo 3-carinatis.

Kao: tree about 4.5 m. tall, trunk about 5 cm. in diameter, flowers white, in open forest on rocky slope, alt. about 180 m., May 6, 1953, *Yuncker 15880* (type in U.S. Nat. Herb., nos. 2128498 and 2157726).

From what is apparently its closest relative, *P. insularum* A. Gray, of Samoa and Tonga, the new species differs in its shorter and less highly connate stipules, in its smaller leaves and more compact inflorescence, and in its comparatively short and essentially truncate calyx limb. The two species (especially referring to *P. insularum* var. *montanum* Christophersen) are somewhat similar in the shape, texture, and venation of their leaves and in the general aspect of their inflorescences, but *P. insularum* has its stipules more than 1.5 cm. long and connate nearly to the apex, while its calyx limb is obviously dentate.



FIGURE 15.—*Psychotria kaoensis*, Yuncker 15880, isotype, in herbarium of DePauw University.

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Psychotria macrocalyx A. Gray (type from Tongatapu, *U. S. Expl. Exped.*, U.S. Nat. Herb. no. 52345) has leaves as small as those of the new species but acuminate and with more sharply ascending secondaries; its fruit has an erect and obviously dentate calyx limb nearly 5 mm. long, and its stipule lobes are very narrow, these characters readily distinguishing it from our species.

Psychotria macrocalyx A. Gray, *Am. Acad. Arts Sci., Proc.* 4: 46, 1860.

Glabrous shrub, the branches slender. Leaves lanceolate or oblong-lanceolate, up to 8 cm. long and 3.5 cm. wide, acuminate, base narrowed to petiole, rather papery, stipular lobes narrow. Flowers in terminal clusters.

Tongatapu: *U. S. Expl. Exped.* Endemic.

Genus **Carinta** Safford

Carinta herbacea (Jacquin) W. F. Wight, ex Safford, U.S. Nat. Herb., *Contrib.* 9: 216, 1905.

Small, glabrous herb with slender, creeping stems rooting at the nodes. Leaves opposite, rounded, deeply cordate, about 2.5 cm. wide, palmately nerved, entire, the petioles commonly about as long as the blade. Flowers small, white, in few-flowered, axillary, pedunculate umbels; the fruit fleshy, red.

'Eua: *Lister*; on moist forest floor in broken sunlight, near center of island. Mar. 18, 1953, *Yuncker 15317*.

Vava'u: *Crosby*.

Occasional in moist forested areas. Pantropic.

Geophila reniformis D. Don in Hemsley's and Burkill's lists.

Tongan name: *tono*.

The leaves are used in medicines.

Genus **Gynochthodes** Blume

Gynochthodes ovalifolia (Valeton) Kanehira var. ***smithii*** Fosberg, *Torrey Bot. Club, Bull.* 67: 421, 1940.

Vigorous, glabrous, woody vine. Leaves opposite, oval-ovate, acuminate, base acute, entire, up to 8 cm. or more long and 6 cm. wide, pinnately nerved, petioles 1-3 cm. long, slightly ridged by decurrent blade margins.

'Eua: climbing in thicket, margin of forest on seaward terrace of coastal cliff on way down to Lokupo, Mar. 27, 1953, *Yuncker 15520*.

Apparently very infrequent. Also in Fiji and Samoa.

Genus **Morinda** Linnaeus

Morinda citrifolia Linnaeus, *Sp. Pl.*, 176, 1753.

Shrub or small tree with four-sided, glabrous branches. Leaves opposite, broadly oval or slightly obovate, pubescent when young, acute at both ends, up to 30 cm. long and 15

cm. wide, petioles 1-2 cm. long, narrowly ridged by decurrent blade margins, stipules connate. Flowers white, in a globose, fleshy, headlike, pedunculate, axillary cluster; fruit globose-ovoid, about the size of an egg, fleshy and yellowish white when mature.

Tongatapu: *Forster*; in thicket near Vaini village, Feb. 26, 1953, *Yuncker 15037, 15038*.

'Eua: *Lister*; in open forest near center of island, Mar. 19, 1953, *Yuncker 15367*.

Lifuka: clearing near east side of island, along cross-island road between Pangai and eastern coast, Apr. 27, 1953, *Yuncker 15756*.

Vava'u: *Crosby*; along trail to summit of Talau, west of Neiafu, May 23, 1953, *Yuncker 16146*.

Common in thickets at lower altitudes throughout Tonga. From India through Malaya to Polynesia.

Tongan name: *nonu*.

The roots furnish a dye; the leaves are used as a remedy for boils; and various parts of the plant are used in medicines.

Morinda umbellata Linnaeus var. **forsteri** (Seemann) Fosberg, in Smith, *Sargentia*: 1: 123, 1942.

Stout, woody vine. Leaves opposite, elliptic, acute to acuminate, base acute, up to 8 cm. or more long and 4 cm. wide, somewhat coriaceous, pinnately nerved, lateral nerves submarginally loop-connected, petiole 1-1.5 cm. long, narrowly laterally ridged by the decurrent blade margins. Flowers white, in a fleshy, pedunculate, axillary, globose, headlike cluster; fruit globose-ovoid, less than 1 cm. in diameter.

Tongatapu: *Home*.

'Eua: *Lister*; in thicket along trail to summit of eastern ridge, Mar. 30, 1953, *Yuncker 15553*.

Kao: climbing in open forest on steep rocky slope, May 6, 1953, *Yuncker 15894, 15895*.

Vava'u: *Crosby*.

Occasional in forested area. New Hebrides, Fiji, Polynesia.

Genus **Borreria** G. F. W. Meyer

Borreria laevis (Lamarck) Grisebach, K. Ges. Wiss. Goet., Abh. 7: 231, 1857.

Low, branching, ascending plant, slightly woody at the base. Leaves opposite, elliptic-lanceolate, sharply acuminate, base cuneate, mostly 2-4 cm. long and 5 mm. wide, pinnately nerved, nerves prominent, sessile, stipules connate, with filamentous processes. Flowers small, white, in verticillate, axillary clusters.

Tongatapu: frequent in calcareous soil near sea, Sopa, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15007*.

'Eua: in pastured area near center of island, Mar. 22, 1953, *Yuncker 15428*.

Rather frequent as a weed in waste areas and clearings throughout Tonga. A tropical American species now widespread in tropical countries.

FAMILY CUCURBITACEAE

Genus **Melothria** Linnaeus

Melothria grayana Cogniaux, DC. Monogr. Phanerog. 3: 591, 1881.

Slender, glabrous, tendril-bearing, herbaceous vine. Leaves alternate, broadly triangular-ovate, acute, the base broadly cordate, up to 8 cm. or more long and about as wide, somewhat irregularly and finely toothed, palmately five-nerved, scabrous on the upper surface, the petioles slender. Flowers white, on slender, axillary pedicels; the fruit spindle-form, 2 cm. or more long.

'Eua: *Lister*.

Kao: climbing in thicket on rocky lower slope, May 6, 1953, *Yuncker* 15877.

Infrequent. Fiji and central Polynesia.

Genus **Momordica** Tournefort

Momordica charantia Linnaeus, Sp. Pl., 1009, 1753.

Slender, tendril-bearing, herbaceous vine. Leaves alternate, suborbicular in outline, up to 10-12 cm. long, deeply five- to seven-lobed, lobes dentate or lobulate, acute, petioles slender and about equaling blade. Flowers solitary or clustered, on long, slender, bracteate pedicels, monoecious, yellow. Fruit ovoid, up to 20 cm. or more long, tuberculate, orange-colored.

Tongatapu: *Moseley*.

'Eua: climbing in thicket back of Pangai village on way to Fuai, Mar. 25, 1953, *Yuncker* 15473.

Lifuka: climbing in roadside thicket at northern end of island near Lifuka end of interisland causeway, May 11, 1953, *Yuncker* 15981.

Vava'u: *Crosby*.

Frequent throughout Tonga. Pantropic.

Tongan name: *vaine 'initia*.

Genus **Luffa** Tournefort

Luffa cylindrica (Linnaeus) M. Roemer var. **insularum** Cogniaux, DC. Monogr. Phanerog. 3: 459, 1881.

Climbing, slightly hairy or subglabrous, herbaceous vine, stems five-angled. Leaves round-ovate or reniform-ovate, acuminate, base deeply cordate with open sinus, scabrous, up to 20 cm. long and about as wide, five- or seven-angled or lobed, petiole shorter than blade. Flowers yellow, male flowers crowded toward end of solitary, axillary peduncles, female flowers solitary; fruit smooth or shallowly ribbed, oblong-cylindric, up to 30 cm. long, pulpy.

Tongatapu: *Moseley*.

Vava'u: *Barclay* 3405; climbing in tall weeds along rim trail, cliff on north-western side of island, May 25, 1953, *Yuncker* 16165.

Infrequent in Tonga. Widespread through the Pacific area.

Tongan names: *mafa'i*, *fangu 'a kuma*.

Genus **Benincasa** Savi

Benincasa hispida (Thunberg) Cogniaux, DC. Monogr. Phanerog. 3: 513, 1881.

Wide-spreading, hairy vine. Leaves rounded-ovate, base rounded, cordate, 5- or 7-lobed, up to 25 cm. or more wide, tendrils branched. Flowers yellow, 8-10 cm. or more wide, solitary, axillary, male flowers long-pedicellate; fruit oblong to cylindrical, up to 40 cm. long, hairy, flesh white, edible.

Vava'u: *Crosby*.

An Asiatic species now widely cultivated as a food plant.

The muskmelon (*Cucumis melo* Linnaeus), the cucumber (*C. sativus* Linnaeus), the watermelon (*Citrullus vulgaris* Schrader), the squash (*Cucurbita maxima* Duchesne), and pumpkins (*C. pepo* Linnaeus) are cultivated for their fruit.

FAMILY CAMPANULACEAE

Genus **Wahlenbergia** Schrader

Wahlenbergia marginata (Thunberg) A. de Candolle, Monogr. Campanul., 143, 1830.

Low, nearly glabrous herb with strong tap root, stem with numerous, slender, erect branches. Leaves small, alternate, linear-lanceolate, reduced, scalelike upward. Flowers blue, on very slender pedicels up to 3 or 4 cm. long, in few-flowered, branching, terminal clusters.

'Eua: in moist, grassy area on central plain approaching eastern ridge, Mar. 30, 1953, *Yuncker 15551*.

An Asiatic species rare in Polynesia.

Probably the same species collected on 'Eua by Lister and reported by Hemsley as *W. gracilis* A.DC.

Genus **Hippobroma** G. Don

Hippobroma longiflora (Linnaeus) G. Don, Gen. Syst. 3: 717, 1834.

Thinly pubescent, sparsely branched herb up to 25 or sometimes 50 cm. in height. Leaves alternate, elliptic-lanceolate, acute, narrowed to sessile base, margin sharp-toothed, up to 10 or 15 cm. long, pinnately nerved. Flowers white, axillary, tubular, narrow tube up to 6 or 8 cm. long, lobes spreading to 3 or 4 cm.; capsule nodding, about 1.5 cm. long.

Tongatapu: local in low, moist situations about Nuku'alofa, Mar. 7, 1953, *Yuncker 15197*.

A native of tropical America widely distributed in the tropics where it often escapes from cultivation. The juice is said to cause skin irritation and the plant to be poisonous when eaten. In the most recent treatment of this group, Wimmer [Pflanzenr. 107 (IV. 276b): 405, 1953] discusses the species as *Laurentia longiflora* (L.) Endl.



FIGURE 16.—Beach scene on the island of Tongatapu. Strand plants are, for the most part, species of wide distribution on Pacific islands.

FAMILY GOODENIACEAE

Genus *Scaevola* Linnaeus

Scaevola floribunda A. Gray, Am. Acad. Arts Sci., Proc. **5**: 152, 1861.

Hemsley includes this species in his list on the basis of a specimen collected by the U.S. Exploring Expedition. No specimens are known to have been taken by subsequent collectors. A. C. Smith states that as far as he knows, the species is a Fiji endemic and, furthermore, that he finds no U.S. Exploring Expedition collection from Tonga in the U.S. National Herbarium.

Scaevola frutescens (Miller) Krause, Pflanzenr. **54** (IV. 277): 125, fig. 25, 1912, var. *frutescens*.

Shrub, up to about 2 m. tall, stems stout, with large pith. Leaves alternate, with hairy tufts in axils, oblong-spatulate, obtuse, base cuneate-decurrent, up to 15 cm. long and 8 cm. wide, margins somewhat wavy and obscurely toothed, crowded toward ends of branches, petiole short, winged by decurrent blade margins. Flowers white or pale lavender, appearing as though partly lacking, in cymose, axillary clusters; fruit subglobose, about 1 cm. in diameter, white, fleshy.

Tongatapu: in seaside thicket, Sopu, west of Nuku'alofa, May 30, 1953, *Yuncker 16210*; forming a strand association just above high-tide limit, below Navutoka village, Feb. 27, 1953, *Yuncker 15102*; forming clumps along beach to east of Nuku'alofa, Mar. 7, 1953, *Yuncker 15217*.

'Eua: forming a thicket along strand just above high-tide limit, Lokupo, Mar. 27, 1953, *Yuncker 15535*.

Lifuka: in thicket, strand, north of Pangai village, Apr. 26, 1953, *Yuncker 15739*.

Vava'u: upper rim of coastal limestone cliff above Leimatua, May 25, 1953, *Yuncker 16080*.

Niuafu'ou: in thicket, summit of main crater rim, May 16, 1953, *Yuncker 16016*.

Common throughout Tonga along the strand (fig. 16). From India to Australia and Polynesia.

S. koenigii Vahl in Hemsley's list.

Tongan names: *ngahu*, *ngahu molemole*.

The bark is used medicinally "to cure a leprosy-like disease and ringworm."

Scaevola frutescens* var. *sericea (Forster) Merrill, Philippine Jour. Sci. 7C: 354, 1912.

All parts of the plant densely silky pubescent.

Vava'u: along upper rim of seaside limestone cliff above Leimatua, May 20, 1953, *Yuncker 16077*.

Niuafu'ou: on upper rim of main crater, in thicket May 16, 1953, *Yuncker 16014*.

Occasional. Philippines to Polynesia.

Scaevola porrecta A. C. Smith, sp. nov. (fig. 17).

Herba suffruticosa porrecta ut videtur pauciramosa, ramulis teretibus pilis 1-2 mm. longis pallidis molliter vestitis; foliis alternatis, petiolis 1-2 cm. longis ut ramulis pilosis ad basim ampliatam anguste alatis, laminis in sicco subcoriaceis (in vivo forsan carnosis) fusco-olivaceis elliptico-lanceolatis, 4-6 (-7) cm. longis, 1.2-2.5 (-3) cm. latis, basi longe attenuatis et in petiolum decurrentibus, apice calloso-acutis, margine manifeste crenato-serratis (dentibus 2-3 per centimetrum callosis), utrinque pilis pallidis mollibus circiter 1 mm. longis adpressis ornatis, costa supra subplana subtus elevata, nervis aliis immersis; floribus in axillis bractearum solitariis sessilibus in spicis terminalibus laxis paucifloris 2-4.5 cm. longis dispositis, bracteis foliaceis oblongis apice obtusis callosis utrinque pilosis, maximis ad 20 mm. longis et 6 mm. latis, superioribus minoribus, bracteolis lateralibus similibus lanceolatis ad 8 × 1.5 mm.; calyce pilis numerosis pallidis 4-5 mm. longis basi circumdato, tubo ellipsoideo glabro saepe ruguloso 2-3 mm. longo 1.5-2 mm. lato, limbo erecto plerumque 0.5-1 mm. longo, lobis 5 praeter marginem ciliatum glabris plerumque parvis inconspicuis ad 0.5 mm. longis, lobo unico interdum lanceolato acuto ad 2.5 mm. longo; ovario biloculari, ovulis in quoque loculo solitariis; corolla alba membranacea 16-18 mm. longa, tubo utrinque inconspicue piloso intus faucibus setis deflexis 0.7-1 mm. longis paucis diffuse capitellatis obsito, lobis quam tubo paullo longioribus ovato-lanceolatis alis inclusis 2.5-3.5 mm. latis apice calloso-brevi-acuminatis utrinque glabris vel extus parce pilosis, alis membranaceis undulatis circiter 1 mm. latis; staminibus glabris, filamentis gracilibus 3.5-5 mm. longis, antheris oblongo-ellipsoideis 1.3-1.7 mm. longis; stylo gracili circiter 9 mm. longo copiose breviter piloso apice curvato incrassato, indusio membranaceo circiter 2 mm. diametro minute ciliolato, stigmatate late cuneato complanato truncato; fructibus non visis.

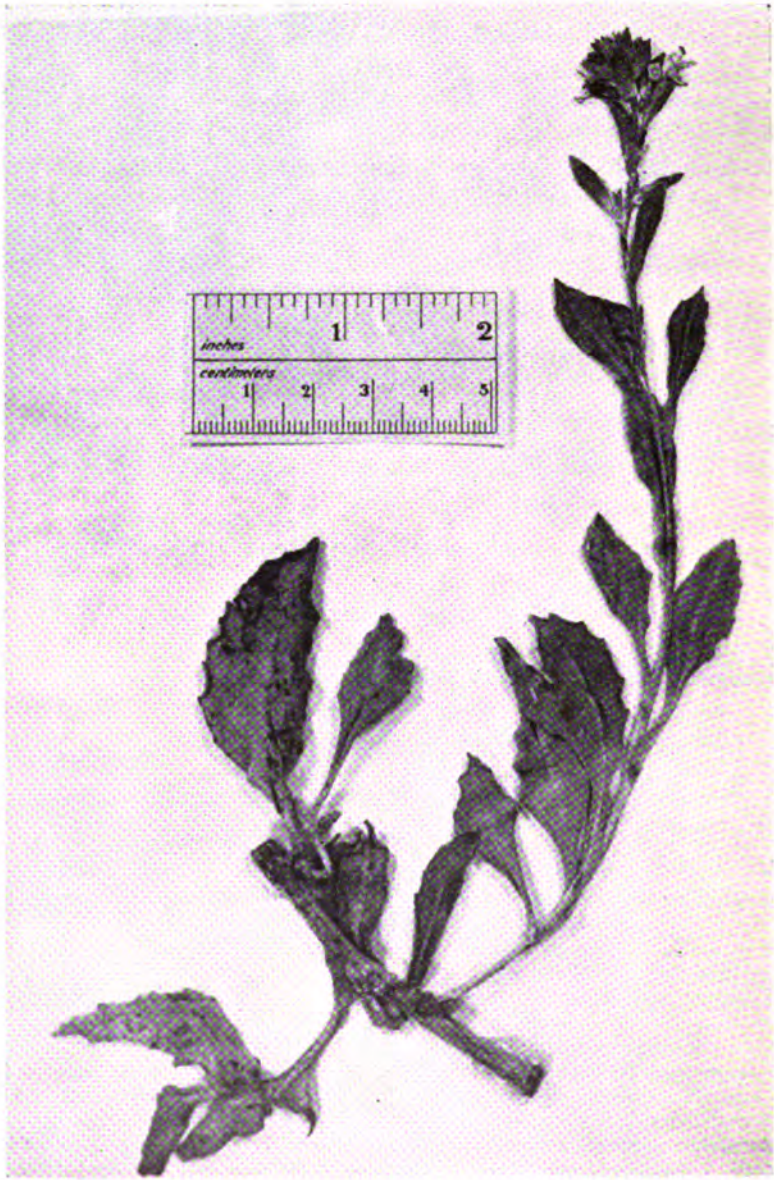


FIGURE 17.—*Scaevola porrecta*, Yuncker 15928, isotype, in herbarium of DePauw University.

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Kao: sprawling over rocks near summit, alt. about 900 m., flowers white, May 6, 1953, *Yuncker 15928* (type in U.S. Nat. Herb., no. 2128505).

Tongan name: *ngahu'uta*.

The very distinct plant here described is not closely allied to other species of the region, being best placed in the section *Xerocarpacea* G. Don, according to Krause's treatment [Pflanzenr. 54 (IV. 277): 117-168, 1912]. Here its relationship seems to be with *S. suaveolens* R. Brown and *S. gracilis* Hooker f., of Australia and the Kermadec Islands respectively. From both of these it differs in its softer and less copious indument, its glabrous calyx with usually inconspicuous lobes, its corolla with a closer indument, and its less obviously pilose style with the indusium obscurely ciliolate. It is noteworthy that *S. suaveolens* has five approximately equal calyx lobes, whereas the calyx of *S. gracilis* is said to have three subulate lobes and two smaller ones. The calyx of the new species commonly has the five calyx lobes very inconspicuous, but sometimes a single one is elongate and lanceolate. The relationship of *S. porrecta* to species of the general region, of the section *Sarcocarpacea* G. Don, such as the New Caledonian *S. montana* Labillardière and the Fijian *S. floribunda* A. Gray, is remote.

FAMILY COMPOSITAE

Genus *Vernonia* Schreber

Vernonia cinerea (Linnaeus) Lessing, *Linnaea* 4: 291, 1827.

Simple or branched, slightly hairy herb, up to 75 cm. or more tall. Leaves alternate, elliptic to obovate or ovate-oblong, up to 6-8 cm. long, narrowed down to a winged petiole. Flower heads purplish, 5-8 mm. wide, on slender peduncles, in terminal or axillary, corymbose-paniculate clusters, pappus of white, capillary bristles.

Tongatapu: weed in plantation near sea below Fu'amotu village, June 5, 1953, *Yuncker 16240*; roadside near Lavengatonga village, Mar. 6, 1953, *Yuncker 15182*.

'Eua: weed in grazing area near center of island, Mar. 22, 1953, *Yuncker 15419*.

Vava'u: *Crosby*.

A weed of plantations and waste areas throughout Tonga. A weed of the Old World tropics now pantropic in distribution.

V. insularum Benth. and Hook. in Hemsley's list.

Tongan name: *fisipuna*.

Genus *Elephantopus* Linnaeus

Elephantopus mollis H.B.K., *Nov. Gen. Sp. Pl.* 4: 26, 1820.

Coarse, hairy herb up to 2 m. tall. Leaves alternate, elliptic-obovate, acute, narrowing downward to form a winged petiolar base, serrate, soft-hairy, up to 15 cm. or more long.

pinnately nerved. Flower heads about 1 cm. long, florets white, on slender peduncles, in loose, terminal and axillary clusters, pappus of stout bristles widened at base.

Lifuka: forming a rather large colony near center of island in plantation along road from Pangai village to eastern side of island, Apr. 27, 1953, *Yuncker 15770*. Believed to be a new record for Tonga.

A species of Mexican origin now known from the Hawaiian Islands, Borneo, and islands of the Pacific area. A bad weed in parts of Fiji.

Tongan name: *lata hina*.

Genus *Adenostemma* Forster

Adenostemma lavenia (Linnaeus) O. Kuntze, Rev. Gen. Pl. 1: 304, 1891.

More or less hairy herb, up to 70 cm. or more tall. Leaves opposite, thin, ovate or deltoid, acute, base abruptly contracted, toothed, three-nerved from base, up to 20 cm. long and 8 cm. wide, petiole up to 2 cm. long, winged. Flower heads about 5 mm. wide, in corymbose-paniculate clusters, grayish white, flowers small, numerous, pappus scale-like.

Tongatapu: *Moseley*.

Vava'u: *Crosby*.

Occasional in Tonga as a waste-area weed. An American species now of pantropic distribution.

A. viscosum Forst. in Hemsley's list.

Genus *Ageratum* Linnaeus

Ageratum conyzoides Linnaeus, Sp. Pl., 839, 1753.

Erect to somewhat sprawling, weak-stemmed, hairy herb. Leaves opposite, ovate, acutish, base rounded and acute at petiole, crenate, up to 8 cm. or more long, petiole up to 5 cm. or more long. Flower heads small, bluish, in loose, terminal and axillary clusters, pappus of five awned scales.

Tongatapu: weed in plantation near Nualei village, Mar. 9, 1953, *Yuncker 15239*.

'Eua: margin of grazing area near center of island, Mar. 22, 1953, *Yuncker 15424*; weed near dwellings, Apr. 5, 1953, *Yuncker 15642*.

Vava'u: *Crosby*.

A frequent plantation and waste-area weed throughout Tonga. Of American origin, now of pantropic distribution as a cultivated ornamental or weed.

Genus *Dichrocephala* L'Héritier

Dichrocephala latifolia (Lamarck) de Candolle, in Wight, Contrib. Bot. Ind., 11, 1834.

Rather low, somewhat hairy, herbaceous plant. Leaves alternate, elliptic, obtuse or acute, base cuneate, coarsely toothed, petioles slender, 1-2 cm. long. Flower heads small, in open terminal, paniculate clusters, florets small, pappus lacking.

Tongatapu: *Cook*.

From tropical and subtropical Africa and Asia through Malaya to Fiji and the Society Islands.

Genus **Erigeron** Linnaeus

Erigeron sumatrensis Retzius, *Observ. Bot.* 5: 28, 1789.

Small to rather large, robust, hairy herb. Leaves alternate, lanceolate to oblanceolate, acute, subsessile or with a short, winged petiole, up to 12 cm. or more long, toothed or slightly lobed, teeth few, remote. Flower heads 5-8 mm. long, numerous, whitish, in rather dense, large, terminal, paniculate clusters, pappus tawny.

Tongatapu: weed in plantation near village of Ha'akame, Mar. 12, 1953, *Yuncker 15274*.

'Eua: *Lister*.

Lifuka: *Harvey*.

Kao: on rocky outcrop in open alpine area at about 720 m. alt., May 6, 1953, *Yuncker 15931*.

A weed of plantations and waste areas throughout Tonga. A European weed, now of wide distribution in warm climates. Known from Fiji, the Hawaiian Islands, and Easter Island in the Pacific area.

Possibly the *Erigeron albidus* A. Gray of Hemsley's list.

Tongan name: *pakaka*.

Genus **Siegesbeckia** Linnaeus

Siegesbeckia orientalis Linnaeus, *Suppl.*, 900, 1753.

Pubescent, branching herb, up to 1 m. or more tall. Leaves opposite, broadly ovate-deltoid or lanceolate, acute, abruptly narrowed at base to form lateral petiolar wings, dentate, up to 5 cm. long, three-nerved from near base. Flower heads scarcely 5 mm. long, in loose, terminal and axillary, leafy, paniculate clusters, flowers yellow, pappus lacking.

Tongatapu: *Moseley*; in sandy waste area below Navutoka village, Feb. 27, 1953, *Yuncker 15092*; weed in plantation near Fatai village, Mar. 10, 1953, *Yuncker 15258*.

'Eua: *Lister*; weed in grazing area near center of island, Mar. 22, 1953, *Yuncker 15429*.

Vava'u: *Crosby*.

A plantation and waste-area weed throughout Tonga. An Asiatic species now widely spread in tropical countries.

Tongan name: *kakamika*.

Genus **Wedelia** Jacquin

Wedelia biflora (Linnaeus) de Candolle, in Wight, *Contrib. Bot. Ind.*, 18, 1834.

Trailing to erect, more or less scabrous, branching shrub. Leaves opposite, elliptic-ovate, acute to acuminate, base acute, shallowly serrate, up to 15 cm. or more long and

8-10 cm. wide, three-nerved from near base, rough-hispid above, petiole up to 3-4 cm. long. Flower heads about 2.5 cm. wide, on peduncles up to 5 cm. or more long, in terminal and axillary clusters, rays yellow, pappus mostly lacking.

Tongatapu: *Moseley*; in thin soil on rocky cliffs along coast, near Vaini village, Feb. 26, 1953, *Yuncker 15057*.

'Eua: *Lister*; on sand near beach at Lokupa, Mar. 27, 1953, *Yuncker 15513*.

Kao: on rocky slope in open undergrowth of small trees, May 6, 1953, *Yuncker 15872*.

Vava'u: *Barclay*; *Crosby*; *Home*; in open rocky area along upper rim of steep seaside cliff above Leimatua, May 20, 1953, *Yuncker 16058*.

Abundant along rocky shores and in littoral thickets throughout Tonga. From southern Asia and Malaya to Polynesia.

W. strigulosa Benth. and Hook. in Hemsley's and Burkill's lists.

Tongan name: *ate*.

Genus **Synedrella** Gaertner

Synedrella nodiflora (Linnaeus) Gaertner, *Fruct. et Semin. Pl.* 2: 456, pl. 171, fig. 7, 1791.

Ascending to erect, branched, somewhat pubescent herb, up to 60 or 80 cm. tall, often rooting at lower, procumbent nodes. Leaves opposite, oval-ovate, acute, narrowing at base to winged petiole, serrulate, up to 8 cm. long and 5 cm. wide, scabrous, three-nerved from near base. Flower heads small, sessile or short-pedunculate, mostly axillary, florets few, yellow, small, involucre scales becoming scarious in fruit, disk achenes with long, sharp, apical awns, ray achenes with marginal and apical awns.

Tongatapu: weed in clearing near sea below Niutoua village, Mar. 2, 1953, *Yuncker 15139*.

Lifuka: weed in plantation between road and shore north of Pangai village, May 11, 1953, *Yuncker 15978*.

Weed in plantations and waste areas, probably on all of the islands of Tonga. An American species of pantropic distribution.

Tongan name: *pakopako*.

Genus **Bidens** Linnaeus

Bidens australis Sprengel, *Syst.* 3: 453, 1826.

Sub-shrubby, glabrous plant, up to 3 m. tall. Leaves opposite, simple, thin, oblong-lanceolate, acuminate, base cuneate, finely serrate, petiole slender, up to 10 cm. or more long. Flower heads small, yellow, on slender peduncles up to 3 cm. long, in loose, axillary and terminal, paniculate-corymbose clusters; fruit flattened, with two short, retrorsely barbed awns.

Tongatapu: *Banks and Solander*.

Also in the Society Islands.

Bidens biternata (Loureiro) Merrill and Sherff, Bot. Gaz. 88: 293, 1929.

Erect herb up to 1.5 m. tall, stem four-angled. Leaves alternate, pinnately compound, leaflets in turn more or less deeply lobed or compounded, sharply acute, base acute to cuneate, serrate, petiole up to 5 cm. long. Flower heads white, long-pedunculate, few, in terminal or axillary subradiate clusters; fruit angled, with four or five retrorsely barbed awns.

Tongatapu: *Forster*.

Widely distributed in eastern and southern Asia, Malaysia, Africa, and Fiji.

Bidens pilosa Linnaeus, Sp. Pl., 832, 1753.

Erect, branching, glabrous or somewhat pubescent herb, up to 1 m. tall. Leaves opposite, simple or ternately compound, serrate, acute. Flower heads yellow, 1-2 cm. long, on axillary and terminal peduncles up to 3 cm. or more long; fruit four-angled, with two to four retrorsely barbed awns.

Tongatapu: *Forster*; *Moseley*; weed in sandy area near sea, below Laven-gatonga village, Mar. 6, 1953, *Yuncker 15184*.

'Eua: *Lister*; weed in old plantation near Ha'aluma village, Apr. 1, 1953, *Yuncker 15605*.

Vava'u: *Crosby*.

Found throughout Tonga as a waste-area weed. Of wide distribution in tropical and subtropical countries. (Identifications by E. E. Sherff.)

Tongan name: *fisi'uli*.

Genus **Erechtites** Rafinesque**Erechtites valerianaefolia** (Wolf) de Candolle, in DC. Prodr. 6: 295, 1837.

Simple or branched, smooth or slightly hairy herb, up to 1.5 m. or more tall, stem longitudinally grooved. Leaves alternate, irregularly and sharply pinnately lobed, lobes in turn cuspidately toothed, tapering at base to narrowly winged petiole, sessile upward, up to 12 cm. or more long. Flower heads about 1 cm. long, lavender, on slender peduncles in terminal and axillary cymose clusters, pappus of soft, capillary, white bristles.

Tongatapu: weed in trailside plantation between Fu'amotu village and the sea, Mar. 4, 1953, *Yuncker 15153*.

'Eua: weed in grazing area, near center of island, Mar. 22, 1953, *Yuncker 15425*.

A plantation and waste-area weed throughout Tonga. A tropical American species, now of pantropic distribution.

Genus **Emilia** Cassini**Emilia sonchifolia** (Linnaeus) de Candolle, in DC. Prodr. 6: 302, 1837.

Smooth, erect, branching herb, up to 60 cm. or more tall. Leaves alternate, narrowly oblong-lanceolate, acuminate, irregularly lobed and toothed, clasping stem at broad base. Flower heads about 1 cm. long, on long, slender peduncles in loose, branching, terminal clusters, rays lavender, pappus bristles white, silky.

Tongatapu: weed in plantation near Ha'akame village, Mar. 12, 1953, *Yuncker 15276*.

'Eua: weed in pasture near center of island, Apr. 6, 1953, *Yuncker 15656*.

Lifuka: weed in clearing along road north of Pangai village, Apr. 24, 1953, *Yuncker 15706*.

Found throughout Tonga as a plantation and waste-area weed. An Old World weed of pantropic distribution.

Tongan name: *longolongo'uha*.

Genus **Taraxacum** Zinn

Taraxacum officinale Weber, Prim. Fl. Holsat., 56, 1780.

Low, stemless herb with a long tap root. Leaves clustered at crown, divergent, narrow, elongated, subentire to pinnatifid, up to 10 cm. or more long, tapering at base to narrowly winged petiole. Flower heads yellow, large, solitary on an elongated, erect, hollow scape, up to 20 cm. or more long, pappus bristles soft, white, capillary.

Tongatapu: weed in dooryard, Nuku'alofa, Mar. 7, 1953, *Yuncker 15205*.

'Eua: weed in grassy area about plantation buildings near center of island, Mar. 22, 1953, *Yuncker 15412*.

In dooryards and about dwellings throughout Tonga. A weed native of the temperate parts of Europe, now widespread as a lawn weed throughout much of the world.

Genus **Sonchus** Linnaeus

Sonchus asper (Linnaeus) Hill, Herb. Brit. 1: 47, 1769.

Smooth, erect herb, up to about 50 cm. tall. Leaves alternate, obovate, somewhat pinnatifid, spiny-toothed, acute, base rounded-auriculate, clasping stem. Flower heads pale yellow, in loose, terminal clusters; fruit usually with three longitudinal ribs on each side, pappus bristles soft, white.

Tongatapu: *Forster*.

Vava'u: *Barclay; Crosby*.

A European weed of wide distribution in temperate and tropical regions.

Sonchus oleraceus Linnaeus, Sp. Pl., 794, 1753.

Hollow-stemmed herb up to about 1 m. or more tall. Leaves thin, alternate, up to 20 cm. long, deeply pinnately lobed, terminal lobe broad, lobes dentate with short, spiny teeth, clasping stem at base with sharply acute, auriculate lobes. Flower heads pale yellow, about 2.5 cm. wide, on long peduncles, in loose, terminal clusters, pappus bristles fine, white.

Tongatapu: *Moseley*; weed in plantation near Fu'amotu village, June 5, 1953, *Yuncker 16239*.

Probably grows throughout Tonga as a plantation weed. A native of Europe, now of worldwide distribution in temperate and tropical regions.

Tongan name: *longolongo'uha*.

Genus **Youngia** Cassini

Youngia lyrata Cassini, Ann. Sci. Nat. 23 : 88, 1831.

Slender herb, up to 30 cm. or more tall. Leaves alternate, lyrate, lobes with small, spinelike teeth, basal leaves up to 5 cm. long, much reduced upward. Flower heads scarcely 5 mm. long, numerous, yellow, on slender peduncles up to 2 cm. long, in much-branched, terminal and axillary clusters, pappus bristles capillary, white.

Tongatapu: weed in plantation near Nualei village, Mar. 9, 1953, *Yuncker 15227*.

Probably also grows elsewhere in Tonga as a plantation weed. Asia.

Ornamental species noted in cultivation are *Chrysanthemum* spp., *Coreopsis tinctoria* Nuttall, *Cosmos* spp., *Dahlia pinnata* Cavanilles, *Helianthus* spp., *Tagetes* spp., and *Zinnia elegans* Jacquin.

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