

# FLOWERING PLANTS OF SAMOA

By  
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## INTRODUCTION

This paper is a report on a collection of plants made during an 11-month stay in Samoa, from August to November 1929, and from June 1931 to January 1932, and on other Samoan collections of plants in Bernice P. Bishop Museum which had not previously been studied. These collections include those of D. W. Garber, approximately 800 numbers from Tutuila and the Manua Islands collected in 1921 to 1925; E. H. Bryan, Jr., approximately 150 numbers from Tutuila, Upolu, and Savaii collected in 1924; G. P. Wilder (and O. H. Swezey), approximately 100 numbers from Tutuila and Upolu collected in 1923 and 1925; A. J. Eames, approximately 250 numbers from Tutuila and Upolu collected in 1921; A. F. Judd, plants from the Manua Islands collected in 1926, 1927, and 1932; and L. H. MacDaniels, plants from Upolu collected in 1927.

The cryptogams are being studied by others: marine algae by W. A. Setchell, fresh-water algae by Gottfried Huber-Pestalozzi, mosses by H. J. O. Reimers and E. B. Bartram, and pteridophytes by Carl Christensen and A. H. G. Alston. Some of the flowering plants are also treated by specialists: Pandanaceae by Ugolino Martelli, Gramineae by A. S. Hitchcock, Cyperaceae by Georg Kükenthal, Orchidaceae by Rudolf Mansfeld, Peperomia by T. G. Yuncker, Ficus by V. S. Summerhayes, Coprosma by W. R. B. Oliver, Compositae by Johannes Mattfeld. Three of these groups, Pandanaceae, Peperomia, and Ficus are not included in this report, and other critical groups are still being studied, namely, Piper, Laportea, Elatostema, Cypholophus, Weinmannia, Phaleria, Eugenia, Melastomataceae, Convolvulaceae, Labiatae, Gesneriaceae, Psychotria, and Sarcopygme (new genus).

The collections contain several new records for Samoa and for the individual islands, and the following species and varieties are described as new to science:

<i>Cyperus Seemannianus</i> variety <i>altus</i>	<i>Balaka tuasivica</i>
<i>Cyperus Seemannianus</i> variety <i>perdensus</i>	<i>Joinvillea Bryanii</i>
<i>Carex savaiiensis</i>	<i>Pipturus viridis</i>
<i>Clinostigma savaiiense</i>	<i>Anacolosa insularis</i>
<i>Balaka Burretiana</i>	<i>Cryptocarya samoensis</i>
<i>Balaka siliensis</i>	<i>Litsea magnifolia</i> variety <i>samoensis</i>

Pittosporum samoense	Reynoldsia Grayana
Acronychia Boweriana	Meryta capitata
Canarium mafoa	Palaquium Stehlinii
Baccaurea Seemanni variety samoensis	Planchonella Garberi
Alectryon samoensis	Maba savaiiensis
Elaeocarpus magnifolius	Alstonia Setchelliana
Elaeocarpus tuasivicus	Alyxia erythrosperma variety samoensis
Elaeocarpus Ulianus	Alyxia septangularis
Calophyllum samoense	Hoya attenuata
Melicytus ramiflorus variety samoensis	Hoya chlorantha variety tutuilensis
Xylosma suaveolens variety samoensis	Ixora samoensis variety montana.

I wish to express my gratitude to Dr. H. E. Gregory, Director of Bernice P. Bishop Museum, who has planned the surveys and followed my work in the field and at the Museum with keen and stimulating interest; and to Mr. A. F. Judd, President of the Trustees of Bernice P. Bishop Museum, who has given me valuable advice from his experiences in the field, and whose inspiring ideas have enriched my outlook on the problems involved.

I am greatly indebted to Dr. E. D. Merrill, Director of the New York Botanical Garden, who has given tentative identifications of a great many of the plants. I am also indebted to the botanists who have determined the plants of special groups: Dr. A. S. Hitchcock, Dr. Georg Kükenthal, Dr. Johannes Mattfeld, and Dr. W. R. B. Oliver. Special thanks are due to Professor W. A. Setchell, who has given me many stimulating suggestions and who has directed my attention to the group of rubiaceous plants discovered by him to be a new genus.

Many botanists have facilitated my work by furnishing information from books inaccessible to me, examining type specimens, extending loans, and in various other ways: Dr. J. G. B. Beumee, Dr. E. B. Copeland, Dr. F. V. Coville, Dr. I. M. Johnston, Dr. Karl Keissler, Dr. Rudolf Mansfeld, Mr. John Ramsbottom, Dr. B. L. Robinson, Dr. K. Münster Ström, Dr. William Trelease, and Mr. E. E. Ward. To all these I wish to extend my sincere thanks.

I am indebted to Dr. F. B. H. Brown and Dr. Harold St. John for stimulating coöperation at Bernice P. Bishop Museum; to Dr. C. S. Stang and Dr. Henning Mörländ for revision of the Latin descriptions; to Mr. E. H. Bryan, Jr., for his faithful and self-sacrificing attention to my needs in the field and to the care of the plants as they were shipped to Honolulu, which contributed in no small degree to the success of the survey; to Mr. E. P. Hume, my field assistant a part of the time; to Mr. Edward Hosaka, who has made all the drawings of the new species and varieties; and to Miss Margaret Titcomb, who has revised the bibliography.

It is impossible here to mention all those who helped me in various ways during my stay in Samoa: Colonel S. S. Allen and General H. E. Hart,

Administrators of Western Samoa; Captain G. S. Lincoln, Governor of American Samoa; Mr. William Watson, Resident Commissioner on Savaii; Mr. Edmund Stehlin, Jr., Inspector of Plantations; Mr. Jack Bower, District Officer; Mr. P. T. Diefenderfer, Superintendent of Education; Mr. C. A. Anunsen, Plantation Owner; Mrs. M. Walter, Apia; Mr. N. H. Macdonald, Surveyor; Mr. T. Andrew, Apia; Mr. Ernest Oldehaver, Salailua. To all these, to the chiefs of Samoa, and to all the others who have given freely of their knowledge and hospitality, I want to extend my sincere thanks. Mr. Edmund Stehlin, Jr., has been my companion on many trips and has been of invaluable assistance to me in acting as interpreter and giving me information from his wealth of knowledge of Samoa and Samoan ways.

The Nansen Fund and the Norwegian Government Fund for Research have contributed towards defraying expenses for equipment and transportation to the field.

## MONOCOTYLEDONEAE

## FAMILY 1. PANDANACEAE

The Pandanaceae of Samoa are treated in a paper by Martelli (38)\*.

## FAMILY 2. HYDROCHARITACEAE

## I. HALOPHILA Thouars

**Halophila ovalis** (R. Brown) Hooker f.: Fl. Tasm., vol. 2, p. 45, 1860.

Upolu: in sea near low water, Apia harbor, February 16, 1921, Eames no. 30; coral sand banks, Apia harbor, March 2, 1921, Eames no. 129.

These specimens are different from variety *bullosa* described by Setchell (51, p. 114) in size, form, and venation of the leaf. The size of the full-grown leaves is 1.2-1.8 cm. by 0.6-1.1 cm., and the number of secondary veins ranges between 14 and 16 on each side of the midrib. The form of the leaf is more broadly oval than in variety *bullosa*. Regarding the bullosity it is difficult to form an opinion from dried material.

## FAMILY 3. GRAMINEAE

DETERMINED BY A. S. HITCHCOCK

## I. SCHIZOSTACHYUM Nees

? **Schizostachyum glaucifolium** (Ruprecht) Munro: Linn. Soc., Trans., vol. 26, p. 137, 1868.

Olosenga: Piumafua Ridge, altitude 500 meters, June 17, 1925, Garber no. 1041. Upolu: woods near Apia, altitude 50 meters, February 19, 1921, Eames no. 67. Savaii: open woodland, east of Olo, above Safotu, altitude 700-800 meters, August 8, 1931, Christophersen and Hume no. 2306; river bank above Sili, altitude 400 meters, November 12, 1931, Christophersen no. 3185. Native name *ofe* ('*ofe*') (nos. 1041, 67, 2306, 3185), *ofe samoa*.

The plants collected are all sterile, making the identification uncertain. The species is not very common, found in scattered clumps at low and middle elevation, growing to a height of 6-8 meters. It may be found in the forest in an apparently native state far removed from any present-day cultivation. The culms are used by the natives, especially for making temporary shelter houses in the plantations or in the forests. They are also used for shelves (*talitali*) in the regular houses, for fishing rods ('*ofe*'), and for pillows ('*ali*'). More commonly used for pillows, however, is the *ofe fiti*, probably a true bamboo, which is cultivated near the villages. This bamboo has thicker culms

\* Numbers in parentheses refer to Literature Cited, p. 213.



and shorter internodes than the native "bamboo." Less commonly bamboo (especially 'ofe fiti) is used for "kerosene guns," effective noise-making toys, probably of Chinese introduction, and for storing tobacco leaves (*tipi*).

## 2. ERAGROSTIS Beauvois

**Eragrostis amabilis** (Linnaeus) Wight et Arnott: Hook. et Arn., Bot. Beechey Voy., p. 251, 1841.

Tutuila: roadside, Pago Pago, flower, February 7, 1921, Eames no. T-6 (determined by Christophersen); Goat Island, flower, fruit, November 27, 1924, D. W. Garber no. 796; in Nuuuli Village, flower, November 9, 1929, Christophersen no. 1178. Upolu: sandy waste place, Apia, flower, fruit, February 16, 1921, Eames no. 34; dry waste land along beach, Apia, flower, February 22, 1921, Eames no. 70-a; waste place, Apia, flower, fruit, August 30, 1929, Christophersen no. 482. Savaii: in lawn, Fangamalo, flower, fruit, July 4, 1931, Christophersen and Hume no. 1865 (determined by Christophersen).

## 3. CENTOTHECA Desvaux

**Centotheca latifolia** (Osbeck) Trinius: Fund. Agrost., p. 141, 1820.

Tau: Sani Ridge, back of Fitiuta, altitude 125 meters, flower, August 9, 1921, Garber no. 589. Olosenga: trail back of Olosengauta, altitude 300 meters, flower, June 17, 1925, Garber no. 1035. Tutuila: Afono-Vatia trail, altitude 150 meters, flower, December 17, 1924, Garber no. 867; plantation back of Pago Pago, December 26, 1924, Garber no. 889. Upolu: moist places, Vailima, altitude 100-300 meters, flower, February 27, 1921, Eames no. 85; forest above Malololelei, altitude 680 meters, flower, August 5, 1929, Christophersen no. 9; river canyon near Malololelei, altitude 500 meters, flower, August 6, 1929, Christophersen no. 77. Savaii: near Safune, altitude 10-50 meters, flower, fruit, April 30, 1924, Bryan no. 111; trail side, forest above Salailua, altitude 300 meters, flower, May 23, 1924, Bryan no. 179. Native name, *sefa* (nos. 867, 889), *vao fali* (nos. 85, 111).

## 4. LEPTURUS R. Brown

**Lepturus repens** (Forster) R. Brown: Prodr. Fl. Nov. Holl., p. 207, 1810.

Savaii: sandy pocket, rocky coast, Salailua-Lata-itai, flower, September 18, 1931, Christophersen nos. 2646, 2648 (determined by Christophersen); rocky coast, Falealupo-Fangalele, flower, November 22, 1931, Christophersen no. 3339 (determined by Christophersen).

## 5. ELEUSINE Gaertner

**Eleusine indica** (Linnaeus) Gaertner: Fruct., vol. 1, p. 8, 1788.

Tutuila: Goat Island, flower, fruit, November 27, 1924, Garber no. 794; Goat Island, fruit, December 14, 1924, Garber no. 810. Upolu: roadside, Apia, flower, fruit, February 16, 1921, Eames no. 38 (determined by Christophersen); below Malololelei, altitude 500 meters, flower, Christophersen (by native) no. 334; on road at Malololelei, altitude 500 meters, flower, fruit, August 25, 1929, Christophersen no. 428. Savaii: taro plantation, above Salailua, altitude 400 meters, flower, Bryan no. 178; at creek below Matavanu Crater, altitude 650 meters, flower, fruit, September 16, 1929, Christophersen no. 631. Native names, *sefa* (nos. 794, 810), *taa taa* (*ta'a ta'a*) or *lau taa taa* (nos. 38, 334).

## 6. CHLORIS Swartz

**Chloris inflata** Link: Hort. Berol., vol. 1, p. 105, 1827.

*Chloris paraguayensis* Steudel.

Tutuila: dry roadside, Pago Pago, flower, fruit, February 7, 1921, Eames no. T-17 (determined by Christophersen); Pago Pago, flower, September 19, 1923, Wilder no. 21; Goat Island, fruit, November 27, 1924, Garber no. 801; reservoir trail, altitude 100 meters, fruit, October 30, 1929, Christophersen no. 980.

## 7. DIGITARIA Scopoli

**Digitaria chinensis** Hornemann: Hort. Hafn., Suppl., p. 8, 1819.

*Digitaria timorensis* (Kunth) Balansa: Morot, Jour. de Bot., vol. 4, p. 138, 1890.

Savaii: taro plantation, above Letui, altitude 150 meters, flower, September 27, 1929, Christophersen no. 765.

Dr. Hitchcock, through the courtesy of Dr. Christensen, Director of the Botanic Garden at Copenhagen, has been able to examine the type of *D. chinensis* Hornemann. It is the same as *D. timorensis* (Kunth) Balansa, and must replace that as the valid name for the species. This species was described from Hawaii by Hitchcock (29) under the name *Syntherisma debile* (Desfontaines) Skeels, which is a different species of the Mediterranean region. *Syntherisma chinense* (Nees) Hitchcock (29) and *Digitaria chinensis* (Nees) A. Camus (30), based on *Paspalum chinense* Nees (1836), become, according to Dr. Henrard of Leiden, who has examined the type, *Digitaria violascens* Link.

**Digitaria Henryi** Rendle: Jour. Linn. Soc., Bot., vol 36, p. 323, 1904.

Savaii: sandy beach, Avau, flower, July 8, 1931, Christophersen and Hume no. 1935:

**Digitaria longiflora** (Retzius) Persoon: Syn., vol. 1, p. 85, 1805.

Upolu: cow paddock at Malololelei, altitude 550 meters, flower, August 17, 1929, Christophersen no. 316. Native name, *sefa* (no. 316).

**Digitaria microbachne** (Presl) Henrard: Med. Rijks Herb. Leiden, vol. 61, p. 13, 1930.

Savaii: open "fern country," Vaipouli-Manase, altitude 100 meters, fruit, September 21, 1929, Christophersen no. 727; open "fern country," Vaipouli-Manase, altitude 100 meters, fruit, July 12, 1931, Christophersen and Hume no. 1980; plantation, Falealupo, altitude 25 meters, flower, fruit, September 29, 1931, Christophersen no. 2806 (determined by Christophersen); taro plantation, Salailua, altitude 150 meters, flower, October 28, 1931, Christophersen nos. 2987 and 3001; rocky coast, Falealupo-Fangalele, flower, November 22, 1931, Christophersen no. 3334. Native name, *tui se* (?) (no. 2806).

**Digitaria pruriens** (Trinius) Buese: Miquel, Pl. Jungh., p. 379, 1854.

Tutuila: at the shore, Pago Pago, flower, September 21, 1923, Wilder no. 30; Goat Island, fruit, November 27, 1924, Garber no. 797. Upolu: waste ground, Apia, flower, February 18, 1921, Eames no. 54. Savaii: taro plantation, above Salailua, altitude 400 meters, flower, May 23, 1924, Bryan no. 177.

## 8. PASPALUM Linnaeus

**Paspalum cartilagineum** Presl: Rel. Haenk., vol. 1, p. 216, 1830.

Tutuila: moist place, Pago Pago harbor, fruit, February 7, 1921, Eames no. T-8 (determined by Christophersen). Upolu: marshy place, Apia, flower, fruit, February 22, 1921, Eames no. 70; swamp near Tiavi, altitude 720 meters, flower, fruit, August 12, 1929, Christophersen no. 182.

**Paspalum conjugatum** Bergius: Act. Helvet. Phys. Math., vol. 7, p. 129, pl. 8, 1762.

Tutuila: low ground, Pago Pago, fruit, February 7, 1921, Eames no. T-25 (determined by Christophersen); roadside near Matuu, flower, January 3, 1925, Garber no. 964. Upolu: moist ground, Apia, flower, fruit, February 22, 1921, Eames no. 68; opening in forest, above Malololelei, altitude 680 meters, flower, August 5, 1929, Christophersen no. 10; along trail, forest above Malololelei, altitude 700 meters, flower, fruit, August 12, 1929, Christophersen no. 168; top of Fao mountain, altitude 680 meters, flower, September 6, 1929, Christophersen no. 552. Savaii: near Safune, flower, fruit, April 30, 1924, Bryan no. 110; lava cracks below Matavanu Crater, altitude 300 meters, fruit, September 12, 1929, Christophersen no. 596; plantation, back of Vaipouli, altitude 100 meters, flower, fruit, July 6, 1931, Christophersen and Hume no. 1892; river bed, above Matavanu Crater, altitude 850 meters, flower, fruit, August 6, 1931, Christophersen and Hume no. 2281; plantation

ground Lata-iuta, altitude 50 meters, flower, October 31, 1931, Christophersen no. 3020.

Native name, *vailima* (nos. 552, 110). This name was given to the plant because of some association between R. L. Stevenson's residence, Vailima, and its first occurrence or introduction. The *vailima* (the Hilo grass of Hawaii) is widely distributed on all the main Samoan islands, in waste places, in plantations, and in open places in the forests. It is, however, a prominent element only in abandoned plantation land, where it may cover the ground for acres in association with the recent immigrant *fue saina* ("mile-a-minute," *Mikania micrantha*).

**Paspalum distichum** Linnaeus: Syst. Nat., 10th ed., vol. 2, p. 855, 1759.

Savaii: Sandy pocket, rocky shore, Salailua-Lata-itai, September 18, 1931, Christophersen no. 2647.

**Paspalum longifolium** Roxburgh: Fl. Ind., vol. 1, p. 283, 1820.

Tutuila: Goat Island, flower, fruit, November 27, 1924, Garber no. 805; open place in scrub forest, top of Le Pioa, altitude 500 meters, flower, January 2, 1932, Christophersen no. 3560. Savaii: tidal swamp, near Tufutafoe, flower, fruit, November 22, 1931, Christophersen no. 3313.

**Paspalum orbiculare** Forster: Fl. Ins. Austr. Prodr., p. 7, 1786.

Savaii: open "fern country," Vaipouli-Manase, fruit, September 21, 1929, Christophersen no. 729.

**Paspalum paniculatum** Linnaeus: Syst., 10th ed., p. 855, 1759.

Upolu: at stream, Moa Moa plantation, altitude 200 meters, March 2, 1921, Eames no. 138.

**Paspalum vaginatum** Swartz: Prodr. Veg. Ind. Occ., p. 21, 1788.

Upolu: edge of mangrove swamp, Mulinuu, Apia, August 27, 1929, Christophersen no. 438 (specimens sterile, may belong to this species); sandy beach, Poutasi-Salani, flower, October 23, 1929, Christophersen no. 976.

## 9. AXONOPUS Beauvois

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

Upolu: roadside near Malololelei, altitude 650 meters, fruit, August 10, 1929, Christophersen no. 155.

## 10. PANICUM Linnaeus

**Panicum maximum** Jacquin: Ic. Pl. Rar., vol. 1, pl. 13, 1786.

Savaii: plantation near Samalaeulu, altitude 10-20 meters, fruit, October 13, 1929, Christophersen no. 918.

**Panicum pilipes** Nees et Arnott: Hook. Jour. Bot. Kew Miscel., vol. 2, p. 97, 1850.

Ofu: plantation, Feaia Point, altitude 90 meters, flower, fruit, May 25, 1925, Garber no. 975. Tutuila: open, top of Le Pioa, altitude 500 meters, flower, January 2, 1932, Christophersen no. 3559. Upolu: abandoned clearing, near Apia, altitude 50 meters, flower, February 19, 1921, Eames no. 59. Savaii: near Manase, altitude 25 meters, flower, August 17, 1931, Christophersen and Hume no. 2421.

**Panicum trigonum** Retzius: Obs., vol. 3, p. 9, 1783.

Upolu: cow paddock at Malololelei, altitude 550 meters, flower, fruit, August 17, 1929, Christophersen no. 325. Native name, *sefa* (no. 325).

### 11. BRACHIARIA Grisebach

**Brachiaria ambigua** (Trinius) A. Camus: Lecomte, Fl. Gen. Indo-Chine, vol. 7, p. 433, 1922.

Tutuila: moist banks, Pago Pago, flower, February 7, 1921, Eames no. T-24 (determined by Christophersen); near Pago Pago, flower, September 25, 1923, Wilder no. 50.

### 12. OPLISMENUS Beauvois

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

Upolu: edge of forest, Moa Moa plantation, altitude 250 meters, flower, fruit, March 2, 1921, Eames no. 149. Savaii: rim of Papafu Crater, altitude 1500 meters, September 22, 1931, Christophersen no. 2712 (specimens sterile, identification probable).

### 13. ECHINOCHLOA Beauvois

**Echinochloa colonum** (Linnaeus) Link: Hort. Berol., vol. 2, p. 209, 1833.

Tutuila: moist ground, Pago Pago, flower, fruit, February 7, 1921, Eames no. T-26 (determined by Christophersen); Pago Pago, fruit, September 19, 1923, Wilder no. 21-a; roadside near Fanganeanea, fruit, January 3, 1925, Garber no. 966. Upolu: wet place, Apia, flower, fruit, February 19, 1921, Eames no. 65 (determined by Christophersen).

### 14. CENCHRUS Linnaeus

**Cenchrus echinatus** Linnaeus: Sp. Pl., p. 1050, 1753.

Tutuila: Goat Island, flower, December 16, 1924, Garber no. 830. Upolu: on beach, Apia, flower, fruit, August 29, 1929, Christophersen no. 471. Savaii: in lawn, Fangamalo, flower, July 4, 1931, Christophersen and Hume no. 1864. Native name, *vao tui tui* (no. 830).

## 15. THUAREA Persoon

**Thuarea involuta** (Forster) Roemer et Schultes: Syst., vol. 2, p. 808, 1817.

Upolu: waste ground near beach, Apia, flower, February 18, 1921, Eames no. 53; on the beach, Apia, flower, August 29, 1929, Christophersen no. 473. Savaii: in lawn, Fangamalo, flower, July 4, 1931, Christophersen and Hume no. 1858 (determined by Christophersen). Native name, *sefa* (no. 53).

## 16. IMPERATA Cyrillo

**Imperata cylindrica** (Linnaeus) Beauvois: Ess. Agrost., pp. 165, 177, pl. 5, fig. 1, 1812.

Savaii: lava field, above Safune, altitude 600 meters, flower, May 4, 1924, Bryan no. 129; lava below Matavanu Crater, altitude 400 meters, flower, fruit, September 12, 1929, Christophersen no. 595; at creek below Matavanu Crater, altitude 650 meters, flower, fruit, September 16, 1929, Christophersen no. 658.

## 17. MISCANTHUS Andersson

**Miscanthus japonicus** (Thunberg) Andersson: Oefers. K. Sv. Vet. Akad. Forhandl. Stockh., vol. 12, p. 166, 1856.

Tau: along road, Luma, flower, January 11, 1922, Garber no. 705. Tutuila: moist slopes, Pago Pago, flower, February 7, 1921, Eames no. T-19 (determined by F. Brown); Goat Island, flower, fruit, November 2, 1924, Garber no. 793. Upolu: thicket, Vailele, March 5, 1921, Eames no. 155. Savaii: open "fern country" near Manase, altitude 50-100 meters, flower, September 18, 1929, Christophersen no. 806; Salailua, flower, November 9, 1931, Christophersen (by native) no. 3127.

Native name, *u* (nos. 705, 793, 155, 3127). The culms are used in making thatch in the same way that the stem of the *lafa* is used (see p. 47).

## 18. SACCHARUM Linnaeus

**Saccharum officinarum** Linnaeus: Sp. Pl., p. 54, 1753.

Savaii: abandoned plantation, above Safotu, altitude 375 meters, July 16, 1931, Christophersen and Hume no. 2002; cultivated, Salailua, altitude 75 meters, October 26, 1931, Christophersen no. 2950; cultivated, Ngangamalae, November 4, 1931, Christophersen nos. 3025 and 3026; cultivated, Sili, altitude 50 meters, November 14, 1931, Christophersen no. 3143. Native name, *tolo*.

Spontaneous sugar cane was never met with in Samoa, but it is found persisting in abandoned plantations. It is cultivated in all village plantations, where it is grown for thatch and as a confection. Neither natives nor white

people grow sugar cane in Samoa for commercial purposes. The following forms were noted:

**Tolo fiti.** The culm is robust with short internodes which are black or bluish black except for a narrow gray belt below the node. Commonly planted around the houses for chewing purposes. Specimen no. 2950.

**Tolo fua lau.** This is the principal form used for thatch, and consequently the one most extensively cultivated. The culms are slender, the internodes in the lower part being dark bluish purple or brownish purple with a narrow darker belt just above the node, in the upper part covered with a gray bloom and of a lighter, reddish-purple color. The leaves are relatively short. In one sample the diameter of the culm is 3.5 cm., the nodes 2.5-4.5 cm. long. Specimen no. 3026.

**Tolo lele.** I have not seen any specimens of this form. The name was given by three informants from different villages. By one informant the culm was said to be dark red, by another, white.

**Tolo pau.** This name, given by Pratt (42, p. 328), was verified by one informant in Savaii, but I have not seen any specimens.

**Tolo samoa.** Probably another name for *tolo fua lau*, which is called "the Samoan sugar cane." It was said to be used for thatch.

**Tolo tea.** The culms are heavier than those of the thatch cane (*tolo fua lau*) and the nodes and leaves are longer. In the lower part of the culm the nodes are light green with dark spots, in the upper part they are yellow. One specimen has a diameter of 4 cm., the nodes being 4-7.5 cm. long. Specimen no. 3025.

**Tolo ula.** The color of the culms is dark red.

**Tolo uli.** This form comes very close to *tolo fiti*, the two names being given to the same specimen by different informants who maintained, however, that the two forms are distinct.

**Vaevae ula.** This form is very decorative with slender culms and nodes with longitudinal, alternating red and green stripes. Specimen no. 3143.

Pratt (42, pp. 137, 328) gives *fiso* and *tolofiso* as names of forms of sugar cane. The name *tolofiso* was verified once and *fiso* several times in Savaii but without identification of actual specimens. Neither name was given in any of the lists of sugar canes taken down from native informants, making it improbable that they refer to a form of this plant. Setchell (51, p. 113) identifies *fiso* as *Miscanthus japonicus*. However, the common name for this plant, and the only one I have heard, is *u*. Pratt (42, p. 137) gives for *fiso* the additional meaning of "the blossom of the sugar cane," and as verb, "to blossom, of the sugar cane." It is possible, therefore, that *fiso* (*tolo fiso*), strictly speaking, refers to the flower of the sugar cane, and *tolo* to the plant as a whole. A distinction of this kind is found in several other plants, for instance *alo alo* ('alo 'alo), the flowers of the *ngatae* (*Erythrina variegata*), and *singano*, the flowers of the *hala* (*fala*; *Pandanus*).

## 19. ISCHAEMUM Linnaeus

**Ischaemum murinum** Forster: Prodr., p. 73, 1786.

Tutuila: Goat Island, flower, November 27, 1924, Garber no. 806.

**Ischaemum Stokesii** F. Brown: B. P. Bishop Mus., Bull. 84, p. 53, pl. 2, 1931.

Tutuila: open place, top of Le Pioa, altitude 500 meters, flower, January 2, 1932, Christophersen no. 3545.

## 20. SORGHUM Linnaeus

**Sorghum vulgare** Persoon varietas **sudanensis** (Piper) Hitchcock.

Upolu: waste ground, Apia, flower, February 16, 1921, Eames no. 43.

## 21. RHAPHIS Loureiro

**Rhaphis aciculata** (Retzius) Desvaux: Opusc., p. 69, 1831.

Tutuila: dry grassy place, Pago Pago, flower, fruit, February 7, 1921, Eames no. T-17 (determined by Christophersen); Goat Island, flower, fruit, November 27, 1924, Garber no. 798. Upolu: in lawn, Lalumanu, flower, October 24, 1929, Christophersen no. 965. Savaii: open "fern country," Vaipouli-Manase, altitude 100 meters, flower, fruit, September 21, 1929, Christophersen no. 726; sandy beach, Avau, flower, fruit, July 1931, Christophersen and Hume no. 1934 (determined by Christophersen). Native name, *mutia vao* (?) (no. 798).

The lemon grass, *Cymbopogon citratus* (DeCandolle) Stapf, is commonly planted about the houses but has not been found in a native state. The Samoans use it for scenting coconut oil, and for perfume in hair wash. The leaves are also chewed as a remedy for sore gums. The native name is *moengalo*. (Upolu: Eames no. 166; Walter in 1932. Savaii: Christophersen (by native) no. 664. Specimens determined by Christophersen).

## 22. ZEA Linnaeus

**Zea Mays** Linnaeus: Sp. Pl., p. 971, 1753.

Tutuila: Pago Pago, January 6, 1932, Christophersen (by native) no. 3599. Native name, *fiso* (?). (See p. 13).

## 23. COIX Linnaeus

**Coix lachryma-jobi** Linnaeus: Sp. Pl., p. 972, 1753.

Tutuila: roadside below Samoan hospital, Naval Station, fruit, December 26, 1924, Garber no. 896; Pago Pago harbor, fruit, 1929, Diefenderfer no. 23; at Aua village, flower, fruit, November 10, 1929, Christophersen no. 1207. Upolu: low ground, Apia, flower, fruit, February 28, 1921, Eames no. 127.

Native name, *sanga sanga* (nos. 896, 1207). A common grass in moist places, along watercourses. The seeds are used by the natives for necklaces ('*ula*).



## FAMILY 4. CYPERACEAE

DETERMINED BY G. KÜKENTHAL

## I. KYLLINGA Rottboell

**Kyllinga brevifolia** Rottboell: Descr. Ic., p. 13, pl. 4, fig. 3, 1773.

Upolu: moist, waste places, Apia, flower, February 16, 1921, Eames no. 41; along trail, ridge above Malololelei, altitude 700 meters, flower, August 12, 1929, Christophersen no. 167. Savaii: coconut plantation, Lata-iuta, altitude 50 meters, flower, October 5, 1931, Christophersen no. 2818. Native name, *tuse* (no. 41).

**Kyllinga cephalotes** (Jacquin) Druce: Bot. Exch. Club Brit. Isl. for 1916, p. 630, 1917.

*Kyllinga monocephala* Rottboell.

Tutuila: moist places, Pago Pago, flower, February 7, 1921, Eames no. T-4 (determined by Christophersen); forest along pipe line above Naval Station, flower, April 12, 1924, Bryan no. 79; edge of plantation, Afono-Vatia trail, altitude 150 meters, flower, December 17, 1924, Garber no. 866; below Government House, Pago Pago, flower, December 21, 1924, Garber no. 888. Upolu: on the beach, Apia, flower, August 29, 1929, Christophersen no. 472. Savaii: in lawn, Fangamalo, flower, July 4, 1931, Christophersen and Hume no. 1859. Native names, *taa taa* (*ta'a ta'a*) (nos. 866 and 888), *tuse* (no. 79).

## 2. CYPERUS Linnaeus

**Cyperus compressus** Linnaeus: Sp. Pl., p. 46, 1753.

Tau: plateau back of Luma, altitude 100 meters, flower, fruit, December 15, 1921, Garber no. 659 (determined by Christophersen). Tutuila: moist places, Pago Pago, flower, fruit, February 7, 1921, Eames no. T-1. Upolu: waste places, Apia, flower, fruit, February 18, 1921, Eames no. 47.

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

*Cyperus flexifolius* Boeckeler.

*Mariscus Sieberianus* Nees.

Tau: plateau back of Luma, altitude 125 meters, flower, December 15, 1921, Garber no. 647 (determined by Christophersen). Tutuila: low ground, Pago Pago, flower, February 7, 1921, Eames no. T-12 (determined by Christophersen); wet places along road, Pago Pago, flower, fruit, September 22, 1923, Wilder no. 40 (determined by Christophersen); wet places along road, Fangasa, flower, September 5, 1923, Wilder no. 72 (determined by Christophersen); Goat Island, flower, December 16, 1924, Garber no. 831. Native name, *taa taa* (*ta'a ta'a*) (no. 831).

**Cyperus cyperoides** (Linnaeus) O. Kuntze subspecies **cyperinus** (Retzius)  
Kükenthal: Engl. Bot. Jahrb., vol. 59, p. 46, 1924.

*Kyllinga cyperina* Retzius.

*Mariscus cyperinus* Vahl.

Tau: plateau back of Luma, altitude 125 meters, flower, fruit, December 15, 1921, Garber no. 649. Tutuila: moist places, Pago Pago, flower, February 7, 1921, Eames no. T-15; reservoir trail above Naval Station, altitude 200 meters, flower, October 30, 1929, Christophersen no. 992. Upolu: low ground, Apia, fruit, February 28, 1921, Eames no. 123. Savaii: at creek below Matavanu Crater, altitude 650 meters, fruit, September 16, 1929, Christophersen no. 657; in lava cracks, near Saleaula, altitude 10 meters, flower, September 20, 1929, Christophersen no. 709; open "fern country" between Vaipouli and Manase, altitude 100 meters, flower, September 21, 1929, Christophersen no. 718; by river, above Sili, altitude 400 meters, fruit, November 12, 1931, Christophersen no. 3145; plantation above Auala, altitude 100 meters, flower, November 20, 1931, Christophersen no. 3357; coconut plantation, near Sataua, altitude 25 meters, flower, November 21, 1931, Christophersen no. 3418.

**Cyperus pennatus** Lamarck: Tabl. Encycl., vol. 1, p. 144, 1791.

*Cyperus stuppeus* Forster f., nomen nudum.

Tutuila: low ground, Pago Pago, flower, February 7, 1921, Eames no. T-20; Goat Island, flower, December 16, 1924, Garber no. 832. Upolu: low ground, Apia, flower, February 16, 1921, Eames no. 44; on the beach, Apia, fruit, August 27, 1929, Christophersen no. 431. Savaii: rocky bluff, Safotu-Manase, fruit, August 20, 1931, Christophersen and Hume no. 2456; swamp, Falealupo, flower, September 30, 1931, Christophersen no. 2777. Native name, *sele sele* (*lau sele sele*) (nos. 832, 2777).

?**Cyperus polystachyus** Rottboell: Descr. Nov. Pl., p. 39, 1773.

Savaii: rocky shore, Salailua-Lata-itai, September 18, 1931, Christophersen no. 2650. The specimens are over-ripe and not definitely determinable.

**Cyperus rotundus** Linnaeus: Sp. Pl., p. 45, 1753.

Upolu: roadside, Apia, flower, February 22, 1921, Eames no. 69. Savaii: Salailua, flower, October 27, 1931, Christophersen no. 2977; in lawn, Fanga, flower, December 19, 1931, Christophersen no. 3468. Sterile specimens from Safune (Christophersen and Hume no. 2394) probably belong here.

Native name, *mumuta* (nos. 2977, 3468). The lemon-scented bulbs are used by the natives as a perfume in shampoos.

**Cyperus Seemannianus** Boeckeler: Linnaea, vol. 36, p. 390, 1870.

Upolu: Maunga Tele Ridge, above Saluafata, altitude 650 meters, flower, September 4, 1929, Christophersen no. 521.

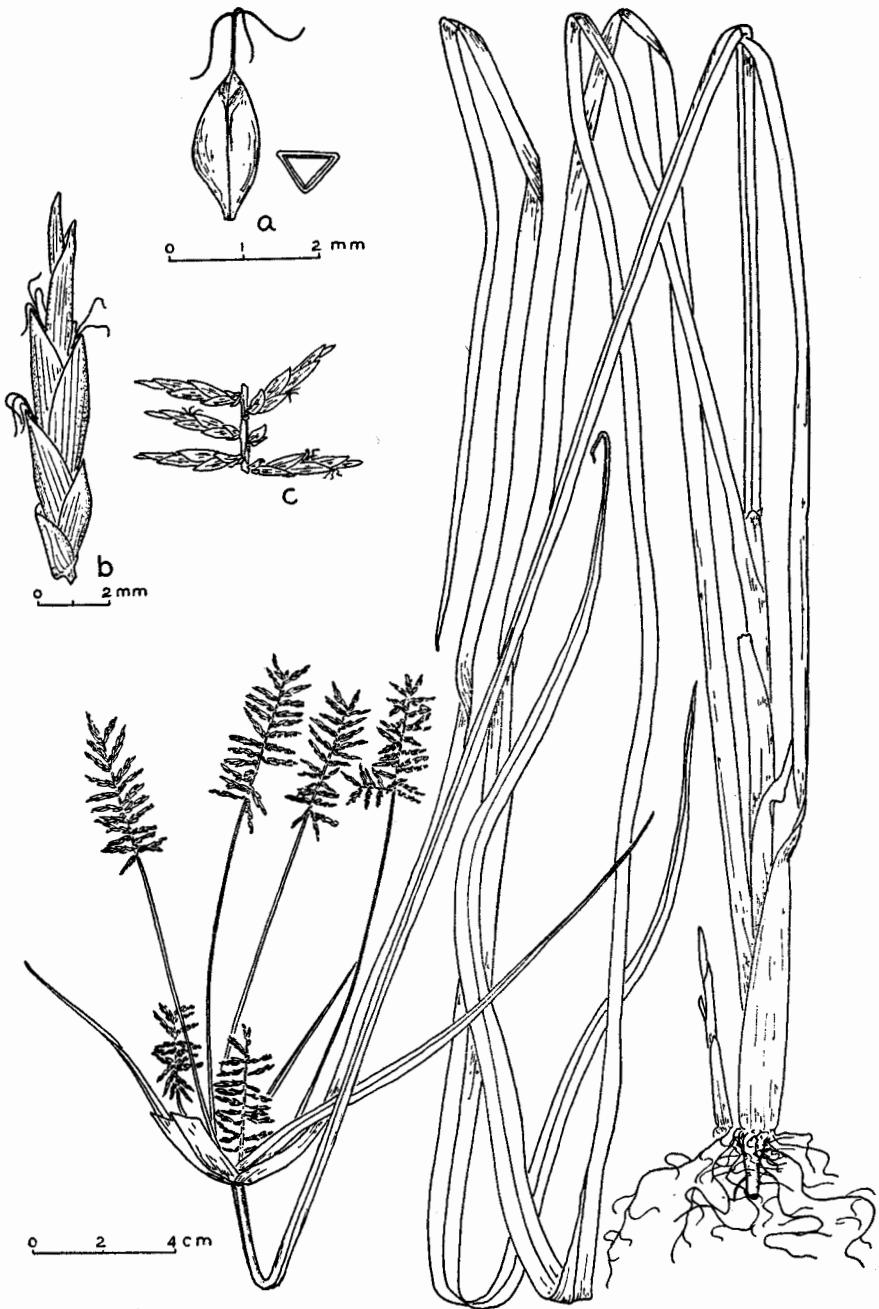


FIGURE 1.—*Cyperus Seemannianus* varietas *altus* Kükenthal: a, achene and cross section; b, spikelet; c, part of spike.

**Cyperus Seemannianus** Boeckeler varietas **altus** Kükenthal, varietas nova (fig. 1).

Culmus ad 60 cm. altus. Folia 8 mm. lata. Radii ad 10 cm. longi. Spicae densae. Spiculae 5-8 mm. longae 4-nucigerae. Squamae stramineo-flavidae valde nervosae.

Culms to 60 cm. high. Leaves 8 mm. broad. Rays to 10 cm. long. Spikes dense. Spikelets 5-8 mm. long, 4-seeded. Scales straw-yellow with strong veins.

Upolu: forest, Maunga Tele Ridge, above Saluafata, altitude 600 meters, flower, fruit, September 4, 1929, Christophersen no. 537; forest, Fao trail, above Sauango, altitude 400 meters, flower, September 6, 1929, Christophersen no. 549, type.

**Cyperus Seemannianus** Boeckeler varietas **monostachys** (Boeckeler) Kükenthal, combinatio nova.

*Cyperus monostachys* Boeckeler: Linnaea, vol. 36, p. 389, 1870.

*Cyperus monostachys* Boeckeler a *C. Seemannianus* Boeckeler *nonnisi* spicis saepius singulis laxioribus, necnon squamis sanguineo-fuscis abhorret, quare mihi illae subjungenda videtur.

Tau: Sani Ridge back of Fitiuta, altitude 125 meters, flower, September 8, 1921, Garber no. 590; plateau back of Luma, altitude 150 meters, fruit, December 15, 1921, Garber no. 657. Tutuila: low ground, Pago Pago, flower, February 7, 1921, Eames no. T-22. Savaii: edge of forest, near Manase, altitude 25 meters, flower, August 17, 1931, Christophersen and Hume no. 2420.

**Cyperus Seemannianus** Boeckeler varietas **perdensus** Kükenthal, varietas nova (fig. 2).

Similariter var. *altus*. Sed spicae *perdensae*. Spiculae 3 mm. longae 1-2-nucigerae. Squamae sordide brunneae.

Similar to varietas *altus*. Spikes very dense. Spikelets 3 mm. long, 1-2-seeded. Scales dirty brown.

Tutuila: forest, Alava Ridge, altitude 500 meters, fruit, June 24, 1931, Christophersen and Hume no. 1819.

### 3. ELEOCHARIS R. Brown

**Eleocharis dulcis** (Burman f.) Trinius: ex Henschel, Vita Rumph., p. 186, 1833.

*Eleocharis plantaginea* Roemer et Schultes.

Upolu: in shallow water, Lake Lanutoo, altitude 700 meters, flower, August 21-22, 1929, Christophersen no. 378; tidal swamp, Poutasi-Salani, flower, October 23, 1929, Christophersen no. 973. Savaii: swamp, Fangamalo, flower, August 25, 1931, Christophersen and Hume no. 2512; tidal swamp, Falealupo, flower, September 30, 1931, Christophersen no. 2779. Native name, *utu utu* ('utu 'utu) (nos. 378, 2779).

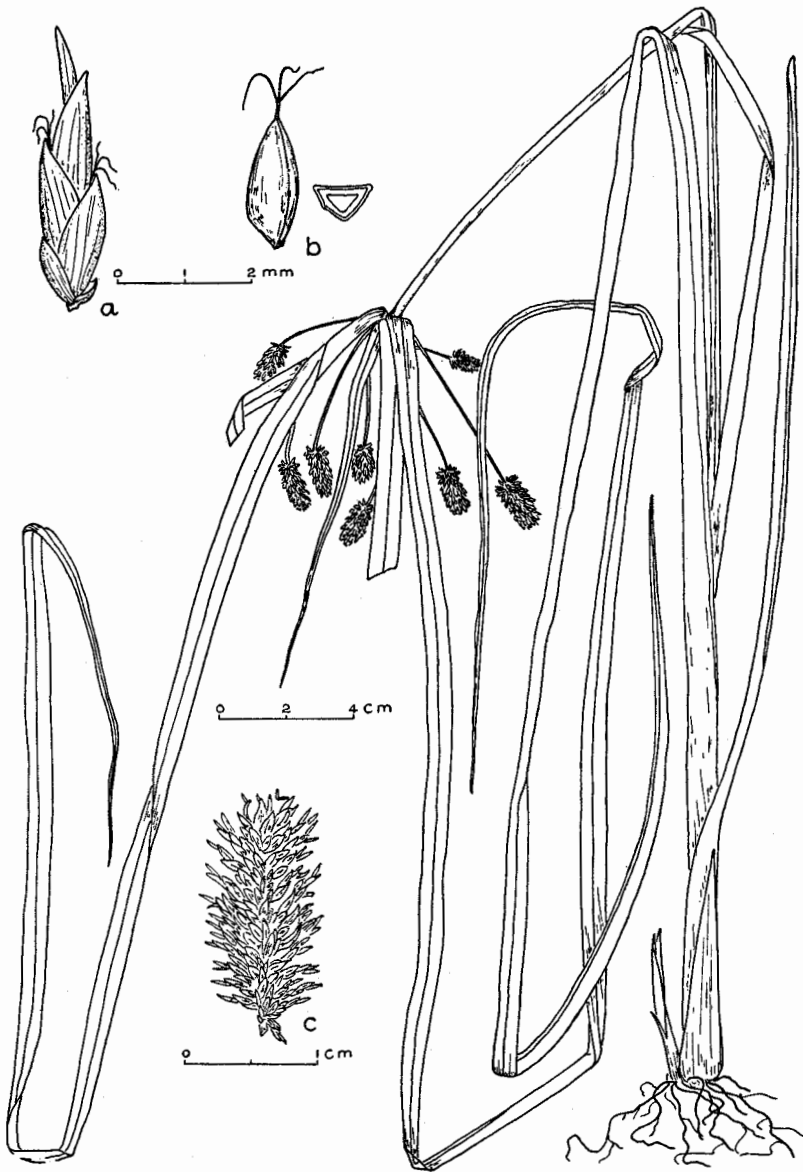


FIGURE 2.—*Cyperus Seemannianus* varietas *perdensus* Kükenthal: a, spikelet; b, achene and cross section; c, spike.

## 4. FIMBRISTYLIS Vahl

**Fimbristylis cymosa** R. Brown varietas **pycnocephala** (Hillebrand) Kükenthal, combinatio nova.

*Fimbristylis pycnocephala* Hillebrand: Fl. Haw. Is., p. 473, 1888.

Tau: lava rock along sea, Fitiuta, fruit, August 10, 1921, Garber no. 608. Tutuila: rocky beach, Goat Island, flower, November 27, 1924, Garber no. 807. Savaii: in lava cracks, rocky shore, Vangenga, flower, October 10, 1929, Christophersen no. 926; rocky coast, Falealupo-Fangalele, flower, November 22, 1931, Christophersen no. 3338. Native name, *mutia* (no. 608).

**Fimbristylis diphylla** (Retzius) Vahl: Enum., vol. 2, p. 289, 1806.

*Scirpus diphyllus* Retzius: Obs., vol. 6, p. 15, 1791.

Tau: Plateau back of Luma, altitude 125 meters, flower, fruit, December 15, 1921, Garber no. 648. Tutuila: near government house, Naval Station, fruit, December 19, 1924, Garber no. 887; reservoir trail, above Naval Station, altitude 200 meters, flower, October 30, 1929, Christophersen no. 993. Upolu: low places, Apia, flower, fruit, February 19, 1921, Eames no. 64. Savaii: at creek below Matavanu Crater, altitude 650 meters, flower, September 16, 1929, Christophersen no. 632; plantation, Salailua, altitude 25 meters, flower, fruit, October 8, 1931, Christophersen no. 2844; river bed above Matavanu Crater, altitude 900 meters, flower, July 14, 1931, Christophersen and Hume no. 2054 (*forma macra*).

**Fimbristylis diphylla** (Retzius) Vahl varietas **podocarpa** (Nees et Meyen) Kükenthal: Engl. Bot. Jahrb., vol. 59, p. 48, 1924.

Savaii: open "fern country" near Manase plantation, altitude 100 meters, flower, September 18, 1929, Christophersen no. 687.

**Fimbristylis diphylla** (Retzius) Vahl varietas **Royeniana** (Nees) Kükenthal forma **explicata** Kükenthal: Engl. Bot. Jahrb., vol. 59, p. 48, 1924.

Tutuila: moist places, Pago Pago, flower, February 7, 1921, Eames no. T-7.

## 5. RHYNCHOSPORA Vahl

**Rhynchospora corymbosa** (Linnaeus) Britton: N. Y. Acad. Sci., Trans., vol. 11, p. 84, 1892.

Olosenga: taro swamp, back of Olosenga Village, flower, June 23, 1925, Garber no. 1090. Tutuila: swampy places, Pago Pago, flower, September 25, 1923, Wilder no. 53 (determined by Christophersen); plantation, Anuuu Island, flower, November 12, 1929, Diefenderfer no. 1245 (determined by Christophersen). Upolu: marsh, Apia, flower, February 19, 1921, Eames

no. 65; swamp near Tiavi, altitude 720 meters, flower, fruit, August 12, 1929, Christophersen no. 180; shore of Lake Lanutoo, altitude 700 meters, flower, August 21-22, 1929, Christophersen no. 398; tidal swamp between Poutasi and Salani, flower, October 23, 1929, Christophersen no. 972 (determined by Christophersen). Savaii: shore of Lake Mataulanu, altitude 900 meters, flower, October 3, 1929, Christophersen no. 882; swamp, Fangamalo, flower, August 25, 1931, Christophersen and Hume no. 2553; edge of tidal swamp, Falealupo, flower, September 30, 1931, Christophersen no. 2778; wet ground, forest, Salailua-Lata-itai, altitude 10 meters, flower, October 16, 1931, Christophersen no. 2856.

Native name, *lau sele sele* or *vao sele sele* (nos. 1090, 2778). The stem of the plant is used for plaiting fans.

### 6. CLADIUM P. Browne

*Cladium samoense* C. B. Clarke: Trans. Linn. Soc., Bot., 2d ser., vol. 4, p. 245, 1894, pro parte; emend. O. Stapf in Jour. Linn. Soc., vol. 42, p. 179, 1914.

Tutuila: top of Matafao, altitude 650 meters, flower, November 3, 1929, Christophersen no. 1023; top of Le Pioa, altitude 500 meters, flower, January 2, 1932, Christophersen no. 3490. Savaii: at brook, forest above Matavanu Crater, altitude 750 meters, flower, September 15, 1929, Christophersen no. 623; river bed, forest above Matavanu, altitude 900 meters, flower, July 14-15, 1931, Christophersen and Hume nos. 2055 and 2079.

*Cladium samoense* C. B. Clarke est mixtum compositum, ab Stapf (54) in species 3 divisum, nempe *Vincentia malesiaca* Stapf (i.e. planta borneensis), *Vincentia samoensis* (C. B. Clarke) Stapf (i.e. planta samoensis et vitiensis), et *Vincentia Bidwellii* Stapf (i.e. planta tahitensis, vide Setchell, 51, p. 112). Diagnosis *C. samoense* a C. B. Clarke (11) ipso ex characteribus plantae samoensis sumpta est, quare nomen *C. samoense* mihi retinendum videtur. Postea *Cladium* Stapf (in Setchell, 51, p. 111) pro specie nova *Vincentia dissoluta* Stapf descripsit, quam notis sequentibus a *V. samoensis* segregavit: "bracteis infimis bases anthelarum vaginantibus sursum in fibras solutis, spiculis majoribus pallidioribus magis coarctatis, perianthio 3-1 setis constituto, ovario ut videtur estipitato." Haec planta exceptis solis bracteis infimis in fibras solutis omnino cum specimenibus Christophersen no. 1023 congruit in eodem loco collectis. Specimen Christophersen no. 623 setis hypogynis omnino caret, sed caeterum haud abhorret. Nux in omnibus specimenibus samoensibus nonnisi in primo statu estipitata videtur, serius stipes conspicuus apparet. Inde mihi persuasum habeo, specimina samoensia omnia ad unam speciem, nempe ad *Cladium samoense* C. B. Clarke pro parte (emend. O. Stapf) pertinere.

*Cladium samoense* a *C. angustifolium* Drake, cui proximum, inflorescentia multo brevior et angustior, bracteis brevius vaginantibus et brevius laminatis necnon pedunculis undique hispidis optime distinguendum est.

*Vincentia dissoluta* Stapf ulterius observanda erit, utrum character bractearum in fibras dissolutarum constans sit, an tantum status anormalis.

—G. Kükenthal.

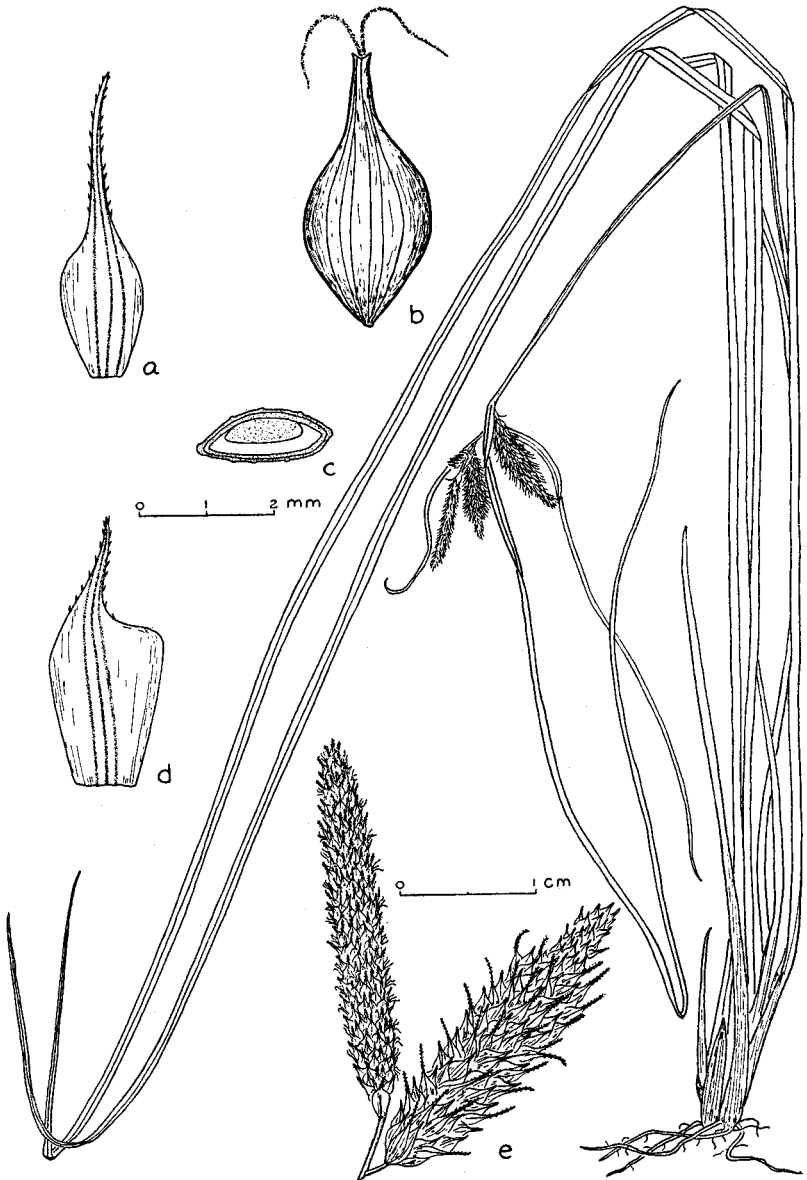


FIGURE 3.—*Carex savaiiensis* Kükenthal: a, pistillate bract; b, perigynium; c, cross section of perigynium and achene; d, staminate bract; e, staminate and pistillate spikes.



## 7. THORACOSTACHYUM Kurz

**Thoracostachyum lucbanense** (Elmer) Kükenthal: Philipp. Jour. Sci., vol. 11, p. 258, 1916.

Tutuila: forest, top of Le Pioa, altitude 500 meters, November 10, 1929, Christophersen no. 1209; scrub forest, top of Le Pioa, altitude 500 meters, flower, January 2, 1932, Christophersen no. 3484.

## 8. MAPANIA Aublet

**Mapania longifolia** (Boeckeler) C. B. Clarke: Kew Bull., add. ser., vol. 8, p. 54, 1908.

Tau: below peak back of Tau, altitude 600 meters, fruit, January 28, 1922, Garber no. 739. Upolu: forest, ridge above Malololelei, altitude 750 meters, fruit, August 15, 1929, Christophersen no. 279. Savaii: forest above Sili, altitude 200 meters, flower, fruit, November 11, 1931, Christophersen no. 3245.

**Mapania macrocephala** (Gaudichaud) K. Schumann: Engl. Bot. Jahrb., vol. 13, p. 265, 1891.

Tutuila: forest, Alava Ridge, altitude 400 meters, flower, fruit, November 7, 1929, Christophersen no. 1122; scrub forest, top of Le Pioa, altitude 500 meters, flower, fruit, January 2, 1932, Christophersen no. 3508 (determined by Christophersen); forest, Alava Ridge, altitude 450 meters, flower, fruit, January 5, 1932, Christophersen no. 3584.

## 9. SCLERIA Bergius

**Scleria lithosperma** (Linnaeus) Swartz: Prodr., p. 18, 1788.

Tau: Luma-Faleasao trail, altitude 40 meters, flower, fruit, January 8, 1922, Garber no. 690. Tutuila: near government house, Naval Station, flower, fruit, December 16, 1924, Garber no. 828; above Vatia, flower, fruit, December 17, 1924, Garber no. 875. Upolu: waste land, near Apia, altitude 50 meters, flower, fruit, February 19, 1921, Eames no. 58; forest, Vaea Mountain, altitude 300 meters, fruit, August 28, 1929, Christophersen no. 457. Savaii: rocky bluff, Safotu-Manase, fruit, August 20, 1931, Christophersen and Hume no. 2452. Native name, *popo vao* (nos. 828, 875).

**Scleria scrobiculata** Nees: Wight, Contrib., p. 117, 1834.

Tau: plateau back of Luma, altitude 100 meters, fruit, December 15, 1921, Garber no. 644. Tutuila: moist places, Pago Pago, flower, fruit, September 18, 1923, Wilder no. 82 (determined by Christophersen); above Vatia, fruit, December 17, 1924, Garber no. 874; top of Matafao, altitude 650 meters, flower, November 3, 1929, Christophersen no. 1030; forest, ridge west of Pago Pago, altitude 300 meters, fruit, November 14, 1929, Christophersen no. 1261; scrub forest, top of Le Pioa, altitude 500 meters, fruit, January 2,

1932, Christophersen no. 3572 (determined by Christophersen). Upolu: edge of forest, above Sauango, altitude 200 meters, flower, September 6, 1929, Christophersen no. 548; top of Fao Mountain, altitude 680 meters, fruit, September 6, 1929, Christophersen no. 553. Savaii: moist places, near Safune, flower, fruit, April 30, 1924, Bryan no. 112; open "fern country," Vaipouli-Manase, altitude 100 meters, flower, September 21, 1929, Christophersen no. 728 (determined by Christophersen); on the lava flow of 1905-11, near Saleaula, fruit, August 21, 1931, Christophersen and Hume no. 2462. Native name, *tafa tolu* (no. 644).

#### 10. CAREX Linnaeus

**Carex Graeffeana** Boeckeler: Flora, vol. 58, p. 22, 1875.

Savaii: forest above Matavanu Crater, altitude 1300 meters, flower, September 24, 1929, Christophersen no. 803; swamp in bottom of crater, above Matavanu Crater, altitude 1550 meters, flower, July 29, 1931, Christophersen and Hume no. 2209; swamp in crater bottom, above Matavanu Crater, flower, fruit, July 30, 1931, Christophersen and Hume no. 2228; low forest, rim of Papafu Crater, altitude 1500 meters, flower, fruit, September 23, 1931, Christophersen no. 2761. Native name, *vao sele sele* (no. 2209).

**Carex savaiiensis** Kükenthal species nova (fig. 3).

Rhizoma abbreviatum. Culmus 70-95 cm. altus rigidus triqueter angulis sursum scaberrimus parte tertia inferiore foliatus. Folia culmum aequantia 5-8 mm. lata plana rigida, vaginae pallide brunneae. Spiculae 5-8, terminalis mascula linearis 1.5 cm. longa pedunculata, reliquae foemineae apice plerumque masculae cylindricae 2.5-5 cm. longae 4 mm. latae densiflorae basin versus laxiores singulae pedunculatae erectae vel cernuae, superiores 2 spiculam masculam superantes, inferiores  $\pm$  remotae. Bracteae longissimae vix breviter vaginantes. Squamae foemineae obovatae apice subtruncatae rufescentes e carina viridi trinervi in aristam validam scabram excurrentes. Utriculi squamis (arista exclusa) longiores latioresque suberecti membranacei ovato-elliptici plano-convexi fere 4 mm. longi straminei dense purpureo-glandulosi plurinervi breviter stipitati marginati in rostrum conspicuum laeve ore submarginatum sensim desinentes. Nux subarcte inclusa late ovalis. Stylus longus basi paullo incrassatus. Stigmata 2.

Species e vicinia proxima *Carex subdola* Boott, in Nova Selandia indigena. Differt: Stolonibus nullis, foliis bracteisque latioribus, squamis obovatis rufescentibus (haud sanguineis) longe aristatis, utriculis longius rostratis.

Rhizome short. Culm 70-95 cm. high, rigid, triangular, edges very scabrous above, lower third of culm leafy. Leaves as long as the culm, 5-8 mm. broad, flat, rigid, sheaths pale brown. Spikelets 5-8, terminal one staminate, linear, 1.5 cm. long, pedunculate, remaining spikelets pistillate, frequently with staminate top, cylindrical, 2.5-5 cm. long, 4 mm. broad, dense-flowered, more lax towards the base, solitary, pedunculate, erect or drooping, the two upper ones exceeding the staminate spikelet, the lower ones more or less remote. Bracts very long, shortly clasping. Pistillate scales obovate, apex subtruncate, becoming reddish, running out into a strong, scabrous awn from the three-veined, green keel. Utricles longer and broader than the scales (excluding the awn), suberect, membranaceous, ovate-elliptical, plano-convex, about 4 mm. long, straw-colored, densely purple-glandular, many-veined, shortly stipitate, marginate, gradually ending in a conspicuous, smooth beak with submarginate orifice. Nut somewhat closely included, broadly oval. Style long, base slightly thickened. Stigmata 2.

This species is most closely related to *Carex subdola* Boott, indigenous in New Zealand, from which it differs in the absence of stolons, leaves and bracts broader, scales obovate, becoming reddish (not crimson), long aristate, utriculus with longer beak.

Savaii: swamp, bottom of crater, above Matavanu Crater, altitude 1500 meters, flower, September 24, 1929, Christophersen nos. 800 and 801; swamp, bottom of crater, above Matavanu, altitude 1500 meters, flower, fruit, July 30, 1931, Christophersen and Hume no. 2229.

#### FAMILY 5. PALMAE

##### I. PRITCHARDIA Seemann et H. Wendland

*Pritchardia pacifica* Seemann et H. Wendland: Bonplandia, vol. 9, p. 260, 1861, and vol. 10, pp. 197, 309, pl. 15, 1862.

Ofu: cultivated, Aloafao, altitude 8 meters, flower, June 6, 1925, Garber no. 1012. Savaii: cultivated, Salailua, flower, October 8, 1931, Christophersen no. 2842; cultivated, Fanga, fruit, December 28, 1931, Christophersen no. 3598. Native name, *niu piu* (nos. 1012, 2842, 3598).

Beccari (3, pp. 206, 212) describes variety *samoensis*, differing from the type in smaller flowers (fruiting perianth) and in thicker pericarp. The fruiting perianth of the submature fruits of Christophersen no. 3598 is 2.5-3 mm. thick and 3 mm. long, that is, slightly smaller than that of *P. pacifica* as given by Beccari and Rock (5, p. 29) namely 3.5 mm. thick and 4 mm. long. Beccari (3, p. 206) gives the fruiting perianth as 3-3.5 mm. thick, which conforms exactly with the fruits collected by Rock (cultivated in Honolulu), used as illustration of *P. pacifica* in the monograph by Meccari and Rock (5, pl. 24, *W*). The flowers, however, are longer in the Samoan specimens. The unopened flowers of Garber no. 1012 are 9 mm. long and 2.5-3 mm. broad. Those of Christophersen no. 2842 are 10 mm. long and 2.5-3 mm. broad. The flowers of *P. pacifica* are 7.5-8 mm. long and 3.5 mm. broad (5, p. 29). The pericarp of the submature fruits of Christophersen no. 3598 varies from less than 1 mm. to almost 2 mm. in thickness. The pericarp of *P. pacifica* is stated to be 1.3 mm. thick (5, p. 29) but the fruits collected by Rock (5, pl. 24, *W*) have a pericarp varying from 1 mm. to 2.5 mm. in thickness.

The Samoan specimens, therefore, do not agree with variety *samoensis* as described by Beccari (3, p. 206, 212). They differ very slightly from *P. pacifica* as interpreted by Beccari and Rock (5, p. 29), hardly enough and with scarcely sufficient consistency to refer them to a separate variety. The palms are not native to Samoa. They are frequently found planted in the villages and in gardens but have nowhere been observed in a natural state.

The generic name *Pritchardia* Seemann et H. Wendland (1862) is antedated by *Pritchardia* Unger (1840). Kuntze (36) has proposed *Eupritchardia*, which is apparently the correct name to be applied. If, however, the

reduction of *Colpotherimax* Grisebach et H. Wendland (1879) is to be upheld, this name would have to be applied to the genus. Cook (13) proposes *Styloma*, stating that no satisfactory name has as yet been proposed. He makes a transfer of several species.

## 2. CLINOSTIGMA H. Wendland

This genus was established by Wendland (57, p. 196) on the basis of material collected in Samoa by Pickering of the U. S. Exploring Expedition and forwarded to him by Asa Gray. Unfortunately the material is not complete, consisting, according to Wendland (57, p. 196), of a part of a frond and one of the main branches of a flowering spadix with fertilized female flowers, the tip of a spadix with immature fruits, labelled "Savaii", to which may belong a frond, which, however, is from a young plant. No male flowers or mature fruits are present. In contrasting the genus with the nearly related ones, Wendland (57, p. 197) lays main stress on the characters of the immature fruit. This fruit he describes as berrylike, almost globose, with a diameter of 1 cm. The remains of the stigma are situated on the ventral side midway between the top and the bottom of the fruit. The mesocarp is fibrous. The seeds are halfway united with the endocarp.

Warburg (in Reinecke, 46, pp. 588-590) refers the specimens collected by Reinecke on Upolu to *Cyphokentia*, stating that they probably are conspecific with Pickering's specimens, thus reducing *Clinostigma* to *Cyphokentia*. Reinecke's material, as that of Pickering, is incomplete, and although labeled under one number, the various parts have probably not come from the same plant. Female and male flowers are present, but neither fully grown frond nor mature fruits.

In the only reproductive parts common to Reinecke's and Pickering's material, namely, female flowers and immature fruits, there are differences at least of specific value. The differences in the shape and relative length of the segments of the perianth are pointed out by Warburg (46, p. 590). The immature fruit is by Wendland (57, p. 197) described as almost globose with the remains of the stigma situated midway between top and bottom. Warburg (46, pp. 589-590) describes and figures the immature fruit as distinctly elongated with the remains of the stigma near the top.

Beccari (2, p. 144), after examining part of Reinecke's already sparse material from Breslau consisting of two spadix parts, one anomalous male flower (four petals), and immature fruits (one juvenile frond was considered not to belong to this species), expressed his opinion that this material is identical with *Clinostigma samoense* H. Wendland. Beccari (2, 144) states that he had not seen Pickering's material. In a later publication Beccari (4, pp. 284-289) describes two additional species of *Clinostigma* from Samoa, with a reservation as to their possible identity with *Lepidorrhachys*. Both of

these species are described from spadices with mature fruits, the first ones to be described for the genus.

These facts (I have not seen Pickering's or Reinecke's specimens), I consider, do not satisfactorily prove that Reinecke's specimens are to be referred to *C. samoense* H. Wendland. Pickering's material is probably heterogenous, an assumption already noted by Wendland (57, p. 196), and if any one part is to be selected as the type I presume that it has to be the fruiting spadix showing the basic characters of the genus. The fruit, however, with the stigmatic remains in the middle of the ventral side, a character that is not going to change materially at maturity, is nonconformant with that of Reinecke's specimens as described and figured by Warburg (46, pp. 589-590, figs. F, G).

Rechinger (45, p. 234) refers several specimens collected by him in Samoa to *Cyphokentia samoensis* Warburg, stating that he thinks it very probable that this species is identical with *Clinostigma samoense* H. Wendland. Burret (9, p. 292) has compared some of Rechinger's specimens with those of Reinecke. He refers the only fruiting specimen (Rechinger no. 1990, Vienna herbarium) to *Clinostigma oncorhyncha* Beccari, and parts of a frond of another specimen (Rechinger no. 655, Vienna herbarium) he considers identical with a young frond of Reinecke's material.

Specimens from 10 different trees are present in the herbarium of Bernice P. Bishop Museum. None of them are conspecific with *Clinostigma samoense* H. Wendland, as far as fruits and flowers are concerned. The fruits, however, with their ventral-lateral stigmatic remains and the basal-lateral placentation of the seed, leave little doubt as to the generic identity. The relationship to *Exorrhiza* Beccari (*Bentinckiopsis* Beccari) has yet to be definitely settled.

The native name for species of this genus is *niu vao* (coconut palm of the forest).

***Clinostigma oncorhyncha*** Beccari: *Webbia*, vol. 4, pt. 2, p. 284, fig. 29, 1914.

Upolu: forest near Malololelei, altitude 550 meters, fruit, August 17, 1929, Christophersen no. 303.

The fruiting parts of these specimens are identical with *C. oncorhyncha* as described and figured by Beccari (4, p. 284, fig. 29). The fruits, however, are covered with a milky-blue bloom, obscuring the basic dark purplish-brown color. Segments from the middle part of the frond correspond in all details to that part of the original description of *C. samoense* H. Wendland (57, p. 196) appertaining to a section from the middle part of a frond. This section, then, probably does not belong to the fruiting spadix of the type

material. Its generic identity, however, is reasonably certain, as leaves and fruits of Christophersen no. 303 are definitely from the same tree.

This palm is a very stately tree, in habit resembling that of *Oreodoxa regia* (B. P. Bishop Museum photo no. 16384). It grows scattered through the forest from an elevation of 200 meters up to at least 700 meters, being more common at the higher elevations.

It is used by the natives for *aso* ('aso) in roof construction because the wood is flexible and will split in long straight sections.

***Clinostigma savaiiense*, species nova (fig. 4).**

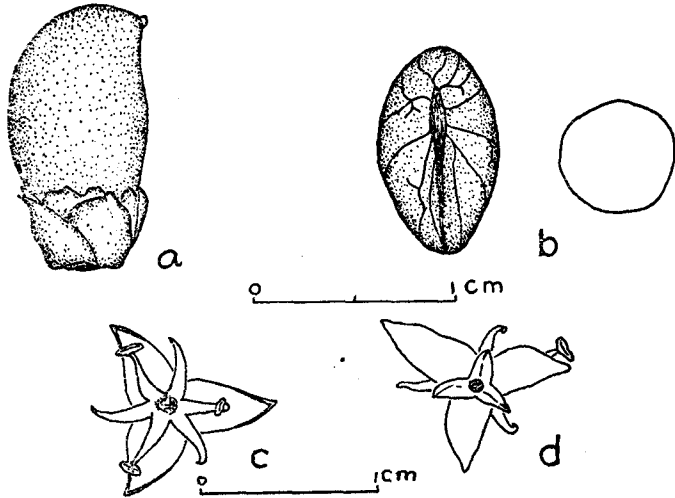


FIGURE 4.—*Clinostigma savaiiense*: a, fruit, lateral view; b, seed, front view and cross section; c, male flower, top view; d, male flower, bottom view. Fruit and seed from type specimen.

Arbor monocaulis 10-12 m. alta, caule recto vel leviter arcuato cinereo-albo annulato laevi. Frons pinnatisecta arcuata, rachi in parte media glabra laevi subtus leviter convexa supra plana 15-18 mm. lata 10 mm. alta sectione transversa rhomboidea. Segmenta media subopposita 4.5-5 cm. dissita linearia glabra laevia 60-72 cm. longa 22-28 mm. lata supra costa prominente subtili nervis lateralibus duobus subprominentibus ex margine remotis subtus in nervis minute nigro-tuberculata costa nervisque minus prominentibus costa supra basim lepidibus brunneis lanceolatis instructa, apice longe anguste acuminato subulato (?), basi leviter contracta, insertione triangulari. Spadix fructifer infra frondes positus 60 cm. + longus multiramis, ramis primariis circiter 21 inferioribus ramosis superioribus simplicibus, ramis fructiferis ad 39 cm. longis in parte media circiter 2 mm. latis valde sinuosis. Glomeruli spiraler dispositi 5 mm. dissiti. Perianthium fructiferum 4-5 mm. altum, sepalis imbricatis rotundatis vel late triangularibus, petalis imbricatis rotundatis breviter et late apiculatis quam sepala paullo vel  $1/3$  longioribus. Fructus maturus niger pruinosis gibboso-ellipsoideus vel gibboso-obovoideus leviter compressus in vivo 14-15 mm. longus 8-9 mm. latus 9 mm. crassus epicarpio laevi mesocarpio nigro-violaceo carnosus in sicco 12-13 mm. longus 7-8 mm. latus 7-8 mm. crassus epicarpio ruguloso. Cicatrix stigmatum ventralis prope apicem fructus. Mesocarpium intus fibrosum. Endocarpium lignosum. Semen leviter brunneum gibboso-obovoideum 9 mm. longum

5.5 mm. latum 5.5 mm. crassum, raphae ramis utrinque circiter 6 leviter anastomisantibus. Embryon basilare.

Differt a *C. samoensi* H. Wendland pro parte foliosa matura segmentis angustioribus brevibus pro parte fructifera cicatrice stigmatum prope apicem posito, a *C. oncorhyncha* Beccari fructibus minoribus, a *C. Powelliana* Beccari fructibus non globosis.

Unbranched tree 10-12 m. high; stem straight or slightly curved, grayish white, annulate, smooth. Fronds curved, pinnately divided; rachis glabrous and smooth in the middle part, slightly convex below, plane above, 15-18 mm. broad, 10 mm. thick, cross-section rhomboid. Middle segments subopposite, placed 4.5-5 cm. apart, linear, glabrous, smooth, 60-72 cm. long, 22-28 mm. broad; upper surface with prominent, sharp midrib, the two lateral veins subprominent, running at a distance from the margin; lower surface with minute, black warts on the veins, midrib and veins less prominent, midrib with brown, lanceolate scales above the base, apex narrowly long-acuminate, subulate (?), base slightly contracted, insertion triangular. Fruiting spadix inserted below the fronds, 60 cm. + long, much branched; primary branches about 21, lower ones branched, upper ones simple; fruiting branches to 39 cm. long, about 2 mm. broad in the middle part, prominently sinuate. Glomerules spirally inserted 5 mm. apart. Fruiting perianth 4-5 mm. high; sepals imbricate, rounded, or broadly triangular; petals imbricate, rounded, shortly and broadly apiculate, slightly longer to one third longer than the sepals. Mature fruit black, pruinose, gibbose-ellipsoid or gibbose-obovoid, slightly flattened; living specimens 14-15 mm. long, 8-9 mm. broad, 9 mm. thick, with smooth epicarp and blackish purple, fleshy mesocarp; dried specimens 12-13 mm. long, 7-8 mm. broad, 7-8 mm. thick, with rugulose epicarp; stigmatic scar ventral, near apex of fruit; mesocarp fibrous; endocarp woody. Seed light brown, gibbose-obovoid, 9 mm. long, 5.5 mm. broad, 5.5 mm. thick; branches of raphe about 6 on each side, slightly anastomosing. Embryo basal.

Differs from the mature leaves of *C. samoense* H. Wendland in its narrower and shorter segments, and from the fruiting part in its stigmatic scar, which is placed near the apex. Differs from *C. oncorhyncha* Beccari in its smaller fruits. Differs from *C. Powelliana* Beccari in its non-globose fruits.

Savaii: forest above Matavanu Crater, altitude 1300 meters, fruit, September 24, 1929, Christophersen no. 808; open woodland near Matavanu Crater, altitude 600-700 meters, male and female flowers, July 10, 1931, Christophersen and Hume no. 1946; forest along stream, above Matavanu Crater, altitude 900 meters, fruit, July 15, 1931, Christophersen and Hume no. 2078; forest above Matavanu Crater, altitude 900 meters, fruit, August 5, 1931, Christophersen and Hume no. 2267, type in B. P. Bishop Museum, and no. 2266; forest above Matavanu Crater, altitude 900 meters, male and female flowers, August 5, 1931, Christophersen and Hume no. 2273; forest north-east of Salailua, altitude 1400 meters, fruit, September 8, 1931, Christophersen no. 2565; forest above Salailua, altitude 1400 meters, fruit, November 6, 1931, Christophersen no. 3088. Native name, *niu vao* (nos. 2078, 2266, 2267, 2273, 2565, and 3088).

Judging by the characters of the fruit there is a possibility that this species is identical with *Cyphokentia samoensis* Warburg (Reinecke 46, p. 588). However, no definite conclusions can be reached, as the fruits of the type material are immature, according to Warburg (46, p. 590) 5 mm. long, according to Beccari (2, p. 145) 7 mm. long, 5.5 mm. broad including the perianth. No specimens of flowers and fruits from the same tree are present

in the Bishop Museum collection. But the flowers of nos. 1946 and 2273, referred to this species on the characters of leaves and spadix, do not agree with those described for *Cyphokentia samoensis*. The female flowers are 3.5-4 mm. long; the sepals are obtuse and only slightly shorter than the petals. The male flowers disagree in having lanceolate but broader sepals, petals to 5 mm. long, and shorter anthers attached slightly below the middle.

The size of mature fruits and seeds is almost constant for each collection number (tree), but varies somewhat throughout the collection. The following measurements of seeds were taken (length  $\times$  thickness  $\times$  width in mm.): no. 3088, 11  $\times$  6  $\times$  6, 11  $\times$  6  $\times$  5.5; no. 808, 11  $\times$  5  $\times$  5, 11  $\times$  5  $\times$  5, 11  $\times$  5  $\times$  5; no. 2565, 10  $\times$  6  $\times$  5.5, 10  $\times$  6.5  $\times$  6; no. 2078, 9  $\times$  6  $\times$  5.5.

This stately palm has the same general habit as *C. onchorhyncha*. However, as far as it has been observed, it grows to a greater height, trees 20 meters high having been seen. It has not been observed to grow below 600 meters and is a common tree scattered through the forests up to an elevation of at least 1500 meters.

The wood, as that of *C. onchorhyncha*, is highly valued by the natives for *aso* ('*aso*, thatch rafters) in house building. For this purpose only the outer part of the stem is used. The stem is cut in about 9-foot lengths and split in about six sectors. The bark and the inner soft part are cut off. The similar wood of the coconut palm is also used for *aso*, but *niu vao* is greatly preferred because it splits in greater lengths. *Niu vao* wood is also used for the *too too* (*to'o to'o*) of the *tulafale* (talking chief's stick).

### 3. SOLFIA Reching

?*Solfia samoensis* Reching: Fedde Rep. Nov. Spec., vol. 4, p. 233, 1907.

Savaii: forest above Salailua, altitude 1000 meters, young flower, young fruit, September 22, 1931, Christophersen no. 2703; forest, Le To, above Salailua, altitude 750 meters, young flower, fruit, October 21, 1931, Christophersen no. 2897. Native name, *maniuniu* (nos. 2703 and 2897).

Type specimens of this species have not been examined, but the Bishop Museum specimens, which are identical, come very close to the original description and the supplementary description of Burret, (9, p. 280). They differ in the broader median segments of the frond (70 cm. long to 52 mm. broad), in the length of the fruiting perianth (7-8 mm.), the distinct venation of the sepals, and in the ellipsoid-oblong, slightly obovoid, not ovoid-ellipsoid fruits. In characters of fruiting perianth and fruit, however, they agree closely with the additional fruits described by Burret (9, p. 281) of which he states that they undoubtedly belong to the same genus and apparently to the same species.



Young male and female flowers are present, and as flowers have not been described for the genus a description follows (Christophersen no. 2897) :

Glomerules spirally arranged, in the lower part of the fruiting branches 3-flowered, median flower female, lateral flowers male, in the upper part 2-flowered or 1-flowered with no female flowers. Unopened male flowers 7 mm. long; sepals imbricate, rounded, ciliate, irregularly costate, 2.5 mm. long; petals valvate, acute, prominently longitudinally veined, 6.5 mm. long, 2.5-3 mm. broad. Stamens numerous on short filaments. Young female flowers 3 mm. long; sepals unequal, imbricate, rounded, distinctly veined, straw-colored, the larger one about 1 mm. high; petals imbricate, rounded, rugulose, in the upper part dark brown, lighter below.

Ripe fruits, also heretofore unknown for the genus, are described (Christophersen no. 2897) :

Red and terete in a natural state, in dried condition reddish brown, irregularly wrinkled longitudinally, oblong with parallel sides or slightly obovoid-ellipsoid, slightly gibbose, shortly and abruptly rostrate, the beak being placed a little towards the ventral side, base and apex rounded, 19 mm. long, 10-11 mm. broad. The epicarp is characterized by the densely set, minute, linear prominences due to sclerenchyma tissue. The mesocarp is fleshy in its outer part, with strong, flattened, furcate fibers next to the endocarp. The endocarp is thin, leathery. The seeds are oblong-ellipsoid, rounded at both ends, reddish brown, with straw-colored hairs, 11-12 mm. long, 7 mm. broad. The raphe has anastomosing branches from the apex. The embryo is basal.

Submature fruits of Christophersen no. 2703 preserved in alcohol are 19-20 mm. long, 12 mm. broad, obovoid, gibbose. The seed is oblong-ellipsoid, 13 mm. long, 9 mm. broad.

This palm is in habit much like a *Balaka* palm. The natives in their name do not distinguish between the two genera. It grows to a larger size than the *Balaka* palms, a maximum of 10 meters in height and 12 cm. in diameter breast high having been recorded (no. 2703). It is probably of rare occurrence in the forests at middle and high elevations.

#### **Solfia** species.

Upolu: forest, Maunga Tele ridge above Saluafata, altitude 500 meters, flower, September 4, 1929, Christophersen no. 517; forest, Maunga Tele Ridge above Saluafata, altitude 500 meters, flower, young fruit, October 17, 1929, Christophersen nos. 940, 941, and 942.

These specimens, all collected in the same locality, are identical in characters of the leaf. Nos. 517 and 940 have flowers only, nos. 941 and 942 have immature fruits only. No mature fruits are present. They differ from the specimens referred to *S. samoensis* in the narrower segments of the frond (middle segments to 77 cm. long, 32 mm. broad), in the upper segments, cut off in the shape of a fish tail, and in the fruits, which have more distinct sclerenchymatous prominences, a more distinctly obovoid-ellipsoid form with a narrower apex.

These palms grow to a height of 3 to 8 meters with graceful, strongly

curved fronds. They very probably belong to an undescribed species, but with no mature fruits present a sufficiently distinct characterization is not possible. The genus may be expected to contain several closely related species.

#### 4. BALAKA Beccari

This genus was established by Beccari (1) on the two Fijian palms *Ptychosperma Seemannii* H. Wendland and *P. perbreve* H. Wendland. Later Burret (9, p. 276) included the Samoan *Drymophloeus Reineckeii* Warburg and described two new species for Samoa. One species is also known from Tahiti. The genus, well characterized by its angular fruits, is represented in Samoa by several species. Four have been previously described, and three additional ones are proposed here. Undoubtedly more species are as yet undescribed.

The first species recorded for Samoa, *B. Reineckeii* (Warburg) Burret, is unfortunately described from heterogeneous material. According to Burret (9, p. 276) who has studied the original material, it is impossible to correlate the individual specimens with each other or with the cited numbers. He describes two new species from fragmentary infrutescences in Reinecke's material: *B. Rechingiana* and *B. brachyclamys*. Beccari (4, p. 267) describes *B. samoensis* from an infrutescence in Kew Herbarium collected by Rev. S. J. Whitmee. No species, therefore, is as yet described from complete material. It is admitted, however, that the characters of the mature fruit and seed, coupled with those of the fruiting perianth, are the most reliable characters in separating the species. They are absolutely constant within the specimens. Leaf characters are also important; the size of the apical segments, especially, may be of diagnostic value. The leaf segments are characterized by having 3 or 4 very prominent veins, and an equal number slightly less prominent.

The native name is *maniuniu* in both Upolu and Savaii, but several informants gave the name *niu vao*. *Niu vao*, however, is always applied to the *Clinostigma* palms and is probably incorrectly applied to the species of *Balaka*.

#### **Balaka Burretiana** species nova (fig. 5, a).

Arbor parva monocaulis 4 m. alta. Frons pinnatisecta, petiolo circiter 30 cm. longo griseo-furfuraceo, rachi angulari tuberculata. Segmenta media utrinque circiter 10 cm. inter se distantia basim et apicem versus decrescenda, segmenta superiora subopposita media et inferiora alterna. Segmentum infimum parvum oblique praemorsum 18 cm. longum 10 mm. latum, nervo valde prominente uno. Segmentum sequens 1.7 cm. distans 25 cm. longum 28 mm. latum. Segmenta media ad 42 cm. longa 75 mm. lata oblique praemorsa, nervis 3 valde prominentibus, nervis 4 minus prominentibus, apice oblique praemorso, basi contracta. Segmenta apicalia subopposita oblique truncato-praemorsa 9.5 cm. lata, basi leviter contracta rachi 7.5 cm. adnata, margine superiore 11.5 cm., margine inferiore 16-17.5 cm. Spadix fructifer 55-58 cm. longus (incl. pedunculo), floriger 58 cm. longus duplicato-ramosus, ramis angularibus primariis 8-9 fructiferis 15-23

cm. longis, 2-3 mm. latis. Pedunculus fructifer 26-27 cm. longus praeter basim 1 cm. latus, basi amplectente 3 cm. lata. Glomeruli fere distichi alternantes 6 mm. distantes 3-flori flore intermedio femineo. Glomeruli ad apicem 2- vel 1-flori floribus masculis. Flores masculi 10-11 mm. longi. Sepala late imbricata rotundata ciliata 2 mm. alta. Petala valvata acuta striata 9-9.5 mm. longa 3 mm. lata. Stamina inclusa numerosa, antheris 4 mm. longis basi sagittata filamentis vix 1 mm. longis. Pistillodium quam stamina aequilongum. Flores feminei globosi 3-4 mm. alti, sepalis minutis, petalis imbricatis ciliatis rotundatis saepe fissis. Perianthium fructiferum cupuliforme 9-10 mm. alta, sepalis rotundatis quam petalum dimidio minoribus, petalis imbricatis striatis apice breviter mucronato. Fructus maturus ruber oblongus vix obliquus in vivo teres 2.4-2.5 cm. longus 1.1 cm. latus, in sicco obtuse angularis 2.2-2.3 cm. longus, basi anguste rotundata, apice in rostrum 2 mm. longum abrupte contracto. Epicarpium tenue. Endocarpium lignosum 4-angulare costis transversis. Semen maturum ovoideum acutum leviter brunneum 4-angulare 15-16 mm. longum, 6.5-7 mm. latum, basi rotundata, costis transversis.

Differt a *B. Reineckei* (Warburg) Burret perianthiis fructiferis et seminibus majoribus.

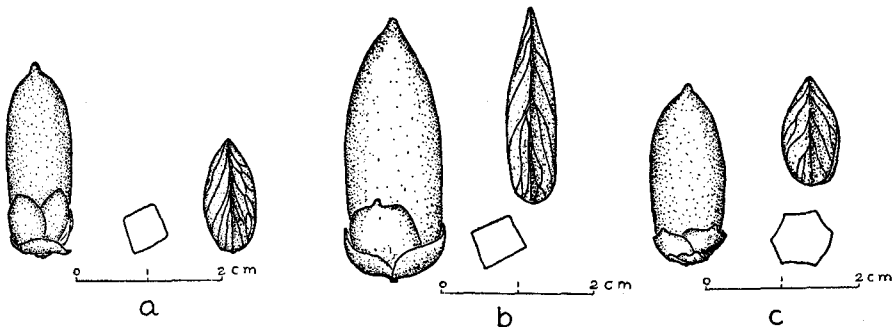


FIGURE 5.—Fruit, seed, and cross section of seeds of *Balaka*: a, *B. Burretiana*; b, *B. siliensis*; c, *B. tuasivica*.

Small unbranched tree 4 m. high. Frond pinnately divided; petiole about 30 cm. long, grayish furfuraceous; rachis angular, warty. Middle segments placed about 10 cm. apart, distance decreasing toward base and apex; upper segments subopposite, lower and middle segments alternate. Basal segment small, obliquely praemorse, 18 cm. long, 10 mm. broad, with one strongly prominent vein. Next segment 1.7 cm. distant, 25 cm. long, 28 mm. broad. Middle segments to 42 cm. long, 75 mm. broad, obliquely praemorse; 3 veins strongly prominent, 4 veins less prominent; apex obliquely praemorse; base contracted. Apical segments subopposite, obliquely truncate-praemorse, 9.5 cm. broad; base slightly contracted, adnate to the rachis for a distance of 7.5 cm.; upper margin 11.5 cm. long, lower margin 16-17.5 cm. long. Fruiting spadix 55-58 cm. long (including peduncle), flowering spadix 58 cm. long, doubly branched; branches angular, primary branches 8-9, fruiting branches 15-23 cm. long, 2-3 mm. broad. Fruiting peduncle 26-27 cm. long, 1 cm. broad above the base; base clasping, 3 cm. broad. Glomerules almost distichous, alternate, 6 mm. distant, 3-flowered, middle flower female. Uppermost glomerules 2- or 1-flowered with male flowers. Male flowers 10-11 mm. long; sepals broadly imbricate, rounded, ciliate, 2 mm. broad; petals valvate, acute, striate, 9-9.5 mm. long, 3 mm. broad; stamens included, numerous; anthers 4 mm. long with sagittate base; filaments hardly 1 mm. long; pistillodium as long as the stamens. Female flowers globose, 3-4 mm. high; sepals minute; petals imbricate, ciliate, rounded, frequently split. Fruiting perianth cup-shaped, 9-10 mm. high; sepals rounded, half as long as the petals; petals imbricate, striate, shortly mucronate. Mature fruit red, oblong, hardly oblique, living specimens terete,

2.4-2.5 cm. long, 1.1 cm. broad, dried specimens obtusely angular, 2.2-2.3 cm. long, base narrowly rounded, apex abruptly contracted into a 2 mm. long beak; epicarp thin; endocarp woody, 4-angular, transversely ribbed. Mature seed ovoid, acute, light brown, 4-angular, 15-16 mm. long, 6.5-7 mm. broad, transversely ribbed, base rounded.

Savaii: forest above Matavanu Crater, altitude 900 meters, flower, fruit, August 5, 1931, Christophersen and Hume no. 2260, type in B. P. Bishop Museum; forest above Matavanu Crater, altitude 750 meters, flower, young fruit, July 16, 1931, Christophersen and Hume no. 2000?

This species, named in honor of Professor Dr. Max Burret, is similar to *B. Reineckei* as interpreted by Burret (9, p. 277) but differs from this and all the other previously described Samoan species, except *B. samoensis*, in the longer fruiting perianth and seeds. From *B. samoensis* it is easily distinguished by its abruptly contracted, smaller fruits.

Specimen no. 2000 is only with doubt referred to this species, as no mature fruits are present. But the submature fruits have seeds of the same shape as *B. Burretiana*, with obtuse transverse ridges, 4-angled with an indication of a fifth ridge, of a size 15 by 6 mm. The segments of the leaf are smaller than in *B. Burretiana*, the young petiole and rachis is gray-scurfy, the rachis tuberculate. The male flowers are slightly shorter, but the shape of the petals of the female flowers and the size of the fruiting perianth are identical with *B. Burretiana*.

This palm is common in the forests at medium elevation in the northeastern part of Savaii.

?**Balaka Rechingieriana** Burret: Fedde Rep. Spec. Nov., vol. 24, p. 275, 1928.

Upolu: heavy woodlands, Moa Moa plantation, altitude 100-300 meters, flower, young fruit, March 2, 1921, Eames no. 128.

This specimen corresponds to the description of *B. Rechingieriana* in the strongly sinuate fruiting branches, the 2 mm. wide internodes, and in the shape and size of the fruiting perianth. The fruits are immature, 2 cm. long, 4-angled, with a beak about 4 mm. long. Mature male flowers are 8-9 mm. long, sepals imbricate, rounded, ciliate, 2 mm. long, petals valvate, acute, 8 mm. long, 3 mm. wide. The apical segments of the fronds are 12-12.5 cm. wide, upper margin 19 cm. long, lower margin 30-31 cm. long. The next segment is 34.5 cm. long, 4.6 cm. wide. These leaf measurements correspond to those of the mature leaf described by Warburg (46, p. 591) under *B. Reineckei*. This leaf, then, may belong to the fruiting branch included in the material of *B. Reineckei* from which *B. Rechingieriana* Burret is described. The middle segments of Eames no. 128 reach a length of 42 cm. and a width of 6.5 cm.

**Balaka siliensis** species nova (fig. 5, b).

Arbor parva monocaulis 4-5 metralis. Frons pinnatisecta, lamina 1.5 m. longa, petiolo 45 cm. longo. Segmenta utrinque 6-7 cm. dissita, infima 2 approximata, superiora opposita, media et inferiora alterna. Segmenta infima parva angusta 20-22 cm.

longa 12-22 mm. lata oblique praemorsa nervis valde prominentibus 4. Segmenta sequentia 1.8 cm. distantia, 29-32 cm. longa 35-40 mm. lata. Segmenta media ad 49 cm. longa 85 mm. lata, nervis 3 valde prominentibus, nervis 4 minus prominentibus, apice oblique praemorso, basi contracta. Segmenta apicalia opposita oblique truncato-praemorsa 11 cm. lata, basi leviter contracta rachi 11.5 cm. adnata, margine superiore 19.5-21 cm., margine inferiore 27-28 cm. Spadix fructifer 60-66 cm. longus (incl. pedunculo) floriger 36 cm. et ultra duplicato-ramosus fusco-furfuraceus dein glaber, ramis angularibus, primariis 7-8, fructiferis 17-24 cm. longis 2-2.5 mm. latis. Pedunculus fructifer 23-33 cm. longus praeter basim 1 cm. latus. Glomeruli fere distichi dispositi maxime 3-flori, flore intermedio femineo. Glomeruli ad apicem 2-flori floribus masculis duobus. Flores masculi 8-9 mm. longi. Sepala late imbricata rotundata 2 mm. alta. Petala valvata acuta 8 mm. longa 3 mm. lata. Stamina inclusa numerosa, antheris 3.5 mm. longis basi sagittata ad  $\frac{1}{4}$  incisus. Pistillodium 4 mm. longum. Flores feminei globosi 2 mm. alti, sepalis minutis, petalis imbricatis ciliatis rotundatis. Perianthium fructiferum cupuliforme 12-14 mm. altum, sepalis rotundatis tertiam partem petalorum longis, petalis imbricatis longitudinaliter nervosis ciliatis, apice breviter retuso-mucronato. Fructus maturus ruber longe ovoideus obliquus in vivo teres 41-42 mm. longus 12-13 mm. latus in sicco angularis circiter 40 mm. longus, basi anguste rotundata, apice breviter rostrato. Epicarpium tenue. Mesocarpium ad 3 mm. crassum. Endocarpium lignosum fibrosum 4-angular. Semen maturum anguste ovoideum acutum leviter brunneum 4-angular 27-28 mm. longum 7 mm. latum, basi rotundata, apice subulato.

Differt a *B. samoensi* Beccari petalis fructiferis retusis fructibus majoribus seminibus longioribus gracilioribus subulatis.

Small unbranched tree 4-5 m. high. Frond pinnately divided; blade 1.5 m. long; petiole 45 cm. long. Segments placed 6-7 cm. apart, the two basal segments close together, upper segments opposite, middle and lower segments alternate. Basal segment small, narrow, 20-22 cm. long, 12-22 mm. broad, obliquely praemorse, with 4 strongly prominent veins. Next segment 1.8 cm. distant, 29-32 cm. long, 35-40 mm. broad. Middle segments to 49 cm. long, 85 mm. broad, 3 strongly prominent veins, 4 less prominent veins; apex obliquely praemorse; base contracted. Apical segments opposite, obliquely truncate-praemorse, 11 cm. broad; base slightly contracted, adnate to the rachis for a distance of 11.5 cm.; upper margin 19.5-21 cm. long, lower margin 27-28 cm. long. Fruiting spadix 60-66 cm. long (including peduncle), flowering spadix 36 cm. + long, doubly branched, dusky furfuraceous, glabrous with age; branches angular, primary branches 7-8, fruiting branches 17-24 cm. long, 2-2.5 mm. broad. Fruiting peduncle 23-33 cm. long, 1 cm. broad above the base. Glomerules almost distichous, mostly 3-flowered, middle flower female. Uppermost glomerules 2-flowered, both flowers male. Male flowers 8-9 mm. long; sepals broadly imbricate, rounded, 2 mm. high; petals valvate, acute, 8 mm. long, 3 mm. broad; stamens included, numerous; anthers 3.5 mm. long with sagittate base, incision  $\frac{1}{4}$  the length of anthers; pistillodium 4 mm. long. Female flowers globose, 2 mm. high; sepals minute; petals imbricate, ciliate, rounded. Fruiting perianth cup-shaped, 12-14 mm. high; sepals rounded,  $\frac{1}{3}$  the length of petals; petals imbricate, longitudinally veined, ciliate, apex shortly and retusely mucronate. Mature fruit red, long ovoid, oblique, living specimens terete, 41-42 mm. long, 12-13 mm. broad, dried specimens angular, about 40 mm. long, base narrowly rounded, apex shortly beaked; epicarp thin; mesocarp to 3 mm. thick; endocarp woody, fibrous, 4-angular. Mature seed narrowly ovoid, acute, light brown, 4-angular, 27-28 mm. long, 7 mm. broad, base rounded, apex subulate.

Savaii: forest above Sili, altitude 300 meters, flower, fruit, November 11, 1931, Christophersen no. 3260, type in Bernice P. Bishop Museum; forest above Sili, altitude 300 meters, young fruit, November 11, 1931, Christophersen no. 3266?

This species is similar to *B. samoensis* Beccari, but differs in the retusely mucronate petals of the fruiting perianth, the slightly longer fruits, and the longer, more slender and sharply pointed seeds. From all the other Samoan species it is easily distinguished by its large fruits.

**Balaka tuasivica** species nova (fig. 5, c).

Arbor monocaulis 5 m. alta. Frons pinnatisecta, petiolo et rachi rubido-furfuraceis angularibus. Segmenta media utrinque 9-11 cm. inter se distantia basim et apicem versus decrescenda, segmenta media et inferiora alterna. Segmenta infima parva 15 cm. longa 22-23 mm. lata oblique praemorsa, nervo valde prominente uno. Segmenta sequentia 4.8 cm. distantia 21.5 cm. longa 36-38 mm. lata. Segmenta media 29-30.5 cm. longa 56-62 mm. lata oblique praemorsa, nervis valde prominentibus 3. Segmenta apicalia non vidi. Spadix floriger 43 cm. longus (incl. pedunculo) fusco-furfuraceus duplicato-ramosus, pedunculo 20 cm. longo praeter basim 7 mm. lato, ramis angularibus, primariis 8, florigeris ad 10 cm. longis, glomerulis 3-floris 5-8 mm. inter se distantibus floribus juvenalibus. Spadix fructifer 39 cm. longus (incl. pedunculo) sparse fusco-furfuraceus duplicato-ramosus, pedunculo 15 cm. longo praeter basim 8 mm. lato, ramis angularibus, primariis 8, fructiferis ad 12 cm. longis. Perianthium fructiferum cupuliforme 4-5 mm. altum, sepalis imbricatis rotundatis 2-3 mm. altis quam corolla circiter dimidio minoribus, petalis imbricatis striatis apice breviter et abrupte mucronato. Fructus maturus in vivo ruber in sicco obtuse angularis oblongus 23-24 mm. longus circiter 12 mm. latus apice in rostrum 2 mm. longum abrupte contracto. Epicarpium tenue minutissime longitudinaliter striatum. Endocarpium lignosum. Semen maturum ovoideum acutum leviter brunneum distincte 6-angulari 15 mm. longum 8 mm. latum, basi rotundata, costis transversis obtusis.

Differt a *B. brachyclamys* Burret seminibus majoribus gracilioribus perianthiis fructiferis altioribus.

Unbranched tree 5 m. high. Frond pinnately divided; petiole and rachis reddish furfuraceous, angular. Middle segments placed 9-11 cm. apart, distance decreasing towards base and apex, middle and lower segments alternate. Basal segment small, 15 cm. long, 22-23 mm. broad, obliquely praemorse, with one strongly prominent vein. Next segment 4.8 cm. distant, 21.5 cm. long, 36-38 mm. broad. Middle segments 29-30.5 cm. long, 56-62 mm. broad, obliquely praemorse, 3 strongly prominent veins. Apical segments not seen. Flowering spadix 43 cm. long (including peduncle), dusky furfuraceous, doubly branched; peduncle 20 cm. long, 7 mm. broad above the base; branches angular, primary branches 8, flowering branches to 10 cm. long; glomerules 3-flowered, placed 5-8 mm. apart; flowers juvenile. Fruiting spadix 39 cm. long (including peduncle), sparsely dusky furfuraceous, doubly branched; peduncle 15 cm. long, 8 mm. broad above the base; branches angular, primary branches 8, fruiting branches to 12 cm. long. Fruiting perianth cup-shaped, 4-5 mm. high; sepals imbricate, rounded, 2-3 mm. high, about half as long as the corolla; petals imbricate, striate, apex shortly and abruptly mucronate. Mature fruit red, dried specimens obtusely angular, oblong, 23-24 mm. long, about 12 mm. broad, apex abruptly contracted into a 2 mm. long beak; epicarp thin, longitudinally minutely striate; endocarp woody. Mature seed ovoid, acute, light brown, distinctly 6-angular, 15 mm. long, 8 mm. broad, base rounded, transverse ribs obtuse.

Differs from *B. brachyclamys* Burret in its larger and more slender seeds, and its higher fruiting perianth.

Savaii: forest, Aopo-Ngangamalae, altitude 1200 meters, young flower, fruit, December 7, 1931, Christophersen no. 3453, type in Bernice P. Bishop Museum.

The name of this species is derived from the Samoan word *tuasivi* applied to the main mountain chain (literally, "backbone"). It is distinguished by 6-angled seeds, larger than those of *B. brachyclamys*. From *B. Burretiana*, in addition to the 6-angled seeds, it is distinguished also by its smaller fruiting perianth.

**Balaka** species.

Upolu: forest above Malololelei, altitude 670 meters, young flower, August 5, 1929, Christophersen no. 6; forest below Tiavi, altitude 500 meters, flower, young fruit, October 22, 1929, Christophersen no. 962.

These two specimens, collected in the same general locality, have no mature fruits to show their identity. In characters of the frond and immature spadix the specimens are very similar except for the almost twice as broad apical segments of no. 962.

The plant from above Malololelei (no. 6) is a tree 4 meters high, with small (108-111 cm. long), slender fronds and narrow, obliquely praemorse segments, 10-11 on each side, the middle ones reaching a length of 37 cm. and a width of 3.3 cm. Apical segments 4-5 cm. wide, obliquely truncate praemorse, upper margin 17.5-18.5 cm. long, lower margin 20-25 cm. long. Inflorescence 32 cm. long including a peduncle of 12.5 cm., in part densely covered with a reddish-brown, scaly wool. Primary branches 7, the 2 lower ones once branched. Flowering branches 10-15 cm. long. Flowers immature.

The plant from Tiavi (no. 962) is a 3-meter-high tree with fronds about 110 cm. long and narrow, obliquely praemorse segments, 8-9 on each side, the middle ones reaching a length of 40 cm. and a width of 4.7 cm. The apical segments 7.1-8.5 cm. wide, obliquely truncate praemorse, upper margin 15-18 cm. long, lower margin 21-25 cm. long. Spadix with young fruits 38 cm. long including a peduncle 19 cm. long, in the lower part with remaining reddish-brown, scaly wool. Primary branches 7, the lower one once branched. Fruiting branches 10-12.5 cm. long. Young fruits much shrivelled. Detached male flowers with shedding pollen 9 mm. long, sepals imbricate, rounded, 2 mm. high, petals valvate, acute, about 9 mm. long, 2.5-3 mm. wide.

## 5. COCOS Linnaeus

**Cocos nucifera** Linnaeus: Sp. Pl., p. 1188, 1753.

Tau: cultivated, Luma, male flower, young fruit, January 10, 1922, Garber no. 703. Savaii: cultivated, Manase, fruit, August 24, 1931, nos. 3611 and 3612; cultivated, Salailua, fruit, October 1931, nos. 3614, 3615, and 3616; cultivated, Foailunga-Fongasavaii, altitude 25 meters, fruit, October 1931, no. 3613; cultivated, Tanga, fruit, October 6, 1931, no. 3617. Native name, *niu*. The coconut palm is everywhere in cultivation, copra being the principal export article of the islands. Several distinct forms are to be found:

- 'Ini 'ini. Fruits are said to be small with thin shell, heavy endosperm, and very little or no juice. The meat is usually taken out entire and dried without being cut.
- La'ita. A relatively small tree with clusters of numerous, small fruits of a light yellowish-brown color. The juice is sweet so that the fruits are favored for drinking purposes, but on account of their size they are seldom, if ever, used for copra. Specimen no. 3614.
- Niu 'afa. Large, relatively long and narrow fruits the husk of which is favored for the making of sennit ('afa). One fruit measured in the submature stage (*niu sami*) at Manasa was 32 cm. long and 21 cm. broad. Specimen no. 3612.
- Niu alava. The fruits are said to be of a very light green color.
- Niu le'a. The dwarf coconut palm, with stocky stem and a dense crown of heavy, stiff leaves not gracefully arching like the common form. It starts to bear at an early age.
- Niu tauanga. Fruits oblong with almost parallel sides (one mature specimen 28 by 16.5 cm.). The fiber of the husk is used for making strainers for coconut cream. Specimen no. 3615.
- Niu tauave. A very distinct form, the fruits being borne sessile directly on the rachis of the branchless spadix. The fruiting spadix is drooping. The fruits are short and relatively broad (one mature specimen 21 by 16 cm.). The nut is flattened at the apex. Specimen no. 3613.
- Niu tau lua sami. The fruits are smaller than those of *niu vai*, used as water bottles in pairs for carrying salt water for *palusami*.
- Niu tetea. Fruits in the submature stage (*niu sami*) are light yellowish green to almost white. Form of fruits ovate (one specimen 25.5 by 16 cm.). Specimen no. 3616.
- Niu vai. The fruits are large and rounded, the nuts being used for water bottles. One submature fruit in Manasa was 25.5 cm. long and 22.5 cm. broad. Specimen no. 3611.
- Tongau. In the submature stage (*niu sami*) the lower part of the nuts, husk, shell and meat is edible, in taste and consistency much like the "heart" of the tree. The upper part of the nut is sweeter, the husk being fibrous. The mature nuts, when allowed to become so, are used for copra. Specimen no. 3617.
- Niu mea and niu ui. These names are used for the brown and green color forms respectively, but do not, as I was informed, apply to any particular form. That is, *niu vai*, for instance, may occur as *niu mea* (brown) and *niu ui* (green).

The various stages of ripeness in the coconut are recognized by definite names. *Aile* ('aile) is the earliest stage when the fruit is beginning to form. In *mua sui* (*mu'a su'i*) the fruit is bigger, but no soft meat (*a'a'no*) is as yet formed. In the *niu mamata* stage the nut contains soft meat and is filled with liquid. In the *niu sami* stage the meat is partly ripened, nut filled with liquid. *Popo* is the ripe stage, meat fully developed, nut only partly filled with liquid.

The coconut palm is used for a variety of purposes. The leaves furnish material for mats, baskets, brooms (midrib of leaflets). The wood is used for thatch rafters ('aso), walking sticks, canoes (?). The husk of certain varieties is used for sennit, strainers and for sandals. The shell is used for cups and water bottles, playing discs (*lafonga*), for fire where strong heat is desired, and for charcoal (charcoal irons). The meat of the nut is used for a variety of food preparations, the dried meat (copra) being the only important native produce and source of income.



## FAMILY 6. ARACEAE

## I. RAPHDOPHORA Hasskarl

?**Raphidophora Graeffei** Engler: Engl. Bot. Jahrb., vol. 25, p. 9, 1898.

Upolu: forest, Malololelei-Lanutoo, altitude 700 meters, flower, August 5, 1929, Christophersen no. 20; forest at lake Lanutoo, altitude 700 meters, young flower, August 21-22, 1929, Christophersen no. 402. Native name, *tuafanga* (no. 402).

These specimens differ from the description of *R. Graeffei* in their acuminate, relatively broad leaves. The largest leaves of no. 402 are 30 cm. by 13 cm. on petioles 20 cm. long. No. 20 has leaves to 30 cm. by 11.5 cm. on petioles 30 cm. long. The peduncles are 6.5-7 cm. long and the style is included. In addition to the smaller size of all its parts, *R. Graeffei* is distinguished from *R. Reineckeii* in the shape of the fruit, which is longer and narrower in *R. Reineckeii* (7 mm. long, hardly 3 mm. wide). As far as the leaves are concerned, these specimens are intermediate between the two species. There are unfortunately no fruits.

Dr. P. H. Buck (7) collected a fish trap in Savaii (Sapapalii), the material of which was said to be *tuafanga*. Examination of this basket (B. P. Bishop Museum no. C 635, 27-4) shows that the material is roots of *Raphidophora*.

**Raphidophora Reineckeii** Engler: Engl. Bot. Jahrb., vol. 25, p. 9, 1898.

Savaii: forest above Safune, altitude 500-800 meters, fruit, May 1, 1924, Bryan no. 115; edge of forest above Vaipouli, altitude 150 meters, young flower, July 7, 1931, Christophersen and Hume no. 1902; edge of forest, Salailua, altitude 75 meters, flower, October 26, 1931, Christophersen no. 2956; edge of forest, Salailua, altitude 150 meters, flower, October 28, 1931, Christophersen no. 2998; forest, Le Vai, above Salailua, altitude 350 meters, flower, October 28, 1931, Christophersen no. 3004. Native name, *pau tutunga* (no. 2956).

A very common, luxuriant climber ranging from the lowland forests to an altitude of 1300-1400 meters. The long roots emitted from the stem are very strong and flexible and form a favorite material with the natives for tying up wild pigs and for use in the construction of shelter huts in the forest.

## 2. EPIPREMNUM Schott

**Epipremnum pinnatum** (Linnaeus) Engler: Pflanzenr., IV, 23B, p. 60, 1908.

Tutuila: Pago Pago harbor, 1929, Diefenderfer no. 2.? Upolu: forest near Apia, altitude 100 meters, February 27, 1921, Eames no. 78; forest on Vaea mountain, altitude 200 meters, June 28, 1931, Christophersen and Hume no. 1831. Savaii: coconut plantation, Safotu-Manase, altitude 2 meters, August 17, 1931, Christophersen and Hume no. 2414.

All the specimens are sterile, but agree in the vegetative characters with the description of Engler (18), except that the leaves are narrower, not more than 23 cm. broad. Engler (45, p. 238) has referred a specimen from Upolu collected by Rechinger to this species. Diefenderfer no. 2 is juvenile. Eames no. 78 shows one entire leaf. The leaves of the other specimens are variously dissected.

### 3. CYRTOSPERMA Griffith

?*Cyrtosperma Merkusii* (Hasskarl) Schott: Oesterr. Bot. Wochenbl., vol. 7, p. 61, 1857.

Savaii: Tanga, altitude 10 meters, October 6, 1931, Christophersen (by native) no. 2830. Native name, *pulaa* (*pula'a* or *pulā*?).

Petiole with spines in the lower part, 123-126 cm. long; leaf blade hastate, angle between main veins of basal lobes 90 degrees, basal lobes longer than apical, 37-40 cm. long, apical lobe 32-37 cm. long. No flowers or fruits.

The leaves agree with the interpretation given by Engler (19, p. 17). *Cyrtosperma Chamissonis* (Schott) Merrill (*C. edule* Schott) is reported from Tutuila by Setchell (51, p. 108), who states that the obtuse angle between the basal lobes distinguishes this species from *C. Merkusii*. In the specimens from Savaii, however, the sinus is rectangular, agreeing with the interpretation of Engler (19, p. 15), and narrower than the sinus of *C. Chamissonis* of Schott (48), and Engler (19, pp. 15, 17, 18).

### 4. AMORPHOPHALLUS Blume

*Amorphophallus campanulatus* (Roxburgh) Blume: Ann. Mus. Hist. Nat. Par., vol. 3, p. 366, 1834.

Tau: in bush at Siufanga, altitude 3 meters, September 21, 1922, Garber no. 774. Tutuila: above Pago Pago, altitude 300 meters, March 18, 1930, Diefenderfer no. 17. Savaii: Fangamalo, September 16, 1929, Christophersen (by native) no. 676; waste land above Letui, altitude 200 meters, September 27, 1929, Christophersen no. 767; coconut plantation, Salailua, altitude 10 meters, September 14, 1931, Christophersen no. 2593. Native name, *teve* (nos. 774, 676, 767, and 2593).

Common in the plantations and on waste ground at lower elevations. The juice of the plant is irritating to the skin, a fact that was utilized by the Samoans in exercising punishment. Unfaithful wives were beaten with the *teve* plant.

### 5. COLOCASIA Schott

*Colocasia esculentum* (Linnaeus) Schott: Melet. Bot., p. 18, 1832.

Ofu: cultivated, Ofu village, altitude 8 meters, June 22, 1925, Garber no. 1100. Savaii: moist open ground, forest near lake Mataulanu, altitude 800

meters, October 2, 1929, Christophersen no. 881; riverside above Sili, altitude 400 meters, November 12, 1931, Christophersen no. 3151. Native name, *talo*.

In a wild state the *talo* (taro) is found in wet ground to high elevations. Some of the wild forms are good food plants, but are not relished much by the Samoans. Most of the cultivated *talo* is grown on dry land, "wet" *talo* (*talo fusi*) being found in only a few places. In Savaii is still practised the method of burning virgin forest, planting the land in *talo* for a number of years, and then leaving it when the productivity decreases. This method has resulted in large areas of waste land, mostly covered by *Mikania micrantha* and *Paspalum conjugatum*. Slight needs for new land and a passive satisfaction with things as they are have prevented this destruction from growing very far, so that the lowland forests are still for the greater part intact.

*Talo* is the main staple of the Samoans, and the only vegetable of ceremonial standing—that is, it is acceptable as a gift on important occasions. Breadfruit, bananas, and yams do not have this rank. The following forms of *talo* have been observed, or their names only ascertained:

*Talo manu'a*. The main type of this form is easily recognized by its dark, greenish-purple petioles with pure purple streaks and its tall stature. The meat of the tuber and the base of the shoot are pure white. This form and *talo niue* are the two most common forms on Savaii.

*Talo manu'a tusitisi*. A subform of *talo manu'a* differing in the color of the petioles, which are basically green and abundantly striped with purplish-black stripes.

*Talo manu'a pa'epa'e*. A subform of *talo manu'a* with yellowish-green petioles sparsely striped with brown or purple streaks.

*Talo manu'a uli*. No specimen seen.

*Talo niue*. The petioles of the main type are green, slightly striped with red or purple, and the base of the shoot and the meat of the tuber are pink. The uppermost part of the petiole is red and the veins of the leaf are red or purplish red.

*Talo niue uli*. A subform of *talo niue* with darker petioles. Under wet cultivation in Vaisala, Savaii.

*Talo niue fa'a vavae ula*. Petioles prominently striped with purple streaks. Under wet cultivation in Vaisala, Savaii. The name refers to the red, striped sugar cane.

*Talo niue samasama*. Petioles (or tubers?) yellow. No specimen seen.

*Talo anosamasama*.

*Talo fangaloa*.

*Talo fetuna*. Apparently introduced from the island of Fetuna.

*Talo fiti*. Petioles much like *talo manu'a* in color, purplish black but with more red.

Leaf veins distinctly red, only slightly so or green in *talo manu'a*. The meat of the tuber is white with an offensive odor like *palamanu*. Apparently introduced from Fiji.

*Talo fui* (fuitalo).

*Talo manini*.

*Talo pa'epa'e*. Young leaves white underneath, mature leaves less so. Petioles reddish. Meat of tuber white.

*Talo pone*.

*Talo pueutu*.

*Talo sina*. Petioles light yellowish green, with red-margined wings, leaf with conspicuous white bloom underneath, some of the veins purplish. Meat of tuber white.

*Talo ta'anga* or *tanga*. Said to be red. Not seen.

*Talo uli*.

Talo vai. A common name for several forms of *talo* growing along water courses. A form growing wild at the bank of a stream above Sili, Savaii (E. Christophersen no. 3151), has light, greenish-yellow stems, leaves yellowish green above with bloom below. The tuber is as large as cultivated *talo*, meat white, soft when cooked.

A'ali'i. Tuber smooth with no or few roots.

Fa'aele'ele.

Levela.

Mangasiva. Petioles dark, reddish purple similar to *talo manu'a*, leaf veins red or purple, meat of tuber red, or brownish red, deeper red than *sungale* and much deeper red than *talo niue*. The tuber is bifurcate in the upper part like *matangi fanua*. *Mangasiva* is said to be a chief's *talo*.

Mangasiva i'a.

Mangasiva nono.

Mangasiva pa'epa'e.

Mangasiva uli.

Mangasiva ulu.

Mangauli.

Matale (talo matale).

Matale mangauli.

Matangi fanua. Petioles red or reddish purple, wings pale, leaf veins distinctly dark purple, tuber bifurcate in the upper part (compare *mangasiva*).

Ola ola vale. Petioles green striped with white, leaf veins green or purplish, meat of tuber white, tuber large, in one specimen 40-50 cm. long, 20 cm. wide.

Palamanu. Petioles green, the uppermost part and wings red, meat of tuber pink with an offensive odor. Plants tall.

Pula. Petioles light green, red in the uppermost part, meat of tuber yellow, of a stronger color when baked. A common form, said to be an original Samoan *talo*.

Pula'a (ula'a). Said to be a wild *talo* in swampy ground, but most probably the informants have referred to *Cyrtosperma*, which has been definitely identified as *pula'a*.

Pula'au.

Pula fau.

Pula lupe.

Pula manu'a. By one informant said to be identical with *pula ula*.

Pula ngefu.

Pula pa'epa'e.

Pula u (ula u).

Pula ula.

Pula uli.

Sasauli (talo sasauli). Petioles brilliant reddish purple, leaf veins reddish purple, tuber light red like *talo niue*.

Sasauli fa'ama'i.

Sasauli mumu.

Sasauli pa'epa'e (sasauli pa'e).

Sasauli sina.

Sasauli uliuli.

Se'ese'e.

Se'ese'e fa.

Sungale. Petioles purple or green striped with purple, leaf veins bluish purple, meat and skin of tuber red, of a deeper color than that of *talo niue*. One specimen had a tuber about 30 cm. long, 20 cm. wide.

Sungale se. Tubers small.

Sungale ulu.

Vase (talo vase).

## 6. ALOCASIA Necker

*Alocasia macrorrhiza* (Linnaeus) Schott: Oesterr. Bot. Wochenbl., vol. 4, p. 409, 1854.

Upolu: canyon of Vaisingano River near Malololelei, altitude 500 meters, flower, fruit, August 6, 1929, Christophersen no. 91; Apia, altitude 50 meters, February 27, 1921, Eames no. 74. Savaii: cultivated, Salailua, altitude 25 meters, flower, November 28, 1931, Christophersen no. 3422. Native name, *ta'amu*.

The *ta'amu* grows naturally in moist places at low and medium elevations. This wild *ta'amu* is not used for food, but numerous forms are cultivated, for the greater part as a dry land crop. The following forms were noted:

'Ape. General term for wild forms.

'Ape ngatala. Distinguished by green petioles with purple stripes, specially pronounced on the inside of the wings. The leaves are large.

Fanga (*ta'amu fanga*). The tuber has a very pungent taste and is used only in time of famine. It grows wild in the coconut plantations.

Fiasenga. Characterized by its yellow and yellowish-green, striped petioles. The leaves are also partly yellow.

Fui ngatala.

Lau fola. Petioles green, distinguished from the similar *lau o'o* in the apical hood of the leaf which is turned outwards, being turned toward the center of the plant in *lau o'o*.

Regarding the shape of the leaf I was shown two types, one relatively long and narrow with acute apex, and another broader type with rounded apex, both claimed to be *lau fola*.

Lau malu.

Lau o'o. Petioles green, leaves very large. The hood of the leaf apex is turned inward. *Ta'amu fui*.

*Ta'amu niukini*. Distinguished by its petioles which are bluish purple at the base and on the wings, green with a purplish tint on the back and above. Probably introduced from New Guinea as the name implies.

*Ta'amu saina* (?).

*Ta'amu sala'i*.

*Ta'amu tonga*. Leaves broad, rounded at the apex. Probably introduced from Tonga. *Ta'amu uli*.

## UNDETERMINED SPECIMENS

Diefenderfer no. 5 (Pago Pago, Tutuila), Eames no. 79 (Apia, Upolu), Christophersen no. 453 (Vaea mountain, Upolu), and Christophersen no. 2877 (Salailua-Lataitai, Savaii).

The specimens are all sterile and perhaps juvenile. The plants are found trailing on the forest floor. Petioles long, leaf blades unsymmetrical, acuminate, base broadly attenuate, rounded or cordate, veins irregular. Size of leaf blades: 7 by 3.5 cm., 9 by 3.5 cm., 11 by 5 cm. The venation does not show the subparallel regularity characteristic of *Scindapsus* and *Raphidophora*. The specimens may represent juvenile plants of *Epipremnum pinnatum*.

## FAMILY 7. LEMNACEAE

## I. LEMNA Linnaeus

?*Lemna paucicostata* Hegelmaier: Lemn., p. 294, 1868.

Savaii: forest pool, Puapua-Samalaulu, October 13, 1929, Christophersen no. 914.

## FAMILY 8. FLAGELLARIACEAE

## I. JOINVILLEA Gaudichaud

*Joinvillea Bryanii* species nova (fig. 6).

Planta erecta  $\pm$  3 m. alta habito *Bambusae*. Caulis simplex teres fistulatus levis glaber in parte media 8 mm. diametro, internodiis in parte superiore 6-7 cm. longis in parte media 10-12 cm. longis. Vaginae internodia tegentes patulae virgatae leves in parte superiore pubescentes dein glabrae, margine scarioso angusto. Ligula biaurita, laciniis ligulatis obtusis 5-8 mm. longis, marginibus scariosis. Laminae lineari-lanceolatae basi constricta apice attenuato-acuminato concavae 18-22-plicatae costis prominentibus utrinque scabris marginibus, immaturae subtus pubescentes supra glabrae, maturae subtus pilis rubiginosis sparsim instructae, mediae in statu complanato 60-68 cm. longae 8.5-9 cm. latae. Inflorescentia terminalis erecta paniculata pyramidalis 17-20 cm. longa 19-22 cm. lata, ramis primariis 16-20, caule ramisque tomentosis, bracteis triangulis vel lanceolatis acuminatis inferioribus ad 2 cm. longis, bracteolis triangulis vel lineari-lanceolatis acuminatis 1-3 mm. longis. Perigonium diturnum biseriatum, tepalis exterioribus 3 lanceolatis acuminatis carinatis concavis saccatis 1-nervatis margine scarioso in statu complanato 3.2-3.5 mm. longis 1.2-1.5 mm. latis, tepalis interioribus exterioribus alternis ovato-lanceolatis acuminatis concavis 3-nervatis in statu complanato 2.8-3 mm. longis 1.5-1.8 mm. latis. Fructus submaturus viridis vel aurantiacus triangulus rostratus trilocularis ad 5 mm. diametro (in sicco). Stigma 3-divisum laciniis filiformibus 3 mm. longis. Semina 3 vel minus globosa fulvo-rubra rugulosa 1.6 mm. diametro.

Differt a *J. eleganti* tepalis subaequalibus, a *J. Gaudichaudiano* tepalis lanceolatis angustioribus.

Plant erect,  $\pm$  3 m. high, of a habit like bamboo. Stem simple, terete, hollow, smooth, glabrous, 8 mm. in diameter at the middle; internodes in the upper part 6-7 cm. long, in the middle part 10-12 cm. long. Sheaths covering the internodes, open, rod-shaped, smooth, pubescent in the upper part, glabrous with age, margin scarios, narrow. Ligule bi-auricular; lobes ligulate, obtuse, 5-8 mm. long; margins scarios. Leaf blades linear-lanceolate, constricted at base, attenuate-acuminate, concave, 18-22-plicate, prominent veins on both surfaces scabrous, margin scabrous; immature blades pubescent below, glabrous above; mature blades with scattered reddish hairs below, middle blades 60-68 cm. long and 8.5-9 cm. broad in flattened condition. Inflorescence terminal, erect, paniculate, pyramidal, 17-20 cm. long, 19-22 cm. broad; primary branches 16-20; stem and branches tomentose; bracts triangular or lanceolate, acuminate, lower bracts to 2 cm. long; bracteoles triangular or linear-lanceolate, acuminate, 1-3 mm. long. Perigone persistent, biseriate; outer tepals 3, lanceolate, acuminate, keeled, concave, saccate, 1-veined, 3.2-3.5 mm. long and 1.2-1.5 mm. broad in flattened condition, margin scarios; inner tepals alternating with outer ones, ovate-lanceolate, acuminate, concave, 3-veined, 2.8-3 mm. long and 1.5-1.8 mm. broad in flattened condition. Submature fruit green or orange-colored, triangular, beaked, 3-celled, to 5 mm. in diameter (dried specimens). Stigma 3-lobed, lobes filiform, 3 mm. long. Seeds 3 or less, globose, tawny red, rugulose, 1.6 mm. in diameter.

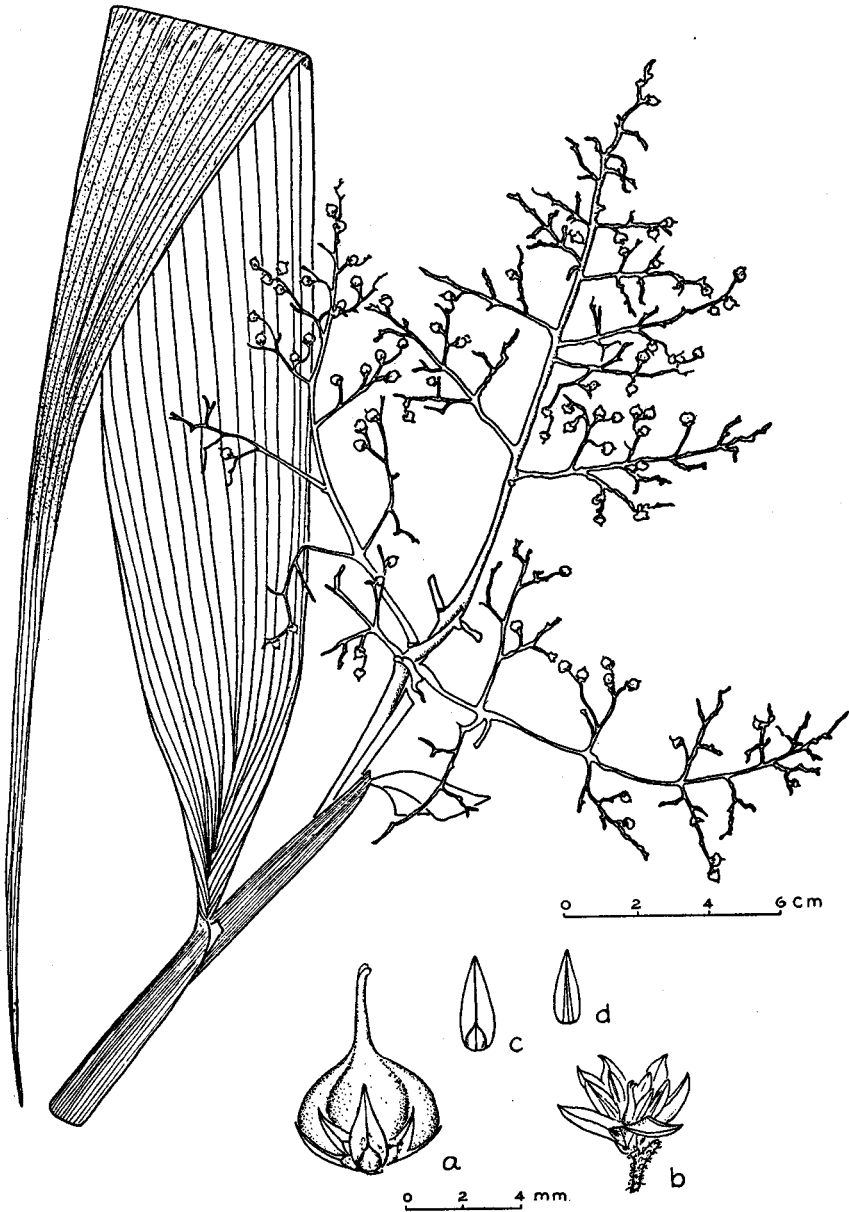


FIGURE 6.—Fructing branch, *Joinvillea Bryanii*: a, immature fruit; b, flower; c, outer tepal; d, inner tepal.

PAGO PAGO: AS 96739

Savaii: forest above Safune, altitude 900+ meters, fruit, May 3, 1924, Bryan no. 125; forest above Matavanu Crater, altitude 800 meters, fruit, July 14, 1931, Christophersen and Hume no. 2040; forest above Matavanu Crater, altitude 800 meters, fruit, July 16, 1931, Christophersen and Hume no. 2088; forest above Matavanu Crater, altitude 850 meters, fruit, August 6, 1931, Christophersen and Hume no. 2283; forest, slopes of Papafu Crater above Salailua, altitude 1400 meters, fruit, September 23, 1931, Christophersen no. 2682; low forest, Papafu Crater above Salailua, altitude 1500 meters, flower, fruit, September 22, 1931, Christophersen no. 2714; forest above Salailua, altitude 1200-1300 meters, fruit, September 23, 1931, Christophersen no. 2747; forest above Salailua, altitude 1400 meters, fruit, November 6, 1931, Christophersen no. 3097; forest above Aopo, altitude 900-1000 meters, fruit, December 7, 1931, Christophersen no. 3457, type in B. P. Bishop Museum.

This species is named in honor of Mr. E. H. Bryan, Jr., who discovered it in the mountain forests above Safune on Savaii. It differs from *J. elegans* in the subequal perianth segments and from *J. Gaudichaudiana* in the narrower, lanceolate segments. It is closely related to the Fijian species (Seemann no. 645 in Kew Herbarium, Yeoward no. 27 in Kew Herbarium, Gillespie no. 4820 in B. P. Bishop Museum) characterized by lanceolate, acuminate, subequal perianth segments, which, however, are shorter and narrower than in *J. Bryanii*.

The plant is common in the forests of Savaii from an altitude of about 800 meters to 1500 meters or more. (Above Sili *Joinvillea* was observed at an altitude of about 400 meters, but the specific identity was not determined.) It grows in clumps in the manner of bamboo, the top of the stems gracefully curved.

**Joinvillea Gaudichaudiana** Brongniart et Gris: Soc. Bot. France, Bull., vol. 8, p. 269, 1861.

Upolu: forest, Lake Lanutoo, altitude 700 meters, flower, fruit, August 8, 1931, Christophersen no. 122; forest, Lake Lanutoo, altitude 700 meters: flower, August 21-22, 1929, Christophersen no. 372. Savaii: forest above Matavanu Crater, altitude 900 meters, flower, fruit, July 15, 1931, Christophersen and Hume no. 2030; rim of crater, above Matavanu Crater, altitude 1600 meters, flower, fruit, July 29, 1931, Christophersen and Hume no. 2206; forest northeast of Salailua, altitude 1200 meters, flower, September 8, 1931, Christophersen no. 2562.

These plants can not be distinguished from the Hawaiian *Joinvillea* and must be referred to the same species. On an average the segments of the perianth are somewhat smaller in the Samoan specimens, but the maximum dimensions are the same except that the inner segments are not more than



3 mm. long (2.5-3.5 mm. in Hawaiian specimens). This species is found in Savaii with *J. Bryanii* in the mountain forests from an altitude of about 800 meters into the highest plateau forests. In Upolu it was observed to be common in the forests of the western summit plateau.

## 2. FLAGELLARIA Linnaeus

?*Flagellaria gigantea* Hooker f.: Icon. Plant., vol. 15, p. 23, pl. 1429, 1883.

Upolu: deep forest, Moa Moa plantations, March 2, 1921, Eames no. 200; forest, ridge above Malololelei, altitude 700 meters, August 12, 1929, Christophersen no. 194. Savaii: open woodland, Olo, above Safotu, altitude 700 meters, fruit, August 5, 1931, Christophersen and Hume no. 2255. Native name, *lafo* (nos. 200 and 2255).

The original description, based on Fijian specimens has not been consulted. The specimens have been compared with material from Fiji (Gillespie nos. 2319 and 4804, Parks no. 20122), the inflorescence being in all parts coarser in the Samoan plants, the flowers (fruits) more distantly inserted on the branchlets and the segments of the perianth larger. This species is very common on both Upolu and Savaii, climbing up into the crowns of even the biggest trees. It is rarely seen in flower, as the inflorescences are borne in the upper layer of the forest canopy.

The stem of the *lafo* is used in thatch for native houses, serving as a stick to which the leaves of the sugar cane are attached.

## FAMILY 9. BROMELIACEAE

### I. ANANAS Tournefort

*Ananas sativus* Schultes f.: Syst., vol. 7, 2, p. 1283, 1830.

The pineapple (*fala* or *fala 'aina*) was in many places observed to grow in a natural state in the lowland forests, especially in stony places. Some of these established forms produce palatable fruits, but the Samoans do not depend on them for their wants, cultivating other forms in their plantations. The following forms were noted:

*Fala saina*. The ripe fruits are said to be of greenish or yellow color.

*Fala samoa*. A common cultivated form with relatively small, almost cylindrical fruits which are yellow when ripe. It is very sweet, said to be the sweetest of all forms in Samoa.

*Fala tonga*. The fruits are strongly tapering and larger than those of *fala samoa*. They are bluish purple when ripe, sweet, but less so than *fala samoa*. The most common form in the native plantations. Smooth Cayenne?

*Fala toto*.

*Fala ui*. Said to be another name for *fala samoa*.

*Fala 'ula*. Scales of the young fruit brilliant red. Leaves narrow with marginal spines from base to apex. An established form.

*Fala uli*.

The "eyes" of the fruit of several varieties are commonly used for necklaces ('*ula*). All the informants asked said that the leaves were not used for cordage.

#### FAMILY 10. COMMELINACEAE

##### I. COMMELINA Plumier

***Commelina nudiflora*** Linnaeus: Sp. Pl., p. 41, 1753.

Olosenga: wet *talo* plantation, Olosenga, flower, June 23, 1925, Garber no. 1088. Upolu: roadside near Malololelei, altitude 650 meters, flower, August 13, 1929, Christophersen no. 226. Native name, *ma'u'u tonga* (no. 226).

Differs from *Commelina benghalensis* Linnaeus in the open spathe. Common in moist places on all the main islands.

##### 2. ANEILEMA R. Brown

***Aneilema vitiense*** Seemann: Fl. Vit., p. 314, pl. 96, 1868.

Tau: Sani Ridge back of Fitiuta, altitude 100 meters, flower, fruit, August 9, 1921, Garber no. 588. Upolu: Vaisingano River, near Malololelei, altitude 500 meters, flower, fruit, August 7, 1929, Christophersen no. 107. Native name, *ma'u'u tonga* (no. 588).

#### FAMILY 11. LILIACEAE

##### I. CORDYLINA Commerson, ex Jussieu

***Cordylina terminalis*** Kunth: Abh. Berl. Akad., p. 30, 1820.

Tau: Fitiuta trail, altitude 80 meters, fruit, August 4, 1921, Garber no. 554. Tutuila: Goat Island, flower, December 14, 1924, Garber no. 808; Afono-Vatia trail, altitude 40 meters, fruit, December 17, 1924, Garber no. 870; moist forest, altitude 200 meters, flower, fruit, April 12, 1924, Bryan no. 74. Upolu: cultivated, Apia, flower, February 28, 1921, Eames no. 106; Moa Moa plantations, deep woods, altitude 200 meters, March 2, 1921, Eames no. 193; forest, ridge above Malololelei, altitude 700 meters, fruit, August 14, 1929, Christophersen no. 240; forest, above Malololelei, altitude 750 meters, flower, August 15, 1929, Christophersen no. 252; cultivated, Apia, August 17, 1929, Allen no. 307; Vailele, flower, fruit, August 20, 1929, Christophersen (by native) no. 349. Savaii: coconut plantation, Safune, altitude 10 meters, August 13, 1931, Christophersen and Hume no. 2431; cultivated, Ngan-gamalae, November 4, 1931, Christophersen nos. 3028, 3029, 3030, 3031, 3052. Native name, *ti, lau ti* (nos. 554, 808, 240, and 252).

The *ti* is a common shrub in the forest and in openings from the lowlands to high altitudes (1500 meters or more). The specific name of this

wild ti is *ti vao*. Several forms of cultivated ti are to be found in and around the villages:

Ti fangasā. The basal part of the leaf blade green, margin and apical part red (not purple). Petiole reddish purple. Other specimens (no. 3052) have purplish-red lower leaf surfaces. Proportions of leaf blade: 3.5:1.

Ti fanua.

Ti laumanifi.

Ti tonga. According to A. F. Judd (34), this form furnishes the best root.

Ti tongo tongo. Leaf blade green with brownish-red margin and stripes. Wings of petiole brownish red. Proportions of leaf blade: 5.5:1. Specimen no. 3030.

Ti uea. Leaf blade very narrow, red. Proportions 9:1. Specimen no. 3029.

Ti ufi.

Ti 'ula. A common name for several forms of red-leaved ti. One specimen (no. 3031) has leaves with purplish-red tips and margins, red veins and petioles. Proportions of leaf blade: 3.2:1.

Ti uli.

Ti vai. Leaf blade green with red (not purplish-red) tip and veins, petiole purple. Proportions of leaf blade: 4:1. Specimen no. 3028.

The root of the ti is not commonly used in Samoa. But the leaves are extensively used for decoration and for making skirts. They are also commonly used in the forest for the roof of temporary shelter huts.

## 2. COLLOSPERMUM Skottsberg

*Collospermum samoense* Skottsberg, in litt.

*Astelia montana* Reinecke, non Seemann.

Upolu: forest at Lake Lanutoo, altitude 700 meters, flower, August, 21-22, 1929, Christophersen no. 376; forest, Malololelei-Lanutoo trail, altitude 700 meters, fruit, August 21-22, 1929, Christophersen no. 422. Savaii: forest above Safotu-Letui, altitude 16-1700 meters, fruit, September 25, 1929, Christophersen no. 786; forest above Matavanu Crater, altitude 1300 meters, fruit, July 24, 1931, Christophersen and Hume nos. 2130 and 2154; forest above Matavanu Crater, altitude 900 meters, flower, July 15, 1931, Christophersen and Hume no. 2005; forest above Matavanu Crater, altitude 1500 meters, flower, fruit, July 30, 1931, Christophersen and Hume no. 2223; forest above Salailua, altitude 1350 meters, late flower, November 7, 1931, Christophersen no. 3112.

Most of my informants did not know any native name for this plant. Reinecke (46, p. 595) gives *sala sala*, a name that I did not succeed in verifying. One informant in Upolu gave *tuafanga* (specimen no. 376), but this name is no doubt the name for *Raphidophora Graeffei* (and *R. Reineckei*?) (see p. 39). An informant in Savaii gave *lau fala fala* (specimen no. 2223), meaning "the plant with a leaf that looks like the *fala* (*Pandanus*)." This name was not verified by other informants.

The plant is a common epiphyte in the forests at high elevations. All my informants denied that any use was made of it. The statement by Reinecke (46, p. 595) that the leaves are used for fine mats (*'ie tonga*) is most probably based on a confusion with *Pandanus*, as he describes the plant as "mächtigen, mit scharfen, hakenartigen Zähnen besetzten Blättern."

### 3. ASPARAGUS Linnaeus

**Asparagus plumosus** Baker: Jour. Linn. Soc., Bot., vol. 14, p. 613, 1875.

Upolu: open woods, Vailima, altitude 100 meters, February 28, 1921, Eames no. 108. A garden escape.

Native name, *lau lili'i*. A common name for several plants with small leaves.

## FAMILY 12. AMARYLLIDACEAE

### I. ZEPHYRANTHES Herbert

**Zephyranthes rosea** (Sprengel) Lindley: Bot. Reg., vol. 10, pl. 821, 1824.

Upolu: grassy waste place, Apia, flower, February 18, 1921, Eames no. 55. Savaii: in lawn, Fangamalo, fruit, July 4, 1931, Christophersen and Hume no. 1866; Fangamalo, flower, July 19, 1931, Christophersen and Hume no. 2103.

Common in lawns. In Fangamalo it flowers regularly in abundance for a few days every month.

### 2. FOURCROYA Ventenat

**?Fourcroya cubensis** Ventenat: Bull. Soc. Philom., vol. 1, p. 66, 1793.

Savaii: border of lagoon swamp, Falealupo, flower, September 30, 1931, Christophersen no. 2776. Native name, *lau talo talo papalangi*.

Flowers and a leaf tracing were sent to Dr. William Trelease, who has kindly examined them and expressed the opinion that the plant supposedly belongs to this species.

An escape from cultivation, very common along the borders of the salt-water lake and swamp behind Falealupo Village, and common also along the shore at Falelima.

## FAMILY 13. TACCACEAE

### I. TACCA Forster

**Tacca pinnatifida** Forster: Char. Gen., p. 70, pl. 35, 1776.

Tau: plateau back of Luma, altitude 125 meters, flower, fruit, December 15, 1921, Garber no. 653. Upolu: near Fangalii, flower, August 20, 1929, Christophersen (by native) no. 350. Savaii: open "fern country" between

Vaipouli and Manase, altitude 100 meters, flower, September 21, 1929, Christophersen no. 714. Native name, *masoa* (nos. 653, 350, 714).

Common in the lowlands as a spontaneous plant, especially in plantation ground, but also in natural vegetation. The starchy root is used by the natives in various food preparations and also as paste in the making of *siapo*.

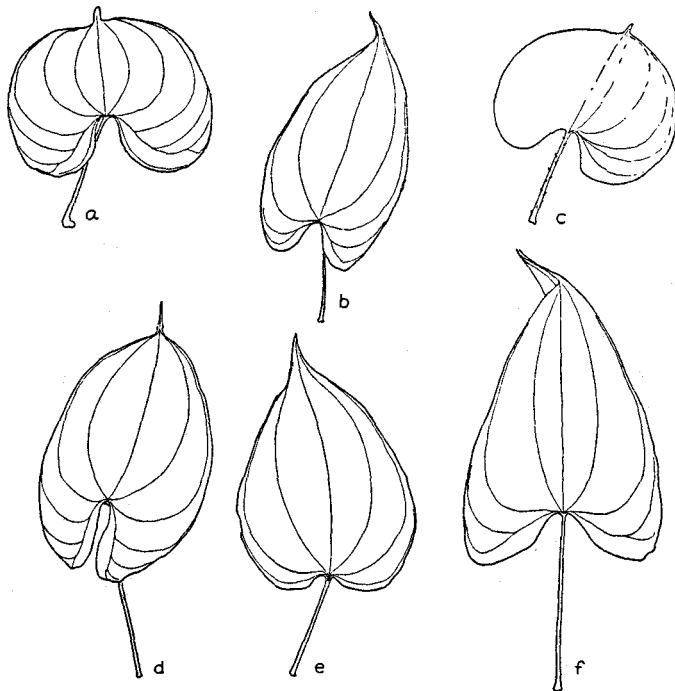


FIGURE 7.—Leaves of forms of *Dioscorea affinis alata*: a, *ufi vao*; b, *taiulu ango*; c, *ufi lei*; d, *lau selifi*; e, *palai (ufi palai)*; f, *ufi voli*.

#### FAMILY 14. DIOSCOREACEAE

##### I. DIOSCOREA Plumier

*Dioscorea affinis alata* Linnaeus: Sp. Pl., p. 1033, 1753 (fig. 7).

Tutuila: Pago Pago harbor, altitude 100 meters, March 18, 1930, Die-fenderfer (by native) no. 18. Upolu: cultivated, Apia, February 28, 1921, Eames no. 111. Savaii: spontaneous in plantation ground, Salailua, altitude 100 meters, September 11, 1931, Christophersen no. 2580; forest, Falealupo, altitude 25 meters, September 29, 1931, Christophersen no. 2801; forest, Tapueleele, altitude 300 meters, December 19, 1931, Christophersen no. 3465; cultivated, Salailua, altitude 75-100 meters, September-October, 1931, Chris-

tophersen nos. 2577, 2581, 2963, 2964, 2965, 2966, and 2967. Native name, *ufi*.

Almost all the cultivated yams observed and some spontaneous forms belong in this affinity. They are distinguished by their opposite, deeply cordate or sagittate leaves and their winged stems, the wings in most forms not being very broad. The shape of the leaf blade varies from broadly oval cordate, broader than long in no. 2580, to narrowly ovate, sagittate, about twice as long as broad in no. 3465. All specimens are sterile, so that a definite identification is not possible.

The cultivation of yams is at present not very prominent in Samoan native agriculture. However, I was told by several informants that yams were more intensely cultivated in former times. Falealupo on Savaii used to be famous for its yams, but today they are very inconspicuous in the plantations of that village. The explanation of the decline of yam cultivation in Falealupo, as given to me by one of the chiefs there (Tafa), is that yams do not afford a steady supply of food at all times of the year, being a seasonal crop in Samoa. Thus famines occurred in the off season when bananas and breadfruit did not suffice. The people therefore have abandoned the yams and turned to taro, which is an all-year crop. Yams are usually planted in May and June, and are ready for consumption at the end of the year. A great many forms of yams still exist in Samoa. Some of these I have observed in the plantations; others I know only from native information:

'Aso'aso. The tubers are long with white skin and meat. It is regarded as one of the best yams.

'Aso'aso taiulu moa.

'Au'au maile ('au maile, *ufi* 'au'au maile). No. 2965.

'Au malosi. A wild yam.

'Au malu. A wild yam.

'Au o'a.

'Au poto.

'Ave'ave.

Fatasoa. The base of the petiole and the wings of stem and petiole are red. The tuber is round, red outside, meat white.

Iua (or inga).

Lau palai. A wild yam similar to the palai, but with broader leaves and shorter tubers of a lower arm's length.

Lau selifi (lau silifi?) (fig. 7, *d*). Plant purplish red, especially young leaves and stems (no. 2964).

Lenga. A wild yam not ordinarily eaten.

Mau ato.

Ngū.

Palai (palae?) or *ufi palai* (fig. 7, *e*). The wings of the stem very inconspicuous. Meat of tuber solid. Said to be a wild yam, but cultivated plants by that name were observed at Salailua (no. 2581).

Pelu pelu. The meat of the tuber is said to be reddish purple.

Saliai pelu pelu. The color of the tuber is lighter red than in *pelu pelu*.

Taiulu angō (fig. 7, *b*). A wild yam (no. 3465).

Taiulu moa. See 'aso'aso.

Tauleou.

Tivi.

Tue. Similar to *palai*. The tubers are small.

Tulu. The tuber is round.

Ufi fua.

Ufi fuangu.

Ufi lei (fig. 7, c). Leaves deeply cordate, broader than long, apex rounded with an abruptly contracted acumen. Stems and petioles spiny, not winged. The tuber is said to have a sweet taste like sweet potato. This yam does probably not belong to *Dioscorea alata*. Variations of *ufi lei* are: *ufi lei afa*, *ufi lei 'au*, *ufi lei se* (meat of tuber white), *ufi lei ulu* (meat of tuber reddish), *ufi lei vate*.

Ufi masoa. One of the more common cultivated yams (no. 2963).

Ufi poa. By one informant regarded as "the best *ufi* in Samoa." There are two variations: *ufi poa ula* (red tubers) and *ufi poa sina* (white tubers, probably the same as *ufi poa pa'e pa'e*) (no. 2801).

Ufi sano sano.

Ufi se'e.

Ufi sina. A wild yam.

Ufi tau. No. 2577.

Ufi tonga. No. 2967.

Ufi uea.

Ufi vao (fig. 7, a). This name is probably used as a general term for wild yams, but is also used as a specific name for definite forms. The *ufi vao* collected at Salailua (no. 2580) as a spontaneous plant in the taro plantations has red, smooth stems and petioles with four broad wings, leaves opposite, deeply cordate, broader than long, rounded apex with an abruptly contracted acumen. The tuber is elongated, and is esteemed by the Samoans.

Ufi voli (fig. 7, f). No. 2966.

Veti veti.

***Dioscorea bulbifera* Linnaeus: Sp. Pl., p. 1033, 1753.**

Tutuila: Goat Island, altitude 10 meters, December 15, 1924, Garber no. 823; reservoir trail above Naval Station, altitude 200 meters, November 2, 1929, Christophersen no. 1016. Savaii: edge of forest, Vaipouli-Manase, altitude 100 meters, male flower, September 21, 1929, Christophersen no. 719; plantation, Safune, altitude 10 meters, August 13, 1931, Christophersen and Hume no. 2424; plantation, Salailua, altitude 10 meters, female flower, September 14, 1931, Christophersen no. 2602. Native name, *soi* (nos. 823, 1016, 2424, and 2602). Forms are *soi sina*, *soi 'ula*, and *ufi soi*.

Common as a spontaneous plant in coconut plantations and in open places in the lowland forests. The tuber is not eaten by the Samoans except in times of famine.

***Dioscorea pentaphylla* Linnaeus: Sp. Pl., p. 1032, 1753.**

Tutuila: Pago Pago harbor, altitude 350 meters, March 18, 1930, Die-fenderfer (by native) no. 5. Savaii: Falealupo, altitude 25 meters, September 29, 1931, Christophersen no. 2797; low scrub forest, Fangalele-Falealupo, altitude 10 meters, November 21, 1931, Christophersen nos. 3397 and 3399. Native name, *pilita* (no. 5).

## FAMILY 15. MUSACEAE

## I. HELICONIA Linnaeus

**Heliconia bihai** Linnaeus: Mant., vol. 2, p. 211, 1771.

Tutuila: back of Pago Pago village, flower, fruit, December 26, 1924, Garber no. 943; Pago Pago harbor, altitude 60 meters, March 18, 1930, Diefenderfer (by native) no. 4. Upolu: deep forest, Moa Moa plantations, altitude 80 meters, March 2, 1921, Eames no. 199; forest, Malololelei-Lanutoo, altitude 700 meters, August 5, 1929, Christophersen no. 62; forest near Malololelei, altitude 550 meters, flower, fruit, August 17, 1929, Christophersen no. 315. Savaii: near Salailua, fruit, May 17, 1924, Bryan no. 158; open woodland, Olo above Safotu, altitude 700 meters, flower, fruit, August 9, 1931, Christophersen and Hume no. 2333. Native name, *lau fao* (nos. 943, 4, 199, 315, 158).

A common plant in open woods and abandoned plantations, from the lowlands to an elevation of approximately 900 meters on Savaii. It grows in clumps, reaching a height of 2-3 meters.

The *lau fao* is a useful plant to the Samoans. The large leaves are used as a cover for the stone oven (*umu*), and the fibers of the petiole and midrib of the leaf are used for strainers in the preparation of coconut cream (*pe'e pe'e*). The leaves are also a favorite material for roof cover on temporary shelter huts.

## 2. MUSA Linnaeus

**Musa paradisiaca** Linnaeus subspecies **seminifera** (Loureiro) Baker: Ann. Bot., vol. 7, p. 213, 1893.

Upolu: forest above Apia, altitude 30 meters, April 9, 1927, MacDaniels no. 1115; forest near Malololelei, altitude 600 meters, flower, fruit, August 14, 1929, Christophersen no. 228. Savaii: open woodland, Olo above Safotu, altitude 700 meters, flower, fruit, August 9, 1931, Christophersen and Hume no. 2330. Native name, *taemanu* (no. 228).

I have not had the opportunity to compare the Samoan specimens with material of fertile bananas from their home in India or Malaysia. They are, therefore, only provisionally referred here.

The wild Samoan banana is a plant with slender trunk to 4 meters high; leaf blade to 2 meters long, 35 cm. broad; inflorescence pendant; bracts dark-purple, to 14 by 7.5 cm.; flowers in two rows, 10 ± in each bract; free tepal entire, about half the length of the other part of the perigone, which is 5-toothed; fruits yellow when ripe, small, angular, slightly curved, immature specimens 10.5 cm. long, 2 cm. broad, about 12 cm. long when ripe; seeds numerous, angular, immature specimens 4-5 mm. in diameter, black when mature; mature pulp creamy yellow, sweet, palatable.



The wild banana is not very common on Upolu and Savaii, growing along water courses and in open places up to an elevation of at least 700 meters. Although the pulp is very tasty the natives do not eat the fruits, probably on account of the numerous seeds.

**Musa paradisiaca** Linnaeus subspecies **sapientum** (Linnaeus) O. Kuntze:  
Rev. Gen. Pl., vol. 2, p. 692, 1891.

Savaii: cultivated, Christophersen and Hume nos. 3606 and 3608; Christophersen nos. 3601, 3602, 3603, 3604, 3605, and 3607. Native name, *fa'i*, *fa'i samoa*.

The following cultivated forms were seen or their names ascertained:

'Au malie. Said to have the largest bunches of all the *fa'i samoa*.

'Au malosi. This name is also applied to a form of yam.

Fa'i misi luki. Bunches usually large with numerous, densely crowded small fruits, slightly curved, distinctly beaked, pure yellow when ripe, about 12 cm. long, 3.5 cm. broad, all fruits in the bunch ripening simultaneously. The name is said to have originated from "Mr. Lukas." Quisumbing (43) has described a variety, *Musa sapientum* Linnaeus variety *misi*, based on material of *misi luki* sent from Pago Pago to the Philippines where it was grown. The *misi luki* is a common banana in Samoa, but is not one of the most highly esteemed forms.

Fa'i niue. Trunk, petioles, and fruits red.

Fa'i ota. The name means "unripe banana" and refers to the fact that it is eaten raw before it is ripe. The skin of the green fruit comes off easily by rolling.

Fa'i sala mumu. Trunk tall, green with black markings, petiole with pink wings. Fruits not seen.

Fa'i samoa. A general name applied to all the Samoan forms of this subspecies, in contrast to *fa'i papalangi* (foreign banana) which is applied to the forms of *Musa Cavendishii*. *Fa'i samoa* is, however, applied specifically to a definite form, supposedly regarded as the type of the Samoan bananas. This form has broad, cylindrical, rounded, almost straight fruits with thin yellow skin marked with brown and black, and with soft, pinkish-yellow, not very sweet pulp. Measurements of two ripe fruits from different villages were: 17 cm. long by 5.5 cm. broad, 15 cm. long by 7 cm. broad. It is both used as a cooking banana and eaten raw.

Fa'i sini. Petiole and midrib of leaf pink. Fruits not seen.

Fa'i siusenga.

Fa'i tonga. A relatively short and fat, almost straight banana, resembling the typical *fa'i samoa*. One specimen is 17 cm. long and 5 cm. broad.

Fa'i usi. The fruit of this form is large, markedly curved, distinctly triangular in cross-section. One specimen (no. 3601) is 23 cm. long, 5 cm. broad. It is a favorite banana with the Samoans, who use it both raw and for cooking. Two kinds are distinguished: *usi tuaniu* with slender fruits, and *usi 'ulu* with large and fat fruits.

Fa'i vai vai leta. The fruit is slightly curved with a rounded tip.

Fua tau tau.

Tili manifi.

Lau 'avi 'avi.

Malafatu.

Mamae ('au mamae). Leaves with pink margin and purplish hue on the underside, petioles with pink wings. Fruit tapering toward both ends, angular, slightly curved, the tip forming a distinct beak, skin yellow with brown and purplish spots, meat mealy, orange yellow. One specimen (ripe, no. 3605) 17 cm. long, 4 cm. broad. Another specimen (unripe, no. 3604) 13 cm. long, 4.5 cm. broad. Several kinds of *mamae*

are distinguished: *mamae muli pupu'u*, *mamae se* with small, slender fruits, *mamae ula*, similar to *mamae se* but a taller plant with bigger fruits, and *mamae 'ulu* with the largest fruits.

Mangeo ('au mangeo).

Masoli.

Nifo 'oti.

Papa. Fruit said to be flattened.

Pata. Fruit relatively short and stocky, broadest part near the base, tapering to a narrow point, 16 cm. long, 6 cm. broad (specimen no. 3606). The plant is hardy and easy to grow, and the fruits are large. It is, therefore, one of the most common bananas in Samoa, but is not considered one of the best forms for eating purposes. It is almost always used as a cooking banana; even when ripe it is baked, making a delicious dish with coconut cream. The *pata* may be a plantain (subspecies *normalis* O. Kuntze), but sufficient studies were not undertaken in the field to determine this point. Two kinds of *pata* are distinguished: *pata samoa*, not sweet when ripe, and *pata papalangi* or *tonga*, which is sweet when ripe.

Pipi'o. The ripe fruit is green or yellowish green with brown spots and purple markings, prominently curved, cross section distinctly triangular, of equal diameter throughout except for the short tapering tip, stalk 7 cm. long, fruit 23 cm. long, 4.5-5 cm. in diameter (specimen no. 3607). It is frequently used as *fa'i vevela*, that is, buried in the sand with slow fire to hasten the ripening. By this process the pulp becomes soft and mushy, usually very sweet. The *pipi'o* has the largest fruit of any of the Samoan forms observed.

Pulu (fa'i pulu, 'au pulu). The plant is tall with green trunk and petioles. No fruit observed.

Saumi.

Some of these forms may be plantains (subspecies *normalis* O. Kuntze).

Besides its use for food, the banana is useful to the natives for a variety of purposes. The leaves are used as covers on the trays (*laulau*) on which food is served, in covering up the stone oven (*umu*), as a platter on which food is prepared, for decoration around neck and ankles, for cover on plantation houses, and for umbrellas. The leaves that have dried while still intact on the plant are used for paper (*selui*) in rolling the native cigarette. The *pata* is said to be especially good for *selui*. The flowers are often used for necklaces ('*ula*).

**Musa Cavendishii** Lambert: Paxt. Mag., vol. 3, p. 51, 1837.

Savaii: cultivated, Vaipouli, Christophersen no. 3609. Native name; *fa'i* (*fa'i*), *fa'i papalangi*.

The Chinese banana is grown on a commercial scale in Upolu and Savaii, and is also grown with the Samoan bananas for the native household. It is most commonly used as a cooking banana. Three forms are distinguished: *fa'i fua maualunga*, with relatively tall trunk (specimen no. 3609); *fa'i fua fa'a leongalua*, with medium high trunk; and *fa'i fua maualalo*, a short-trunked, stocky form, which seems to be a favorite for commercial cultivation because of the heavy leaves, most of them not lacerated. Additional forms are *fa'i fua u'umi* and *pata sina*. The Chinese banana has the same general use as the Samoan banana, except that the leaves are not used for cigarette paper (*selui*).

?*Musa fehi* Bertero: ex Vieillard, Ann. Sci. Nat., ser. 4, vol. 16, p. 45, 1861.

Savaii: cultivated, Salailua, Christophersen no. 3610. Native name, *soa'a*.

The *fe'i* banana is recorded by Reinecke (46, p. 596) to grow in the mountain forests of Savaii. I have not seen Reinecke's specimens, nor have I seen any other wild Samoan banana but the one referred to subspecies *semi-nifera*. Several forms of cultivated bananas with erect fruit clusters are found in the native plantations. They may belong to this species.

Fetaoma'i.

Puputa ('au puputa). The fruit is fat and short, almost straight, skin red, pulp orange-yellow. Used for cooking.

Soa'a pula. The fruit is broadest at the base, tapering to a broad beak, sessile or with very short stalk, almost straight, 14 cm. long, 4 cm. in diameter, skin reddish orange, medium thick, pulp deep yellow, sweet, soft, not mealy. Used boiled or baked. (Specimen no. 3610.)

Soa'a se.

Soa'a 'ulu.

Sula sula.

The *soa'a* is usually boiled or baked before eating. From the sap of the trunk is prepared a purple dye used in coloring *siapo*.

## FAMILY 16. ZINGIBERACEAE

### 1. HEDYCHIUM Koenig

*Hedychium flavum* Roxburgh: Hort. Beng., p. 1, 1814.

Upolu: thickets, near Apia, altitude 100 meters, flower, February 16, 1921, Eames no. 11. Native name, *makaliki* (?) (no. 11).

An escape from gardens. The flowers are used for wreaths ('*ula*).

### 2. CURCUMA Linnaeus

*Curcuma* species.

*Curcuma longa* auct., non Linnaeus.

Ofu: Aloafao, altitude 8 meters, June 6, 1921, Garber no. 1009. Tutuila: coconut plantation at Pago Pago, altitude 50 meters, November 7, 1929, Christophersen no. 1147. Upolu: moist woods, Vailima, altitude 100 meters, February 28, 1921, Eames no. 107. Savaii: coconut plantation, Salailua, altitude 5 meters, October 27, 1931, Christophersen no. 2978; plantation, Sili, altitude 50 meters, young flower, November 11, 1931, Christophersen (by native) no. 3133. Native name, *ango* (nos. 1009, 1147, 2978, 3133), *sama* (no. 107).

Valeton (55) has shown that the original *C. longa* Linnaeus is not identical with the turmeric plants by most authors referred to this species. The plants are very rarely seen in flower in Samoa. Most of the native informants told me that they never flowered, and in spite of a consistent search I never saw

any flowers, but I was brought a young inflorescence by a native. This inflorescence is not far enough developed for a definite determination of the species. The peduncle is terminal and the bracts united in the lower part only, placing the plant in the subgenus *Eucurcuma*, section *Mesantha*. The bracts are broad and rounded, rose-colored, distinctly different from those of *C. domestica* Valetton.

The most important use of the *ango* in Samoa is for yellow dye in coloring *siapo*. The dye, prepared from the root in solid form, is called *lenga*. The *ango* is also used in medicine as a poultice for babies.

### 3. ZINGIBER Adanson

**Zingiber Zerumbet** (Linnaeus) Smith: Exot. Bot., vol. 2, p. 103, pl. 112, 1804.

Tau: Luma-Faleasao trail, altitude 40 meters, flower, January 8, 1922, Garber no. 689. Tutuila: back of Pago Pago, flower, December 26, 1924, Garber no. 900; Pago Pago harbor, flower, March 18, 1930, Diefenderfer (by native) no. 1. Upolu: edge of forest above Iva, altitude 100 meters, flower, September 5, 1929, Christophersen no. 530. Savaii: coconut plantation, Salailua, altitude 20 meters, flower, September 15, 1931, Christophersen no. 2603. Native name, '*avapui* (nos. 689, 900, 1, 2603).

The '*avapui* is common in the plantations and in the lowland forests. The root is used in native medicine for certain stomach troubles.

### 4. GEANTHUS Reinwardt

**Geanthus Vignaii** (Rechinger) Loesener: Engl. et Prantl, Nat. Pflanzenf., 2d ed., vol. 15-a, p. 591, 1930.

Tutuila: forest, Alava Ridge, altitude 400 meters, flower, November 7, 1929, Christophersen no. 1124. Savaii: forest above Matavanu Crater, altitude 750 meters, flower, September 15, 1929, Christophersen no. 622; open woodland, Olo above Safotu, altitude 700 meters, flower, August 5, 1931, Christophersen and Hume no. 2250; forest, near Olo above Safotu, altitude 800 meters, flower, August 6, 1931, Christophersen and Hume no. 2271; riverside, above Sili, altitude 400 meters, flower, November 12, 1931, Christophersen no. 3154.

Native name, '*avapui* (no. 1124), really the name of *Zingiber Zerumbet*. Additional qualifying terms are given to distinguish it from this species, as '*avapui fua mumu* (no. 2271) ('*avapui* with red flowers), and '*avapui i le vao* (no. 3154) ('*avapui* in the forest).

This species is closely related to *G. cervuga* of Fiji, from which it differs in its sessile flowers.

## 5. ALPINIA Roxburgh

*Alpinia* species.

Upolu: at Lake Lanutoo, altitude 700 meters, flower, young fruit, August 21-22, 1929, Christophersen no. 379. Savaii: forest above Matavanu Crater, altitude 900 meters, flower, young fruit, July 14, 1931, Christophersen and Hume nos. 1984a, 1984b, 1984c, 1984d. Native name, *fangamanu pa'e pa'e* (no. 379).

Two species of *Alpinia* have been described from Samoa, *A. samoensis* Reinecke and *A. Dyeri* K. Schumann. The exact nature of *A. samoensis* is not clear from the original publication, as the illustration does not at all points agree with the description. The leaves are described as sessile and the calyx as glabrous, but the illustration shows distinctly petiolate leaves and pubescent calyx. Schumann (49, p. 350) has pointed out other incorrect points in the illustration and description. According to Schumann's classification the species is placed in section *Pycnanthus* of the subgenus *Dieramalpinia*. The arrangement of the bracts as illustrated by Reinecke (46, pl. 10) does not conform with the mutually clasping arrangement characteristic of this section.

Until the original material is examined, the relation of the specimens in Bernice P. Bishop Museum to *A. samoensis* can not be definitely settled. Christophersen no. 379, collected in the type locality, differs from the original description of *A. samoensis* in its distinctly petiolate, relatively broader leaves (66-80 cm. long, 20-23 cm. broad, petiole 5-5.5 cm. long). The inflorescence is 15 cm. long with flowers on long pedicels. The calyx is not longer than 1.3 cm. Christophersen and Hume nos. 1984a and 1984b from Savaii are similar to no. 379, and come very close to the original description of *A. samoensis* except for the petiolate leaves (conforming with the illustration), which are broader (62-76 cm. long, 23-24 cm. broad, petiole 5.5-6.5 cm. long), and the pedicellate flowers with slightly longer (2.5-3 cm.) segments of the corolla. Christophersen and Hume nos. 1984c and 1984d are characterized by smaller inflorescences (8-10 cm. long). They agree with the original description of *A. Dyeri* K. Schumann except for the sericeotomentose pedicels, not "apice saltem subtomentosi" (49, p. 349). The leaves of no. 1984c are 58-65 cm. long, 14.5-17 cm. broad, with petioles 5-6 cm. long. *A. Dyeri* is described from leaves and an inflorescence without flowers or fruits, which makes me hesitate to refer the specimens to this species, at least without having seen the original material.

In cultivation, probably not as an escape, is found *Alpinia purpurata* (Vieillard) K. Schumann variety *anomala* Gagnepain. The bracts are purplish red, sterile. Upolu: Christophersen (by native) no. 346. Savaii: Christophersen and Hume no. 2009. Native name, *teuila* or *teuila mumu*.

## FAMILY 17. CANNACEAE

## I. CANNA Linnaeus

**Canna humilis** Bouché: *Linnaea*, vol. 8, p. 153, 1833.

Tau: plateau back of Siufanga, altitude 100 meters, flower, fruit, September 27, 1922, Garber no. 781. Tutuila: roadside, near Naval Station, flower, fruit, October 31, 1929, Christophersen no. 1003. Upolu: Vailele, flower, young fruit, August 20, 1929, Christophersen (by native) no. 360. Native name, *fangamanu* (no. 360).

Kränzlin (35, p. 44) has referred specimens collected by Reching (nos. 321 and 883) on Upolu to this species. The Bishop Museum specimens agree with Kränzlin's description except for the somewhat smaller flowers: total length not more than 7 cm., tube of petals 1 cm. long, free part of petals 3 cm., labellum and staminodes not more than 4.5 cm. long.

The wild *Canna* is common on all the big islands and grows along roadsides, in the vicinity of villages, and in the coconut plantations.

**Canna indica** Linnaeus: *Sp. Pl.*, p. 1, 1753.

Savaii: coconut plantation, Salailua, flower, October 13, 1931, Christophersen no. 2850. Native name, *fa'i masoa*.

Differs from *Canna humilis* in the three entire staminodes. The color of the staminodes is scarlet. This plant is much less common than *Canna humilis*. The root of the garden varieties is used in the present-day Samoan cooking as a flavoring in soups.

## FAMILY 18. MARANTACEAE

## I. MARANTA Linnaeus

**Maranta arundinacea** Linnaeus: *Sp. Pl.*, p. 2, 1753.

Savaii: wet ground, plantation above Ngataivai, altitude 50 meters, November 14, 1931, Christophersen no. 3135.

The plants were growing spontaneously. No cultivation of arrowroot was observed.

## FAMILY 19. ORCHIDACEAE

DETERMINED BY R. MANSFELD

## I. HABENARIA Willdenow

? **Habenaria cyrtostigma** Schlechter: *Fedde, Repert. Nov. Spec.*, vol. 9, p. 83, 1910.

Upolu: herb, on ground, forest, Lanutoo, altitude 700 meters, flower, August 21-22, 1929, Christophersen no. 368. Savaii: herb, forest above

Matavanu crater, altitude 800 meters, flower, September 15, 1929, Christophersen no. 649; herb, on ground, forest above Matavanu crater, altitude 1000 meters, flower, September 23, 1929, Christophersen no. 838.

**Habenaria Vaupelii** Schlechter: Fedde, Repert. Nov. Spec., vol. 9, p. 84, 1910.

Savaii: on ground, wet forest, Siuvao-Auala, altitude 600 meters, flower, November 19, 1931, Christophersen no. 3291.

## 2. CRYPTOSTYLIS R. Brown

**Cryptostylis alismifolia** F. von Mueller: South. Sci. Rec., vol. 1, p. 172, 1881.

Savaii: terrestrial, swampy place in forest, above Matavanu crater, altitude 1200 meters, flower, July 31, 1931, Christophersen no. 2185.

## 3. GOODYERA R. Brown

**Goodyera anomala** Schlechter: Fedde, Repert. Nov. Spec., vol. 9, p. 86, 1910.

Savaii: erect herb, locally abundant in lower rain forest, Salailua, altitude 300 meters, flower, May 19, 1924, Bryan no. 162; terrestrial, wet forest, above Salailua, altitude 900 meters, fruit, September 22, 1931, Christophersen no. 2700.

## 4. PLATYLEPIS Blume

**Platylepis heteromorpha** Reichenbach f.: Ot. Bot. Hamb., vol. 1, p. 52, 1878.

Olosenga: herb, on ground, Olosengauta-Piumafua ridge, altitude 550 meters, flower, June 17, 1925, Garber no. 1073.

## 5. PRISTIGLOTTIS Cretzoiu et J. J. Smith

**Pristiglottis Funkii** Cretzoiu et J. J. Smith: Acta Fauna Flora Universali, ser. 2, vol. 1, no. 14, p. 4, 1934.

*Cystopus Funkii* Schlechter.

Upolu: erect herb, in very moist rain forest at base of *Ficus* tree, on trail between Malololelei and Lake Lanutoo, altitude 660 meters, flower, April 27, 1924, Bryan no. 101. Savaii: low herb, rain forest, Salailua, altitude 900 meters, flower, May 22, 1924, Bryan no. 172; terrestrial, forest above Matavanu crater, altitude 700 meters, flower, July 22, 1931, Christophersen no. 2161.

## 6. ZEUXINE Lindley

**Zeuxine androcardium** Schlechter: Fedde, Repert. Nov. Spec., vol. 9, p. 90, 1910.

Upolu: herb, forest, Malololelei-Lanutoo, altitude 700 meters, flower, August 5, 1929, Christophersen no. 38. Savaii: herb, on ground, forest near Mataulanu lake, altitude 800 meters, flower, fruit, October 2, 1929, Christophersen no. 875; terrestrial, forest east of Olo, altitude 700 to 800 meters, flower, August 8, 1931, Christophersen no. 2295.

**Zeuxine samoensis** Schlechter: Bull. Herb. Boissier, 2d ser., vol. 6, p. 297, 1906.

Upolu: herb, canyon of Vaisingano river near Malololelei, altitude 500 meters, flower, August 6, 1929, Christophersen no. 81.

**Zeuxine sphaerocheila** Fleischmann et Rechinger: Akad. Wiss. Wien., Denkschr., vol. 85, p. 251, pl. 2, fig. 6, 1910.

Upolu: herb, forest, Maunga Tele ridge, above Saluafata, altitude 550 meters, flower, September 4, 1929, Christophersen no. 542. Savaii: herb, edge of forest, above Manase plantation, altitude 200 meters, flower, September 14, 1929, Christophersen no. 653.

#### 7. VRYDAGZYNEA Blume

**Vrydagzynea Whitmeei** Schlechter: Bull. Herb. Boissier, 2d ser., vol. 6, p. 296, 1906.

Upolu: herb, forest, Malololelei ridge to Mt. Vaitou, altitude 750 meters, flower, August 15, 1929, Christophersen no. 253.

**Vrydagzynea** species.

Tau: herb, on mossy rock, Amouli trail, altitude 175 meters, fruit, September 16, 1921, Garber no. 630.

#### 8. COELOGYNE Lindley

**Coelogyne lycastoides** F. von Mueller et Kraenzlin: Oesterr. Bot. Zeitschr., vol. 45, p. 179, 1895.

Tutuila: epiphyte, forest, Matafao ridge, altitude 500 meters, fruit, November 3, 1929, Christophersen no. 1021; epiphyte, Matafao ridge, altitude 500-600 meters, fruit, November 3, 1929, Christophersen no. 1068; epiphyte, on tree trunk, top of South Pioa, altitude 500 meters, August 10, 1924. Garber no. 788. Upolu: epiphyte, open, ridge above Malololelei, altitude 700 meters, August 12, 1929, Christophersen no. 201; epiphyte, swamp near Tiavi, altitude 720 meters, flower, August 12, 1929, Christophersen nos. 175 and 179; epiphyte, forest near Lanutoo, altitude 700 meters, flower, August 21-22, 1929, Christophersen no. 367. Savaii: on lava, Matavanu field, altitude 600 meters, flower, July 10, 1931, Christophersen no. 1964; epiphyte, medium wet forest, near Olo, altitude 800 meters, flower, Christophersen and Hume no. 2269; epiphyte, open woodland, east of Olo, altitude 700 to 800 meters, flower, fruit, August 8, 1931, Christophersen no. 2298.



## 9. OBERONIA Lindley

**Oberonia Betchei** Schlechter: Bull. Herb. Boissier, 2d ser., vol. 6, p. 303, 1906.

Upolu: epiphyte, edge of forest near Malololelei, altitude 550 meters, August 10, 1929, Christophersen no. 146. Savaii: epiphyte, plantation near Vaipouli, altitude 50 meters, flower, September 10, 1929, Christophersen no. 574; "island" in Matavanu lava field, altitude 200 meters, fruit, July 6, 1931, Christophersen no. 1882.

**Oberonia affinis diura** Schlechter: in Schumann et Lauterbach, Nachtr. Fl. Deutsch. Schutzgeb. Südsee, p. 111, 1905.

Savaii: epiphyte on fallen log, medium wet forest, east of Olo, altitude 700 to 800 meters, fruit, August 8, 1931, Christophersen no. 2296 b.

**Oberonia glandulosa** Lindley: Fol. Orchid., Oberonia, p. 6, 1852-59.

Tutuila: epiphyte, on tree trunk, Vaitua-Leloaloa trail, fruit, December 17, 1924, Garber no. 880; epiphyte, coconut plantation at Pago Pago, flower, fruit, November 3, 1929, Christophersen no. 1039. Upolu: epiphyte, swamp near Tiavi, altitude 720 meters, flower, August 12, 1929, Christophersen no. 172.

## 10. MICROSTYLIS Nuttall

**Microstylis Reineckeana** Kraenzlin: Engl. Bot. Jahrb., vol. 25, p. 600, 1898.

Tutuila: herb, on ground, forest on Alava ridge, altitude 400 meters, flower, November 7, 1929, Christophersen no. 1128; terrestrial, wet scrub forest, Alava ridge, altitude 450 to 500 meters, flower, January 5, 1932, Christophersen no. 3582.

**Microstylis samoensis** Schlechter: in Fedde, Repert. Nov. Spec., vol. 9, p. 93, 1910.

Tutuila: terrestrial, scrub forest, top of Pioa, altitude 500 meters, flower, January 2, 1932, Christophersen no. 3567.

**Microstylis** species.

Upolu: herb, on ground, open, top of Fao, altitude 680 meters, fruit, September 6, 1929, Christophersen no. 564.

**Microstylis** species.

Tau: epiphyte, top of peak back of Tau, altitude 700 meters, fruit, January 28, 1922, Garber no. 753.

## 11. LIPARIS L. C. Richard

**Liparis phyllocardium** Schlechter: Fedde, Repert. Nov. Spec., vol. 9, p. 94, 1910.

Savaii: herb, forest above Letui, altitude 1600-1700 meters, September 26, 1929, Christophersen no. 777; herb, on ground, forest, Tuasivi range,

altitude 1500 meters, fruit, September 25, 1929, Christophersen no. 822; terrestrial, swampy place in forest above Matavanu crater, altitude 1100 meters, fruit, July 31, 1931, Christophersen no. 2191.

**Liparis savaiiensis** Fleischmann et Reching: Akad. Wiss. Wien, Denkschr., vol. 85, p. 255, 1910.

Tutuila: epiphyte, on tree trunk, ridge west of Pago Pago, altitude 300 meters, fruit, November 14, 1929, Christophersen no. 1263; epiphyte, tree trunk, Aua-Afono trail, December 17, 1924, Garber no. 848. Upolu: epiphyte, canyon of Vaisingano river near Malololelei, altitude 500 meters, flower, August 7, 1929, Christophersen no. 109; epiphyte, forest near Moa Moa, altitude 200 meters, flower, June 29, 1931, Christophersen no. 1835. Savaii: epiphyte, open woodland near Matavanu crater, altitude 600 to 700 meters, fruit, July 10, 1931, Christophersen no. 1949.

**Liparis stricta** Schlechter: Fedde, Repert. Nov. Spec., vol. 9, p. 95, 1910.

Savaii: herb, forest above Letui, altitude 1600-1700 meters, fruit, September 26, 1929, Christophersen no. 778; herb, in shrubbery on 1902 lava field above Aopo, altitude 1200-1400 meters, October 7, 1929, Christophersen no. 891; herb, on ground, forest, Tuasivi range, altitude 1400 meters, flower, September 24, 1929, Christophersen no. 821; terrestrial, wet forest, above Matavanu crater, altitude 1550 meters, July 29, 1931, Christophersen no. 2207 (identification probable); wet forest, Aopo—Ngangamala, altitude 1200 meters, fruit, December 8, 1931, Christophersen no. 3445 (identification probable).

**Liparis** species.

Tutuila: epiphyte, Matafao ridge, altitude 500-600 meters, flower, fruit, November 3, 1929, Christophersen no. 1062; epiphyte, on tree, top of South Pioa, altitude 500 meters, November 10, 1929, Christophersen nos. 1182 (fruit), 1187 (flower, fruit), 1191 (fruit), and 1200 (flower, fruit).

## 12. APPENDICULA Blume

**Appendicula bracteosa** Reichenbach f.: in Seemann, Flora Vitiensis, p. 299, 1868.

Tau: epiphyte, on damp tree trunk, below peak back of Tau, altitude 600 meters, flower, fruit, January 28, 1922, Garber no. 730; epiphyte, on trunk of tree fern in gulch, trail to peak back of Luma, altitude 300 meters, flower, fruit, January 28, 1922, Garber no. 714. Tutuila: epiphyte, on tree trunk, Alava ridge, altitude 400 meters, flower, November 7, 1929, Christophersen no. 1138. Upolu: epiphyte, canyon near Malololelei, altitude 500 meters, flower, August 6, 1929, Christophersen no. 68. Savaii: epiphyte, forest above Sili, altitude 300 meters, flower, November 11, 1931, Christophersen no. 3238.

13. **GLOMERA** Blume

**Glomera Reineckeana** (Kraenzlin) Schlechter: Fedde, Repert. Nov. Spec., vol. 9, p. 96, 1910.

Tau: epiphyte, near top of peak, back of Tau, on fallen tree trunk, altitude 650 meters, January 28, 1922, Garber no. 748. Tutuila: epiphyte, forest, Matafao ridge, altitude 600 meters, flower, November 3, 1929, Christophersen no. 1040; epiphyte, scrub forest, top of Pioa, altitude 500 meters, fruit, January 2, 1932, Christophersen no. 3527. Upolu: epiphyte, edge of Lake Lanutoo, altitude 700 meters, flower, August 8, 1929, Christophersen no. 123. Savaii: epiphyte, forest above Matavanu crater, altitude 900 meters, flower, July 15, 1931, Christophersen no. 2089.

14. **EARINA** Lindley

**Earina samoensiana** F. von Mueller et Kraenzlin: Oester: Bot. Zeit., vol. 44, p. 211, 1894.

Savaii: epiphyte, edge of forest, Le To (Salailua), altitude 750 meters, flower, October 21, 1931, Christophersen no. 2911.

15. **MEDIOCALCAR** J. J. Smith

**Mediocalcar paradoxum** (Kraenzlin) Schlechter: Fedde, Repert. Nov. Spec., vol. 9, p. 96, 1910.

Upolu: epiphyte, forest, Malololelei-Lanutoo trail, altitude 700 meters, fruit, August 21-22, 1929, Christophersen no. 369.

16. **PHAJUS** Loureiro

**Phajus Graeffei** Reichenbach f.: in Seemann, Fl. Vitiensis, p. 299, 1868.

Upolu: herb, forest, Malololelei-Lanutoo, altitude 700 meters, August 5, 1929, Christophersen no. 49.

17. **CALANTHE** R. Brown

**Calanthe bigibba** Schlechter: Fedde, Repert. Nov. Spec., vol. 9, p. 99, 1911.

Savaii: herb, on ground, moist forest, Tuasivi range, altitude 1600-1700 meters, flower, fruit, September 25, 1929, Christophersen no. 813.

**Calanthe triplicata** (Willemet f.) Ames: Philipp. Jour. Sci., Bot., vol. 2, p. 326, 1907.

Olosenga: Olosengauta-Piumafua ridge, altitude 500 meters, June 17, 1925, Garber nos. 1036, 1077. Tutuila: herb, on the ground, forest, north side of Alava ridge, altitude 300 meters, flower, November 7, 1929, Christophersen no. 1126. Upolu: herb, forest, between Siumu and Poutasi, altitude 50

meters, flower, October 22, 1929, Christophersen no. 964. Savaii: terrestrial, forest, Salailua-Lata-itai, altitude 10 meters, fruit, October 19, 1931, Christophersen no. 2862.

**Calanthe Vaupeliana** Kraenzlin: Notizbl. Kgl. Bot. Gart. Berl., vol. 5, p. 111, 1909.

Tutuila: just below crest of South Pioa, altitude 500 meters, flower, August 10, 1924, Garber no. 785; herb, top of South Pioa, altitude 500 meters, flower, August 10, 1924, Garber no. 783; herb, on ground, forest on Matafao ridge, altitude 500 meters, flower, November 3, 1929, Christophersen no. 1020.

#### 18. SPATHOGLOTTIS Blume

**Spathoglottis pacifica** Reichenbach f.: in Seemann, Fl. Vitiensis, p. 300, 1868.

Tau: herb, bush trail back of Luma, altitude 200 meters, flower, January 28, 1922, Garber nos. 710, 712. Olosenga: Olosengauta-Piumafua ridge, altitude 500-600 meters, June 17, 1925, Garber no. 1054. Upolu: herb, on trail, ridge above Malololelei, altitude 700 meters, flower, August 14, 1929, Christophersen no. 230. Savaii: herb, cracks in lava, below Matavanu crater, altitude 300 meters, flower, September 12, 1929, Christophersen no. 597; herb, dry open fern country, near Manase plantation, altitude 100 meters, flower, September 18, 1929, Christophersen no. 677.

#### 19. DENDROBIUM Swartz

**Dendrobium biflorum** Swartz: Nov. Act. Soc. Sc. Upsal., vol. 6, p. 84, 1799.

Tau: on fallen tree trunk, plateau back of Faleasao, altitude 150 meters, August 4, 1921, Garber no. 575. Tutuila: on tree trunk, back of Pago Pago, December 26, 1924, Garber no. 935. Upolu: epiphyte, on *Bruguiera*, Mulinuu swamp, Apia, August 27, 1929, Christophersen no. 442.

?**Dendrobium dactyloides** Reichenbach f.: Jour. Bot., vol. 15, p. 132, 1877.

Upolu: epiphyte, on *Bruguiera*, Mulinuu swamp, Apia, flower, fruit, August 27, 1929, Christophersen no. 441.

**Dendrobium fililobum** F. von Mueller: South. Sci. Rec., vol. 2, p. 97, 1882.

Tutuila: epiphyte, on tree, top of South Pioa, altitude 500 meters, November 10, 1929, Christophersen nos. 1203 and 1213 (flower, fruit).

**Dendrobium Mohlianum** Reichenbach f.: Bot. Zeit., vol. 20, p. 214, 1862.

Savaii: epiphyte, on tree, forest above Matavanu crater, altitude 1200-1400 meters, flower, September 24, 1929, Christophersen no. 829.

**Dendrobium thysanochilum** Schlechter: in Schumann et Lauterbach, Nachtr. Fl. Deutsch. Schutzgeb. Südsee, p. 152, 1905.

Tutuila: back of Pago Pago, December 26, 1924, Garber no. 933; epiphyte, on tree, top of South Pioa, altitude 500 meters, flower, November 10, 1929, Christophersen no. 1186.

**Dendrobium tokai** Reichenbach f.: Hamb. Gartenz., vol. 21, p. 293, 1865.

Tau: on dead tree, Amouli trail, altitude 150 meters, flower, September 16, 1921, Garber no. 619.

**Dendrobium triviale** Kraenzlin: Engl. Bot. Jahrb., vol. 25, p. 604, 1898.

Upolu: epiphyte, at Lake Lanutoo, altitude 700 meters, fruit, August 21-22, 1929, Christophersen no. 364. Savaii: herb on ground, depression in lava, below Matavanu crater, altitude 400 meters, flower, September 12, 1929, Christophersen no. 593; epiphyte, wet forest, Tapueleele, altitude 200 meters, flower, December 19, 1931, Christophersen no. 3460.

**Dendrobium Vaupelianum** Kraenzlin: Notizbl. Kgl. Bot. Gart. Berl., vol. 5, p. 109, 1909.

Tau: on breadfruit tree, Fitiuta trail, August 4, 1921, Garber no. 557 ?; on breadfruit tree, plateau back of Luma, altitude 150 meters, flower, December 15, 1921, Garber no. 655. Tutuila: epiphyte, on tree, near Pago Pago village, altitude 10-20 meters, flower, fruit, November 14, 1929, Christophersen no. 1252; epiphyte, on tree, top of South Pioa, altitude 500 meters, flower, fruit, November 10, 1929, Christophersen no. 1190; epiphyte, on tree, ridge west of Pago Pago, altitude 300 meters, flower, November 14, 1929, Christophersen no. 1256. Upolu: epiphyte, edge of forest near Malololelei, altitude 550 meters, fruit, August 10, 1929, Christophersen no. 145.

## 20. PSEUDERIA Schlechter

**Pseuderia**, species nova?

Tau: epiphyte, trail to peak back of Tau, altitude 400 meters, fruit, January 28, 1922, Garber no. 717. Tutuila: epiphyte, on tree, top of South Pioa, altitude 500 meters, flower, fruit, November 10, 1929, Christophersen no. 1190a.

## 21. ERIA Lindley

**Eria curvipes** Kraenzlin: Notizbl. Kgl. Bot. Gart. Berl., vol. 5, p. 110, 1909.

Upolu: epiphyte, forest, Lanutoo, altitude 700 meters, flower, fruit, August 21-22, 1929, Christophersen no. 365.

**Eria** species.

Upolu: epiphyte, forest, Malololelei-Lanutoo, altitude 700 meters, August 5, 1929, Christophersen no. 17; epiphyte, forest, Malololelei-Lanutoo trail,

altitude 700 meters, August 21-22, 1929, Christophersen nos. 366 (flower), 416 (flower), and 417 (fruit).

## 22. BULBOPHYLLUM Thouars

**Bulbophyllum atrorubens** Schlechter: Engl. Bot. Jahrb., vol. 39, p. 82, 1906, vel valde aff.

Tutuila: epiphyte, on tree, top of South Pioa, altitude 500 meters, flower, November 10, 1929, Christophersen no. 1185.

**Bulbophyllum Betchei** F. von Mueller: South. Sci. Rec., vol. 1, p. 173, 1881.

Upolu: epiphyte, swamp near Tiavi, altitude 720 meters, flower, August 12, 1929, Christophersen no. 174; epiphyte, forest, Malololelei-Lanutoo, altitude 700 meters, August 5, 1929, Christophersen no. 37. Savaii: epiphyte, open woodland, Olo, altitude 700 meters, flower, fruit, August 4, 1931, Christophersen no. 2245.

**Bulbophyllum** species (cf. *nigroscapum* Ames).

Tutuila: epiphyte, on tree, top of South Pioa, altitude 500 meters, fruit, November 10, 1929, Christophersen no. 1181.

**Bulbophyllum** species (cf. *nigrosignatum* Ames).

Upolu: epiphyte, forest, Malololelei-Lanutoo trail, altitude 700 meters, fruit, August 21-22, 1929, Christophersen no. 418.

? **Bulbophyllum pachyanthum** Schlechter: Engl. Bot. Jahrb., vol. 39, p. 85, 1906.

Tutuila: epiphyte, Matafao ridge, altitude 500-600 meters, fruit, November 3, 1929, Christophersen no. 1044; epiphyte, on tree, top of South Pioa, altitude 500 meters, fruit, November 10, 1929, Christophersen nos. 1179 and 1212. Upolu: epiphyte, forest, Fao mountain, altitude 300 meters, flower, September 6, 1929, Christophersen no. 558.

**Bulbophyllum praealtum** Kraenzlin: Notizbl. Kgl. Bot. Gart. Berl., vol. 5, p. 109, 1909.

Tutuila: epiphyte, on *Bruguiera*, mangrove swamp near Nuuuli, flower, November 4, 1929, Christophersen no. 1037. Savaii: herb on ground, depression in lava, below Matavanu crater, altitude 400 meters, flower, fruit, September 12, 1929, Christophersen no. 592.

**Bulbophyllum** species.

Tutuila: epiphyte, Matafao ridge, altitude 500-600 meters, fruit, November 3, 1929, Christophersen no. 1063.

**Bulbophyllum** species.

Upolu: epiphyte, edge of forest near Malololelei, altitude 650 meters, flower, August 15, 1929, Christophersen no. 277.

The collection also contains sterile, indeterminable specimens of *Bulbophyllum*.

### 23. PHREATIA Lindley

**Phreatia Reineckei** Schlechter: Fedde, Repert. Nov. Spec., vol. 9, p. 109, 1911.

Tau: epiphyte, on dead limb of tree, Amouli trail, altitude 175 meters, fruit, September 16, 1921, Garber no. 629. Tutuila: epiphyte, on tree, top of South Pioa, altitude 500 meters, November 10, 1929, Christophersen nos. 1193 (flower) and 1211 (flower, fruit); epiphyte, on tree trunk, ridge west of Pago Pago, altitude 300 meters, flower, fruit, November 14, 1929, Christophersen no. 1259; epiphyte, back of Pago Pago, fruit, December 26, 1924, Garber no. 938; epiphyte, on tree, Matafao ridge, altitude 500-600 meters, flower, fruit, November 3, 1929, Christophersen no. 1057; epiphyte, forest, Atua-Vatia trail, altitude 200 to 300 meters, flower, June 24, 1931, Christophersen no. 1821; epiphyte, scrub forest, top of Pioa, altitude 500 meters, flower, fruit, January 2, 1932, Christophersen no. 3573. Upolu: epiphyte, ridge above Malololelei, altitude 670 meters, flower, August 5, 1929, Christophersen no. 5; epiphyte, forest, Malololelei-Lanutoo, altitude 700 meters, flower, August 5, 1929, Christophersen no. 41. Savaii: epiphyte, forest, east of Olo, altitude 700 to 800 meters, flower, August 8, 1931, Christophersen no. 2296-a; epiphyte, forest above Sili, altitude 200 meters, flower, November 11, 1931, Christophersen no. 3278; epiphyte, forest above Sili, altitude 150 meters, flower, November 13, 1931, Christophersen no. 3207.

**Phreatia samoensis** (Kraenzlin) Schlechter: Fedde, Repert. Nov., Spec., vol. 3, p. 320, 1907.

Tau: epiphyte, on tree trunk, slope of peak back of Tau, altitude 650 meters, January 28, 1922, Garber no. 745. Tutuila: epiphyte, on tree trunk, Alava ridge, altitude 400 meters, flower, fruit, November 7, 1929, Christophersen no. 1133; epiphyte, on tree, top of South Pioa, altitude 500 meters, fruit, November 10, 1929, Christophersen no. 1189; epiphyte, scrub forest, top of Pioa, altitude 500 meters, flower, January 2, 1932, Christophersen no. 3503; epiphyte, scrub forest, top of Pioa, altitude 500 meters, flower, January 2, 1932, Christophersen no. 3538. Upolu: epiphyte, forest, Malololelei-Lanutoo, altitude 700 meters, August 8, 1929, Christophersen no. 130; epiphyte, swamp near Tiavi, altitude 720 meters, August 12, 1929, Christophersen no. 173; epiphyte, on tree, open ground near Malololelei, altitude 550 meters, flower, October 22, 1929, Christophersen no. 961. Savaii: herb on ground, forest above Matavanu crater, altitude 750 meters, September 15, 1929, Christophersen no. 627; epiphyte, wet forest above Matavanu crater, altitude 1030 meters, flower, fruit, July 28, 1931, Christophersen no. 2187; epiphyte,

open woodland, Olo, altitude 700 meters, flower, August 9, 1931, Christophersen no. 2318.

Specimen no. 3538 is only tentatively determined, as it is too young.

#### 24. THRIXSPERMUM Loureiro

**Thrixspermum Graeffei** Reichenbach f.: in Seemann, Fl. Vitiensis, p. 297, 1868.

Tutuila: epiphyte, on tree, top of South Pioa, altitude 500 meters, November 10, 1929, Christophersen nos. 1180 (flower) and 1192 (flower, fruit).

#### 25. TAENIOPHYLLUM Blume

**Taeniophyllum** species.

Tau: epiphyte, near South Point, Fitiuta trail, altitude 150 meters, October 12, 1921, Garber no. 641.

#### INDETERMINABLE SPECIES

Olosenga: herb, on ground, near top of Piumafua, altitude 600 meters, fruit, June 17, 1925, Garber no. 1033.

### DICOTYLEDONEAE

#### FAMILY 20. CHLORANTHACEAE

##### I. ASCARINA Forster

**Ascarina lanceolata** Hooker f.: Jour. Linn. Soc., Bot., vol. 1, pp. 127, 129, 1857.

Upolu: top of Fao mountain, altitude 680 meters, fruit, September 6, 1929, Christophersen no. 571. Savaii: forest above Safotu-Letui, altitude 1600 meters, fruit, September 24, 1929, Christophersen no. 820; forest above Matavanu Crater, altitude 900 meters, July 14, 1931, Christophersen and Hume no. 1996; rim of old crater, above Matavanu Crater, altitude 1000 meters, flower, young fruit, July 15, 1931, Christophersen and Hume no. 2014; forest above Matavanu Crater, altitude 1300 meters, fruit, July 24, 1931, Christophersen and Hume nos. 2153 and 2167.

Two native names, *tongo vao* (nos. 2153, 2167) and *fiti* (nos. 1996, 2014), were given for this species. They were, however, not independently verified, and the circumstances under which they were obtained lead me to believe that their correctness should be doubted.

This species is originally described from the Kermadec Islands. I have not seen the type or specimens from the type locality, but the Samoan specimens differ sufficiently from the original description as well as from the



more detailed description of Cheeseman (10) to make it possible that a distinct species is represented. *A. lanceolata* has by several authors been accredited with a wide distribution from the Kermadec and Cook islands to Samoa, Fiji, and the New Hebrides.

A common forest tree in Savaii at middle and high elevations. At an elevation of 1300 meters trees 15-18 meters high were observed.

## FAMILY 21. ULMACEAE

### I. TREMA Loureiro

**Trema orientalis** (Linnaeus) Blume varietas **viridis** Lauterbach: Engl. Bot. Jahrb., vol. 50, p. 321, fig. 2-D, 1913.

Tau: Fitiuta trail back of Luma, altitude 100 meters, flower, fruit, December 16, 1921, Garber no. 670. Tutuila: edge of forest back of Pago Pago, flower, fruit, September 18, 1923, Wilder no. 25; back of Pago Pago village, flower, December 26, 1924, Garber no. 902. Upolu: forest, Moa Moa plantations, altitude 300 meters, flower, fruit, March 2, 1921, Eames no. 139. Savaii: forest above Salailua, altitude 250 meters, flower, fruit, October 28, 1931, Christophersen no. 3002; forest, Siuvao-Auala, altitude 300 meters, flower, November 19, 1931, Christophersen no. 3298. Native name, *mangele* (nos. 670, 902).

A small or medium-sized tree common in openings and forests of the foothills.

### 2. GIRONNIERA Gaudichaud

**Gironniera celtidifolia** Gaudichaud: Voy. Bonite, Atlas, pl. 85, 1846-49(?).

Savaii: forest above Matavanu Crater, altitude 750 meters, flower, fruit, October 15, 1929, Christophersen no. 652; open forest near Olo, above Safotu, altitude 700 meters, flower, fruit, July 13, 1931, Christophersen and Hume no. 2036; forest above Salailua, altitude 600 meters, flower, fruit, September 24, 1931, Christophersen no. 2742; forest by river, above Sili, altitude 400 meters, fruit, November 12, 1931, Christophersen no. 3179.

A small tree common in the forests of Savaii at medium elevations.

## FAMILY 22. MORACEAE

### I. PARATROPHIS Blume

**Paratrophis anthropophagorum** (Seemann) Bentham et Hooker: ex Drake del Castillo, Ill. Fl. Ins. Mar. Pac., fasc. 7, p. 296, 1892.

Upolu: forest above Malololelei, altitude 750 meters, August 15, 1929, Christophersen nos. 266 (male flower), 267 (male and female flower), 268,

273 (female flower); forest, Maunga Tele Ridge, above Saluafata, altitude 500 meters, September 4, 1929, nos. 535 (female flower, fruit) and 544 (male flower).

The Samoan specimens appear to belong to this species as described and figured from Fiji by Seemann (50, p. 258, pl. 73). They differ in the length of the female inflorescence, which in all specimens is shorter than the leaves.

## 2. ARTOCARPUS Forster

**Artocarpus communis** Forster: Char. Gen., p. 102, 1776.

Ofu: cultivated, June 1925, Garber nos. 1003, 1004, 1005, 1006, 1007, 1016, 1017, 1018. Upolu: cultivated, August 1929, Christophersen nos. 448, 449, 450, 451. Savaii: cultivated, August 1931, Christophersen nos. 2386, 2387, 2388, 2389, 2398, 2400, 2481, 2491, 2492. Native name 'ulu.

The breadfruit is the most common village tree everywhere in Samoa. On the coasts exposed to the trade winds, as the Faasaleleanga coast on Savaii, it is less in evidence than on the leeward coasts. In the plantations it bears at an altitude of 450 meters. It is commonly found in openings in the lowland forests, but is hardly anywhere spontaneous. The breadfruit requires, or receives, the least care of any of the main Samoan crops. It may be reproduced from seed, but is most commonly propagated by cuttings. There will always be some trees in bearing at any time of the year, but there are four seasons of abundance. The following varieties were seen or their names ascertained:

Asina ('ulu asina). Leaves deeply lobed. Specimen no. 1004 (Ofu).

Aveloloa. Leaves lobed to the middle. Fruit oblong, one specimen measuring 13 cm. long, 10.5 cm. wide. Considered not to be one of the old Samoan varieties but of more recent introduction. The wood of this form is preferred for housebuilding. Specimens nos. 449 (Upolu) and 2389 (Savaii).

Avesasa'a (avesa'a?). *Avesa'a* is said to be another name for 'ulu ea.

Avetele ('ulu avetele). Perhaps the same as *avetetele*, which, according to Pratt (42, p. 38) is a Tutuila name for *aveloloa*.

Fa'a fia puou.

Fatufala.

Ma'afala. This form is said to have the smallest fruit of all. On one tree in Lelepa, Savaii, the largest fruits measured 12 cm. long, 9 cm. wide. The leaves are cut to about the middle. Specimens nos. 1003 (Ofu) and 2400 (Savaii).

Malali.

Maopo. Leaves almost entire or shallowly lobed. Fruits large, oblong, one fruit measuring 22 cm. long, 17 cm. wide. Considered to be one of the best forms. Common. Specimens nos. 1018 (Ofu), 448 (Upolu), and 2386 (Savaii).

Mase'e ('ulu mase'e). Leaves deeply lobed. Fruit big, similar to the *maopo*.

Moa moa. Leaves lobed beyond the middle. Fruit globose. Specimen no. 2492 (Savaii).

Moa moa fala. Fruit small, globose.

Moa moa lenga.

Moa moa manga. Fruits usually in clusters of two or three.

Ngutufangu. Leaves cut to the middle or less deeply cut. Fruit oblong, one specimen measuring 17 cm. long, 14 cm. wide. Specimen no. 2398 (Savaii).  
Pungaleve.

Puou. Leaves cut to the middle or deeper. Fruit subglobose, one specimen measuring 15 cm. long, 13.5 cm. wide. This is said to be one of the old Samoan forms. It is one of the commonest forms in cultivation and considered by the Samoans as one of the best. The wood of this form is used in housebuilding. Specimens nos. 1006 (Ofu), and 451 (Upolu) and 2388 (Savaii).

Tui tu.

'Ulu au.

'Ulu ea. Leaves lobed deeper than to the middle. Fruit slightly oblong, one specimen measuring 15.5 cm. long, 12.5 cm. wide. It is one of the favorites with the Samoans, and said to be one of the old Samoan forms. Specimens nos. 1005 (Ofu), 450 (Upolu), and 2387 (Savaii).

'Ulu fau. Leaves cut to the middle or deeper. Fruit oblong, cylindrical, large. Specimen no. 2481.

'Ulu ma'a.

'Ulu ma'a maopo.

'Ulu mama. Leaves deeply cut. Fruit is said to be similar to the *ma'afala* with smooth skin.

'Ulu manu'a. Leaves deeply cut. Fruit small, globose. Specimens nos. 1017 (Ofu) and 2491 (Savaii).

'Ulu peti. Fruit said to be large, larger than the *maopo*, but globose, not oblong.

'Ulu sina.

'Ulu tala. The fruit is said to be spiny, otherwise similar to the *puou*. It is also said to be a kind of *mase'e*.

'Ulu vale.

'Ulu vase ('ulu vasi?). Leaves cut almost to the midrib. Specimen no. 1007 (Ofu).

The breadfruit, besides furnishing one of the staple foods of Samoa, is extensively used in housebuilding. The arches of the rounded ends of the house are almost always made of breadfruit, and the outer posts may also be of breadfruit. The two forms *aveloloa* and *puou* are preferred for building purposes. Of the ripe fruit a paste ('ulu *pe*) is used for patching pieces in the making of *siapo*, and for tightening cracks in canoes. The skin of the fruit is said to be used for green color in decorating *siapo*, but this I have not been able to confirm.

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*Artocarpus integra* (Thunberg) Merrill, the jack fruit, 'ulu *initia* (India) of the Samoans, is cultivated in a few places by Europeans, but not by the Samoans.

*Broussonetia papyrifera* Ventenat, the paper mulberry or *u'a*, is cultivated in all villages but has not been observed to grow spontaneously. The bark from young saplings furnishes the material for bark cloth (*siapo*). Olosenga: plantation back of Olosengauta, altitude 350 meters, Garber no. 1071.

*Castilloa elastica* Cervantes, the castilloa rubber, has been introduced into Samoa but was not observed to grow spontaneously. Upolu: cow paddock at Malololelei, altitude 550 meters, August 7, 1929, Christophersen no. 319.

## FAMILY 23. URTICACEAE

## I. FLEURYA Gaudichaud

**Fleurya interrupta** (Linnaeus) Gaudichaud: Bot. Freyc. Voy., p. 497, 1826.

Tau: plateau back of Faleasao, altitude 150 meters, flower, fruit, August 4, 1921, Garber no. 576. Ofu: at plantation house, Tua, flower, fruit, June 5, 1925, Garber no. 1001; Aloafao, flower, fruit, June 6, 1925, Garber no. 1013. Upolu: moist place, Apia, flower, fruit, February 18, 1921, Eames no. 49. Savaii: waste ground, Safotu-Safune, flower, fruit, August 13, 1931, Christophersen and Hume no. 2379. Native names, *ongo ongo* (nos. 576, 2379), *vao mangeso* (nos. 1013, 49).

A weed common in waste places in the lowlands.

## 2. PILEA Lindley

**Pilea microphylla** (Linnaeus) Liebmann: Vidensk. Selsk. Skr., vol. 5, 2, p. 302, 1851.

Tutuila: Pago Pago harbor, flower, fruit, 1929, Diefenderfer no. 24. Savaii: among rocks, Ngangamalae village, flower, fruit, November 4, 1931, Christophersen no. 3027. Native name, *tamole* (no. 3027).

## 3. PROCRIIS Commerson

**Procris pedunculata** (Forster) Weddell: DC Prodr., vol. 16, 1, p. 191, 1869.

Tau: trail, Fitiuta, flower, August 10, 1921, Garber no. 607. Tutuila: above Afono, altitude 20 meters, flower, fruit, December 17, 1924, Garber no. 859; near Vatia, altitude 60 meters, flower, December 17, 1924, Garber no. 869; back of Pago Pago, fruit, December 26, 1924, Garber no. 934; forest above Naval Station, altitude 200-300 meters, flower, October 30, 1929, Christophersen no. 986. Upolu: ravine, Vailele, altitude 100 meters, flower, fruit, March 5, 1921, Eames no. 158; forest above Malololelei, altitude 700 meters, flower, fruit, August 14, 1929, Christophersen no. 238. Savaii: forested "island" in Matavanu lava field, altitude 200 meters, fruit, July 6, 1931, Christophersen and Hume no. 1893; open forest near Olo, above Safotu, altitude 700 meters, flower, fruit, August 5, 1931, Christophersen and Hume no. 2252; mangrove swamp (epiphytic), Salailua-Lata-itai, fruit, September 18, 1931, Christophersen no. 2639; forest, Falealupo, altitude 25 meters, flower, fruit, September 29, 1931, Christophersen no. 2798. Native names, *fua lole* (nos. 859, 869), *lole vao* (no. 934).

A common plant in the forests of the lowlands and medium elevations. It is most commonly growing as an epiphyte.

## 4. BOEHMERIA Jacquin

? *Boehmeria platyphylla* Don: Prodr. Fl. Nepal., p. 60, 1825.

Tutuila: reservoir trail above Naval Station, altitude 200-300 meters, flower, October 30, 1929, Christophersen no. 987. Savaii: forest above Salailua, altitude 650 meters, flower, May 21, 1924, Bryan no. 170; forest above Letui, altitude 800 meters, flower, September 27, 1929, Christophersen no. 741; forest above Matavanu Crater, altitude 900 meters, July 15, 1931, Christophersen nos. 2018 and 2022 (fruit); forest above Salailua, altitude 1400 meters, flower, September 23, 1931, Christophersen no. 2683; forest above Salailua, altitude 1300 meters, flower, November 7, 1931, Christophersen no. 3070.

The identity of these specimens is uncertain. They may be referred to *B. platyphylla*, recorded for several Polynesian and Melanesian groups. But it is probable that monographic work will prove these plants to be distinct.

A shrub growing in open places in the forests at medium and high elevations.

## 5. PIPTURUS Weddell

*Pipturus affinis argenteus* (Forster) Weddell: DC Prodr., vol. 16, pt. 1, p. 235, 19, 1869.

Tau: beach at Fitiuta, female flower, fruit, August 8, 1921, Garber no. 585; Faleasao, male flower, January 8, 1922, Garber no. 696. Ofu: Nuu Islet, female flower, July 4, 1925, Garber no. 1110. Tutuila: forest, altitude 40 meters, male flower, September 9, 1923, Wilder no. 90; Goat Island, male flower, December 14, 1924, Garber no. 813; grassy slope, above Pago Pago, altitude 50-100 meters, female flower, November 3, 1929, Christophersen no. 1073. Upolu: Moa Moa plantations, altitude 60 meters, male flower, March 2, 1921, Eames no. 145; forest, Vaialele, altitude 30 meters, female flower, March 5, 1921, Eames no. 156; forest below Malololelei, altitude 500 meters, female flower, fruit, August 19, 1929, Christophersen (by native) no. 330. Savaii: Matavanu lava field, altitude 200 meters, male flower, September 12, 1929, Christophersen no. 618; altitude 200 meters, male flower, July 6, 1931, Christophersen and Hume no. 1899; altitude 600 meters, male flower, July 10, 1931, Christophersen and Hume no. 1960; open woodland, Olo above Safotu, altitude 700 meters, male flower, August 26, 1931, Christophersen and Hume no. 2516; forest above Safune, altitude 500 meters, male flower, May 2, 1924, Bryan no. 118; forest above Safune, altitude 400 meters, female flower, fruit, May 4, 1924, Bryan no. 126; open forest above Auala, altitude 200 meters, female flower, fruit, November 20, 1931, Christophersen no. 3359; coconut plantation, Salailua, altitude 25 meters, male flower, October 8, 1931, Chris-

tophersen no. 2843; rocky shore, Foailalo, male flower, November 4, 1931, Christophersen no. 3039.

*Songa* (no. 330) is the most common native name for this plant. *Fau songa* (no. 696) is also frequently used in alluding to the use of the bast, and the duplicate *songa songa* (no. 1960) has been heard. Four specimens (nos. 145, 156, 2843, and 3039) have been named *ma'o*, a name which is used for *Melochia odorata*, but apparently applicable also to certain green-leaved forms of this species.

Winkler (58) has found it untenable to keep *P. incanus* (Blume) Weddell apart from *P. argenteus* (Forster) Weddell as a separate species, giving it a varietal rank under the latter species. Skottsberg (53, pp. 60-62), after studying the types and material from a great number of Pacific islands, concludes that the distinctness of the two species is obscured by a series of intermediate forms. However, he thinks "it may be possible to retain *P. incanus* as a species of Java and Malacca and to refer all the other forms to *P. argenteus*" (53, p. 62). The non-Tahitian forms of *P. argenteus* (except the one from Timor) Skottsberg (53, p. 62) provisionally refers to variety *lanosus*, stating that "close field observations are necessary if we want to segregate more varieties or forms."

The Samoan specimens under consideration represent a great many forms linked together in a gradual, uninterrupted series, the extremes being distinct. The specimens from Tau (Garber nos. 585 and 696) have broadly ovate leaves, shortly acuminate, distinctly cordate, rounded or cuneate at base, with coarsely crenate margin. The lower surface is grayish white, the indistinct areoles being densely covered with wool and with numerous long, erect, more or less stiff hairs. The glomerules are arranged in branching spikes. The female specimen from Ofu (Garber no. 1110) is very similar, the leaves being less coarsely crenate. Garber's specimen from Tutuila (no. 813) comes close to the Tau specimen in leaf shape, pubescence, and the branched spikes, the margin of the leaves being less deeply crenate. Wilder no. 90 (Tutuila) with its relatively narrower, ovate, long-acuminate leaves and more distinct areoles forms a transition to Christophersen no. 1073 and Setchell no. 85 (in B. P. Bishop Museum), which latter comes very close to the type of *P. argenteus* as described by Skottsberg (53, p. 44) and to Tahitian specimens examined (Setchell and Parks no. 468, Grant no. 4609). The areoles, however, are more distinct in the Tahitian specimens and the wool hairs less prominent. The specimens from Upolu are all characterized by a greenish-gray to green lower leaf surface and relatively narrow, long-acuminate leaves. Eames no. 145 has branching male spikes shorter than the petioles, leaf margin crenate, ultimate areoles indistinct, leaves on flowering branches to 15 cm. long, 7 cm. wide. Eames no. 156 has smaller leaves (to 11 by 5.5 cm. on flowering

branches), leaf margin serrate, ultimate areoles indistinct, the female glomerules sessile or in simple or branching spikes. Christophersen no. 330 has narrow leaves (to 14 by 4 cm. on flowering branches), leaf margin finely crenate-serrate, ultimate areoles rather distinct, the female glomerules in short, simple spikes. The specimens from Savaii form a rather uniform series. The leaves are acuminate to long-acuminate, less than three times as long as broad, the lower surface dominantly green, ultimate areoles indistinct, wool and more or less stiff, erect hairs prominent, margin shallowly crenate to dentate. Spikes simple or branched. Bryan no. 126 (female) differs in the narrower leaves.

The inner bark of this plant has great tensile strength and is extensively used for string where such strength is needed, as in tying fishhooks and for fishing lines. It is also used for "wings" on fishhooks. It is light gray and turns almost white by use in salt water.

**Pipturus polynesianus** (Skottsberg) varietas **samoensis** (Hochreutiner)

Skottsberg: Medd. Göteborg. Bot. Trädg., vol. 7, p. 28, 1932.

Savaii: forest above Matavanu Crater: altitude 1300 meters, male flower, July 24, 1931, Christophersen and Hume no. 2150; altitude 1500 meters, female flower, fruit, July 30, 1931, Christophersen and Hume nos. 2221 and 2233; altitude 1600 meters, male flower, September 6, 1931, Christophersen and Hume no. 2560; forest above Salailua, altitude 1400 meters, female flower, fruit, September 23, 1931, Christophersen no. 2681? Native name, *songa* (no. 2681).

The specimens differ from the description of Hochreutiner (31, p. 349): leaves relatively narrower and with slightly narrower base, more elongated acuminate than the drawing of Hochreutiner's plant by Skottsberg (52, p. 25). Otherwise they agree in pubescence of leaves and branches, long petioles, and character of fruit.

**Pipturus (§Mamakea) viridis** species nova (fig. 8).

Frutex. Ramuli florigeri 2-3 mm. crassi brunnei glabri versus apicem adpresse hirsuti. Petiolus adpresse hirsutus fusco-brunneus 0.8-1.5 cm. longus. Lamina coriacea ovata acuta vel acuminata basi late rotundata margine praeter basim dense crenato-dentato supra plerumque bullata hispidula subtus candide viridis in nervis majoribus dense cano-hirsuta areolis lana viridi crispa tectis 30-56 mm. longa 20-30 mm. lata. Stipulae profunde bifidae lanceolatae acuminatae 5-6 mm. longae. Dioicus glomerulis cum floribus femineis 4 mm. diametro fructiferis 6 mm. diametro. Flos femineus perianthio ovoideo praeter basim hirtello 1 mm. alto. Stigma 3-3.5 mm. longum. Perianthium fructiferum late ovoideum rostratum apice hirtello 1.5 mm. altum 1 mm. latum. Nux ovoidea compressa apiculata carinata nitida brunnea usque fusco-brunnea 1.3 mm. longa 0.9 mm. lata.

Species distincta foliis parvis subtus candide viridibus stigmatibus longo.

Shrub. Flowering branches 2-3 mm. thick, brown, glabrous, appressed hirsute towards apex. Petiole appressed hirsute, dusky brown, 0.8-1.5 cm. long. Leaf blade coriaceous, ovate, acute or acuminate, broadly rounded at base, 30-56 mm. long, 20-30 mm. broad; upper surface mostly bullate, hispidulous; lower surface brilliant green, larger veins

densely grayish hirsute, areoles covered with green, curly wool; margin densely crenate-dentate above the base. Stipules deeply bifid, lanceolate, acuminate, 5-6 mm. long. Dioecious, flowering female glomerules 4 mm. in diameter, fruiting glomerules 6 mm. in diameter. Perianth of female flower ovoid, minutely hirsute above the base, 1 mm. high. Stigma 3-3.5 mm. long. Fruiting perianth broadly ovoid, beaked, minutely hirsute at apex, 1.5 mm. high, 1 mm. broad. Nut ovoid, flattened, apiculate, keeled, shining, brown to dusky brown, 1.3 mm. long, 0.9 mm. broad.—Distinguished by its small leaves, which are bright green below, and its long stigma.

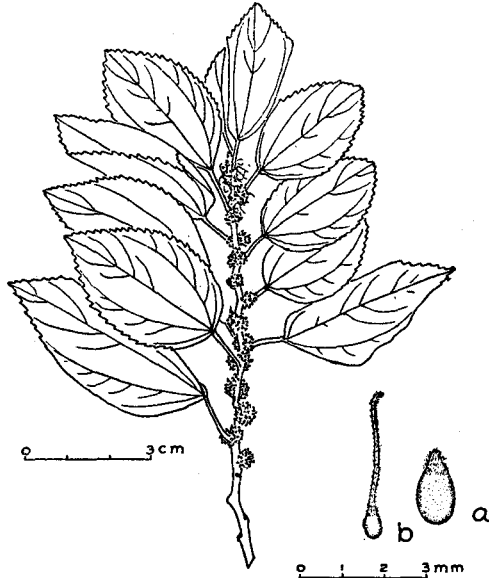


FIGURE 8.—Flowering branch, *Pipturus viridis*: a, fruit; b, ovary and style.

Savaii: shrub, recent lava field above Aopo, altitude 1200-1400 meters, female flower, fruit, October 7, 1929, Christophersen no. 901, type in B. P. Bishop Museum.

A small shrub with bright green colored lower surface of the leaves and long stigmas. It was collected only once on the recent lava field above Aopo.

#### **Pipturus** species.

Savaii: on 1902 lava field above Aopo, altitude 1200-1400 meters, male flower, October 7, 1929, Christophersen no. 895; open scrub-forest at rim of crater, Aopo-Ngangamalae, altitude 1520 meters, female flower, fruit, December 8, 1931, Christophersen no. 3448.

These two plants are related to *P. polynesianus* variety *samoensis* but differ in the smaller, chartaceous leaves and shorter petioles. No. 3448 is almost identical with no. 2681 under doubt referred to variety *samoensis*. No. 895 has still smaller leaves up to 4 cm. long on petioles not exceeding 1 cm. The internodes are 3-4 mm. long.



## 6. LEUCOSYKE Zollinger et Moritzi

*Leucosyke corymbulosa* (Weddell) Weddell: DC Prodr., vol. 16, 1, p. 235, 30, 1869.

Tutuila: forest, Pago Pago harbor, fruit, September 10, 1923, Wilder no. 86; Goat Island, flower, December 14, 1924, Garber no. 809; forest back of Pago Pago village, fruit, December 26, 1924, Garber no. 922. Upolu: open woods, Vailima, altitude 100 meters, fruit, March 2, 1921, Eames no. 128; forest, Vaea, altitude 100 meters, flower, fruit, April 9, 1927, MacDaniels no. 1124; forest, Vaea, altitude 150 meters, flower, August 28, 1929, Christophersen no. 464. Native name, *ala'ala toa* (nos. 809, 922, 128).

A shrub or small tree in open forests of the foothills.

FAMILY 24. LORANTHACEAE<sup>1</sup>

## I. LORANTHUS Linnaeus

*Loranthus insularum* A. Gray: Bot., Phanerog., U. S. Expl. Exped., vol. 15, pt. 1, p. 738, pl. 98, 1854.

Tutuila: Pago Pago harbor, altitude 150 meters, flower, September 20, 1923, Wilder no. 27. Upolu: on *Inocarpus edulis*, Moa Moa plantations, altitude 200 meters, flower, fruit, March 2, 1921, Eames no. 204. Savaii: open forest near Matavanu Crater, altitude 600-700 meters, bud, fruit, July 10, 1931, Christophersen and Hume no. 1955; on *Ficus*, Olo, above Safotu, altitude 620 meters, flower, fruit, July 16, 1931, Christophersen and Hume no. 1999.

*Loranthus samoensis* Reinecke: Engl. Bot. Jahrb., vol. 25, p. 628, 1898.

Upolu: edge of forest near Malololelei, altitude 540 meters, flower, August 7, 1929, Christophersen no. 104. Savaii: forest above Safune, altitude 1100 meters, flower, fruit, May 8, 1924, Bryan no. 137; forested "island" in Matavanu lava field, altitude 400 meters, flower, September 12, 1929, Christophersen no. 590; open forest near Matavanu Crater, altitude 600-700 meters, bud, July 10, 1931, Christophersen and Hume no. 1954; forest above Matavanu Crater, altitude 900 meters, bud, July 15, 1931, Christophersen and Hume no. 2090; forest above Matavanu Crater, altitude 1050 meters, flower, July 22, 1931, Christophersen and Hume no. 2123; forest above Matavanu Crater, altitude 1300 meters, July 24, 1931, Christophersen and Hume nos. 2144 (fruit), 2148 (fruit), and 2156 (flower, fruit); low forest on rim of Papafu Crater, altitude 1500 meters, flower, fruit, September 22, 1931, Christophersen no. 2730; forest, Falealupo, altitude 25 meters, flower, September 29, 1931,

<sup>1</sup>The Samoan species of Loranthaceae have recently been transferred to other genera as follows: *Loranthus insularum* A. Gray = *Amylotheca insularum* (A. Gray) Danser: Bull. Jard. Bot. Buitenz., ser. 3, vol. 10, p. 301, 1929. *Loranthus samoensis* Reinecke = *Amyema samoensis* (Reinecke) Danser: Vehr. Kon. Akad. Wet. Amsterdam, Afd. Natuurk., 2. sec., vol. 29, no. 6, p. 33, 1933. An emended description and an illustration of *Amyema samoensis* is given by Danser in Rec. trav. bot. neerl., vol. 31, pp. 225-227, 1934.

Christophersen no. 2788; forest above Salailua, altitude 1350 meters, flower, fruit, November 7, 1931, Christophersen no. 3114.

This species is readily distinguished from *L. insularum* by its short-petioled or sessile leaves and its few-flowered inflorescences. It is parasitic on several species of trees, ranging from lowlands to high elevations.

## FAMILY 25. OLACACEAE

### I. XIMENIA Plumier

***Ximenia americana*** Linnaeus: Sp. Pl., p. 1193, 1753.

Savaii: rocky shore, Asau, flower, fruit, October 8, 1929, Christophersen no. 934; rocky shore, Auala-Vaisala, flower, fruit, November 20, 1931, Christophersen no. 3352; coastal scrub forest, Fangalele-Falealupo, fruit, November 21, 1931, Christophersen no. 3400. Native name, *moli tai* (nos. 934, 3352, 3400).

This widely distributed seashore shrub or small tree is found in a few places on the island of Savaii but has not been recorded for any of the other Samoan islands. The fruits are eaten by the Samoans.

### 2. ANACOLOSA Blume

***Anacolosia insularis*** species nova (fig. 9).

Arbor parva 5 m. alta. Ramuli teretes glabri cortice cinereo-brunneo. Folia alterna petiolata, laminis oblongis ellipticis vel late lanceolatis coriaceis utrinque glabris apice acuto vel breviter acuminato basi attenuata margine integro nervis primariis utrinque 2-4 subtus prominentibus ascendentibus 9-14 cm. longis 3.2-5 cm. latis, petiolis glabris supra sulcatis 6-9 mm. longis. Gemmae axillares congestae ovoideae ad 3 mm. longae pedicellis puberulis 1 mm. longis. Calyx dense puberulus cupuliformis fere truncatus vel dentatus lobis late triangularibus. Sepala 6 extus puberula. Ovarium obscure 2-loculare ovulis in loculis solitariis. Flores expansi non visi. Fructus immaturus late ellipsoidalis dense cinereo-puberulus stylo persistente pedicello valido elongato calice incrassato irregulariter laciniato. Fructus maturus (ex exemplario 3312) obovoideus teretis minute apiculatus 18 mm. longus 12 mm. latus pedicello 5-6 mm. longo. Semen 16 mm. longum 9 mm. latum.

Differt a *A. lutea* Gillespie corolla puberula fructibus immaturis puberulis fructibus maturis minoribus in sicco non angulatis minute apiculatis. Differt a *A. ilicoides* Masters petiolis brevioribus calyce puberulo lobis vix deltoideis petalis sepalis ultra 2-3-plo longioribus ovario obscure 2-loculari.

Small tree, 5 m. high. Branches terete, glabrous, bark ashy brown. Leaves alternate, petiolate; blades oblong, elliptical or broadly lanceolate, coriaceous, glabrous on both sides, acute or shortly acuminate, attenuate at base, 9-14 cm. long, 3.2-5 cm. broad, margin entire, primary veins 2-4 on each side of midrib, prominent below, ascending; petioles glabrous, grooved above, 6-9 mm. long. Buds axillary, crowded, ovoid, to 3 mm. long; pedicels puberulous, 1 mm. long; calyx densely puberulous, cup-shaped, almost truncate or dentate, lobes broadly triangular; sepals 6, puberulous on the outside; ovary indistinctly 2-celled, ovules single in each cell. Expanded flowers not seen. Immature fruit broadly ellipsoid, densely ashy puberulous; style persistent; pedicel stout, elongated; calyx thickened, irregularly lobed. Mature fruit (from specimen no. 3312) obovoid, terete, minutely apiculate, 18 mm. long, 12 mm. broad; pedicel 5-6 mm. long. Seed 16

mm. long, 9 mm. broad.—Differs from *A. lutea* Gillespie in its puberulous corolla, puberulous immature fruits, smaller, minutely apiculate mature fruits, which are not angular when dried. Differs from *A. ilicoides* Masters in its shorter petioles, puberulous calyx with hardly deltoid lobes, petals more than 2-3 times as long as sepals, ovary indistinctly 2-celled.

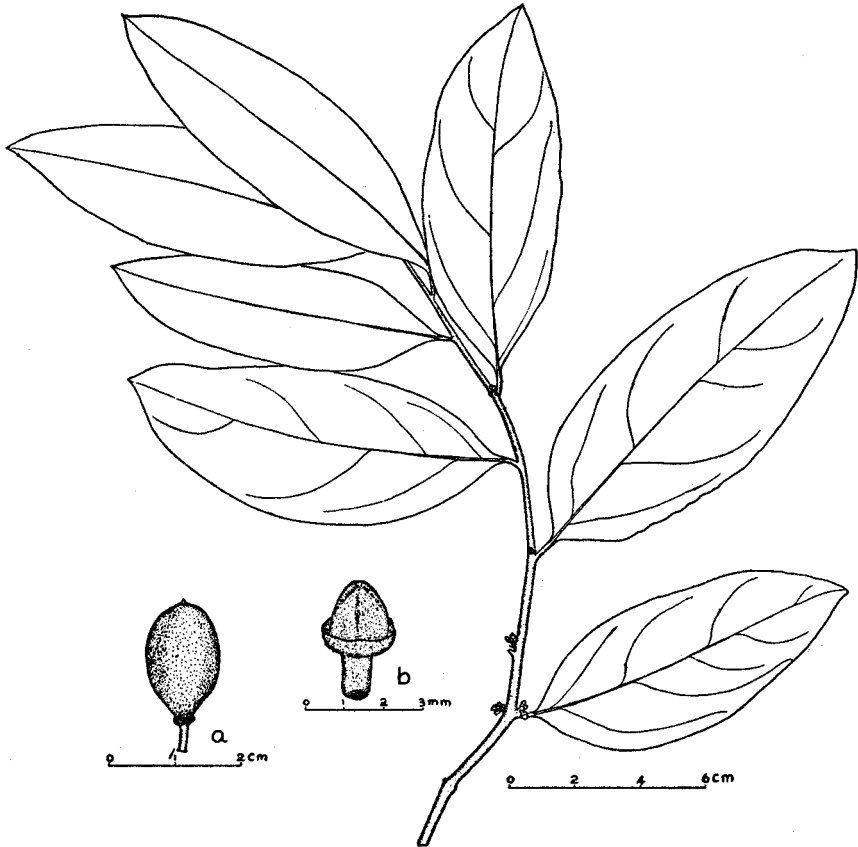


FIGURE 9.—Branch with buds, *Anacolosia insularis*: a, fruit; b, flower bud.

Savaii: forest near Tufutafoe, altitude 10 meters, bud, young fruit, September 30, 1931, Christophersen no. 2771, type in B. P. Bishop Museum; same locality, fruit, November 22, 1931, Christophersen no. 3312.

This species comes close to the Fijian *A. lutea* Gillespie of which I have examined the type specimen. It also appears to come close to the Indian *A. ilicoides* Masters, to which species Burkill (8) has referred plants collected in Tonga. I have not seen specimens of this species, but the Samoan plants do not conform with the description as given by Hooker (33).

## FAMILY 26. ARISTOLOCHIACEAE

## I. ARISTOLOCHIA Tournefort

Back of Pago Pago village on Tutuila, Garber (no. 937) collected an *Aristolochia* with fruits and buds. The leaves are oblique, truncate or shallowly cordate, shortly acuminate, 8-9 cm. long. The fruits are hexagonal, 5-6 cm. long. The specimen does not agree with the original description of *A. cortinata* Reinecke. Nor is it *A. elegans* Masters, recorded for Upolu by Rechinger (45, p. 278).

## FAMILY 27. AMARANTHACEAE

## I. AMARANTHUS Linnaeus

**Amaranthus viridis** Linnaeus: Sp. Pl., 2d ed., p. 1405, 1763.

Olosenga: Olosenga-Olosengauta trail, flower, fruit, June 17, 1925, Garber no. 1069. Tutuila: Fanganeanea, flower, fruit, January 3, 1925, Garber no. 968. Upolu: waste place, Apia, flower, fruit, February 16, 1921, Eames no. 42.

## 2. CYATHULA Loureiro

**Cyathula prostrata** (Linnaeus) Blume: Bijdr. Fl. Jav., p. 549, 1825.

Tau: Sani Ridge back of Fitiuta, altitude 150 meters, flower, August 9, 1921, Garber no. 592; Fitiuta trail, altitude 100 meters, flower, December 16, 1921, Garber no. 669. Upolu: woods near Apia, altitude 100 meters, flower, February 16, 1921, Eames no. 13; forest above Malololelei, altitude 680 meters, flower, August 5, 1929, Christophersen no. 8. Savaii: forest above Sili, altitude 400 meters, flower, November 13, 1931, Christophersen no. 3212. Native name, *manutonga* (no. 13).

Common along forest trails from the lowlands to high elevations.

## 3. ACHYRANTHES Linnaeus

**Achyranthes aspera** Linnaeus: Sp. Pl., p. 204, 1753.

Tau: Fitiuta trail, altitude 125 meters, flower, fruit, August 4, 1921, Garber nos. 563 and 568. Tutuila: Amaluia (?), flower, fruit, September 5, 1923, Wilder no. 9; roadside near Nuuli, flower, fruit, January 3, 1925, Garber no. 962. Savaii: rocky bluff, Safotu-Manase, flower, fruit, August 20, 1931, Christophersen and Hume no. 2458; plantation, Falealupo, flower, fruit, September 29, 1931, Christophersen no. 2796; roadside, Auala-Vaisala, flower,

fruit, November 20, 1931, Christophersen no. 3356. Native name, *lau tama tama* (nos. 568, 2796).

A weed, not common in the lowlands along roads and in plantations. The leaves are applied on wounds.

#### 4. ALTERNANTHERA Forskål

**Alternanthera sessilis** (Linnaeus) R. Brown: ex Roem. et Schult., Syst., vol. 5, p. 554, 1819.

Ofu: Aloafao, flower, June 6, 1925, Garber no. 1010. Tutuila: roadside, altitude 60 meters, flower, September 18, 1923, Wilder no. 26; *malae* in Afono, flower, December 17, 1924, Garber no. 862. Upolu: thicket, sandy shore, near Apia, flower, February 16, 1921, Eames no. 31. Savaii: beach, Salailua, flower, October 3, 1931, Christophersen no. 2812; tidal swamp, near Tufutafoe, flower, November 22, 1931, Christophersen no. 3315.

A common weed in open places and waste land at low elevations.

An *Alternanthera* escaped from cultivation was found on Goat Island (Garber no. 818).

#### 5. GOMPHRENA Linnaeus

**Gomphrena globosa** Linnaeus: Sp. Pl., p. 224, 1753.

Tutuila: Goat Island, flower, December 16, 1924, Garber no. 829; plantation, Aunuu, flower, November 12, 1929, Diefenderfer no. 1241. Upolu: roadside, Apia, flower, February 28, 1921, Eames nos. 117 and 119. Savaii: cultivated, Safune, flower, April 30, 1924, Bryan no. 104. Native name, *malila* (nos. 829, 104). The specimens of Eames (nos. 117 and 119) are marked *makelika*.

*Celosia cristata* Linnaeus is a common cultivated plant around the native houses. The Samoan name is *ma moe* (Christophersen no. 3054).

### FAMILY 28. NYCTAGINACEAE

#### I. MIRABILIS Linnaeus

**Mirabilis Jalapa** Linnaeus: Sp. Pl., p. 177, 1753.

Savaii: roadside, Falelima, flower, October 7, 1929, Christophersen no. 924; waste ground, Fatausi, flower, August 20, 1931, Christophersen and Hume no. 2479; coconut plantation, Salailua, flower, October 3, 1931, Christophersen no. 2815; waste ground, Salailua, flower, October 19, 1931, Christophersen no. 2857. Native name, *peteli* (nos. 2479 and 2857).

In plantations and waste places.

## 2. BOERHAAVIA Linnaeus

**Boerhaavia diffusa** Linnaeus: Sp. Pl., p. 3, 1753.

Tau: roadside, Fitiuta, fruit, August 8, 1921, Garber no. 586. Tutuila: coral ground, Afono, flower, fruit, December 17, 1924, Garber no. 861. Savaii: stony road, Samalaeulu, flower, fruit, September 20, 1929, Christophersen no. 699; stony place, Salelavalu Village, flower, August 21, 1931, Christophersen and Hume no. 2476; rocky coast, Falealupo-Fangalele, flower, fruit, November 22, 1931, Christophersen no. 3329.

On rocky ground, not uncommon in the villages and along the shores. The tuberous root is said to be eaten in times of scarcity, and the plant is therefore called *ufi* or *ufi samoa*.

## 3. CEODES Forster

**Ceodes excelsa** (Blume) Skottsberg: Medd. Göteb. Bot. Trädg., vol. 2, p. 231, 1926.

Tau: plateau back of Faleasao, altitude 150 meters, flower, August 4, 1921, Garber no. 574; Faleasao-Fitiuta trail, fruit, April 19, 1922, Garber no. 761. Upolu: forest, Moa Moa plantations, altitude 250 meters, flower, March 2, 1921, Eames no. 187; forest, Malololelei-Lanutoo, altitude 700 meters, bud, August 5, 1929, Christophersen nos. 30 and 42; forest above Malololelei, altitude 650 meters, flower, August 10, 1929, Christophersen no. 151; forest, Malololelei-Lanutoo, altitude 700 meters, bud, August 21-22, 1929, Christophersen no. 394, open grassland near Malololelei, altitude 650 meters, October 18, 1929, Christophersen no. 955.

Fruiting perigone club-shaped to 5.5 cm. long and 4 mm. broad, sticky, not with glandular hairs. A small tree to 4 meters high growing in the forests at low and middle elevations.

**Ceodes** species.

Savaii: forest near Tapueleele, altitude 200 meters, bud, December 19, 1931, Christophersen no. 3461. Native name, *taipoipo* (no. 3461).

Leaves broadly ovate, rounded or cordate at base. Fruits not present. This may belong to an undescribed species. It is not *C. Brunoniana* (Endlicher) Skottsberg as interpreted by Heimerl (28).

## FAMILY 29. AIZOACEAE

## I. SESUVIUM Linnaeus

**Sesuvium portulacastrum** Linnaeus: Syst., 10th ed., p. 1058, 1759.

Ofu: rock crevices on spray-swept cliff, Ofu-Samoi trail, flower, June 7, 1925, Garber no. 1024.

A widespread species apparently rare in Samoa, this being the first and only record.

## FAMILY 30. PORTULACACEAE

## I. PORTULACA Linnaeus

**Portulaca lutea** Solander: Forster, De Pl. Esc., p. 72, 1786.

Ofu: rocky cliff, Feaia Point, bud, young fruit, June 7, 1925, Garber no. 1023.

**Portulaca oleracea** Linnaeus: Sp. Pl., p. 445, 1753.

Tutuila: Goat Island, fruit, December 15, 1924, Garber no. 821; Fanganeanea, fruit, January 3, 1925, Garber no. 970. Savaii: lava cracks near Saleaula, flower, fruit, September 20, 1929, Christophersen no. 705. Native name, *tamole* (no. 970).

**Portulaca quadrifida** Linnaeus: Mant., vol. 1, p. 73, 1767.

Tau: Faasamene Spring near Faleasao, flower, fruit, January 8, 1922, Garber no. 697. Tutuila: Goat Island, flower, fruit, December 15, 1924, Garber nos. 816 and 822. Upolu: waste place, Apia, flower, February 28, 1921, Eames no. 104. Savaii: gravelly road, Samalaeulu, flower, September 20, 1929, Christophersen no. 704; cracks in lava, near Saleaula, flower, fruit, September 20, 1929, Christophersen no. 708; gravelly waste ground, Lelepa, flower, July 8, 1931, Christophersen and Hume no. 1928; rocky coast, Falealupo-Fangalele, flower, November 22, 1931, Christophersen no. 3340. Native name, *tamole* (nos. 816, 822, 104, 704). A common plant in gravelly and rocky places in and near the villages.

## FAMILY 31. MENISPERMACEAE

## I. STEPHANIA Loureiro

**Stephania Forsteri** (De Candolle) A. Gray: Bot. Phanerog., U. S. Expl. Exped., vol. 15, pt. 1, p. 36, 1854.

Savaii: forest above Matavanu Crater, altitude 750 meters, September 15, 1929, Christophersen no. 624; coconut plantation, Safune, August 13, 1931, Christophersen no. 2430. Native name, *lau iatolo* (no. 2430).

Both specimens are sterile. The leaves of no. 624 are pale green beneath, those of no. 2430 are glaucous beneath and are said to be effective in curing a certain type of boil on the head.

## FAMILY 32. ANONACEAE

## I. CANANGIUM Baillon

**Canangium odoratum** (Lamarck) Baillon: ex King, Jour. As. Soc. Beng., vol. 61, 2, p. 41, 1892.

Tau: plateau back of Luma, altitude 125 meters, flower, fruit, Garber no. 650. Tutuila: rocky slopes, altitude 15 meters, March 18, 1930, Diefenderfer no. 3. Upolu: rocky slopes near Apia, altitude 100 meters, flower, February 16, 1921, Eames no. 14; woods near Vailima, altitude 250 meters, flower, February 27, 1921, Eames no. 84; forest below Malololelei, altitude 500 meters, flower, fruit, August 16, 1929, Christophersen no. 295. Savaii: forest, Salailua-Lata-itai, flower, fruit, October 16, 1931, Christophersen no. 2855. Native name, *moso'oi* (nos. 650, 3, 14, 84, 295, 2855).

A common tree in the forests at low and medium elevations. It grows to a great size with a straight trunk. The wood is very light and highly favored by the Samoans for canoes. The flowers are strongly fragrant and used for necklaces ('*ula*) and for scenting coconut oil.

## 2. ARTABOTRYS R. Brown

**Artabotrys uncinatus** (Lamarck) Merrill: Philipp. Jour. Sci., vol. 7, p. 234, 1912.

Upolu: cultivated (?), Vaialele, altitude 100 meters, fruit, March 5, 1921, Eames no. 169; hillside near Apia, altitude 50 meters, flower, fruit, March 2, 1921, Eames no. 198; forest near Malololelei, altitude 550 meters, August 17, 1929, Christophersen no. 317?

Native name, *moso'oi honolulu* (no. 198). Cultivated for its fragrant flowers. Escaped (?).

Common in cultivation is found the soursop, *Anona muricata* Linnaeus. It persists in abandoned plantations but is hardly an escape. The native name is *sasalapa* (Upolu, Christophersen no. 345; Savaii, Christophersen no. 3044).

## FAMILY 33. MYRISTICACEAE

## I. MYRISTICA Linnaeus

**Myristica hypargyrea** A. Gray: Bot., Phanerog., U. S. Expl. Exped., vol. 15, pt. 1, p. 33, 1854.

Tutuila: forest above Pago Pago, altitude 150 meters, September 21, 1923, Wilder and Swezey no. 38; near old radio station above Pago Pago, December 26, 1924, Garber nos. 917, 918, (fruit), and 928 (young fruit); forest trail to reservoir above Naval Station, altitude 200 meters, October 30,



1929, Christophersen no. 996. Upolu: forest above Malololelei, altitude 650 meters, flower, August 10, 1929, Christophersen no. 150. Savaii: forest near Samalaeulu, altitude 10 meters, flower, August 18, 1931, Christophersen and Hume no. 2486; open forest, Olo, above Safotu, altitude 700 meters, August 26, 1931, Christophersen and Hume no. 2527; forest above Sili, altitude 100 meters, November 13, 1931, Christophersen no. 3203; alluvial forest near Samalaeulu, altitude 10 meters, fruit, December 28, 1931, Christophersen no. 3474. Native name, *atone* (nos. 2486, 3203, 3474), *atone 'ulu* (nos. 917, 918, 928).

A medium-sized tree, common in the lowlands and at middle elevations.

**Myristica inutilis** Rich: ex A. Gray, Bot., Phanerog., U. S. Expl. Exped., vol. 15, pt. 1, p. 34, 1854.

Tau: Fitiuta trail back of Faleasao, fruit, August 11, 1921, Garber no. 609. Tutuila: forest, altitude 75 meters, flower, September 10, 1923, Wilder no. 91; low forest on ridge above Naval Station, altitude 200 meters, flower, fruit, April 12, 1924, Bryan no. 73; above Pago Pago village, young fruit, December 26, 1924, Garber no. 908; forest, trail to reservoir above Naval Station, altitude 200 meters, October 30, 1929, Christophersen nos. 984 (flower) and 995 (fruit). Upolu: forest above Vailima, altitude 300 meters, fruit, February 27, 1921, Eames no. 76; forest below Malololelei, altitude 500 meters, fruit, August 16, 1929, Christophersen no. 292. Savaii: coconut plantation, Salailua, altitude 125 meters, fruit, September 15, 1931, Christophersen no. 2612; shore forest, Tanga, flower, fruit, October 6, 1931, Christophersen no. 2838; forest above Sili, altitude 100 meters, flower, November 13, 1931, Christophersen no. 3202; alluvial forest near Samalaeulu, altitude 10 meters, fruit, December 28, 1931, Christophersen no. 3473. Native name, *atone* (nos. 91, 73, 908, 76, 292, 2612, 2838, 3202, 3473).

A medium-sized tree to 15 meters high, common in the forests of the lowlands and foothills. It is distinguished from *M. hypargyraea* by its smaller leaves and more elongated, lighter-colored fruits.

**Myristica** species.

Upolu: forest, Moa Moa plantations, altitude 250 meters, fruit, March 2, 1921, Eames no. 186; forest near Malololelei, altitude 550 meters, fruit, August 17, 1929, Christophersen no. 314. Native name, *atone* (nos. 186, 314).

These specimens have the smaller, narrower leaves characteristic of *M. inutilis* and the subglobose, darker brown, densely pubescent fruits characteristic of *M. hypargyraea*. The young leaves are glabrous, bringing the specimens closer to *M. hypargyraea*, but the seeds (no. 314) are broader than originally described for this species, measuring 30 mm. long, 26 mm. wide (original description: 32 mm. by 20 mm.).

## FAMILY 34. MONIMIACEAE

## I. HEDYCARYA Forster

**Hedycarya denticulata** (A. Gray) Perkins et Gilg: Pflanzenr., IV, 101, p. 19, 1901.

Tutuila: forest above Pago Pago, male flower, September 21, 1923, Wilder and Swezey no. 39; Aua-Afono trail, male flower, fruit, December 17, 1924, Garber no. 846; above Pago Pago village, bud, December 26, 1924, Garber no. 910; forest, Alava Ridge, altitude 400 meters, male flower, November 7, 1929, Christophersen no. 1140. Upolu: forest, Moa Moa plantations, altitude 250 meters, fruit, March 2, 1921, Eames no. 184; forest near Malololelei, altitude 550 meters, male and female flower, July 8, 1925, Wilder no. 414; forest, Vaea, altitude 150 meters, fruit, April 9, 1927, MacDaniels no. 1118; forest above Malololelei, altitude 650 meters, August 10, 1929, Christophersen nos. 152 (male flower), and 161 (fruit); forest near Malololelei, altitude 550 meters, fruit, August 17, 1929, Christophersen no. 306. Savaii: forest above Safune, altitude 800 meters, fruit, May 3, 1924, Bryan no. 124; forest back of Vaipouli, altitude 150 meters, fruit, July 7, 1931, Christophersen and Hume no. 1912; forest above Matavanu Crater, altitude 900 meters, fruit, July 14-15, 1931, Christophersen and Hume nos. 2025, 2034, and 2046; forest above Matavanu Crater, altitude 1300 meters, July 24-25, 1931, Christophersen and Hume nos. 2140 (male flower) and 2174 (female flower, fruit); forest above Matavanu Crater, altitude 1550 meters, female flower, fruit, July 30, 1931, Christophersen and Hume no. 2241; open forest, Olo, above Safotu, altitude 700 meters, male flower, August 6, 1931, Christophersen and Hume no. 2275; open forest, Olo, above Safotu, altitude 700 meters, female flower, fruit, August 26, 1931, Christophersen and Hume no. 2517; forest, northeast of Salailua, altitude 1200 meters, female flower, fruit, September 8, 1931, Christophersen no. 2568; forest above Salailua, altitude 900-1000 meters, male flower, September 22, 1931, Christophersen no. 2705; forest at Le To, above Salailua, altitude 750 meters, fruit, October 21, 1931, Christophersen no. 2947; open plantation ground, Salailua, altitude 150 meters, male flower, October 28, 1931, Christophersen no. 2993; forest above Sili, altitude 450 meters, fruit, November 13, 1931, Christophersen no. 3217; forest, Siuvao-Auala, altitude 600 meters, male flower, November 20, 1931, Christophersen no. 3367.

A small tree common in the forests at all altitudes.

## 2. TRIMENIA Seemann

**Trimenia weinmanniaefolia** Seemann: Fl. Vit., p. 425, pl. 99, 1871.

Savaii: forest above Safotu-Letui, altitude 1600-1700 meters, flower, fruit,

September 26, 1929, Christophersen no. 793; forest above Matavanu Crater, altitude 900 meters, July 15, 1931, Christophersen and Hume nos. 2074 (fruit) and 2083 (flower).

This small genus found in New Guinea, New Caledonia, Fiji, and the Marquesas is here for the first time recorded for Samoa. The Samoan specimens belong to the type species, agreeing, except for their longer leaves, with the original description and plate as well as with Fijian specimens examined (Gillespie no. 4843). The leaf blade is 9-14 cm. long and 2.2-3 cm. wide. The fruit is a fleshy drupe, red at maturity, the dry mesocarp with a strong odor of turpentine, the dry fruit 5-6 mm. long, 3-4 mm. broad, 2 mm. thick.

### FAMILY 35. LAURACEAE

#### I. CINNAMOMUM Tournefort

**Cinnamomum elegans** Reinecke: Engl. Bot. Jahrb., vol. 25, p. 633, 1898.

Savaii: shore forest, Tanga, bud, young fruit, October 6, 1931, Christophersen no. 2826; open coastal forest, Auala-Vaisala, flower, November 20, 1931, Christophersen no. 3350.

**Cinnamomum affinis pallidum** Gillespie: B. P. Bishop Mus., Bull. 91, p. 6, fig. 5, 1932.

Upolu: edge of forest near Malololelei, altitude 650 meters, fruit, August 15, 1929, Christophersen no. 276. Native name, *tingamoni* (no. 276).

The indistinctly reticulate leaves and the stout peduncle bring this specimen close to the Fijian *C. pallidum*. The leaves emit a strong cinnamon odor when bruised.

**Cinnamomum zeylanicum** Blume: Bijdr., p. 568, 1825.

Savaii: edge of forest, Vaipouli-Manase, altitude 100 meters, September 21, 1929, Christophersen no. 716; same locality, flower, fruit, July 16, 1931, Christophersen and Hume no. 2075. Native name, *tingamoni* (nos. 716, 2075).

A rare escape from cultivation. The Samoans use it for scenting coconut oil.

#### 2. LITSEA Lamarck

**Litsea magnifolia** Gillespie varietas *samoensis*, varietas nova (fig. 10).

Differt a typo ramulis juvenilibus rufo-tomentosis foliis minoribus 7.5-14 cm. longis 4.5-9 cm. latis pedunculis fructiferis immaturis gracilioribus brevioribus ad 6 mm. longis axibus florum brevioribus circiter 5 mm. longis.

Differs from the type of the species in its reddish tomentose young branches, smaller leaves 7.5-14 cm. long and 4.5-9 cm. broad, peduncles of immature fruits more slender, shorter, to 6 mm. long, floral axis shorter, about 5 mm. long.

Upolu: forest near Malololelei, altitude 550 meters, fruit, August 17, 1929, Christophersen no. 328, type in B. P. Bishop Museum. Savaii: forest east of Olo, above Safotu, altitude 700-800 meters, August 8, 1931, Christophersen and Hume no. 2307; forest at Le To, above Salailua, altitude 750 meters, October 21, 1931, Christophersen no. 2885; forest, Siuvao-Auala, altitude 600 meters, male bud, November 20, 1931, Christophersen no. 3387.

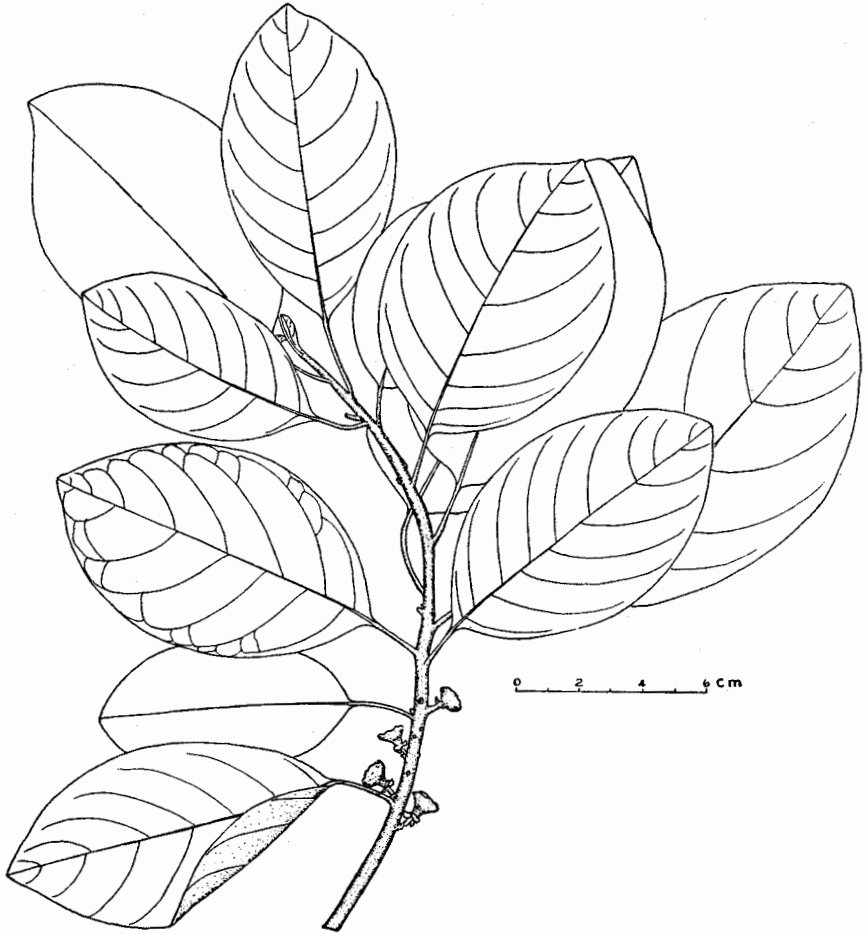


FIGURE 10.—Fruiting branch, *Litsea magnifolia* varietas *samoensis*.

These specimens have been compared with the type of *L. magnifolia* and other Fijian specimens. They come very close, but differ in the dense reddish tomentum of the young parts and the smaller leaves. The parts of the immature infructescence are smaller.

A large tree to 20 meters high growing in the forests at middle elevation.

## 3. CRYPTOCARYA R. Brown

*Cryptocarya samoensis*, species nova (fig. 11).

Arbor mediocris. Ramuli teretes glabri. Folia petiolata, laminis coriaceis glabris ellipticis vel ovatis acuminatis apice obtuso basi cuneata interdum rotundata margine integerrimo nervis primariis utrinque 6-9 aliis reticulatis 10-19 cm. longis 3.3-10 cm. latis, petiolis glabris 1.5-2 cm. longis. Paniculae axillares glabratae ad 13 cm. longae. Perianthium pilosum, tubo conico circiter 2 mm. alto, lobis 6 subaequalibus ovatis obtusis 2 mm. longis 1.5 mm. latis. Stamina ordinum I et II 6 bilocularia introrsa II breviora filamentis pilosis ordinis III 3 bilocularia extrorsa staminodia ordinis IV 3 acuminata complanata basi pilosa. Stylus circiter 2 mm. longus. Ovarium glabrum ovoideum. Fructus obovoideus breviter et abrupte acuminatus 6-costatus rugosus in vivo nigro-purpureus in sicco ad 4 cm. longus 1.7 cm. latus.

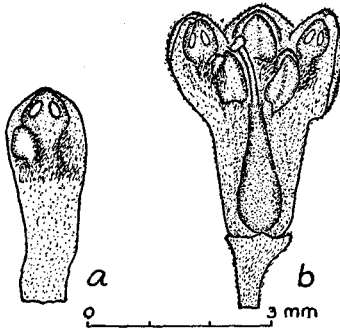


FIGURE 11.—*Cryptocarya samoensis*: a, part of perianth showing anthers; b, longitudinal section of flower.

Differt a *C. glaucescens* fructibus obovoideis non globosis.

Medium size tree. Branches terete, glabrous. Leaves petiolate; blades coriaceous, glabrous, elliptical or ovate, acuminate, obtuse, cuneate or rounded at base, 10-19 cm. long, 3.3-10 cm. broad, margin entire, primary veins 6-9 on each side of midrib, other veins reticulate; petiole glabrous, 1.5-2 cm. long. Panicles axillary, glabrate, to 13 cm. long. Perianth pilose; tube conical, about 2 mm. high; lobes 6, subequal, ovate, obtuse, 2 mm. long, 1.5 mm. broad. Stamens of series I and II 6, 2-celled, introrse, stamens of series II shorter with pilose filaments; stamens of series III 3, 2-celled, extrorse; staminodes of series IV 3, acuminate, complanate, base pilose. Style about 2 mm. long. Ovary glabrous, ovoid. Fruit obovoid, shortly and abruptly acuminate, 6-ribbed, rugose, living specimens blackish purple, dried specimens to 4 cm. long and 1.7 cm. broad.—Differs from *C. glaucescens* in its obovoid, not globose fruits.

Savaii: forest at Le To, above Salailua, altitude 750 meters, flower, fruit, October 21, 1931, Christophersen no. 2912, type in B. P. Bishop Museum.

A tree 5 meters high in the forests of Savaii at middle elevations.

## 4. ENDIANDRA R. Brown

*Endiandra elaeocarpa* (A. Gray) Gillespie: B. P. Bishop Mus., Bull. 83, p. 7, fig. 6, 1931.

Upolu: forest above Malololelei, altitude 650 meters, August 10, 1929, Christophersen no. 153; forest above Malololelei, altitude 700 meters, August 14, 1929, Christophersen no. 241; forest, Malololelei-Lanutoo trail, altitude 700 meters, flower, August 21-22, 1929, Christophersen no. 421. Savaii: forest above Matavanu Crater, altitude 900 meters, flower, August 5, 1931, Christophersen and Hume no. 2263; open forest at Olo, above Safotu, altitude 700 meters, flower, August 26, 1931, Christophersen and Hume no. 2520; forest above Salailua, altitude 800 meters, September 22, 1931, Christophersen no. 2693; forest above Sili, altitude 400 meters, flower, November 13, 1931, Christophersen no. 3231; forest above Sili, altitude 300 meters, flower, young fruit, November 11, 1931, Christophersen no. 3256; forest above Sili, altitude 100 meters, flower, young fruit, November 11, 1931, Christophersen no. 3262. Native name, *asi* (no. 2263).

The leaves are in all the specimens elliptic or ovate-elliptic and acuminate, differing from the obovate, obtuse or slightly acuminate leaves of the Fijian type as figured by Gillespie (23, fig. 6). However, the leaves of this species as interpreted by Gillespie (23, p. 7) vary from ovate to obovate with rounded or acuminate apex. In other leaf characters and in characters of the inflorescence the Samoan specimens agree with the type.

A tree to 15 meters high growing in the forests at low and middle elevations.

## 5. CASSYTHA Linnaeus

*Cassytha filiformis* Linnaeus: Sp. Pl., p. 35, 1753.

Savaii: open "fern country" near Manase, altitude 100 meters, flower, fruit, September 18, 1929, Christophersen no. 673; sandy beach, Avau, flower, fruit, July 8, 1931, Christophersen and Hume no. 1933; rocky coast, Falealupo-Fangalele, flower, November 22, 1931, Christophersen no. 3336.

This pantropic parasite is common in open places in the lowlands of Savaii and Upolu.

## FAMILY 36. HERNANDIACEAE

## I. GYROCARPUS Jacquin

*Gyrocarpus americanus* Jacquin: Stirp. Am., p. 282, pl. 178, 1763.

Ofu: Nu'u Islet, flower, fruit, July 4, 1925, Garber no. 1108.

2. *HERNANDIA* Plumier

? *Hernandia Moerenhoutiana* Guillemin: Ann. Sci. Nat., 2d ser., vol. 7, p. 189, 1837.

Tutuila: Matafao Ridge, altitude 500-600 meters, fruit, November 3, 1929, Christophersen no. 1058. Upolu: forest above Malololelei, altitude 750 meters, flower, fruit, August 15, 1929, Christophersen no. 255. Savaii: forest above Salailua, altitude 1200-1300 meters, flower, fruit, September 23, 1931, Christophersen no. 2667. Native name, *pipi* (nos. 255, 2667).

The leaves are elliptic or obovate broadly acute or obtuse with a cuneate or slightly rounded base, the blades are on an average 11 cm. long and 5 cm. broad, the largest blade being 13 cm. long and 7.7 cm. broad. The bracts are densely tomentose, the five stamens have each one gland at the base, the style has five glands at the base, and the ripe fruit is about 2 cm. long and 1.5 cm. broad. According to the original description *H. Moerenhoutiana* has ovate-oblong leaves and glabrous bracts. According to the interpretation of Drake del Castillo (15, p. 169) this species has slightly peltate leaves.

The insufficient and partly contradictory descriptions make an examination of the type necessary in order to determine the exact relation of the Samoan plants to the Tahitian *H. Moerenhoutiana*. The specimens come close to *H. samoensis* Hochreutiner but differ in their much larger leaves. The fruit of this species is not known.

*Hernandia ovigera* Linnaeus: in Stickm. Herb. Amb., p. 14, 1754.

*Hernandia peltata* Meisner.

Tau: Amouli beach trail, flower, fruit, January 7, 1922, Garber no. 676. Tutuila: beach, Nuuuli, flower, fruit, January 3, 1925, Garber no. 961. Upolu: beach near Apia, flower, fruit, February 16, 1921, Eames no. 32; shore, Lepa-Lalumanu, flower, fruit, October 23, 1929, Christophersen no. 968. Savaii: Fangamalo, September 16, 1929, Christophersen (by native) no. 663; rocky beach, Lelepa, flower, fruit, July 8, 1931, Christophersen and Hume no. 1940; sandy beach, Salailua-Lata-itai, flower, fruit, September 18, 1931, Christophersen no. 2636. Native name, *pu'a* (nos. 676, 961, 32, 663, 2636).

This widely distributed coastal tree is common along the shores.

***Hernandia* species.**

Savaii: forest above Matavanu Crater, altitude 1550 meters, flower, fruit, July 29, 1931, Christophersen and Hume no. 2202.

A tree 10 meters high with broader leaves and larger fruits than in the specimens referred with doubt to *H. Moerenhoutiana*. The leaves are oval or obovate broadly acute or rounded at base, 6 by 3.8-8 by 6.8-12.5 by 7.5 cm. long and broad. The mature fruits are 2.8 cm. long and 2.5 cm. broad with a red cupule.

**Hernandia** species.

Tutuila: scrub forest, top of Le Pioa, altitude 500 meters, January 2, 1932, Christophersen no. 3523. Savaii: forest above Patamea, altitude 200-300 meters, October 1, 1929, Christophersen no. 872.

These sterile specimens have leaves totally different from any of the other Samoan specimens of *Hernandia*. The leaves are ovate, attenuately acuminate, rounded or obtuse at base, with wavy margin, 14.5-25 cm. long and 5-12 cm. broad, petioles 3-10 cm. long.

## FAMILY 37. CRUCIFERAE

## I. NASTURTIUM R. Brown

**Nasturtium sarmentosum** (Solander) O. E. Schulz: Engl. Bot. Jahrb., vol. 32, p. 595, 1902.

Tau: on beach, Faleasao-Fanga trail, flower, fruit, April 19, 1922, Garber no. 762. Olosenga: taro patch, back of Olosenga village, flower, fruit, June 23, 1925, Garber no. 1089. Savaii: river bed above Patamea, altitude 150 meters, flower, fruit, October 1, 1929, Christophersen no. 870; waste place, Lata-iuta, altitude 50 meters, flower, fruit, September 12, 1931, Christophersen no. 2583.

## FAMILY 38. CAPPARIDACEAE

## I. POLANISIA Rafinesque

**Polanisia icosandra** (Linnaeus) Wight et Arnott: Prodr., p. 22, 1834.

Upolu: pastures, Apia, flower, fruit, September 15, 1923, Wilder no. 6.

## 2. CRATAEVA Linnaeus

**Crataeva religiosa** Forster: Prodr., p. 35, 1786.

Ofu: exposed coast near Mafafa, altitude 40 meters, flower, May 26, 1925, Garber no. 983.

The specimen was taken from a large tree about 12 meters high.

## 3. CAPPARIS Tournefort

**Capparis sandwichiana** De Candolle: Prodr., vol. 1, p. 245, 1824.

Savaii: no locality, bud, September 1931, Christophersen (by E. Stehlin) no. 2662; rocks at the shore, Falealupo, flower, September 29, 1931, Christophersen no. 2782; rocky coast, Falealupo-Fangalele, flower, November 22, 1931, Christophersen no. 3342.



The Samoan specimens have been compared with a great number of specimens of this species from Hawaii showing a close agreement. They differ, however, in the fewer primary veins, usually 5-6 in the Samoan specimens and about 8 in the Hawaiian specimens. The stamens are purple, petals pure white turning pink when fading.

This species has as yet only been observed in Savaii, where it is rare on rocky shores.

#### FAMILY 39. CRASSULACEAE

##### I. BRYOPHYLLUM Salisbury

**Bryophyllum pinnatum** (Lamarck) Kurz: Jour. As. Soc. Beng., vol. 40, 2, p. 309, 1876.

Upolu: cow paddock at Malololelei, altitude 550 meters, flower, August 25, 1929, Christophersen no. 424.

In cultivation, not common as an escape.

#### FAMILY 40. PITTOSPORACEAE

##### I. PITTOSPORUM Banks

**Pittosporum samoense**, species nova (fig. 12).

Arbor 15 m. alta. Ramuli teretes lenticellati novelli fulvo-villosi. Folia alterna vel subverticillata petiolata, laminis ellipticis subtus nervis fulvo-pubescentibus exceptis glabris supra glabris nitidis apice acuto vel breviter acuminato basi attenuata margine integro vel minutissime crenato leviter revoluta nervis primariis utrinque circiter 10 subtus leviter prominentibus 6-12 cm. longis 2-4.2 cm. latis, petiolis villosis 10-22 mm. longis. Inflorescentia axillaris cymosa fulvo-villosa. Pedunculus fructifer 20-28 mm. longus pedicellis circiter 10 mm. longis. Fructus immaturus basi villosa maturus glaber rugosus oblongo-ovoides apiculatus ad 21 mm. longus 18 mm. latus. Semina angulato-lenticulares 5-6 mm. diametro.

Differt a *P. Richii* A. Gray foliis nitidis ramulis novellis inflorescentiisque villosis fructibus ovoideis seminibus angulo-lenticularibus.

Tree 15 m. high. Branches terete, lenticellate, young branches yellowish villose. Leaves alternate or subverticillate, petiolate; blades elliptical, glabrous below except the yellowish pubescent veins, glabrous above, shining, acute or shortly acuminate, attenuate at base, 6-12 cm. long, 2-4.2 cm. broad, margin entire or minutely crenate, slightly revolute, primary veins about 10 on each side of midrib, slightly prominent below; petioles villose, 10-22 mm. long. Inflorescence axillary, cymose, yellowish villose. Fruiting peduncle 20-28 mm. long, pedicels about 10 mm. long. Immature fruit with villose base; mature fruit glabrous, rugose, oblong-ovoid, apiculate, to 21 mm. long, 18 mm. broad. Seeds angular-lenticular, 5-6 mm. in diameter.

Savaii: forest above Salailua, altitude 1420 meters, fruit, November 6, 1931, Christophersen no. 3087, type in B. P. Bishop Museum.

The genus *Pittosporum* is here for the first time recorded for Samoa. The species comes close to some of the Fijian species, notably *P. Richii* A. Gray

from which it differs in its shiny leaves, villose young branches and inflorescences, ovoid fruits, and angular, lenticular seeds. It differs from *P. Brackenridgei* A. Gray and *P. Pickeringii* A. Gray among other things in its axillary inflorescences. From *P. rhytidocarpum* A. Gray it differs in its rugose, not prominently warty capsules.

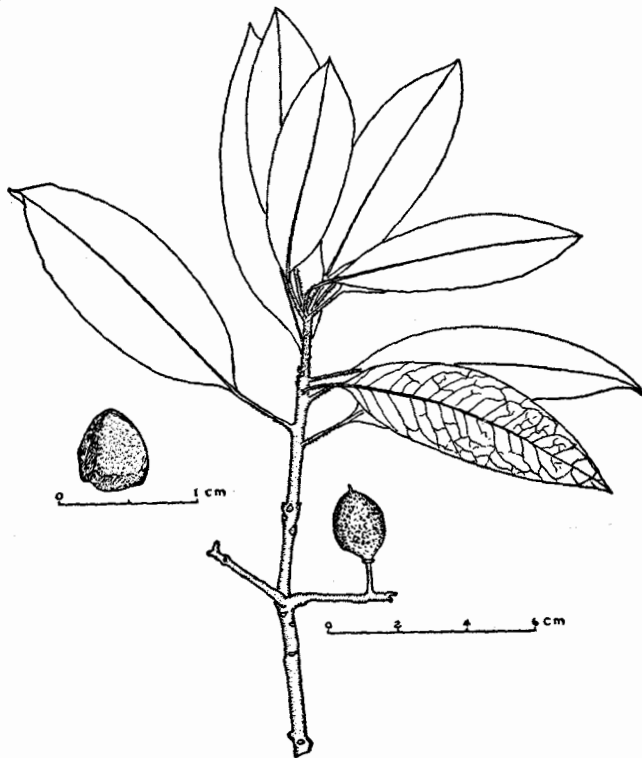


FIGURE 12.—Fruiting branch and seed, *Pittosporum samoense*.

A medium-large tree observed only in one locality on Savaii at high altitude. In this locality it was abundant.

#### FAMILY 41. CUNONIACEAE

##### I. SPIRAEANTHEMUM A. Gray

*Spiraeanthemum samoense* A. Gray: Bot., Phanerog., U. S. Expl. Exped., vol. 15, pt. 1, p. 667, pl. 83-A, 1854.

Tutuila: Matafao Ridge, altitude 500-600 meters, fruit, November 3, 1929,

Christophersen nos. 1048 and 1067; scrub forest, top of Le Pioa, altitude 500 meters, flower, fruit, January 2, 1932, Christophersen nos. 3506 and 3576. Upolu: forest, Malololelei-Lanutoo trail, altitude 700 meters, flower, fruit, August 21-22, 1929, Christophersen nos. 373 and 399. Savaii: forest above Letui, altitude 1600-1700 meters, September 26, 1929, Christophersen no. 780; forest above Safotu-Letui, altitude 1600 meters, fruit, September 24, 1929, Christophersen no. 819; forest above Matavanu Crater, altitude 900 meters, flower, July 14-15, 1931, Christophersen and Hume nos. 1992 and 2069; forest above Matavanu Crater, altitude 1300 meters, flower, July 24, 1931, Christophersen and Hume no. 2131.

A common tree in the forests at middle and high elevations, growing 4-8 meters high.

#### FAMILY 42. ROSACEAE

##### I. PARINARIUM Aublet

**Parinarium glaberrimum** Hasskarl: Flora, vol. 27, p. 583, 1844.

*Parinarium laurinum* A. Gray.

Tutuila: back of Pago Pago, altitude 30 meters, fruit, December 26, 1924, Garber no. 892. Upolu: cultivated, Apia, July 24, 1925, Wilder no. 402; near Apia, flower, fruit, August 20, 1929, Christophersen (by native) no. 344. Savaii: coconut plantation, Safune, fruit, August 13, 1931, Christophersen and Hume no. 2442; open ground above Sili, altitude 100 meters, flower, November 11, 1931, Christophersen no. 3242. Native name, *ifi ifi* (nos. 892, 402, 344, 2442, 3242).

A small tree in open places and forests of the lowlands. The fruits are used for scenting coconut oil.

Above Sili on Savaii, at an altitude of 300 meters, plants were collected differing in leaf form from the other Samoan specimens (Christophersen no. 3272). The leaves are narrowly elliptic or oblong, long acuminate with acute or subrotundate base, 20-28 cm. long, 4.5-6.5 cm. wide. The fruits are identical in structure with those of *P. glaberrimum*, to 6.5 by 6 by 5 cm. long, wide, and thick, the shell 6-7 mm. thick.

**Parinarium insularum** A. Gray: Bot., Phanerog., U. S. Expl. Exped., vol. 15, pt. 1, p. 488, pl. 54, 1854.

Upolu: cultivated, Apia, fruit, August 1, 1925, Wilder no. 404; Vaialele, fruit, August 20, 1929, Christophersen (by native) no. 351. Native name, *sea* (no. 351).

## FAMILY 43. LEGUMINOSAE

## I. ACACIA Willdenow

**Acacia simplicifolia** (Linnaeus f.) Druce: Rep. Bot. Exch. Cl. Brit. Isles, 1916, p. 602, 1917.

*Acacia laurifolia* Willdenow.

Savaii: beach near Falelima, October 9, 1929, Christophersen no. 939; sandy beach, Avau, flower, fruit, July 8, 1931, Christophersen and Hume no. 1931; beach Safotu-Manase, flower, August 20, 1931, Christophersen and Hume no. 2460; sandy shore, near Falealupo, flower, September 30, 1931, Christophersen no. 2774. Native name, *tatania* (nos. 939, 1931, 2774).

This shrub grows in scattered places on the sandy beaches of Savaii. The seeds are said to be used for necklaces ('*ula*).

## 2. ADENANTHERA Royen

**Adenanthera pavonina** Linnaeus: Sp. Pl., p. 384, 1753.

Tutuila: Pago Pago harbor, fruit, 1929, Diefenderfer no. 17. Upolu: cultivated, Apia, fruit, February 27, 1921, Eames no. 75; Vailele, altitude 100 meters, flower, March 5, 1921, Eames no. 157. Savaii: forest, Lealetele, altitude 25 meters, August 22, 1931, Christophersen no. 2471. Native name, *lopa* (nos. 75, 157, 2471).

A common tree in the lowland forests. The seeds are used for necklaces ('*ula*).

## 3. ENTADA Adanson

**Entada phaseoloides** (Linnaeus) Merrill: Philipp. Jour. Sci., Bot., vol. 9, p. 86, 1914.

*Entada scandens* Benth.

Savaii: above Tanga, altitude 50 meters, November 14, 1931, Christophersen no. 3139.

## 4. INTSIA Thouars

**Intsia bijuga** (Colebrooke) O. Kuntze: Rev. Gen. Pl., p. 192, 1891.

*Afzelia bijuga* A. Gray.

Savaii: coastal bluff near Manase, bud, fruit, July 16, 1931, Christophersen and Hume no. 2004. Native name, *ifilele* (no. 2004).

A tree not very common in the coastal forests, abundant in a few places. The wood is highly esteemed by the Samoans, being the principal wood for kava bowls (*tanoa*).

## 5. CASSIA Tournefort

**Cassia alata** Linnaeus: Sp. Pl., p. 378, 1753.

Upolu: open forest near Apia, March 2, 1921, Eames no. 208. Savaii, cultivated, Fangamalo, September 16, 1929, Christophersen (by native) no. 668; cultivated, Ngangamalae, flower, fruit, November 4, 1931, Christophersen no. 3045. Native name, *fai lafa* or *la'au fai lafa* (nos. 208, 668, 3045).

This cultivated plant is occasionally found as an escape. It is used in native medicine as a cure for ringworm (*lafa*). The leaves are crushed and applied on the skin.

**Cassia mimosoides** Linnaeus: Sp. Pl., p. 379, 1753.

Upolu: Moa Moa plantations, altitude 200 meters, flower, fruit, March 2, 1921, Eames no. 151.

**Cassia occidentalis** Linnaeus: Sp. Pl., p. 377, 1753.

Upolu: waste ground, Apia, flower, fruit, February 18, 1921, Eames no. 46. Savaii: waste ground, Lelepa, flower, fruit, July 8, 1931, Christophersen and Hume no. 1924; rocky bluff, Safotu-Manase, flower, fruit, August 20, 1931, Christophersen and Hume no. 2455.

Common along roadsides and in waste places in and around the villages.

**Cassia tora** Linnaeus: Sp. Pl., p. 376, 1753.

Upolu: waste ground, Apia, flower, fruit, February 27, 1921, Eames no. 86; roadside, Apia, flower, fruit, August 27, 1929, Christophersen no. 434. Savaii: coconut plantation, near Sataua, flower, fruit, November 21, 1931, Christophersen no. 3346.

A weed in plantations and waste places.

In Moa Moa plantations near Apia Eames collected a *Cassia* probably escaped from cultivation. It may be referable to *C. javanica* Linnaeus.

The royal poinciana, *Delonix regia* (Bojer) Rafinesque, is cultivated in a few places (Aunuu, Diefenderfer no. 1231; Upolu, Eames no. 126).

## 6. CAESALPINIA Linnaeus

**Caesalpinia jayabo** Maza: Anal. Soc. Esp. Hist. Nat., vol. 19, p. 234, 1890.

Ofu: at Aofa, altitude 275 meters, September 3, 1925, Garber no. 1115. Savaii: forest, Falealupo, altitude 25 meters, September 29, 1931, Christophersen no. 2804; open plantation ground, Lata-itai, bud, October 31, 1931, Christophersen no. 3017. Native names, *anaoso* (no. 1115), *anaoso vao* (nos. 2804, 3017).

Common in the lowlands and at middle elevations. More common than the nearly related *C. crista* Linnaeus. The Samoans use the spiny branches

in catching the large fruit bat (*pe'a*). The seeds are used as marbles by the children.

*Caesalpinia pulcherrima* (Linnaeus) Swartz is cultivated for ornament by the Samoans (Ofu, Garber no. 1087; Savaii, Christophersen no. 3032). The native name is *lau pa*.

#### 7. SOPHORA Linnaeus

**Sophora tomentosa** Linnaeus: Sp. Pl., p. 373, 1753.

Ofu: beach at Muliulu, fruit, May 26, 1925, Garber no. 985. Upolu: sandy beach, Poutasi-Salani, flower, October 23, 1929, Christophersen no. 974.

A widely distributed shore shrub, not common in Samoa.

#### 8. CROTALARIA Linnaeus

**Crotalaria saltiana** Andrews: Bot. Rep., pl. 648, 1811.

Upolu: beach, Apia, flower, fruit, August 29, 1929, Christophersen no. 468.

**Crotalaria verrucosa** Linnaeus: Sp. Pl., p. 718, 1753.

Savaii: lava field near Saleaula, flower, September 20, 1929, Christophersen no. 706; waste ground, Safotu-Safune, flower, fruit, August 13, 1931, Christophersen and Hume no. 2375; lava field near Saleaula, flower, fruit, August 21, 1931, Christophersen and Hume no. 2466.

#### 9. INDIGOFERA Linnaeus

**Indigofera suffruticosa** Miller: Gard. Dict., 8th ed., no. 2, 1768.

Tau: plateau back of Luma, altitude 60 meters, flower, fruit, August 2, 1921, Garber no. 550. Tutuila: open place, Pago Pago, altitude 40 meters, flower, September 25, 1923, Wilder no. 49. Upolu: thicket, near Apia, flower, fruit, February 16, 1921, Eames no. 36; beach, Apia, flower, fruit, August 29, 1929, Christophersen no. 467. Savaii: roadside, Aopo-Sassina, flower, fruit, August 27, 1931, Christophersen (by E. Stehlin) no. 2542.

The indigo is common along roadsides and in waste places.

#### 10. TEPHROSIA Persoon

**Tephrosia piscatoria** Persoon: Syn. Pl., vol. 2, p. 329, 1807.

Ofu: Aloafao, flower, fruit, June 4, 1925, Garber no. 988. Tutuila: plantation near Aunuu village, Aunuu Island, fruit, November 12, 1929, Diefenderfer no. 1236. Savaii: lava, Letui-Aopo, altitude 200 meters, flower, fruit, May 15, 1924, Bryan no. 145; lava cracks near Saleaula, flower, fruit, September 20, 1929, Christophersen no. 707; Safotu village, flower, fruit, August 13, 1931, Christophersen and Hume no. 2374; lava field near Saleaula, flower,

fruit, August 21, 1931, Christophersen and Hume no. 2468; open scrub, Aopo-Asau, altitude 200 meters, flower, fruit, December 6, 1931, Christophersen no. 3426. Native name, 'avasa (nos. 988, 707, 2374, 3426).

A shrub common in villages, open places, recent lava fields, etc. It is used by the Samoans for its poisonous properties in stupefying fish.

## II. DESMODIUM Desvaux

**Desmodium heterocarpum** (Linnaeus) De Candolle: Prodr., vol. 2, p. 337, 1825.

Tau: Sani Ridge back of Fitiuta, altitude 150 meters, flower, fruit, August 9, 1921, Garber no. 603; Amouli trail, altitude 175 meters, flower, fruit, September 16, 1921, Garber no. 634; plateau back of Luma, altitude 100 meters, flower, fruit, December 15, 1921, Garber no. 645a. Ofu: back of Ofu village, altitude 40 meters, flower, fruit, May 25, 1925, Garber no. 979. Tutuila: edge of forest, Amaluia, flower, September 5, 1923, Wilder no. 13. Savaii: open "fern country" near Manase, altitude 100 meters, flower, September 18, 1929, Christophersen no. 696; open "fern country" near Manase, altitude 100 meters, flower, fruit, August 13, 1931, Christophersen and Hume no. 2382; coconut plantation, Salailua, flower, fruit, October 16, 1931, Christophersen no. 2854.

A common lowland weed along roadsides, in open places and waste ground.

**Desmodium triflorum** (Linnaeus) De Candolle: Prodr., vol. 2, p. 334, 1825.

Tutuila: dry place, Pago Pago, flower, fruit, February 7, 1921, Eames no. T2; Goat Island, flower, fruit, November 27, 1924, Garber no. 799; in lawn, Goat Island, fruit, December 27, 1924, Garber no. 945. Upolu: roadside, Apia, February 27, 1921, Eames no. 83; beach, Matautu, flower, August 30, 1929, Christophersen no. 479. Savaii: sandy beach, Avau, flower, fruit, July 8, 1931, Christophersen and Hume no. 1932.

Common in grassy places and on the beaches.

**Desmodium umbellatum** (Linnaeus) De Candolle: Prodr., vol. 2, p. 325, 1825.

Tau: Luma-Faleasao trail, fruit, January 8, 1922, Garber no. 692. Tutuila: sandy shore, Pago Pago harbor, flower, fruit, September 18, 1923, Wilder no. 24; Goat Island, flower, fruit, December 15, 1924, Garber no. 820. Upolu: Apia, flower, fruit, July 16, 1925, Wilder no. 429; beach, Apia, flower, fruit, August 29, 1929, Christophersen no. 469. Savaii: lava, Letui-Aopo, altitude 100 meters, flower, fruit, May 15, 1924, Bryan no. 143; beach, Fangamalo, flower, fruit, July 4, 1931, Christophersen and Hume no. 1857. Native name, *lau lala* or *lala* (no. 820).

A shrub common on the beach, rare inland.

## 12. URARIA Desvaux

**Uraria lagopodioides** (Linnaeus) Desvaux: Mem. Soc. Linn. Paris, vol. 4, p. 309, 1826.

Tau: plateau back of Luma, altitude 100 meters, fruit, December 15, 1921, Garber no. 645b. Tutuila: roadside, Amaluia, flower, September 5, 1923, Wilder no. 11. Savaii: open "fern country," Vaipouli-Manase, altitude 100 meters, flower, fruit, September 21, 1929, Christophersen no. 724; roadside near Tufutafoe, flower, November 22, 1931, Christophersen no. 3311.

A low shrub along roadsides and in grassy places in the lowlands.

## 13. DERRIS Loureiro

**Derris trifoliata** Loureiro: Fl. Cochinch., p. 433, 1790.

Tutuila: at mud lake, Aunuu Island, November 12, 1929, Diefenderfer no. 1251. Savaii: roadside, Falelima, flower, October 9, 1929, Christophersen no. 933; Foailunga, flower, November 4, 1931, Christophersen (by native) no. 3040; coastal forest, Tanga, December 16, 1931, Christophersen (by native) no. 3600. Native name, *fue 'o'ona* (no. 3600) meaning "poisonous vine."

This widely distributed vine is not common in Samoa. It grows along the shore in scattered places. The stems are used by the Samoans for their poisonous properties in stupefying fish.

In Iva on Savaii I collected a cultivated vine (Christophersen no. 2480) said to be used for poisoning fish. The specimens are sterile. They may possibly belong to *Derris elliptica* (Roxburgh) Bentham brought to Samoa by native missionaries returning from New Guinea. Native name, *fue fai 'ava* (a vine of which is made kava—for the fish).

## 14. INOCARPUS Forster

**Inocarpus edulis** Forster: Char. Gen., p. 66, pl. 33, 1776.

Tau: Luma, fruit, December 15, 1921, Garber no. 661. Tutuila: Pago Pago village, fruit, December 26, 1924, Christophersen no. 893; at mud lake, Aunuu Island, November 12, 1929, Diefenderfer no. 1246. Upolu: forest, Moa Moa plantations, altitude 200 meters, flower, March 2, 1921, Eames no. 194; Apia, flower, September 1923, Wilder no. 76; Vailele, August 20, 1929, Christophersen (by native) no. 347. Savaii: forest, Papa-Fangalele, altitude 25 meters, fruit, November 21, 1931, Christophersen no. 3410. Native name, *ifi* (nos. 661, 893, 1246, 76, 347, 3410).

The *ifi* or "Tahitian chestnut" is a large tree common in the lowland forests. The wood is much esteemed for firewood, and the roasted nuts are highly relished by the Samoans.



## 15. ABRUS Linnaeus

**Abrus precatorius** Linnaeus: Syst., 12th ed., p. 472, 1767.

Ofu: Nuu Islet, fruit, July 4, 1925, Garber no. 1111. Tutuila: coastal scrub, flower, September 19, 1923, Wilder no. 18. Savaii: coastal scrub forest, Fangalele-Falealupo, November 21, 1931, Christophersen no. 3389.

Not uncommon in the lowland forests.

## 16. ERYTHRINA Linnaeus

**Erythrina variegata** Linnaeus varietas **orientalis** (Linnaeus) Merrill: Interpret. Herb. Amb., p. 276, 1917.

*Erythrina indica* Lamarck.

Tau: plateau back of Luma, altitude 100-125 meters, flower, August 4, 1921, Garber no. 581. Ofu: at water's edge, Toanga, bud, fruit, June 23, 1925, Garber no. 1094. Upolu: seashore, Apia, February 18, 1921, Eames no. 52. Native name, *ngatae* (nos. 581, 1094, 52). The flowers are called *alo alo* ('alo 'alo).

A common tree in the lowland forests especially along the coast. The seeds are used for necklaces ('*ula*). When the fruits are ripe the *iamanu* ('*iamanu*, whale) is running and the yams (*ufi*) are in season (Garber in field notebook). The leaves and bark are used in medicine (Eames on field label).

**Erythrina fusca** Loureiro: Fl. Cochinch., p. 427, 1790.

*Erythrina ovalifolia* Roxburgh.

Tutuila: swampy place near Leone, altitude 10-20 meters, fruit, November 4, 1929, Christophersen no. 1035. Upolu: swampy place near Apia, September 13, 1923, Wilder no. 8. Native name, *lalapa* (no. 1035).

A medium-sized tree in swampy ground in the lowlands.

## 17. STRONGYLODON Vogel

**Strongylodon lucidus** (Forster) Seemann: Fl. Vit., p. 61, 1865.

Upolu: forest below Malololelei, altitude 500 meters, fruit, August 19, 1929, Christophersen (by native) no. 343. Savaii: forest above Salailua, altitude 1200 meters, flower, September 23, 1931, Christophersen no. 2691; forest, Siuvao-Auala, altitude 600 meters, flower, November 20, 1931, Christophersen no. 3361.

This species was first collected in the Society Islands and is now, by various authors, accredited with a wide distribution from Ceylon to Hawaii. I have seen other specimens from the Hawaiian islands only, from which the Samoan specimens differ in their pink, larger flowers, 5.5 cm. long, and relatively broader pods, 8-8.5 cm. long, 5.7-5.8 cm. broad. The seeds are sub-

globose, slightly flattened laterally, black or dark purple with a prominent raphe, 2.3 by 2 by 1.8 cm.

This vine is common, at least in Savaii, where it climbs high in the forest trees at medium and high elevations.

#### 18. MUCUNA Adanson

**Mucuna gigantea** (Willdenow) De Candolle: Prodr., vol. 2, p. 405, 1825.

Ofu: at the shore, Tua, flower, fruit, June 5, 1925, Garber no. 1002. Upolu: edge of mangrove swamp, Matautu, flower, fruit, August 30, 1929, Christophersen no. 475.

A widely distributed coastal species.

In the collections are sterile specimens of two inland vines apparently belonging to this genus. One has long-acuminate, hirsute leaves turning black on drying and is the *fue vai* (water vine) of the natives, so called because the ample sap furnishes a good thirst quencher, running freely from the cut stems (Savaii, altitude 200-800 meters, Christophersen nos. 832, 1896, 2907). The other form has glabrous leaves, remaining essentially green on drying (Savaii, altitude 400-1200 meters, Christophersen nos. 581, 2665).

#### 19. PUERARIA De Candolle

?**Pueraria Harmsii** Rechinger: Denkschr. Akad. Wiss. Wien, vol. 85, p. 292, 1910.

Savaii: on lava, edge of forest near Samalaeulu, altitude 50 meters, October 4, 1929, Christophersen no. 862; open "fern country" near Manase, altitude 100 meters, August 13, 1931, Christophersen and Hume no. 2384.

These sterile specimens probably belong to *P. Harmsii*. Specimen no. 862 is identical with a specimen under this name collected by Rechinger in Savaii (K. and L. Rechinger no. 1932, in Vienna herbarium). However, the leaves of these specimens are smaller than stated in the original description, not exceeding a length of 10 cm.

**Pueraria Thunbergiana** (Siebold et Zuccarini) Bentham: Jour. Linn. Soc. Bot., vol. 9, p. 122, 1865.

Tau: plateau back of Luma, altitude 125 meters, flower, December 15, 1921, Garber no. 651. Tutuila: above Aua, flower, December 17, 1924, Garber no. 849.

This widely distributed vine is rare in Samoa.

#### 20. CANAVALIA De Candolle

**Canavalia rosea** (Swartz) De Candolle: Prodr., vol. 2, p. 404, 1825.

Tau: sandy beach, Fanga-Faleasao, flower, April 19, 1922, Garber no. 763. Ofu: plantation, flower, June 5, 1925, Garber no. 1000; beach, Aloafao,

fruit, July 5, 1925, Garber no. 1114. Savaii: sandy beach, near Asau, flower, October 8, 1929, Christophersen no. 938; fruit, September 1931, Christophersen (by E. Stehlin) no. 2659; rocky coast, Falealupo-Fangelele, flower, November 21-22, 1931, Christophersen nos. 3344 and 3390. Native names, *vaa*, (*va'a*) (nos. 1000, 1114), *fue fue fai vaa* (no. 938).

A common vine on sandy and rocky beaches.

## 21. PHASEOLUS Tournefort

*Phaseolus adenanthus* G. F. W. Meyer: Prim. Fl. Esseq., p. 239, 1818.

Savaii: abandoned plantation back of Vaipouli, altitude 100 meters, flower, fruit, July 6, 1931, Christophersen and Hume no. 1890; lava field near Saleaula, flower, August 21, 1931, Christophersen and Hume no. 2461.

## 22. VIGNA Savi

*Vigna marina* (Burm.) Merrill: Interpret. Herb. Amb., p. 285, 1917.

Tau: sandy beach, Fangamalo, flower, January 7, 1922, Garber no. 684; Faleasao-Fitiuta trail, altitude 20 meters, fruit, January 8, 1922, Garber no. 700. Ofu: beach, Aloafao, fruit, July 5, 1925, Garber no. 1113. Tutuila: seashore, Pago Pago, flower, September 21, 1923, Wilder no. 28; edge of tidal swamp, Nuuuli, flower, January 3, 1925, Garber no. 954. Upolu: beach, Apia, flower, fruit, August, 27, 1929, Christophersen no. 430. Savaii: sandy beach, Salailua, flower, October 3, 1931, Christophersen no. 2814.

A widely distributed vine common in Samoa on sandy beaches.

## FAMILY 44. OXALIDACEAE

### I. OXALIS Linnaeus

*Oxalis corniculata* Linnaeus varietas **repens** (Thunberg) Zuccarini: Abh. Akad. Muench., vol. 1, p. 230, 1829-30.

Olosenga: plantation above Olosengauta, altitude 350 meters, flower, fruit, June 17, 1925, Garber no. 1082. Tutuila: Goat Island, flower, December 15, 1924, Garber no. 819; Goat Island, December 27, 1924, fruit, Garber no. 946. Upolu: cow paddock near Malololelei, altitude 550 meters, flower, August 17, 1929, Christophersen no. 309. Savaii: rocky coast, Foailunga, flower, fruit, November 4, 1931, Christophersen no. 3042.

### 2. AVERRHOA Linnaeus

*Averrhoa carambola* Linnaeus: Sp. Pl., p. 428, 1753.

Upolu: thicket, Moa Moa plantations, altitude 200 meters, March 2, 1921, Eames no. 210; coconut plantation, Salani-Lepa, flower, October 23, 1929, Christophersen no. 969.

This introduced tree is cultivated and also found in seminatural state.

## FAMILY 45. RUTACEAE

## I. EUODIA Forster

**Euodia hortensis** Forster: Char. Gen. Pl., p. 14, pl. 7, 1776.

Tutuila: ridge to old radio station above Pago Pago, flower, December 26, 1924, Garber no. 931. Upolu: open place, Apia, fruit, March 2, 1921, Eames no. 153; forest Vailele, altitude 100 meters, flower, March 5, 1921, Eames no. 167; forest, Vaea, altitude 200 meters, flower, fruit, April 25, 1924, Bryan no. 98. Savaii: edge of forest, Manase plantation, altitude 100 meters, flower, fruit, September 18, 1929, Christophersen no. 674; forest, Manase, altitude 100 meters, flower, July 12, 1931, Christophersen no. 1979. Native name, *usi* (nos. 931, 153).

A shrub common in the lowlands in open places and plantations. It emits a strong, unpleasant odor. The leaves are used in native medicine.

**Euodia hortensis** Forster forma **simplicifolia** (Rechinger) K. Schumann: Engl. Bot. Jahrb., vol. 55, p. 232, 1918.

*Euodia hortensis* Forster varietas *simplicifolia* Rechinger: Denkschr. Akad. Wiss. Wien, vol. 85, p. 294, 1910.

Tutuila: cultivated, Pago Pago, flower, fruit, September 10, 1923, Wilder no. 83; cultivated, Nuuuili, flower, January 3, 1925, Garber no. 960. Savaii: Saipipi, flower, fruit, October 13, 1929, Christophersen (by native) no. 923; coconut plantation, Safune, flower, August 13, 1931, Christophersen and Hume no. 2434. Native name, *usi* (no. 2434).

## 2. ACRONYCHIA Forster

**Acronychia Boweriana**, species nova (fig. 13).

Arbor parva dioica. Ramuli teretes juniores pubescentes. Folia simplicia opposita, laminis anguste ellipticis vel oblanceolatis glabris pellucido-punctatis leviter acuminatis apice obtuso brevissime mucronato basi acuta margine integro vel leviter undulato nervis primariis utrinque circiter 15 prominentibus 8.5-17.5 cm. longis 2.8-6 cm. latis, petiolis glabris supra leviter sulcatis vel planis apice articulado 1-5 cm. longis. Inflorescentiae femineae axillares 2-4.5 cm. longae pubescentes. Pedicelli sulcati 2.5 mm. longi bracteis minutis. Calyx profunde lobatus sepalis 4 pubescentibus triangularibus acutis vel obtusis 0.75 mm. altis latisque. Petala 4 aestivatione valvata puberula oblonga acuta apice inflexo 2.5 mm. longa 1 mm. lata. Stamina 8 opposita breviora alterna calyce paullo longiora antheris cordatis. Stylus dilatatus 0.5 mm. longus. Stigma globosum 4-lobatum. Ovarium globosum puberulum. Capsula leviter 4-lobata complanato-globosa glabra 4-locularis ad 1 cm. lata. Semina in loculis singula oblique ellipsoidalia nigra lucida 4 mm. longa 3 mm. lata.

Inflorescentiae masculae ex exemplario 3082 axillares ad 6 cm. longae pubescentes. Calyx breviter lobatus sepalis 4 late triangularibus acutis vel obtusis pubescentibus. Petala 4 aestivatione valvata ovata acuta apice inflexo extus parce puberula 2.5 mm. alta 1.5 mm. lata. Stamina 8 opposita breviora alterna 2 mm. alta. Gynoecium redactum 1 mm. longum.

Differt a *A. albiflora* Rechanger foliis majoribus angustioribus stylo ovario brevioro ovario puberulo.

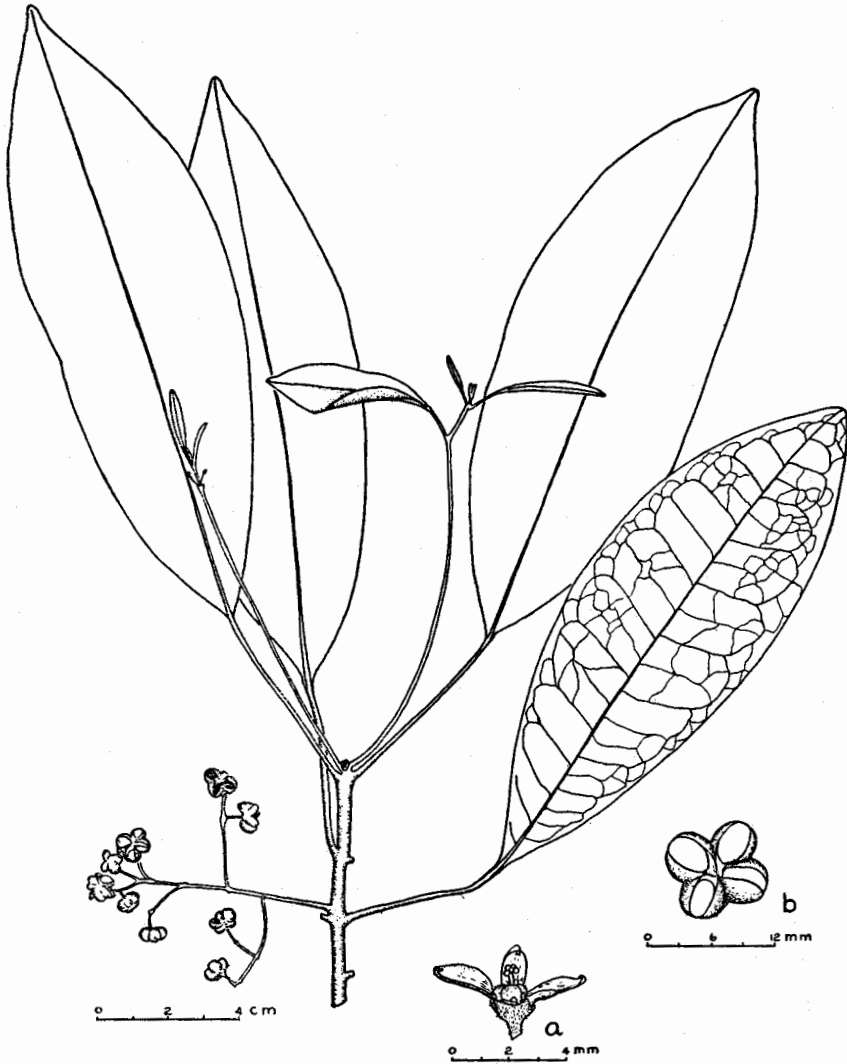


FIGURE 13.—Fruiting branch, *Acronychia Boweriana*: a, female flower; b, fruit.

Small dioecious tree. Branches terete, young branches pubescent. Leaves simple, opposite; blades narrowly elliptical or oblanceolate, glabrous, transparently punctate, slightly acuminate, obtuse, shortly mucronate, acute at base, 8.5-17.5 cm. long, 2.8-6 cm. broad, margin entire or slightly undulate, primary veins prominent, about 15 on each side of midrib; petioles glabrous, slightly grooved or plane above, 1.5 cm. long, apex articulate. Female inflorescence axillary, pubescent, 2-4.5 cm. long. Pedicels grooved,

2.5 mm. long, bracts minute. Calyx deeply lobed; sepals 4, pubescent, triangular, acute or obtuse, 0.75 mm. high and broad. Petals 4, valvate, puberulous, oblong, acute, 2.5 mm. long, 1 mm. broad, apex incurved. Stamens 8, opposite, shorter ones alternate, slightly longer than calyx, anthers cordate. Style dilated, 0.5 mm. long. Stigma globose, 4-lobed. Ovary globose, puberulous. Capsule shallowly 4-lobed, flattened globose, glabrous, 4-celled, to 1 cm. broad. Seeds single in each cell, obliquely ellipsoid, black, shining, 4 mm. long, 3 mm. broad.—Male inflorescence (from specimen no. 3082) axillary, to 6 cm. long, pubescent. Calyx shortly lobed, sepals 4, broadly triangular, acute or obtuse, pubescent. Petals 4, valvate, ovate, acute, outside sparsely puberulous, 2.5 mm. high, 1.5 mm. broad, apex incurved. Stamens 8, opposite, shorter ones alternate, 2 mm. high. Gynoecium rudimentary, 1 mm. long.—Differs from *A. albiflora* Reehinger in its larger and narrower leaves, style shorter than ovary, ovary puberulous.

Savaii: rim of crater, above Matavanu Crater, altitude 1000 meters, male flower, July 15, 1931, Christophersen and Hume no. 2016; forest above Matavanu Crater, altitude 1300 meters, flower, fruit, July 24, 1931, Christophersen and Hume no. 2152, type in B. P. Bishop Museum; forest above Salailua, altitude 1200-1300 meters, September 23, 1931, Christophersen nos. 2666 (bud, fruit) and 2668 (female flower); forest above Salailua, altitude 1450 meters, November 6, 1931, Christophersen nos. 3082 (male flower) and 3085 (female flower); scrub forest on rim of crater, Aopo-Ngangamalae, altitude 1500 meters, male flower, December 7, 1931, Christophersen no. 3451.

This species is named in honor of my friend and interested companion on many camping trips in the mountain forests of Savaii, Jack Bower, District Officer at Faiaai. It is a small tree growing to 8 meters high, common in the forests of Savaii at high altitudes.

***Acronychia heterophylla*** A. Gray: Bot., Phanerog., U. S. Expl. Exped., vol. 15, pt. 1, p. 333, pl. 32, 1854.

Tutuila: forest above Pago Pago, altitude 100 meters, bud, young fruit, September 21, 1923, Wilder no. 34; ridge to old wireless station, above Pago Pago, young fruit, December 26, 1924, Garber no. 909; forest, Alava Ridge, altitude 400 meters, fruit, November 7, 1929, Christophersen no. 1137.

The specimens agree with the original description and illustration. This is no doubt an *Acronychia* with its united carpels and trifoliate leaves in part. A small tree.

***Acronychia retusa*** A. Gray: Bot., Phanerog., U. S. Expl. Exped., vol. 15, pt. 1, p. 338, pl. 34, 1854.

*Melicope Vaupelii* Lauterbach: Engl. Bot. Jahrb., vol. 41, p. 227, 1908.

Savaii: coconut plantation, Safune, bud, fruit, August 13, 1931, Christophersen and Hume no. 2437; forest on coastal bluff, Sataua-Papa, bud, fruit, November 21, 1931, Christophersen no. 3414.

I have examined a cotype specimen of *Melicope Vaupelii* Lauterbach (F. Vaupel no. 67, in B. P. Bishop Museum) which agrees with the original description and illustration of *Acronychia retusa* A. Gray. The leaves may

be retuse or obtusely acute. The petals are valvate to the base and the fruit is shallowly lobed with united carpels, which characters place this species in *Acronychia* rather than *Melicope*.

A shrub of the coastal regions.

***Acronychia Richii*** A. Gray: Bot., Phanerog., U. S. Expel. Exped., vol. 15, pt. 1, p. 336, pl. 33 B, 1854.

Tutuila: Matafao Ridge, altitude 500-600 meters, November 3, 1929, Christophersen nos. 1052 (bud, fruit) and 1066 (male flower); scrub forest, top of Le Pioa, altitude 500 meters, January 2, 1932, Christophersen nos. 3532 (female flower, young fruit) and 3556 (male flower). Savaii: forest above Safotu-Letui, altitude 1600-1700 meters, September 25, 1929, Christophersen nos. 784 (bud) and 812 (male flower); forest above Matavanu Crater, altitude 1500 meters, fruit, July 30, 1931, Christophersen no. 2257.

The specimens from Tutuila agree closely with the original description and illustration of *A. Richii* A. Gray, except for the oblanceolate, rather than oblong-lanceolate to oblong leaves. The specimens from Savaii have elliptic leaves or some with the broadest part slightly above the middle. Articulation of the petiole is seen only in some of the young leaves of the specimens from Tutuila, but is seen also in the mature leaves of the specimens from Savaii. It is in no plant very distinct. The fruits of the specimens from Savaii are larger than those of the type, to 7 mm. broad before opening.

#### ***Acronychia* species.**

*Melicope tahitensis* Nadeaud varietas *glabra* Lauterbach: Engl. Bot. Jahrb., vol. 41, p. 227, 1908.

Savaii: forest above Matavanu Crater, altitude 900 meters, July 14-15, 1931, Christophersen and Hume nos. 1988 (fruit) and 2091 (bud); forest above Matavanu Crater, altitude 1300 meters, flower, July 24, 1931, Christophersen and Hume nos. 2162, 2175; forest above Salailua, altitude 1200-1300 meters, bud, fruit, September 23, 1931, Christophersen no. 2673; low forest on rim of Papafu Crater, altitude 1500 meters, bud, September 22, 1931, Christophersen no. 2724.

These specimens are apparently conspecific, varying slightly in size of leaflets. The petals are distinctly valvate to the base, and the fruit is lobed with united carpels, placing the species in *Acronychia*. The leaves are unifoliate or trifoliate. Specimen no. 2673 is identical with the type of *Melicope tahitensis* Nadeaud variety *glabra* Lauterbach as far as it can be judged by a photograph. Two specimens with the same number (F. Vaupel no. 343) but with different dates and localities are mounted in the Berlin herbarium. The specimen from Maugaloa, altitude 1200 meters, June 30, 1906, is the one cited under the original description and is the type. I have not seen authentic specimens of *Melicope tahitensis*.

Another specimen (Christophersen and Hume no. 2172) also collected at high altitude in Savaii (1300 meters) may be a large-leaved form of this species.

**Acronychia** (?) species.

Upolu: forest near Malololelei, altitude 550 meters, female flower, August 17, 1929, Christophersen no. 329; edge of forest, Lanutoo, altitude 700 meters, male flower, August 21-22, 1929, Christophersen no. 392.

A tree with large, trifoliolate (or unifoliolate) leaves and valvate or slightly imbricate petals. Fruits not seen. It comes close to *A. heterophylla* A. Gray.

### 3. MICROMELUM Blume

**Micromelum minutum** (Forster f.) Seemann: Viti, p. 434, 1862.

Tau: Fitiuta trail, fruit, December 16, 1921, Garber no. 668. Ofu: Nuu Islet, bud, June 4, 1925, Garber no. 990. Tutuila: forest, Papatele Ridge, altitude 300 meters, flower, fruit, October 31, 1929, Christophersen no. 1012. Upolu: forest, Moa Moa plantations, altitude 300 meters, bud, March 2, 1921, Eames no. 183. Savaii: open forest, Manase plantation, fruit, July 12, 1931, Christophersen and Hume no. 1983; forest, Falealupo, bud, fruit, September 29, 1931, Christophersen no. 2790. Native name, *talafalu* (nos. 668, 1012), *taa (ta'a) mafalu* (no. 2790).

A small tree to 5 meters high growing in open forests of the lowlands and foothills.

### 4. CITRUS Linnaeus

**Citrus hystrix** De Candolle: Cat. Hort. Monsp., p. 97, 1813.

Tau: Fitiuta trail, flower, August 4, 1921, Garber no. 569. Savaii: forest above Letui, altitude 400-500 meters, flower, fruit, September 27, 1929, Christophersen no. 768; plantation, Safune, flower, August 13, 1931, Christophersen and Hume no. 2390; Aopo-Sassina, flower, August 27, 1931, Christophersen (by E. Stehlin) no. 2544; forest, Falealupo, altitude 25 meters, September 29, 1931, Christophersen no. 2789; edge of forest, Lata-iuta, altitude 100 meters, fruit, October 30, 1931, Christophersen no. 3006; open coastal forest, Papa-Fangalele, fruit, November 21, 1931, Christophersen no. 3405. Native names, *moli uu (u'u)* (nos. 2390, 2544, 2789, 3006, 3405), *moli samoa* (nos. 569, 2789).

The native Samoan orange is a small tree to 8 meters high growing in open places and forests of the lowlands and foothills. The fruits are globose or slightly flattened, attaining a diameter of 5 cm. They are sour and unfit to eat, but the juice is used by the Samoans as an application to the hair. The wood is used for canes and axe handles.



Cultivated by the Samoans are *C. nobilis* Loureiro, the mandarin, *moli saina* (Savaii, Christophersen no. 3036); *C. aurantium* Linnaeus, the orange, *moli aina* (Savaii, Christophersen no. 2391); *C. medica* Linnaeus, the citron, *tipolo* (Savaii, Christophersen no. 3048); *C. aurantifolia* (Christman) Swingle, the lime, *tipolo* (Ofu, Garber no. 1015; Upolu, Christophersen no. 142; Savaii, Christophersen nos. 3018, 3019).

## FAMILY 46. BURSERACEAE

### 1. GARUGA Roxburgh

*Garuga pacifica* Burkill: Jour. Linn. Soc., Bot., vol. 35, p. 30, 1901.

Savaii: forest, Falealupo, September 29, 1931, Christophersen no. 2795; plantation, Salailua, altitude 25 meters, fruit, October 8, 1931, Christophersen no. 2847; forest, Salailua-Lata-itai, altitude 10 meters, fruit, October 19, 1931, Christophersen no. 2861. Native name, *mangau* (no. 2847).

These specimens, in fruit only, agree with the original description of *G. pacifica* except for the slightly larger leaves with more numerous leaflets. From a sterile Tongan specimen (Setchell and Parks no. 15447, in B. P. Bishop Museum) they differ in the more narrowly acuminate leaflets.

The *mangau* is a common tree of great size in the lowland forests.

#### *Garuga* species.

Savaii: forest, Falelima-Siuvao, altitude 50 meters, young fruit, November 19, 1931, Christophersen no. 3308. Native name, *mangau* (no. 3308).

This specimen is from a twig picked up on the ground, apparently broken from a large tree about 20 meters high. It differs from *Garuga pacifica* Burkill in the upper part of the branches, leaves, and inflorescence being pilose, densely so on the branches, petiole, rachis, petiolules, veins of the leaflets, and branches of the inflorescence. The immature fruits are glabrous. It may be identical to the specimen (Whitmee no. 179) referred to *G. mollis* Turczaninow (*G. abilo* [Blanco] Merrill) by Engler (17). In his last treatment of the genus Engler (20, p. 416) gives the Philippines only as the distribution of this species. The Samoan specimen (Christophersen no. 3308) differs from a specimen (Elmer no. 11010, B. P. Bishop Museum) of *G. abilo* from Mindanao in the type of pubescence, type of crenation, and in size.

### 2. CANARIUM Linnaeus

*Canarium mafoa*, species nova (fig. 14).

Arbor magna ad 15 m. alta. Rami glabri teretes lenticellis orbicularibus prominentibus instructi. Folia glabra 1-3-juga, petiolo lenticellato 5-8 cm. longo, interstitiis interjugis 3-4 cm. longis, petiolulis lenticellatis 1.5-2.5 cm. longis, foliolis ovatis vel oblongo-ovalibus nitidis subcoriaceis acuminatis mediis 10-16 cm. longis 4.5-6 cm. latis

acumine 1-1.5 cm. longo obtuso basi obliqua rotundata nervis lateralibus utrinque circiter 12 subtus prominentibus. Flores non vidi. Pedicelli fructiferi 2.5-3 cm. longi 2.5 mm. crassi. Drupa late ellipsoidalis leviter complanata utrinque rotundata in vivo 4.7-4.8 cm. longa 2.8-3 cm. lata 2.5 cm. crassa. Pyrena triangularis complanata unilocularis 4.3-4.4 cm. longa 2.4-2.6 cm. lata 1.5-1.7 cm. crassa endocarpio 5-7 mm. crasso.



FIGURE 14.—Leaves and fruit of *Canarium*: branch with leaves of *C. maffoa*; a, *C. maffoa*, fruit; b, *C. maffoa*, cross section of fruit; c, cross section of pyrene of *C. Harveyi* from Tonga (Parks no. 16171).

Differt a *C. Harveyi* Seemann drupis majoribus leviter complanatis.

Large tree to 15 m. high. Branches glabrous, terete, with prominent, orbicular lenticels. Leaves glabrous, 1-3-jugate; petiole lenticellate, 5-8 cm. long; distance between leaflets 3-4 cm.; petiolules lenticellate, 1.5-2.5 cm. long; leaflets ovate or oblong-oval, shining, subcoriaceous, acuminate; middle leaflets 10-16 cm. long, 4.5-6 cm. broad, acumen 1-1.5 cm. long, obtuse, base oblique, rounded, lateral veins about 12 on each side, prominent below. Flowers not seen. Fruiting pedicels 2.5-3 cm. long, 2.5 mm. thick. Drupe broadly ellipsoid, slightly flattened, rounded at both ends, living specimens 4.7-4.8 cm. long, 2.8-3 cm. broad, 2.5 cm. thick. Pyrene triangular, flattened, one-celled, 4.3-4.4 cm. long, 2.4-2.6 cm. broad, 1.5-1.7 cm. thick, endocarp 5-7 mm. thick.

Savaii: forest, Siuvao-Auala, altitude 400 meters, bud, November 20, 1931, Christophersen no. 3369; forest, Siuvao-Auala, altitude 600 meters, fruit, November 20, 1931, Christophersen no. 3373, type in B. P. Bishop Museum. Native name, *mafoa* (no. 3373).

This species has its nearest relative in the Tongan *C. Harveyi* Seemann. The fruits are larger in *C. mafoa*, less flattened, and with thicker endocarp. There are also differences in the leaves: the Samoan specimens have longer petiolules, the leaflets are more distantly placed, and the primary veins are more numerous, all of which characters, however, are variable.

The *mafoa* is a large forest tree. It does not exude gum as freely as *C. samoense*, a fact that is well known by the natives, who recognize its relationship to this species.

**Canarium samoense** Engler: DC Mon. Phan., vol. 4, p. 134, 1883.

Upolu: forest below Malololelei, altitude 500 meters, fruit, August 16, 1929, Christophersen no. 290; forest near Moa Moa, altitude 200 meters, June 29, 1931, Christophersen and Hume no. 1833. Savaii: forest near Tufutafoe, altitude 10 meters, bud, September 30, 1931, Christophersen no. 2770. Native name, *maali* (*ma'ali*) (nos. 290, 1833, 2770).

The *maali* is a large forest tree growing at low and medium elevation. It is one of the favorite trees for canoes, and the fragrant gum exudations are used in perfuming coconut oil.

**Canarium** species.

Savaii: forest above Sili, altitude 150 meters, November 11, 1931, Christophersen no. 3279. Native name *aa* (*a'a*) *matie*.

This sterile specimen can not be referred to any of the known Samoan species of *Canarium*. The leaves are large, with leaflets to 20 cm. long and 10.5 cm. broad. The petiole, rachis, petiolules, and midrib are pubescent. Tufts of hair are present in the axils of the primary veins.

*Canarium commune* Linnaeus is found in cultivation (near Apia, Eames no. 197).

## FAMILY 47. MELIACEAE

## I. XYLOCARPUS Koenig

**Xylocarpus moluccensis** (Lamarck) M. Roemer: Syn. Hesper., p. 124, 1846.

Tutuila: Nuuuli, flower, July 3, 1925, Garber no. 1118; shore of lagoon north of Tafuna, fruit, November 9, 1929, Christophersen no. 1177. Savaii: mangrove swamp, Vangenga, between Salailua and Lata-itai, October 10, 1929, Christophersen no. 927; same locality, fruit, September 18, 1931, Christophersen no. 2640. Native name *lei lei* (*le'i le'i*) (nos. 1118, 1177, 927, 2640).

The leaflets in all the specimens are distinctly ovate, 4 to 7 on each leaf. This widely distributed shore tree is rare in Samoa, having been found in two localities only.

## 2. DYSOXYLUM Blume

**Dysoxylum Huntii** Merrill: Setchell, Am. Samoa, p. 83, 1924.

Tutuila: low forest, top of Le Pioa, altitude 500 meters, flower, January 2, 1932, Christophersen no. 3537. Upolu: forest, Malololelei-Lanutoo, altitude 700 meters, fruit, August 21-22, 1929, Christophersen no. 397; open grassland near Malololelei, altitude 650 meters, October 18, 1929, Christophersen no. 956. Savaii: open forest near Matavanu Crater, altitude 600-700 meters, fruit, July 10, 1931, Christophersen and Hume no. 1957; forest above Matavanu Crater, altitude 1300 meters, July 24, 1931, Christophersen and Hume no. 2151; forest above Matavanu Crater, altitude 1550 meters, fruit, July 29, 1931, Christophersen and Hume no. 2210; plantation, Salailua, September 11, 1931, Christophersen and Hume no. 2575; forest above Salailua, altitude 1400 meters, September 23, 1931, Christophersen no. 2680; forest near Le To, above Salailua, altitude 900 meters, November 5, 1931, Christophersen no. 3060; forest above Salailua, altitude 1450 meters, November 6, 1931, Christophersen no. 3083; forest above Salailua, altitude 1200 meters, flower, November 5, 1931, Christophersen no. 3124; forest above Siuvao, altitude 400 meters, flower, November 19, 1931, Christophersen no. 3306.

Native name, *maota mea* (nos. 3537, 2575, 2680, 3060, 3124, 3306). Reinecke (46, p. 644) applies this name to *Aglaia samoensis*, which is the *langu'ali*. A description of the hitherto unknown fruiting parts of this species follows:

Infructescence stout, woody, densely lenticellate, stem to 1 cm. thick above the base, to 27 cm. long, peduncles 2-4 mm. thick. Calyx deeply 5-lobed, lobes rounded, sericeo-pubescent or glabrate on the outside, glabrous inside, ciliate, 1.5-2 mm. long, 2.5-3 mm. broad. Fruit broadly oval, triangular or quadrangular in cross section, base abruptly narrowed into a stout stipe apex shortly pointed, appressed silky pubescent at the base of the stipe, otherwise glabrous, the entire surface densely covered with yellow or pale brown lenticels (?). Locules 3, occasionally 4. Seeds 2 in each locule, reniform, flat-

tened, warty, densely so at the base, reddish brown. Total length of fruit about 3.5 cm., width about 2.5 cm., stipe 5-8 mm. long. Seeds 9 mm. long, 9-10 mm. broad, 5-6 mm. thick.

This species is easily recognized by its robust 5-merous flowers with deeply reflexed petals, and its stipitate, lenticellate (?) fruits. At medium and high altitudes the *maota mea* is one of the commonest forest trees; in the lowlands its dominant place is taken over by the *maota* (*D. maota*) and the *maota mamala* (*D. samoense*). The *maota mea* is a tall tree with a straight stem to 20 meters high and with a diameter breast high of 70 cm. The green wood will burn readily and is therefore a favorite firewood with the Samoans.

**Dysoxylum maota** Reinecke: Engl. Bot. Jahrb., vol. 25, p. 643, 1898.

Upolu: forest, Moa Moa plantations, altitude 200 meters, flower, fruit, March 2, 1921, Eames no. 182. Savaii: coastal forest, Salailua-Lata-itai, flower, September 18, 1931, Christophersen no. 2632; forest above Salailua, altitude 300 meters, fruit, September 21, 1931, Christophersen no. 2762; edge of forest, Salailua, altitude 75 meters, flower, October 26, 1931, Christophersen no. 2957; forest above Sili, altitude 150 meters, flower, November 13, 1931, Christophersen no. 3206. Native name, *maota* (nos. 2632, 2762, 2957, 3206).

A large tree in the lowland forests with subglabrous leaves of eight or more pairs of leaflets. The fruits are a favorite food of the native pigeons.

**Dysoxylum affinis samoense** A. Gray: Bot., Phanerog., U. S. Expl. Exped., vol. 15, pt. 1, p. 241, 1854.

Tutuila: ridge back of Pago Pago, flower, fruit, December 26, 1924, Garber no. 916. Upolu: forest below Malololelei, altitude 500 meters, bud, August 19, 1929, Christophersen (by native) no. 336. Savaii: Falealupo peninsula, altitude 100 meters, flower, fruit, September 28, 1931, Christophersen no. 2807; forest above Sili, altitude 75 meters, flower, November 13, 1931, Christophersen no. 3201. Native name, *maota mamala* (nos. 916, 3201).

These specimens are to be referred to a species of the section *Eudysoxylum*, and they seem to come close to *D. samoense* as interpreted by Setchell (51, p. 80) who has examined the type material of this species. The leaflets differ from the original description of Gray (25, p. 241) in their yellowish hirsute petiolules, lower part of midrib on the under surface, and axils of the primary veins. The petiole and rachis are also hirsute as well as the branches of the inflorescence. The four lobes of the calyx are acute or rounded, not imbricate, in length about one third of the total length of the calyx. The mature fruit is 2.5-3 cm. long, broadly ellipsoid, 4-celled, with one seed in each cell. The mature fruits figured by Setchell (51, fig. 2, *d*, *e*) are less than half the size of the immature fruits described by Gray (25, p. 242).

The *maota mamala* is a large tree in the lowland forests, apparently less common than the *maota*.

Sterile specimens were collected at an altitude of about 700 meters on Savaii (Christophersen and Hume no. 1945, Christophersen no. 2938) apparently belonging to *Dysoxylum* but different from any of the other species collected. The leaves agree largely with the description of those of *D. Betchei* C. de Candolle. The leaflets are glabrate with villous pockets in the axils of the primary veins.

### 3. AGLAIA Loureiro

***Aglaiia samoensis*** A. Gray: Bot., Phanerog., U. S. Expl. Exped., vol. 15, pt. 1, p. 236, 1854.

Ofu: plantation at Toanga, fruit, June 22, 1925, Garber no. 1098. Tutuila: above Vatia, fruit, December 17, 1924, Garber no. 879; back of Pago Pago, fruit, December 26, 1924, Garber no. 914; Pago Pago harbor, March 18, 1930, Diefenderfer (by native) no. 8. Upolu: forest, Moa Moa plantations, altitude 250 meters, March 2, 1921, Eames no. 148; forest, Vaea, altitude 100 meters, fruit, April 9, 1927, MacDaniels no. 1120; forest below Malololelei, flower, August 19, 1929, Christophersen (by native) no. 339; forest, Vaea, altitude 350 meters, flower, August 28, 1929, Christophersen no. 460. Savaii: forest near Vaipouli, altitude 75 meters, fruit, July 3, 1931, Christophersen and Hume no. 1838; coastal forest, Salailua-Lata-itai, flower, September 17, 1931, Christophersen no. 2626; edge of forest, Salailua, altitude 75 meters, flower, young fruit, October 26, 1931, Christophersen no. 2958; open plantation ground, Salailua, altitude 150 meters, flower, October 28, 1931, Christophersen nos. 2986 and 2990; forest above Sili, altitude 400 meters, flower, November 11, 1931, Christophersen no. 3247. Native name, *langaali* (*langa'ali*) nos. 1098, 879, 914, 8, 148, 339, 460, 2626, 2958, 2986, 2990, 3247).

The *langaali* is a small tree to 8 meters high growing in open places or in the forests throughout the lowlands. The wood is used for house posts, and the fragrant flower clusters are used for personal adornment and decoration and also for scenting coconut oil.

#### ***Aglaiia* species.**

Savaii: forest above Matavanu Crater, altitude 1030 meters, fruit, July 27, 1931, Christophersen and Hume no. 2195.

The fruits are ellipsoid, reddish brown, 2.8-3 cm. long, 2.3 cm. broad, 2-celled, 1-seeded, seed flattened, ovate in outline, rugose, black, 2.3 cm. long, 1.6 cm. broad, 1.2 cm. thick. The specimens apparently belong to *Aglaiia* but differ from all the other species of that genus accredited to Samoa in their 1-2-jugate leaves. They differ from *A. samoensis*, *A. Betchei*, and *A. Forbesiana* in their larger fruits. The fruits of *A. Whitmeei* are not known.

## FAMILY 48. POLYGALACEAE

## I. POLYGALA Tournefort

*Polygala paniculata* Linnaeus: Amoen. Acad., vol. 5, p. 402, 1759.

Tutuila: gravelly place, Pago Pago, flower, February 7, 1921, Eames no. T-10; roadside, Amaluia, flower, September 5, 1923, Wilder no. 10; Goat Island, flower, November 27, 1924, Garber no. 795. Upolu: roadside near Malololelei, altitude 650 meters, flower, August 10, 1929, Christophersen no. 157.

## FAMILY 49. EUPHORBIACEAE

## I. BACCAUREA Loureiro

*Baccaurea Seemanni* Mueller-Argau varietas *samoensis*, varietas nova (fig. 15).

Arbor parva ad 5 m. alta. Ramuli fusco-tomentosi dein glabri teretes. Folia petiolata versus apicem ramulorum instructa, laminis ovalibus vel obovatis apice obtuso vel rotundato vel emarginato basi late acuta vel rotundata costa excepta glabris margine levissime undulato-crenato nervis primariis utrinque 6-8 subtus prominentibus 8.5-15.5 cm. longis 5.5-9.3 cm. latis, petiolis tomentosis 1.2-3.5 cm. longis. Inflorescentiae masculae in ramis biennibus dispositae ad 10 cm. longae rachi fulva villosula pedunculis secundariis villosulis 2-4 mm. longis 2-3-floribus bracteis ovatis obtusis ciliatis vix 1 mm. longis. Sepala 6 lanceolata acuta utrinque villosula circiter 2 mm. longa. Stamina 7-10 vix 1 mm. longa glabra filamentis antheris paullo longioribus antheris rotundatis. Ovarii rudimentum bilobatum complanatum villosulum basi lata.

Fructus ex exemplario 1135 globosus rugulosus breviter rostratus ad 1.4 cm. longus et latus pariete chartaceo piloso seminibus 2 rubris tuberculatis complanato-hemisphaericis 11 mm. longis 9-10 mm. latis 4 mm. crassis.

Differt a typo *B. Seemanni* Mueller-Argau sepalis 6 staminibus 7-10 ovarii rudimento basi non stipitata.

Small tree to 5 m. high. Branches terete, dusky tomentose, glabrous with age. Leaves petiolate, inserted near top of branches; blades oval or obovate, obtuse or rounded or emarginate, broadly acute or rounded at base, glabrous excepting the midrib, 8.5-15.5 cm. long, 5.5-9.3 cm. broad, margin slightly undulate-crenate, primary veins 6-8 on each side of midrib, prominent below; petioles tomentose, 1.2-3.5 cm. long. Male inflorescences inserted on second year branches, to 10 cm. long; rachis yellowish, minutely villose; secondary peduncles minutely villose, 2-4 mm. long, 2-3-flowered; bracts ovate, obtuse, ciliate, hardly 1 mm. long; sepals 6, lanceolate, acute, minutely villose on both sides, about 2 mm. long; stamens 7-10, hardly 1 mm. long, glabrous, filaments slightly longer than anthers, anthers rounded; ovary rudimentary, bilobed, flattened, minutely villose, base broad. Fruit (from specimen no. 1135) globose, rugulose, shortly beaked, to 1.4 cm. long and broad, pericarp chartaceous, pilose; seeds 2, red, warty, complanate-hemispherical, 11 mm. long, 9-10 mm. broad, 4 mm. thick.—Differs from type of *B. Seemannii* Mueller-Argau in its 6 sepals, 7-10 stamens, rudimentary ovary not stipitate.

Tutuila: forest, Alava Ridge, altitude 400 meters, female bud, fruit, November 7, 1929, Christophersen nos. 1119 and 1135; scrub forest, top of Le Pioa, altitude 500 meters, January 2, 1932, Christophersen no. 3522. Upolu: forest above Malololelei, altitude 700 meters, August 14, 1929,

Christoffersen no. 245; forest at lake Lanutoo, altitude 700 meters, flower, August 21-22, 1929, Christoffersen no. 371, type in B. P. Bishop Museum; forest above Malololelei, altitude 750 meters, fruit, August 15, 1929, Christoffersen no. 269. Savaii: forest above Sili, altitude 300 meters, fruit, November 11, 1931, Christoffersen no. 3237.

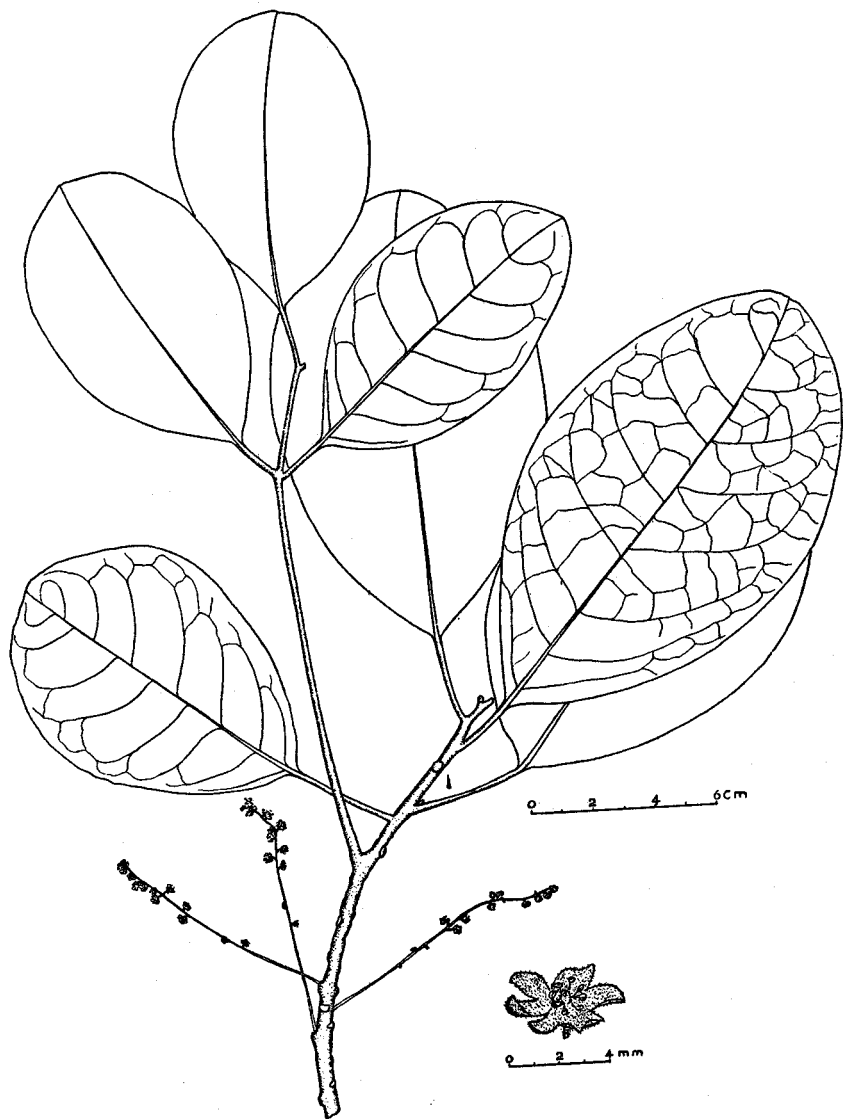


FIGURE 15.—Flowering branch and flower, *Baccaurea Seemanni* varietas *samoensis*.



This variety differs from the type of the species as described by Mueller-Argau (41, p. 462) mainly in the number of sepals and stamens. It is a small tree to 5 meters high growing in the forests at middle elevations.

## 2. ANTIDESMA Linnaeus

**Antidesma sphaerocarpum** Mueller-Argau: DC Prodr., vol. 15, 2, p. 255, 1866.

Savaii: open waste land above Sili, altitude 100 meters, male flower, November 11, 1931, Christophersen no. 3240.

## 3. GLOCHIDION Forster

**Glochidion cuspidatum** (Mueller-Argau) Pax varietas **samoanum** (Mueller-Argau) Pax: Reinecke, Engl. Bot. Jahrb., vol. 25, p. 645, 1898.

Upolu: forest, Malololelei-Lanutoo, altitude 680 meters, flower, fruit, August 5, 1929, Christophersen no. 14; edge of forest near Malololelei, altitude 540 meters, flower, fruit, August 6, 1929, Christophersen no. 67; forest above Malololelei, altitude 750 meters, flower, fruit, August 15, 1929, Christophersen no. 256; forest near Malololelei, altitude 550 meters, flower, fruit, August 17, 1929, Christophersen no. 324; open grassland near Malololelei, altitude 650 meters, bud, October 18, 1929, Christophersen no. 949. Savaii: open woodland, Olo, above Safotu, altitude 700 meters, flower, fruit, August 7, 1931, Christophersen and Hume no. 2293; forest, Siuvao-Auala, altitude 300 meters, November 19, 1931, Christophersen nos. 3300 (flower, fruit) and 3301 (bud). Native name, *masame* (no. 324).

A medium-sized or large tree to 15 meters high, growing in openings and forests at middle elevation.

**Glochidion ramiflorum** Forster varietas **samoanum** (Mueller-Argau) Pax: Reinecke, Engl. Bot. Jahrb., vol. 25, p. 645, 1898.

Olosenga: top of Piumafua mountain, altitude 625 meters, flower, fruit, June 17, 1925, Garber no. 1038. Tutuila: Goat Island, flower, fruit, October 23, 1924, Garber no. 790. Savaii: lava field below Matavanu Crater, altitude 300 meters, flower, October 12, 1929, Christophersen no. 601; lava field between Saleaula and Samalaeulu, flower, fruit, September 20, 1929, Christophersen no. 702; recent lava field above Aopo, altitude 1200-1400 meters, October 7, 1929, Christophersen no. 902; forest above Matavanu, altitude 900 meters, flower, fruit, July 14, 1931, Christophersen and Hume no. 1991; lava field near Saleaula, flower, August 21, 1931, Christophersen and Hume no. 2463; open plantation ground, Salailua, altitude 150 meters, flower, fruit, October 28, 1931, Christophersen no. 2992; forest above Salailua, altitude 1350 meters, flower, November 7, 1931, Christophersen no. 3075; low coastal

forest, Falealupo-Fangalele, flower, fruit, November 22, 1931, Christophersen no. 3322. Native name, *masame* (nos. 790, 902, 1991, 3322).

Some of the specimens are identical with a specimen from Tutuila (Setchell no. 220, B. P. Bishop Museum) which according to Setchell (51, p. 78) has been compared with a specimen from the U. S. Exploring Expedition in Gray Herbarium.

A small to medium-sized tree in the forests at low and middle elevations. It is also one of the pioneers on the recent lava fields of Savaii.

#### **Glochidion** species.

Savaii: forest above Matavanu Crater, altitude 1300 meters, fruit, July 24-25, 1931, Christophersen and Hume nos. 2134 and 2169; forest above Matavanu Crater, altitude 1550 meters, fruit, July 29, 1931, Christophersen and Hume no. 2211.

These specimens differ from *G. ramiflorum* Forster in their narrow, cylindrical styler column, which in the fruiting stage is about 1.5 mm. long. The leaves are small, on an average not more than 5 cm. long and 2 cm. broad, acuminate, strongly oblique. They may represent an undescribed species.

#### 4. BREYNIA Forster

**Breynia nivosa** (Bull) Small: Bull. Torr. Bot. Club, vol. 37, p. 516, 1910.

Tutuila: cultivated at Naval Station, flower, October 31, 1929, Christophersen no. 1002.

Common in cultivation for hedges. Found near the villages as an escape.

#### 5. SECURINEGA Jussieu

##### **Securinega** (§**Flueggea**) species.

Upolu: forest near Vailima, altitude 100 meters, male flower, February 27, 1921, Eames no. 85; forest below Malololelei, altitude 500 meters, fruit, August 16, 1929, Christophersen no. 297; cultivated, Saluafata, fruit, October 17, 1929, Christophersen no. 943; cultivated, Apia, male flower, October 25, 1929, Christophersen no. 979. Savaii: edge of forest, Tufutafoe-Falelima, female flower, September 30, 1931, Christophersen no. 2765; forest near Falealupo, altitude 50 meters, September 29, 1931, Christophersen no. 2794. Native name, *poumulu* (nos. 85, 297, 943, 979, 2765, 2794).

A small or medium-sized tree to 10 meters high, cultivated and growing spontaneously in openings and at the edge of the forest in the lowlands. The wood is durable and is one of the favorites for house posts. The habitat of this tree and the fact that it is cultivated by the Samoans suggest that it may be an introduced species. It is not *S. virosa* (Willdenow) Pax et Hoffmann.

6. *PHYLLANTHUS* Linnaeus

*Phyllanthus Niruri* Linnaeus: Sp. Pl., p. 981, 1753.

Tutuila: roadside, Pago Pago, flower, fruit, September 19, 1923, Wilder no. 19; near dispensary, Naval Station, fruit, January 2, 1925, Garber no. 951; near lagoon, Nuuuli, flower, fruit, January 3, 1925, Garber no. 955; Pago Pago harbor, fruit, 1929, Diefenderfer no. 25; Aunuu Island, plantation near village, flower, fruit, November 12, 1929, Diefenderfer no. 1244. Upolu: roadside, Apia, flower, fruit, August 27, 1929, Christophersen no. 433. Savaii: waste ground, Lelepa, flower, fruit, July 8, 1931, Christophersen and Hume no. 1926.

A common weed in waste places.

*Phyllanthus simplex* Retzius: Obs., vol. 5, p. 29, 1789.

Tau: Luma-Faleasao trail, altitude 40 meters, flower, fruit, January 8, 1922, Garber no. 693. Olosenga: along trail at Olosengauta, altitude 250 meters, flower, fruit, June 17, 1925, Garber no. 1074.

7. *BISCHOFIA* Blume

*Bischofia javanica* Blume: Bijdr., p. 1168, 1826.

Tau: plantation back of Luma, fruit, September 13, 1921, Garber no. 613. Tutuila: Pago Pago harbor, March 18, 1930, Diefenderfer (by native) no. 6. Upolu: Vailele, fruit, August 20, 1929, Christophersen (by native) no. 358. Savaii: open woodland near Matavanu Crater, altitude 600-700 meters, fruit, July 10, 1931, Christophersen no. 1952; open forest at Olo, above Safotu, altitude 700 meters, fruit, August 5, 1931, Christophersen and Hume no. 2259; forest at Le To, above Salailua, altitude 750 meters, October 21, 1931, Christophersen no. 2934. Native name *oa* (*o'a*) (nos. 613, 6, 358, 1952, 2259, 2934).

The *oa* is a common tree in openings and in the forests at low and middle elevations. It is planted, or at least retained in the plantations. From the juice of the bark the Samoans prepare a brown dye, the most common dye in tapa (*siapo*) decoration.

8. *ALEURITES* Forster

*Aleurites moluccana* (Linnaeus) Willdenow: Sp. Pl., vol. 4, p. 590, 1805.

Tau: plateau back of Luma, altitude 100 meters, fruit, September 21, 1922, Garber no. 777. Upolu: Apia, flower, February 18, 1921, Eames no. 48; forest below Malololelei, flower, fruit, August 19, 1929, Christophersen (by native) no. 333. Savaii: coconut plantation, Safune, August 13, 1931, Christophersen and Hume no. 2438. Native name, *lama* (nos. 777, 48, 2438).

The *lama* is abundant in places but is not common throughout the islands. It is confined to the lowland forests. The seeds are used in preparing soot for tattooing and decoration of tapa and are also burned as candles, strung on the midrib of coconut leaflets.

#### 9. CLAOXYLON Jussieu

**Claoxylon samoense** Pax et K. Hoffmann: Pflanzenr., IV., 147, 7, p. 111, 1914.

*Claoxylon fallax* Mueller-Argau varietas *glabra* Lauterbach: Engl. Bot. Jahrb., vol. 41, p. 228, 1908.

Savaii: forest above Salailua, altitude 1200-1300 meters, male flower, September 23, 1931, Christophersen no. 2671; forest above Salailua, altitude 1100 meters, male flower, November 7, 1931, Christophersen no. 3069; forest above Salailua, altitude 1400 meters, female flower, fruit, November 6, 1931, Christophersen no. 3096; forest, Siuvao-Auala, altitude 600 meters, fruit, November 19, 1931, Christophersen no. 3372.

The leaves of no. 3372 are broader, of the other specimens narrower, in nos. 2671 and 3096 also shorter than in the type, and the margin is more distinctly glandular serrate. In other respects, however, they agree with a cotype specimen (Vaupel no. 429, B. P. Bishop Museum) with which they have been compared. This is a much-branched, shrubby tree to 8 meters high growing at middle and high elevations.

#### 10. MACARANGA Thouars

**Macaranga affinis** Grayana Mueller-Argau: DC Prodr., vol. 15, 2, p. 1001, 1866.

Upolu: forest, Malololelei-Lanutoo, altitude 700 meters, male flower, August 8, 1929, Christophersen no. 117.

The leaves are shallowly peltate, truncate or slightly cordate, those on flowering branches are 27-31 cm. long, 21-26 cm. broad, acute, apiculate. The stipules are broad, acute, hirsute, about 2 cm. long. Sepals 2, rounded, red, 1 mm. long, stamens about 30.

**Macaranga Harveyana** Mueller-Argau: DC Prodr., vol. 15, 2, p. 998, 1866.

Tau: Amouli trail, altitude 75 meters, fruit, September 16, 1921, Garber no. 614. Ofu: Feaia Point, altitude 75 meters, flower, May 25, 1925, Garber no. 978. Tutuila: Pago Pago harbor, flower, September 20, 1923, Swezey no. 57. Savaii: forest above Safune, altitude 350 meters, flower, May 12, 1924, Bryan no. 138; lava field near Aopo, altitude 125 meters, fruit, May 15, 1924, Bryan no. 149; Matavanu lava field, altitude 400 meters, flower, September 12, 1929, Christophersen no. 585; rocky bluff, Manase-Safotu, flower,

fruit, August 20, 1931, Christophersen and Hume no. 2448; open forest near lava field, above Safotu, altitude 400 meters, flower, August 27, 1931, Christophersen and Hume no. 2529; coastal bluff near Papa, flower, November 21, 1931, Christophersen no. 3412. Native names, *pata* or *lau pata* (nos. 614, 978, 138, 2529), *lau fatu* (see *M. stipulosa*).

A small tree to 8 meters high, common in coastal forests and in the forests and openings of the foothills up to an altitude of about 400 meters.

**Macaranga stipulosa** Mueller-Argau: DC Prodr., vol. 15, 2, p. 1001, 1866.

Tau: Amouli trail, altitude 200 meters, flower, fruit, September 16, 1921, Garber no. 636. Olosenga: Olosengauta-Piumafua Ridge, altitude 500 meters, fruit, June 17, 1925, Garber no. 1072. Tutuila: Pago Pago harbor, March 18, 1930, Diefenderfer (by native) no. 7. Savaii: forest above Safune, altitude 550 meters, bud, May 13, 1924, Bryan no. 141; open forest at Olo, above Safotu, altitude 700 meters, fruit, August 9, 1931, Christophersen and Hume no. 2317; open forest at Olo, above Safotu, altitude 700 meters, flower, August 27, 1931, Christophersen and Hume no. 2538; edge of forest, Salailua, altitude 75 meters, flower, October 26, 1931, Christophersen no. 2959; edge of forest, Salailua, altitude 150 meters, fruit, October 28, 1931, Christophersen no. 2981.

Native names, *pata* (nos. 636, 1072), *lau pata* (nos. 7, 141, 2317, 2959), *lau fatu* (nos. 2538, 2981). In Savaii I was told by several informants that the correct name for this large-leaved species is *lau fatu*, the name for the small-leaved *M. Harveyana* being *lau pata*. This distinction seems, however, not to hold everywhere in Savaii or in the other islands.

A medium-sized tree to 12 meters high common in the forests at low and middle elevations.

**Macaranga** (?) species.

Savaii: forest above Matavanu Crater, altitude 1300 meters, July 24, 1931, Christophersen and Hume no. 2139; forest northeast of Salailua, altitude 1200 meters, September 8, 1931, Christophersen no. 2573.

Large trees of the upper forest region, in certain localities abundant. They were not observed in flower or fruit. The leaves are slightly peltate, cordate, acuminate, rusty tomentose underneath. The stipules are lanceolate, glabrous, 2-3 cm. long in specimen no. 2139, to 4 cm. long in no. 2573.

## II. ACALYPHA Linnaeus

**Acalypha boehmerioides** Miquel: Fl. Ind. Bat., Suppl., p. 459, 1861-62.

Ofu: at Aloafao, flower, fruit, June 6, 1925, Garber no. 1014. Native name, *ongo ongo* (no. 1014).

**Acalypha grandis** Benthams: Hook., London Jour. Bot., vol. 2, p. 232, 1843.  
Olosenga: at beach, Asanga Pass, flower, June 23, 1925, Garber no. 1093.

**Acalypha indica** Linnaeus: Sp. Pl., p. 1003, 1753.

Upolu: shaded waste place, Apia, flower, fruit, February 18, 1921, Eames no. 51.

#### 12. CODIAEUM (Rumphius) Jussieu

**Codiaeum variegatum** (Linnaeus) Blume varietas **pictum** (Loddiges) Mueller-Argau: DC Prodr., vol. 15, 2, p. 1119, 1866.

Several different forms of the variegated "croton" are cultivated for ornament by the Samoans (Christophersen nos. 666a and 666b), and some are found established in the lowland forests (Christophersen no. 456, Upolu). The form *appendiculatum* Celakovsky is commonly grown in the coconut plantations (Garber no. 769, Tau; Christophersen no. 573, Savaii).

#### 13. JATROPHA Linnaeus

**Jatropha curcas** Linnaeus: Sp. Pl., p. 1006, 1753.

Upolu: roadside near Apia, altitude 100 meters, fruit, February 16, 1921, Eames no. 15; roadside near Malololelei, altitude 650 meters, fruit, August 14, 1929, Christophersen no. 227.

**Jatropha multifida** Linnaeus: Sp. Pl., p. 1006, 1753.

Upolu: open woods near Apia, flower, February 28, 1921, Eames no. 115.

An escape from cultivation.

#### 14. MANIHOT Miller

**Manihot utilissima** Pohl: Pl. Bras. Ic. Descr., vol. 1, p. 32, pl. 24, 1827.

The cassava is commonly cultivated by the Samoans and is rarely found as an escape. Two forms are distinguished by the Samoans: *manioka*, leaves with 7 lobes (Eames no. 81; Christophersen no. 2579), and *tapioka*, leaves commonly with 3 lobes (Christophersen nos. 2578, 3058).

#### 15. HOMALANTHUS Jussieu

**Homalanthus acuminatus** (Mueller-Argau) Pax: Reinecke, Engl. Bot. Jahrb., vol. 25, p. 648, 1898.

Upolu: forest above Malololelei, altitude 700 meters, flower, fruit, August 12, 1929, Christophersen no. 183; forest at Lake Lanutoo, altitude 700 meters, flower, August 21-22, 1929, Christophersen no. 375; top of Fao mountain, male flower, altitude 680 meters, September 6, 1929, Christophersen no. 554. Savaii: forest above Safune, altitude 500 meters, flower, fruit, May 2, 1924.

Bryan no. 119; forest above Matavanu Crater, altitude 1100 meters, fruit, September 23, 1929, Christophersen no. 835; open forest near Matavanu Crater, altitude 600-700 meters, flower, fruit, July 10, 1931, Christophersen and Hume no. 1958; forest above Matavanu Crater, altitude 1550 meters, male flower, July 30, 1931, Christophersen and Hume no. 2237; open woodland near Olo, above Safotu, altitude 700 meters, flower, fruit, August 5, 1931, Christophersen and Hume no. 2242; forest above Salailua, altitude 1000 meters, flower, fruit, September 22, 1931, Christophersen no. 2695; forest at Le To, above Salailua, altitude 750 meters, flower, fruit, October 21, 1931, Christophersen no. 2940; riverside above Sili, altitude 400 meters, fruit, November 12, 1931, Christophersen no. 3146. Native name, *mamala* (nos. 375, 1958, 2237, 2242, 2695, 2940, 3146).

A medium-sized to large tree 20 meters high, common in the forests at middle and high elevations.

**Homalanthus nutans** (Forster) Pax: Engl. et Prantl, Nat. Pflanzenf., III, 5, p. 96, 1890.

Tau: Fitiuta trail back of Luma, altitude 60 meters, flower, fruit, August 4, 1921, Garber no. 553. Olosenga: Olosengauta-Piunafua Ridge, altitude 475 meters, flower, June 17, 1925, Garber no. 1029. Tutuila: open coastal forest, Amaluia, fruit, September 7, 1923, Wilder no. 92. Upolu: forest near Apia, March 2, 1921, Eames no. 127; forest, Vailele, altitude 100 meters, flower, fruit, March 5, 1921, Eames, no. 161. Savaii: lava field below Matavanu Crater, altitude 400 meters, flower, fruit, September 12, 1929, Christophersen no. 582; open "fern country" near Manase plantation, altitude 100 meters, flower, fruit, August 16, 1931, Christophersen and Hume no. 2412; low forest on rim of Papafu Crater, altitude 1500 meters, flower, fruit, September 22, 1931, Christophersen no. 2710. Native names, *fanuamamala* (no. 553), *fongamamala* (nos. 127, 161), *mamala* (no. 2710).

A small tree most common in open localities in the lowlands, but extends upwards to an elevation of 1500 meters in Savaii. It is easily distinguished from *H. acuminatus* by its single male sepal, shortly acuminate leaves, and small fruits. The large leaves of sterile shoots are used as a dressing on circumcision wounds.

**Homalanthus nutans** (Forster) Pax varietas **major** Pax: Reinecke, Engl. Bot. Jahrb., vol. 25, p. 648, 1898.

Tutuila: forest back of Pago Pago, altitude 150 meters, flower, September 21, 1923, Wilder no. 31; forest above Naval Station, altitude 75 meters, flower, fruit, April 12, 1924, Bryan no. 81; Aua-Afono trail, flower, fruit, December 17, 1924, Garber no. 847. Native names, *fongamamala* (no. 81), *fanuamamala* (no. 847).

## 16. EUPHORBIA Linnaeus

**Euphorbia atoto** Forster f.: Prodr., p. 207, 1786.

Ofu: coral beach, Muliulu, flower, May 26, 1925, Garber no. 986. Tutuila: sandy coral strand near Vatia, flower, fruit, December 17, 1924, Garber no. 871. Savaii: roadside, Salailua, flower, fruit, October 10, 1929, Christophersen no. 930; sandy beach, Avau, flower, fruit, July 8, 1931, Christophersen and Hume no. 1937; sandy beach, Salailua, flower, fruit, October 3, 1931, Christophersen no. 2813. Native name, *pulutai* (no. 986).

A common littoral plant.

**Euphorbia hirta** Linnaeus: Sp. Pl. p. 454, 1753.

Tau: Luma-Faleasao trail, altitude 40 meters, flower, fruit, January 8, 1922, Garber no. 691. Tutuila: Goat Island, flower, fruit, November 27, 1924, Garber no. 800; Aunuu, plantation near village, flower, fruit, Diefenderfer no. 1242. Upolu: dry waste place, Apia, flower, fruit, February 18, 1921, Eames no. 50. Savaii: open "fern country," Vaipouli-Manase, altitude 100 meters, flower, fruit, September 21, 1929, Christophersen no. 730; in lawn, Fangamalo, flower, fruit, July 4, 1931, Christophersen and Hume no. 1860. Native name, *la'au fai moti* (no. 800).

A common weed in openings and waste places.

**Euphorbia prostrata** Aiton: Hort. Kew., vol. 2, p. 136, 1789.

Tutuila: roadside, Naval Station, flower, fruit, January 2, 1925, Garber no. 950.

This widely distributed weed has as yet been recorded for Tutuila only.

**Euphorbia Reineckei** Pax: Engl. Bot. Jahrb., vol. 25, p. 648, 1898.

Upolu: above Apia, flower, fruit, September 13, 1923, Wilder no. 3; edge of forest, above Apia, altitude 200 meters, July 8, 1925, Wilder no. 417. Savaii: inside slopes of crater above Safotu-Letui, altitude 1600 meters, flower, fruit, September 25, 1929, Christophersen no. 814; rim of Papafu Crater, altitude 1500 meters, flower, fruit, September 22, 1931, Christophersen no. 2708.

A common plant in openings in the forests at middle and high elevations.

## FAMILY 50. CORIARIACEAE

## I. CORIARIA Nissole

**Coriaria ruscifolia** Linnaeus: Sp. Pl., p. 1037, 1753.

Savaii: low forest on rim of crater, above Safotu-Letui, altitude 1700 meters, flower, fruit, September 25, 1929, Christophersen no. 783.

This shrub or small tree was only seen once, growing in the highest part



of the island of Savaii. It has not previously been recorded from Samoa, but grows in Fiji, Society Islands, New Zealand with adjacent islands, as well as in Chile. The Samoan specimens agree well with specimens from Fiji, Society Islands, and New Zealand.

## FAMILY 51. ANACARDIACEAE

### I. SPONDIAS Linnaeus

*Spondias dulcis* Forster f.: Prodr., p. 34, 1786.

Tau: cultivated, Siufanga, fruit, January 11, 1922, Garber no. 706. Upolu: below Malololelei, altitude 500 meters, flower, August 19, 1929, Christophersen (by native) no. 338. Savaii: edge of forest, Tufutafoe-Falelima, young fruit, September 30, 1931, Christophersen no. 2767; forest near Tufutafoe, young fruit, September 30, 1931, Christophersen no. 2769.

A common large tree in the lowlands, cultivated and spontaneous.

### 2. DRACONTOMELUM Blume

*Dracontomelum vitiense* Engler: DC Mon. Phanerog., vol. 4, p. 253, 1883.

Upolu: rocky slopes near Apia, altitude 50 meters, flower, February 19, 1921, Eames no. 62.

Engler (16, p. 253) has referred a specimen collected in Samoa by Whitmee (no. 110) to this species. The specimen of Eames conforms in characters of inflorescence with the original description of this species, but differs in the longer leaflets with acumen 1.5-2 cm. (not "fere 1 cm."), lateral veins 9-11 (not 5-7), petioles 6-8 mm. (not 4-5 mm.). The pedicels of the flowers are 6-7 mm. long (not "brevissime pedicellatis").

A large forest tree, given by Eames on the field label as 15 meters high, 30 cm. in diameter.

### 3. RHUS Tournefort

?*Rhus taitensis* Guillemain: Ann. Sci. Nat., Bot., 2d ser., vol. 7, p. 361, 1837.

Upolu: forest below Malololelei, altitude 500 meters, fruit, August 16, 1929, Christophersen no. 294; edge of forest near Vailima, altitude 100 meters, flower, June 28, 1931, Christophersen and Hume no. 1832. Savaii: open forest near Vaipouli, altitude 75 meters, flower, young fruit, July 3, 1931, Christophersen and Hume no. 1848; edge of forest, Vaipouli-Manase, altitude 100 meters, flower, July 12, 1931, Christophersen and Hume no. 1975; forest Salailua-Lata-itai, altitude 10 meters, fruit, October 19, 1931, Christophersen no. 2866. Native name, *tavai* (nos. 294, 1848, 2866).

It is only with doubt that I refer these specimens to *R. taitensis* Guillemain. They disagree with the original description in the 3-7-jugate leaves ("foliis

10-jugis”), the puberulent lower surface of the leaflets (“subtus nervo excepto puberulo glabris”), the villose pubescent rachis (“puberula”) and the slightly larger leaflets. They differ also from the plate of Decaisne (14, pl. 28) in the larger and fewer leaflets. The flowers are not more than 2 mm. long with puberulous, ciliate, light brown sepals and glabrous, white, or pinkish petals. The fruits are black, shiny, 4-4.5 mm. long.

The *tavai* is one of the larger forest trees, common at low and medium elevations. When in fruit it is one of the favorite trees of the native pigeons (*lupe*).

#### FAMILY 52. CELASTRACEAE

##### I. GYMNOSPORIA Wight et Arnott

**Gymnosporia samoensis** Loesener: Rech., Denkschr. Akad. Wiss. Wien, vol. 85, p. 304, 1910.

Tutuila: forest, reservoir trail above Naval Station, altitude 200 meters, flower, fruit, November 2, 1929, Christophersen no. 1015. Savaii: forest, near Manase, altitude 25 meters, fruit, August 17, 1931, Christophersen and Hume no. 2416; open scrub on subrecent lava, Aopo-Asau, altitude 200 meters, flower, fruit, December 6, 1931, Christophersen no. 3431.

The specimens have been compared with a cotype in Bernice P. Bishop Museum (Vaupel no. 152).

#### FAMILY 53. ICACINACEAE

##### I. CHARIESSA Miquel

**Chariessa samoensis** (A. Gray) Engler: Engl. et Prantl, Nat. Pflanzenf., III, 5, p. 245, 1893.

Tutuila: stream bed back of Pago Pago, altitude 100 meters, flower, September 21, 1923, Wilder no. 36; near old wireless station, back of Pago Pago, altitude 275 meters, fruit, December 26, 1924, Garber no. 899. Upolu: forest, Vaea, altitude 140 meters, fruit, April 9, 1927, MacDaniels no. 1119. Savaii: forest back of Safotu, altitude 50 meters, fruit, August 13, 1931, Christophersen and Hume no. 2362; low forest on rim of Papafu Crater, altitude 1500 meters, flower, fruit, September 22, 1931, Christophersen no. 2721; low forest on rim of crater, Aopo-Ngangamalae, altitude 1500 meters, flower, fruit, December 8, 1931, Christophersen no. 3443; forest above Aopo, altitude 1200 meters, fruit, December 7, 1931, Christophersen no. 3459. Native names, *alaa* (*ala'a*) (no. 899), *alo alo vao* (no. 2721).

Specimen no. 443 shows the typical broad leaves of the original illustration of *Pleuropetalon samoense* A. Gray (25, Atlas, pl. 27), but the leaves vary considerably in form on the same tree, from broadly oval to narrowly elliptic, from 11 by 9 cm. to 14 by 4.5 cm. in specimen no. 2721.

A small tree 3-8 meters high growing in the forests at all altitudes, at least up to 1500 meters in Savaii.

## 2. *TYLECARPUS* Engler

*Tylecarpus samoensis* Reinecke: Engl. Bot. Jahrb., vol. 25, p. 650, pl. 13, 1898.

Tutuila: back of Pago Pago, fruit, December 26, 1924, Garber no. 919. Savaii: forest above Safune, altitude 650 meters, fruit, May 3, 1924, Bryan no. 122; forest above Matavanu Crater, altitude 800 meters, fruit, July 14, 1931, Christophersen and Hume no. 2039; forest near Olo, above Safotu, altitude 700-800 meters, bud, August 8, 1931, Christophersen and Hume no. 2312; forest above Salailua, altitude 400 meters, September 24, 1931, Christophersen no. 2658; forest above Salailua, altitude 1300-1400 meters, September 23, 1931, Christophersen no. 2676; forest above Salailua, altitude 500 meters, flower, fruit, November 5, 1931, Christophersen no. 3061. Native names, *matamo* (nos. 919, 2676, 3061), *matamo fanua* (no. 2658).

The male flowers of no. 3061 (the only flowering specimen in the collection) are identical with the one figured by Reinecke (46, pl. 13), designated as female. In his monograph on the *Icacinaceae* of New Guinea, Schellenberg (47) accepts the identity of this species with *Tylecarpus*, the type of pilosity of the anthers being the most important generic character. The leaves vary from acute to rounded at base, elliptic to narrowly obovate, primary veins 8-12.

A small tree 3-8 meters high in the forests at middle and high elevations. The wood is said to be used for thatch rafters ('aso).

*Tylecarpus* (?) species.

Upolu: forest at Lake Lanutoo, altitude 700 meters, bud, fruit, August 21-22, 1929, Christophersen no. 386.

This specimen shows the same type of fruit with a swollen outgrowth as found in *Tylecarpus samoensis* Reinecke. But male flowers, to show the characteristic pilosity of the anthers, are absent. The leaves are much larger than those of *T. samoensis*, being ovate or oval, acuminate with rounded base, glabrous or slightly pubescent on the midrib below, secondary veins 9-13, blade 21-26 cm. long, 10-13 cm. broad, petiole pubescent 1.5-2.5 cm. long. The dry fruits are sulcate, about 3.5 cm. long, 1 cm. broad. The inflorescence is densely rusty pubescent, calyx glabrous, ciliate, with five shallow teeth. A tree 5 meters high.

*Tylecarpus* (?) species.

Savaii: swampy forest above Matavanu Crater, altitude 1300 meters, bud, July 25, 1931, Christophersen and Hume no. 2166.

A tree 15 meters high with small, glabrous, leathery, oval leaves, shortly acuminate, rounded at base, 7-9 primary veins, blade 5-6.5 cm. long, 3-4.2 cm. broad, petiole about 1.5 cm. long. Calyx glabrate with five ciliate teeth.

## FAMILY 54. SAPINDACEAE

### I. ALLOPHYLUS Linnaeus

**Allophylus timorensis** (De Candolle) Blume: *Rumphia*, vol. 3, p. 130, 1847.

Upolu: roadside, Apia, fruit, August 27, 1929, Christophersen no. 436. Savaii: open coastal forest, Vaisala-Sataua, flower, November 21, 1931, Christophersen no. 3347; coastal scrub forest, Fangalele-Falealupo, flower, fruit, November 21, 1931, Christophersen no. 3395.

A shrub or small tree to 4 meters high, growing in open places or light forests of the lowlands.

### 2. POMETIA Forster

**Pometia pinnata** Forster: *Char. Gen. Pl.*, p. 110, pl. 55, 1776.

Savaii: plantation, Salailua, altitude 25 meters, flower, young fruit, October 8, 1931, Christophersen no. 2848; forest, Salailua-Lata-iuta, altitude 50 meters, flower, October 31, 1931, Christophersen no. 3009; forest, Lata-iuta-Sili, altitude 50 meters, flower, November 10, 1931, Christophersen no. 3134. Native name, *tava* (nos. 2848, 3009).

A large tree 25 meters or more high, common in the lowland forests. The fruits are eaten by the Samoans.

### 3. ALECTRYON Gaertner

**Alectryon (§Mahoe) samoensis**, species nova (fig. 16).

Arbor mediocris. Ramuli teretes in sicco striati cortice fusco-brunnei novelli dense ferrugineo-tomentosi dein glabri. Folia alterna pinnata ad 40 cm. longa novella ferrugineo-tomentosa dein glabra rachi supra sulcata petiolo ad 9 cm. longo. Foliola 7-10 laminis lanceolatis leviter acuminatis basi inaequaliter rotundata margine leviter undulato coriaceis novellis subtus parce ferrugineo-pubescentibus supra glabris maturis utrinque glabris petiolulis validis 7-10 mm. longis. Paniculae axillares tomentosae 5-6 cm. longae, pedicellis ad anthesin 1 mm. longis dein longioribus. Calyx tomentosus persistens 1.5 mm. altus lobis 5 triangularibus. Corolla nulla. Stamina 8, 2 mm. longa filamentis brevibus parce pilosis antheris oblongis. Ovarium ferrugineo-lanatum 2-3-lobatum 2-3-loculare. Stylus brevis stigmatibus bifido. Fructus pyriformi-globosus leviter complanatus bifidus vel inaequaliter bifidus vel fere integer scaber glaber rubro-brunneus dehiscentia irregulari coccis ad 3.5 cm. longis 4 cm. latis. Semina ossea subglobosa levia in sicco rubro-brunnea ad 2.3 cm. lata arillo in vivo coccineo.

A. macrococcus similis sed differt foliolis lanceolatis basi latiore novellis parce pubescentibus fructibus minoribus.

Tree of medium size. Branches terete, in dried condition striate; bark dusky brown; young branches densely rusty tomentose, glabrous with age. Leaves alternate, pinnate, to 40 cm. long; young leaves rusty tomentose, glabrous with age; rachis grooved above; petiole to 9 cm. long. Leaflets 7-10; blades lanceolate, slightly acuminate, coriaceous,

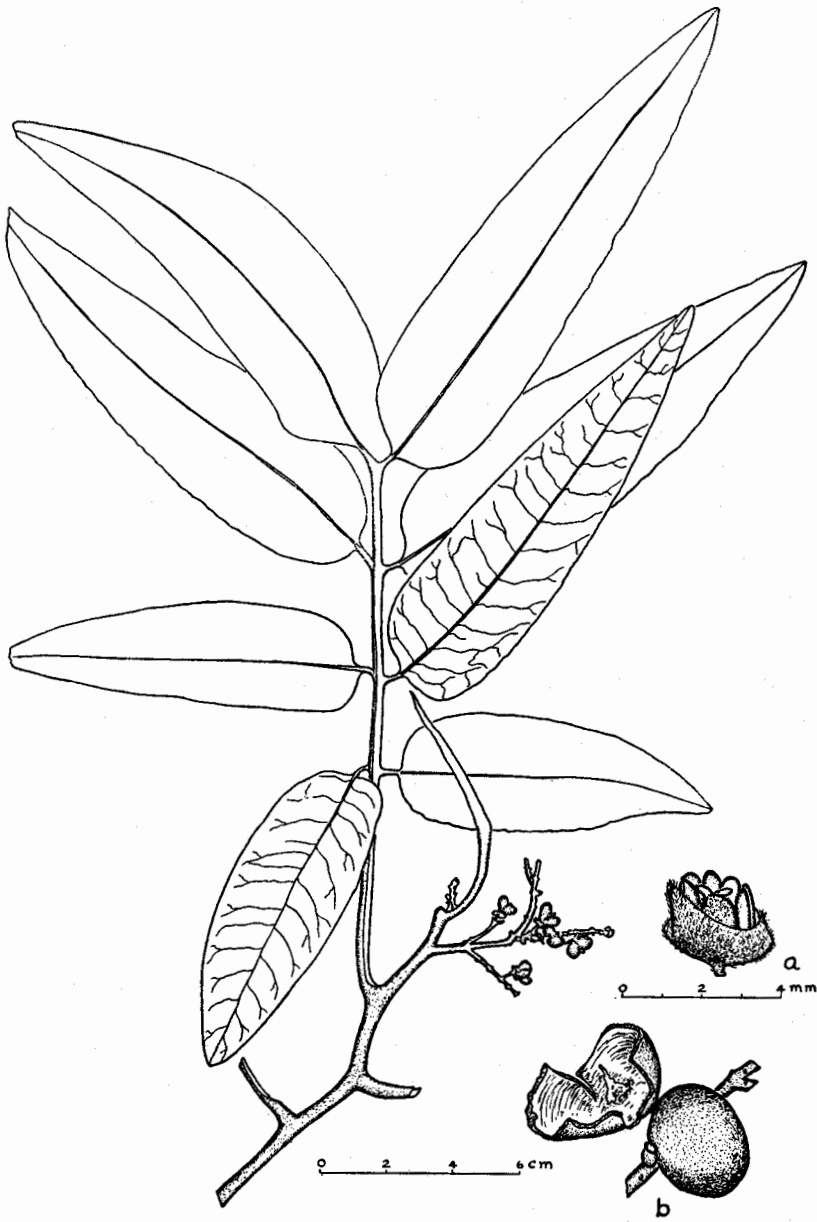


FIGURE 16.—Flowering branch, *Alectryon samoensis*: a, flower; b, fruits.

base unequally rounded, margin slightly undulate; young blades sparsely rusty pubescent below, glabrous above; mature blades glabrous on both sides; petiolules stout, 7-10 mm. long. Panicles axillary, tomentose, 5-6 cm. long; pedicels at anthesis 1 mm. long, elongating afterwards. Calyx tomentose, persistent, 1.5 mm. high; lobes 5, triangular. Corolla none. Stamens 8, 2 mm. long; filaments short, sparsely pilose; anthers oblong. Ovary rusty lanate, 2-3-lobed, 2-3-celled. Style short, stigma bifid. Fruit pyriform-globose, slightly flattened, bifid or unequally bifid or almost entire, rough, glabrous, reddish brown, dehiscence irregular, cocci to 3.5 cm. long, 4 cm. broad. Seeds bony, subglobose, smooth; dried specimens reddish brown, to 2.3 cm. broad; fresh arillus scarlet.

Savaii: forest above Salailua, altitude 1300-1400 meters, flower, fruit, September 23, 1931, Christophersen no. 2678, type in B. P. Bishop Museum; forest above Salailua, altitude 1000 meters, fruit, September 22, 1931, Christophersen no. 2707. Native name, *taputoi* (no. 2707).

This genus is distributed in Malaysia, Melanesia, Australia, and New Zealand, but has so far been recorded for Polynesia only in Hawaii. Its discovery in Samoa fills a gap in its known distribution. The Samoan species comes close to the Hawaiian *A. macrococcus* but differs in the lanceolate leaflets with broader base, the less dense pubescence of the young leaflets, and the smaller fruits. It is a tree of medium size growing in the forests of Savaii at medium and high altitudes. The wood is very hard and is used by the Samoans for axe handles.

#### **Alectryon** species.

Savaii: forest above Siuvao, altitude 300 meters, young fruit, November 19, 1931, Christophersen no. 3302. Native name, *taputoi* (no. 3302).

The specimens, showing immature fruits only, differ from *A. samoensis* in the broader, ovate leaflets, of which there are only six on each leaf.

#### 4. **GUIOA** Cavanilles

**Guioa subfalcata** Radlkofer: Sitzb. Kgl. Bay. Akad. Wiss., vol. 9, p. 609, 1879.

*Cupania lentiscifolia* A. Gray, non Persoon.

Upolu: forest, Fao mountain, altitude 300 meters, flower, October 6, 1929, Christophersen no. 560.

Dr. I. M. Johnston has kindly compared this specimen with the type of *G. subfalcata* Radlkofer in Gray Herbarium, and he states that they are clearly of the same species, agreeing remarkably in detail.

#### 5. **ARYTERA** Blume

?**Arytera oligolepis** Radlkofer: Sitzb. Kgl. Bay. Akad. Wiss., vol. 9, p. 555, 1879.

A sterile specimen from Upolu (Vailele, Eames no. 163) with 8-12 lanceolate, long-acuminate leaflets may belong to this species.

*Arytera samoensis* Radlkofer: Denkschr. Akad. Wiss. Wien, vol. 85, p. 305, 1910.

Tutuila: forest, Alava Ridge, altitude 400 meters, fruit, November 7, 1929, Christophersen no. 1142. Upolu: forest, Vaea, altitude 350 meters, fruit, August 28, 1929, Christophersen no. 462.

The fruits are slightly broader (8 mm.) than stated in the original description, and the leaflets of the specimen from Upolu are broader, to 3 cm. wide. A tree to 8 meters high.

## 6. DODONAEA Linnaeus

*Dodonaea viscosa* Jacquin: Enum. Pl. Carib., p. 19, 1760.

Savaii: open "fern country," Manase plantation, altitude 100 meters, flower, fruit, September 18, 1929, Christophersen no. 680; open "fern country," Manase plantation, altitude 100 meters, flower, young fruit, August 13, 1931, Christophersen and Hume no. 2364; forest, Falealupo, altitude 25 meters, September 29, 1931, Christophersen no. 2792. Native name, *tongo vao* (no. 2792).

A shrub or small tree to 5 meters high growing in open places or forests of the lowlands.

## 7. HARPULLIA Roxburgh

*Harpullia mellea* Lauterbach: Engl. Bot. Jahrb., vol. 41, p. 229, 1908.

Savaii: forest, Papa-Fangalele, altitude 10 meters, flower, fruit, November 21, 1931, Christophersen no. 3407.

A tree of medium size observed only in the lowland forests of western Savaii.

In the collection are also several sterile, undeterminable specimens of Sapindaceae.

## FAMILY 54-A. BALSAMINACEAE

Commonly cultivated by the natives as an ornamental plant is found *Impatiens Balsamina* Linnaeus. The native name is *patiale*, obviously an adaptation of *Impatiens*. Specimen collected in Ngangamala, Savaii (Christophersen no. 3055).

## FAMILY 55. RHAMNACEAE

### I. COLUBRINA L. C. Richard

*Colubrina asiatica* (Linnaeus) Brongniart: Ann. Sci. Nat., vol. 10, p. 369, 1827.

Tau: Luma-Faleasao trail, altitude 40 meters, fruit, January 8, 1922,

Garber no. 687. Ofu: Nuu Islet, fruit, June 4, 1925, Garber no. 993. Tutuila: edge of forest, above Pago Pago, altitude 150 meters, flower, fruit, September 20, 1923, Wilder no. 22; flower, September 15, 1923, Wilder no. 71; seacoast, flower, September 16, 1923, Wilder no. 75; edge of forest, altitude 40 meters, flower, September 9, 1923, Wilder no. 89. Savaii: roadside near Falelima, flower, fruit, October 9, 1929, Christophersen no. 937; roadside, Safotu-Manase, flower, fruit, August 17, 1931, Christophersen and Hume no. 2413; coconut plantation, Safune, August 13, 1931, Christophersen and Hume nos. 2439 and 2443; coastal bluff, Safotu-Manase, flower, fruit, August 20, 1931, Christophersen and Hume no. 2447. Native name, *fisoa* (nos. 687, 993, 937, 2439, 2443).

A common shrub near the seashore. The leaves are used, like those of the *toi*, for washing.

## 2. ALPHITONIA Reissek

**Alphitonia zizyphoides** (Sprengel) A. Gray: Bot., Phanerog., U. S. Expl. Exped., vol. 15, pt. 1, p. 278, 1854.

Tau: Fitiuta trail, altitude 100 meters, fruit, August 4, 1921, Garber no. 559. Ofu: Nuu Islet, altitude 75 meters, fruit, July 4, 1925, Garber no. 1104. Upolu: near Papasea, altitude 40 meters, September 21, 1923, Swezey and Wilder no. 32; forest above Malololelei, altitude 650 meters, August 10, 1929, Christophersen no. 160; forest below Malololelei, altitude 500 meters, fruit, August 16, 1929, Christophersen no. 296. Savaii: forest above Safune, altitude 100 meters, flower, fruit, May 12, 1924, Bryan no. 139; forested "island" in Matavanu lava field, altitude 400 meters, September 12, 1929, Christophersen no. 587; open "fern country" near Manase plantation, altitude 100 meters, fruit, September 18, 1929, Christophersen no. 678; forested "island" in Matavanu lava field, altitude 200 meters, fruit, July 6, 1931, Christophersen and Hume no. 1868; forest, Safune-Aopo, fruit, August 14, 1931, Christophersen (by E. Stehlin) no. 2495; open forest above Safotu (below Olo), altitude 600 meters, fruit, August 27, 1931, Christophersen and Hume no. 2534; abandoned plantation field, above Salailua, altitude 150 meters, fruit, October 28, 1931, Christophersen no. 2982; forest above Siuvao, altitude 300 meters, flower, November 19, 1931, Christophersen no. 3305. Native name, *toi* (nos. 559, 1104, 160, 296, 2495, 2534, 2982, 3305).

The *toi* is a medium-sized tree common in open places and forests of the lowlands and foothills. The leaves will froth when rubbed and are used for washing as a substitute for soap. The wood is favored for firewood.



## FAMILY 56. ELAEOCARPACEAE

## I. ELAEOCARPUS Linnaeus

*Elaeocarpus magnifolius*, species nova (fig. 17).

Arbor parva 4 m. alta. Ramuli validi cortice brunneo tomento rufo-brunneo instructi dein glabri. Folia versus apicem ramulorum disposita longe petiolata, laminis chartaceis vel coriaceis discoloribus supra costa excepta glabris subtus puberulis obovatis acuminatis apice acuto vel obtuso breviter mucronato basi leviter cordata margine plano sparse et leviter undulato-crenato nervis primariis utrinque 12-14 subtus prominentibus 15-24 cm. longis 7.5-13 cm. latis, petiolis ferruginoso-pubescentibus 5-8.7 cm. longis. Racemi laterales ante anthesin ad 7.5 cm. longi 7-11-flori pedunculo rachi pedicellisque cinereo-tomentosis pedicellis ad 10 mm. longis. Sepala 5 valvata lanceolata acuta extus sericeo-tomentosa intus sericeo-tomentosa versus marginem et apicem dense tomentosa ante anthesin 8-8.5 mm. longa 1.5-2 mm. lata. Petala in gemma glabrata. Antherae minute pubescentes aristatae. Ovarium sericeo-tomentosum.

Drupa ex exemplario 246 in sicco complanato-ellipsoidalis valde contracta caerulea ad 4 cm. longa 2.6 cm. lata 1.4 cm. crassa putamine duro profunde irregulariter lobato lobis lateralibus ad 6 mm. longis.

Affinis *E. Graeffei* sed differt foliis majoribus cordatis undulato-crenatis vix dentatis subtus puberulis antheris pubescentibus. Drupa in *E. Graeffei* ignota.

Small tree 4 m. high. Branches stout; bark brown with reddish brown tomentum, glabrous with age. Leaves long petiolate, inserted near end of branches; blades chartaceous or leathery, obovate, acuminate, acute or obtuse at apex, shortly mucronate, slightly cordate at base, surfaces of different color, glabrous above excepting midrib, puberulous below, 15-24 cm. long, 7.5-13 cm. broad, margin plane, sparsely and shallowly undulate-crenate, primary veins 12-14 on each side of midrib, prominent below; petiole rusty pubescent, 5-8.7 cm. long. Racemes lateral, to 7.5 cm. long before anthesis, 7-11-flowered; peduncle, rachis, and pedicels ashy tomentose; pedicels to 10 mm. long. Sepals 5, valvate, lanceolate, acute, outside silky tomentose, inside silky tomentose and densely tomentose towards margin and apex, before anthesis 8-8.5 mm. long, 1.5-2 mm. broad. Petals glabrate in bud. Anthers minutely pubescent, aristate. Ovary silky tomentose.—Dry fruit (from specimen no. 246) flattened ellipsoid, strongly contracted, blue, to 4 cm. long, 2.6 cm. broad, 1.4 cm. thick; putamen hard, deeply and irregularly lobed, lateral lobes to 6 mm. long.—Differs from *E. Graeffei* in its larger, cordate, undulate-crenate, hardly dentate leaves, puberulous below, and its pubescent anthers. Drupe of *E. Graeffei* unknown.

Upolu: forest above Malololei, altitude 700 meters, fruit, August 14, 1929, Christophersen no. 246; forest above Malololei, altitude 750 meters, bud, August 15, 1929, Christophersen no. 257, type in B. P. Bishop Museum. Savaii: forest above Salailua, altitude 1200-1300 meters, bud, September 23, 1931, Christophersen no. 2758; forest at Le To, above Salailua, altitude 750 meters, flower, October 21, 1931, Christophersen no. 2919; forest above Ngangamala, altitude 900 meters, flower, December 9, 1931, Christophersen no. 3438.

This species is closely related to the Fijian *E. Graeffei* as described and figured by Seemann (50, p. 28, pl. 8), but differs in characters of leaves and flowers. The specimens from Savaii differ in the more reddish tomentum of the racemes, which are shorter. A small tree 3-8 meters high in the forests at middle and high elevations.

*Elaeocarpus samoensis* Lauterbach: Engl. Bot. Jahrb., 41, p. 230, 1908.

Upolu: forest above Malololelei, altitude 750 meters, bud, August 15, 1929, Christophersen no. 263. Savaii: open woodland near Olo, above Sa-fotu, altitude 700 meters, fruit, August 9, 1931, Christophersen and Hume no.

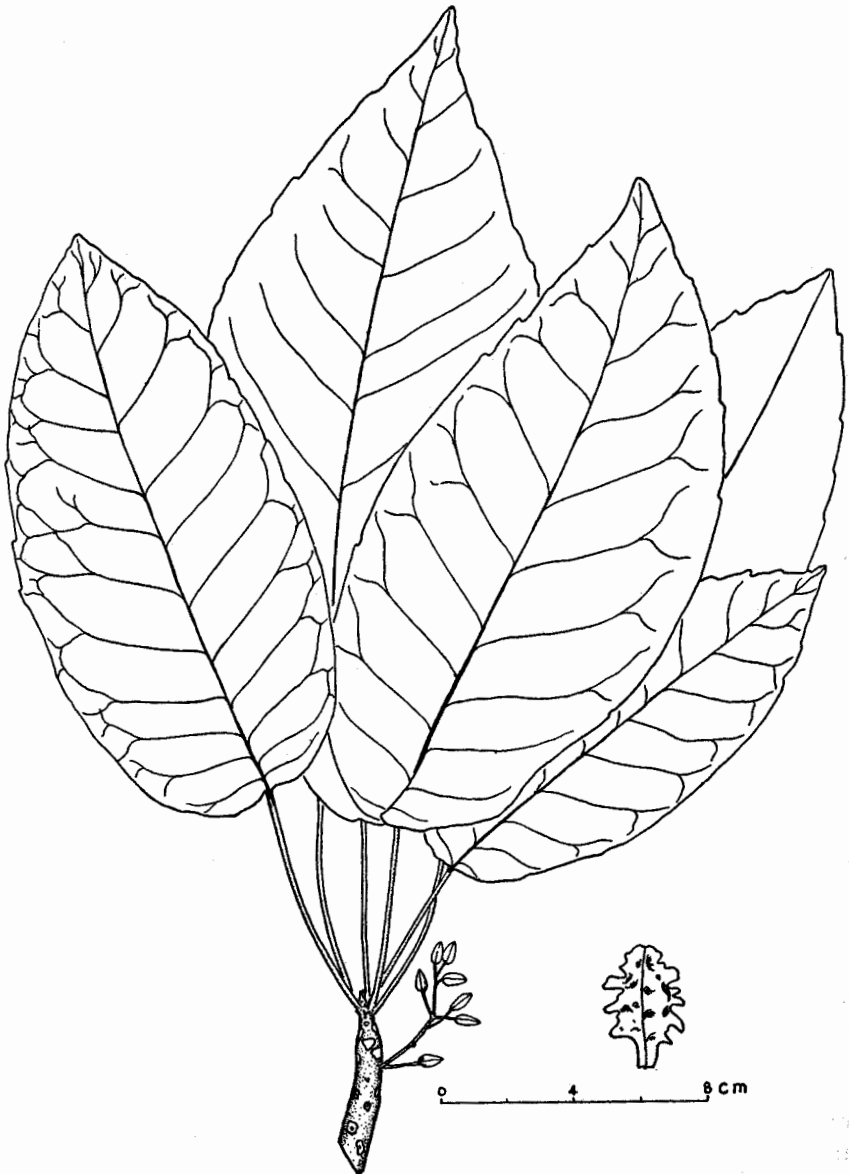


FIGURE 17.—Branch and stone, *Elaeocarpus magnifolius*.

2325; same locality, bud, fruit, August 26, 1931, Christophersen and Hume no. 2526; forest above Sili, altitude 450 meters, flower, November 13, 1931, Christophersen no. 3222.

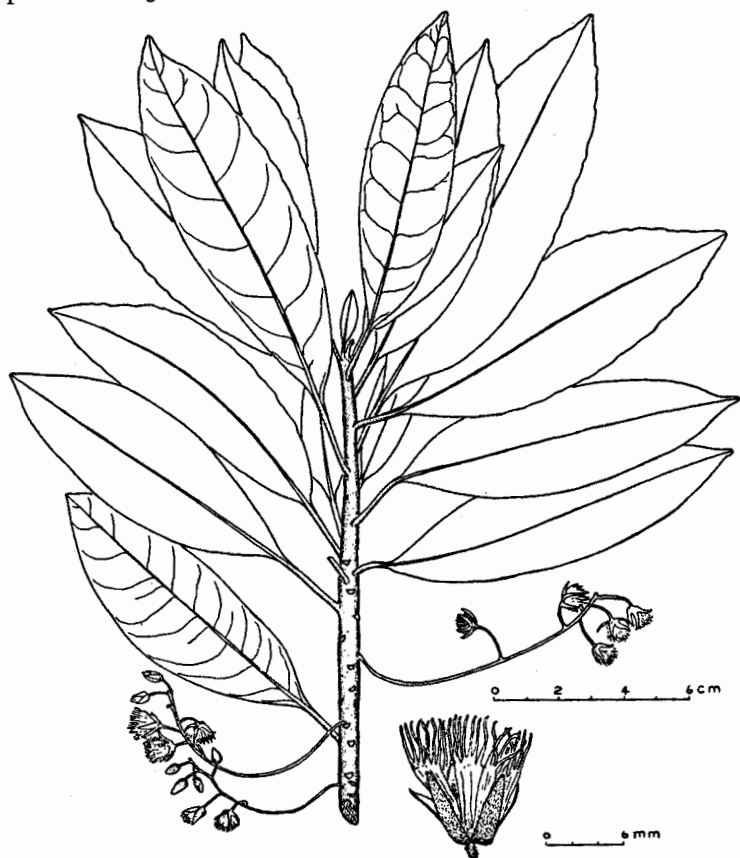


FIGURE 18.—Flowering branch and flower, *Elaeocarpus tuasivicus*.

The specimens from Savaii agree with a cotype specimen (Vaupel no. 390) in Bernice P. Bishop Museum except for the rounded or broadly acute leaf bases. The specimen from Upolu is sterile with longer petioles than the type, but agrees in the prominent, saccate glands at the base of the primary veins and other leaf characters.

***Elaeocarpus tuasivicus*, species nova (fig. 18).**

Arbor 6 m. alta. Ramuli validi glabri teretes cortice brunneo. Folia versus apicem ramulorum disposita petiolata, laminis coriaceis glabris supra saepe nitidis ellipticis vel oblanceolatis leviter acuminatis apice obtuso basi attenuata margine revoluta sparse et leviter undulato-crenato versus basim integro nervis primariis utrinque 8-10 subtus prominentibus secundariis tertiariisque supra prominentibus 6.5-13.5 cm. longis 2-4.5 cm.

latis, petiolis glabris 1-2.2 cm. longis. Racemi laterales 7-8 cm. longi 7-10-flori pedunculo glabrato rachi pedicellisque ferruginoso-pubescentibus pedicellis ad 15 mm. longis. Sepala 5 valvata lanceolata extus puberula intus marginem et apicem versus pubescentia 7 mm. longa ad 2 mm. lata. Petala glabra ovalia in vivo alba 8-10 mm. longa ad 4 mm. lata supra mediam partem irregulariter laciniata laciniis 10-15. Stamina numerosa circiter 4 mm. longa antheris puberulis breviter aristatis quam filamenta glabra paullo longioribus. Stylus subulatus puberulus 1.5-2 mm. longus. Ovarium conicum sericeo-tomentosum 2-loculare. Drupa ignota. Valde distincta foliis angustis fere integris.

Tree 6 m. high. Branches stout, glabrous, terete, bark brown. Leaves petiolate, inserted near end of branches; blades leathery, glabrous, usually shining above, elliptical or oblanceolate, slightly acuminate, obtuse at apex, attenuate at base, 6.5-13.5 cm. long, 2-4.5 cm. broad, margin revolute, sparsely and shallowly undulate-crenate, entire towards base, primary veins 8-10 on each side, prominent below, secondary and tertiary veins prominent above; petiole glabrous, 1-2.2 cm. long. Racemes lateral, 7-8 cm. long, 7-10-flowered, peduncle glabrate, rachis and pedicels rusty pubescent, pedicels to 15 mm. long. Sepals 5, valvate, lanceolate, outside puberulous, inside pubescent towards margin and apex, 7 mm. long, to 2 mm. broad. Petals glabrous, oval, white, 8-10 mm. long, to 4 mm. broad, irregularly laciniate above the middle, lobes 10-15. Stamens numerous, about 4 mm. long; anthers puberulous, shortly aristate, slightly longer than the glabrous filaments. Style subulate, puberulous, 1.5-2 mm. long. Ovary conical, silky tomentose, 2-celled. Drupe unknown.—Markedly distinguished by its narrow, almost entire leaves.

Savaii: forest above Letui, altitude 1600-1700 meters, flower, September 26, 1929, Christophersen no. 776, type in B. P. Bishop Museum; low forest on rim of Papafu Crater, altitude 1500 meters, September 22, 1931, Christophersen no. 2723; forest above Salailua, altitude 1350 meters, bud, November 7, 1931, Christophersen no. 3115; scrub forest on crater rim, above Aopo, altitude 1500 meters, bud, December 7, 1931, Christophersen no. 3458.

The specific name is taken from the Samoan name for the main mountain backbone, because this species is characteristic of the forests of this region. It is characterized by its thick, narrow, almost entire leaves. It is commonly a small tree 5-6 meters high but may grow to a height of 10-12 meters.

#### **Elaeocarpus Ulianus**, species nova (fig. 19).

Arbor magna ultra 20 m. alta. Rami glabri teretes cortice albo. Folia versus apicem ramulorum disposita longe petiolata, laminis coriaceis glabris ovatis acuminatis apice obtuso basi rotundata vel subcordata margine serrato-crenato nervis primariis utrinque 8-9 subtus prominentibus 7-13.5 cm. longis 3-6.2 cm. latis, petiolis pubescentibus vel glabris 2-5 cm. longis. Racemi laterales circiter 8 cm. longi plerumque 10-flori rachi pedicellisque adpresse brunneo-tomentosis pedicellis ad 8 mm. longis. Sepala 5 valvata lineari-lanceolata acuta utrinque sericeo-tomentosa 8 mm. longa 1.5 mm. lata. Petala obovata glabra 9-10 mm. longa ad 4 mm. lata fere ad mediam partem irregulariter laciniata laciniis plerumque 9. Stamina numerosa glabra filamentis circiter 1 mm. longis antheris longioribus longe aristatis. Stylus subulatus 4 mm. longus basi sericeo-tomentosa. Ovarium conicum sericeo-tomentosum 2-loculare.

Drupa submatura ex exemplario 3005 in vivo late ellipsoidalis ad 5 × 4 cm. longa et lata in sicco 4.6 × 3.1 × 1.4 cm. longa lata et crassa putamine duro profunde lobato lobis utrinque 3 ad 8 mm. longis.

Differt a *E. samoensi* Lauterbach drupis majoribus; a *E. Graeffei* Seemann foliis ovatis nec obovatis nec oblongis calyce lobis angustioribus non rufo-tomentellis filamentis comparate longioribus.

Large tree, more than 20 m. high. Branches glabrous, terete, bark white. Leaves long petiolate, inserted near end of branches; blades leathery, glabrous, ovate, acuminate, obtuse at apex, rounded or subcordate at base, 7-13.5 cm. long, 3-6.2 cm. broad, margin serrate-crenate, primary veins 8-9 on each side, prominent below; petiole pubescent or glabrous, 2-5 cm. long. Racemes lateral, about 8 cm. long, usually 10-flowered, rachis and pedicels appressed brownish tomentose, pedicels to 8 mm. long. Sepals 5, valvate, linear-lanceolate, acute, silky tomentose on both sides, 8 mm. long, 1.5 mm. broad. Petals obovate, glabrous, 9-10 mm. long, to 4 mm. broad, irregularly lacinate almost to the middle, lobes usually 9. Stamens numerous, glabrous, filaments about 1 mm. long, anthers longer, long aristate. Style subulate, 4 mm. long, silky tomentose at base. Ovary conical, silky tomentose, 2-celled. Living specimens of submature drupe (from specimen no. 3005) broadly ellipsoid, to 5x4 cm. long and broad, dried specimens 4.6x3.1x1.4 cm. long, broad, and thick; putamen hard, deeply lobed; lobes 3 on each side, to 8 mm. long.—Differs from *E. samoensis* Lauterbach in its larger drupes. Differs from *E. Graeffei* Seemann in its ovate, not obovate or oblong leaves, narrower, not reddish tomentose sepals, relatively longer filaments.

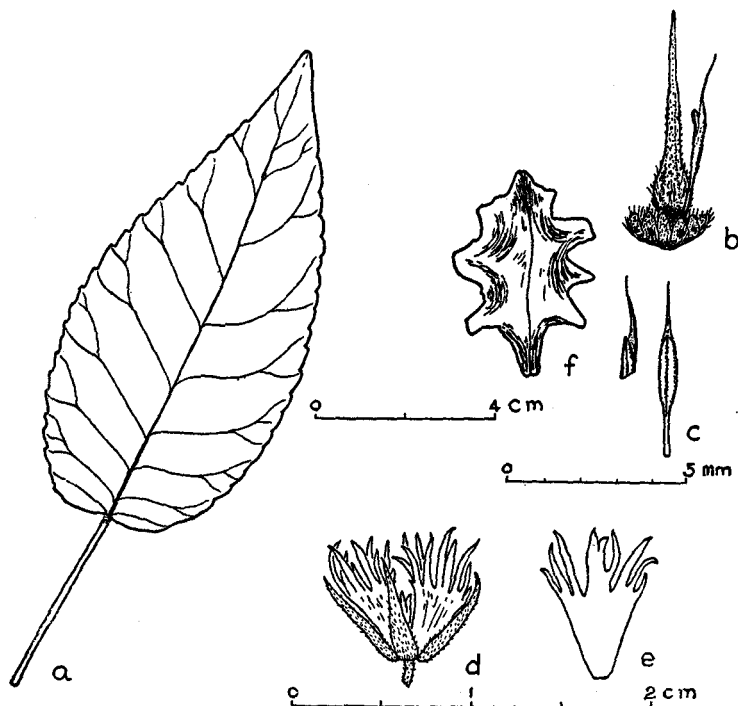


FIGURE 19.—*Elaeocarpus Ulianus* no. 2696, stone no. 3005: a, leaf; b, pistil and stamen; c, anthers; d, flower; e, petal; f, stone.

Upolu: forest near Malololelei, altitude 550 meters, flower, August 17, 1929, Christophersen no. 327. Savaii: forest above Salailua, altitude 900

meters, flower, September 22, 1931, Christophersen no. 2696, type in B. P. Bishop Museum; forest above Salailua, altitude 500 meters, young fruit, October 20, 1931, Christophersen no. 2891; forest at Le Vai, above Salailua, altitude 350 meters, flower, fruit, October 28, 1931, Christophersen no. 3005; forest above Siuvao, altitude 400 meters, flower, fruit, November 19, 1931, Christophersen no. 3307; forest, Siuvao-Auala, altitude 600 meters, flower, November 20, 1931, Christophersen no. 3381.

This species, named after Uli, my Samoan companion on many field trips, is related to the Fijian *E. Graeffei* as described and figured by Seemann (50, p. 28, pl. 8). It differs in its ovate leaves, narrower sepals, which are white or grayish silky tomentose, and its relatively longer filaments. The fruit of *E. Graeffei* is not known.

Growing in the forests at middle elevations, *E. Ulianus* is a large tree 12 to more than 20 meters high with a diameter breast high of 1 meter.

***Elaeocarpus* species.**

Savaii: edge of forest, Tufutafoe-Falelima, altitude 25 meters, bud, fruit, September 30, 1931, Christophersen no. 2766; edge of forest, Salailua, altitude 150 meters, October 28, 1931, Christophersen no. 2983; forest, Falelima-Siuvao, altitude 50 meters, flower, November 19, 1931, Christophersen no. 3309. Native name, *siapo atua* (nos. 2766 and 3309).

This species is very distinct from any of the other Samoan species of *Elaeocarpus*. The ovary is 5-celled with 2 ovules in each cell. The fruits are broadly pear-shaped or subglobose to 20 mm. long and 19 mm. broad, blue, covered with a bloom when ripe. The stone is of the same form, profusely and prominently tuberculate. The anthers are terminated by a hairy appendage, not rigidly aristate as in the other Samoan species. This species seems to come close to *E. ganitrus* Roxburgh. It is not *E. pyriformis* A. Gray from Fiji.

FAMILY 57. TILIACEAE

I. TRICHOSPERMUM Blume

***Trichospermum Richii*** (A. Gray) Seemann: Bonplandia, vol. 9, p. 254, 1861.

Tutuila: scrub forest, top of Le Pioa, altitude 500 meters, fruit, January 2, 1932, Christophersen no. 3570. Savaii: forest by stream, above Matavanu Crater, altitude 900 meters, fruit, July 15, 1931, Christophersen and Hume no. 2076.

The specimens agree with the original description and illustration of Gray (25, p. 200, pl. 14), except that some of the leaves are more elongated acuminate and the fruits are slightly smaller, not more than 2 cm. long and 3 cm. wide. A small or medium-sized tree rare in the forests at medium elevations.

## 2. GREWIA Linnaeus

**Grewia crenata** (Forster) Setchell: Am. Samoa, p. 72, 1924.

Savaii: shore forest, Tanga, bud, October 6, 1931, Christophersen no. 2832; low coastal forest, Falealupo-Fangalele, flower, November 22, 1931, Christophersen no. 3321; rocky coast, Auala-Vaisala, flower, November 20, 1931, Christophersen no. 3353. Native name, *fau ui* (*fau'ui*) (no. 3321).

A shrub or small tree of the coastal forests.

## 3. TRIUMFETTA Linnaeus

**Triumfetta Bartramia** Linnaeus: Syst., 10th ed., p. 1044, 1759.

Tau: Sani Ridge back of Fitiuta, altitude 150 meters, flower, fruit, August 9, 1921, Garber no. 602. Olosenga: Olosengauta, altitude 250 meters, flower, fruit, June 17, 1925, Garber no. 1076. Tutuila: open place, Pago Pago, altitude 30 meters, flower, fruit, September 21, 1923, Wilder no. 37. Upolu: waste place, Apia, flower, fruit, August 30, 1929, Christophersen no. 481. Savaii: near Safune, flower, fruit, April 30, 1924, Bryan no. 114; open "fern country" near Manase, altitude 100 meters; flower, fruit, September 18, 1929, Christophersen no. 675; waste ground near beach, flower, fruit, July 8, 1931, Christophersen and Hume no. 1938; lava field near Salailua, altitude 10 meters, flower, fruit, August 21, 1931, Christophersen and Hume no. 2465.

An erect shrub common in waste ground and open places in the lowlands and foothills.

**Triumfetta procumbens** Forster f.: Prodr., p. 35, 1786.

Tau: beach at Fitiuta, flower, fruit, August 8, 1921, Garber no. 582; sandy beach, Fanga, flower, fruit, April 20, 1922, Garber no. 764. Savaii: road at beach, Safune, flower, fruit, September 27, 1929, Christophersen no. 735; sandy beach, Avau, flower, fruit, July 8, 1931, Christophersen and Hume no. 1936; roadside, Aopo-Sassina, fruit, August 27, 1931, Christophersen (by E. Stehlin) no. 2552; sandy pocket on rocky shore, Tanga, flower, fruit, October 6, 1931, Christophersen no. 2824.

A prostrate shrub common on sandy beaches.

## FAMILY 58. MALVACEAE

## 1. SIDA Linnaeus

**Sida acuta** Burman f.: Fl. Ind., p. 147, 1768.

Savaii: open "fern country," Vaipouli-Manase, altitude 100 meters, flower, fruit, September 21, 1929, Christophersen no. 725.

**Sida rhombifolia** Linnaeus: Sp. Pl., p. 684, 1753.

Tau: plateau back of Luma, altitude 60 meters, flower, fruit, August 2, 1921, Garber no. 548. Olosenga: Olosengauta-Piumafua Ridge, altitude 525 meters, flower, fruit, June 17, 1925, Garber no. 1075. Ofu: at Tua, flower, fruit, June 7, 1925, Garber no. 1020. Tutuila: roadside, Pago Pago, flower, fruit, September 18, 1923, Wilder no. 23; Goat Island, fruit, December 14, 1924, Garber no. 815; Pago Pago harbor, fruit, 1929, Diefenderfer no. 8; plantation near Aunuu Village, Aunuu Island, flower, November 12, 1929, Diefenderfer no. 1240. Upolu: waste places, Apia, flower, fruit, February 16, 1921, Eames no. 39; roadside near Malololelei, altitude 600 meters, flower, fruit, August 10, 1929, Christophersen no. 136. Savaii: near Safune, flower, fruit, April 30, 1924, Bryan no. 113; open "fern country" near Manase, altitude 100 meters, flower, September 18, 1929, Christophersen no. 688; roadside, Fangamalo, fruit, July 4, 1931, Christophersen and Hume no. 1862b. Native name, *mau tofu* (nos. 548, 1075, 1020, 815, 39).

A common weed in waste places, and along roads and trails from the lowlands to medium elevations.

**Sida samoensis** Rechinger: Fedde Rep. Nov. Sp., vol. 4, p. 228, 1907.

Savaii: in lawn, Fangamalo, flower, fruit, September 10, 1929, Christophersen no. 577; sandy place, Manase, flower, fruit, August 24, 1931, Christophersen and Hume no. 2490; sandy place, Falealupo, flower, fruit, November 22, 1931, Christophersen no. 3323.

A decumbent, small-leaved shrub in sandy places.

2. **URENA** Linnaeus**Urena lobata** Linnaeus: Sp. Pl., p. 692, 1753.

Tau: plateau back of Luma, altitude 60 meters, flower, fruit, August 2, 1921, Garber no. 545. Tutuila: open, back of Pago Pago, fruit, December 26, 1924, Garber no. 897; Pago Pago harbor, flower, fruit, 1929, Diefenderfer no. 19; plantation near Aunuu village, Aunuu Island, November 12, 1929, Diefenderfer no. 1237. Upolu: Vaialele, flower, fruit, March 5, 1921, Eames no. 170; roadside, Apia, flower, August 30, 1929, Christophersen no. 480. Savaii: near Safune, flower, fruit, April 30, 1924, Bryan no. 114; Salailua, flower, fruit, May 19, 1924, Bryan no. 167; coastal bluff, Safotu-Manase, flower, fruit, August 20, 1931, Christophersen and Hume no. 2457. Native name, *mau tofu* (nos. 114, 167).

In the lowlands in waste places, roadsides, plantations.



## 3. HIBISCUS Linnaeus

**Hibiscus rosasinensis** Linnaeus: Sp. Pl., p. 694, 1753.

Tutuila: above Vatia, flower, December 17, 1924, Garber no. 876. Upolu: cultivated, Apia, Christophersen no. 3477. Savaii: near Safune, flower, April 30, 1924, Bryan no. 108; forest, along trail, Sili-Lata-iuta, altitude 50 meters, flower, November 14, 1931, Christophersen no. 3142. Specimens from cultivated shrubs: Christophersen nos. 2841, 3046, 3047. Native name, *aute* ('*aute*) (nos. 3477, 108, 3142, 2841, 3046, 3047).

The hibiscus is one of the most common ornamental plants of the Samoans. Several forms are present. It is also met with in the lowland forests, especially along the trails. A red dye for tapa decoration is said to be prepared from the flowers.

**Hibiscus tiliaceus** Linnaeus: Sp. Pl., p. 694, 1753.

Tau: at beach, Fitiuta, flower, fruit, August 8, 1921, Garber no. 583. Tutuila: shore, near Pago Pago, flower, fruit, February 8, 1921, Eames no. T-30; Pago Pago harbor, 1929, Diefenderfer no. 15. Upolu: beach near Apia, flower, fruit, February 16, 1921, Eames no. 35; forest near Apia, fruit, September 15, 1923, Wilder no. 7; Vaialele, August 20, 1929, Christophersen (by native) no. 353. Savaii: open "fern country" near Manase, altitude 100 meters, flower, August 13, 1931, Christophersen and Hume no. 2370; forest above Salailua, altitude 600 meters, November 7, 1931, Christophersen no. 3079; tidal swamp, Fanga, flower, fruit, December 20, 1931, Christophersen no. 3470. Native name, *fau* or *fau tu* (nos. 583, T-30, 35, 7, 353, 2370, 3079, 3470).

All the specimens with the exception of nos. 353 and 3079 have leaves with dense, grayish, velvety tomentum on the lower surface and entire or inconspicuously crenate margin. They may be referred to the broad grouping variety *genuinus* of Hochreutiner (32, p. 63). Specimen no. 353 is sterile and has large cordate leaves to 28 by 25 cm. showing a tendency toward being tri-lobed. The margin is distinctly serrate-crenate and the lower surface is not tomentose but shows scattered stellate hairs only. Specimen no. 3079, also from a sterile tree, is less densely tomentose than the other specimens, and the margin of the leaf is distinctly crenate. Dr. F. B. H. Brown has drawn my attention to the growth in the Marquesas Islands of crenate, glabrate leaves on sterile branches of trees which otherwise have entire, densely tomentose leaves. The species is variable with seemingly little constancy in its variations. Its polymorphic features will add to the difficulties of a satisfactory classification.

The *fau* is a common shore tree in Samoa and grows inland at least to an altitude of 600 meters. It may grow as an erect tree or form a tangle of

prostrate stems. The flowers are favorites with the Samoans for ornament, and the bast furnishes material for rope (*fau*) and skirts (*titi*). The light, strong wood is used for the hull of small canoes (*pao pao*) and also for the float (*ama*) of the outrigger. It is also favored for carrying sticks (*amo*) and for making fire by friction.

*Hibiscus mutabilis* Linnaeus is cultivated by the Samoans for ornamental purposes (Tau, Garber no. 612; Savaii, Christophersen no. 3049). *Hibiscus sabdariffa* Linnaeus, the roselle, is also found in the Samoan gardens. A beverage is prepared from the fleshy calyces (Ofu, Garber no. 989; Savaii, Christophersen no. 2057).

#### 4. ABELMOSCHUS Medikus

**Abelmoschus moschatus** Medikus: Malv., p. 46, 1787.

*Hibiscus Abelmoschus* Linnaeus.

Tau: Sani Ridge above Fitiuta, altitude 150 meters, fruit, August 9, 1921, Garber no. 601; Luma-Faleasao, flower, fruit, October 1930, Judd. Olosenga: taro plantation back of Olosengauta, altitude 350 meters, flower, fruit, June 17, 1925, Garber no. 1085. Upolu: valley above Eva, altitude 100 meters, flower, September 5, 1929, Christophersen no. 528. Savaii: open "fern country," Vaipouli-Manase, altitude 100 meters, September 18-21, 1929, Christophersen nos. 686 and 722 (flower). Native name, *fau tangaloa* (Judd, and no. 601).

In plantations and open places in the lowlands.

#### 5. THESPESIA Solander

**Thespesia populnea** (Linnaeus) Solander: ex Correa, Ann. Mus. Paris, vol. 9, p. 290, 1807.

Tau: beach at Fangamalo, flower, fruit, January 7, 1922, Garber no. 683. Ofu: rocky coast near Tuafanua, fruit, May 26, 1925, Garber no. 982. Tutuila: shore, Aua, flower, November 10, 1929, Christophersen no. 1206. Savaii: mangrove swamp, Salailua-Lata-itai, fruit, September 18, 1931, Christophersen no. 2638. Native name, *milo* (nos. 683, 982, 1206, 2638).

The *milo* is a common seashore tree. The wood is used for kava bowls (*tanoa*).

#### 6. GOSSYPIUM Linnaeus

Several forms of cotton are found in a seminatural state in the vicinity of villages. Some of the specimens (Christophersen nos. 2539, 2661, 3345, all from Savaii) with almost naked seeds and free or slightly united bracteoles appear to be close to *G. barbadense* Linnaeus. Native name, *vavae samoa*.

## FAMILY 58-A. BOMBACACEAE

The kapok, *Ceiba pentandra* (Linnaeus) Gaertner, is cultivated in nearly all villages. The cotton is used by the natives for stuffing pillows, but is not a commercial article. The native name is *vavae* or *vavae papalangi*.

## FAMILY 59. STERCULIACEAE

## 1. MELOCHIA Dillenius

**Melochia odorata** Linnaeus f.: Suppl., p. 302, 1781.

Upolu: open place, Malololelei, altitude 550 meters, flower, July 8, 1925, Wilder no. 416; edge of forest near Malololelei, altitude 550 meters, flower, fruit, August 6, 1929, Christophersen no. 65; forest above Malololelei, altitude 650 meters, flower, August 10, 1929, Christophersen no. 164; grassland near Malololelei, altitude 650 meters, fruit, October 18, 1929, Christophersen no. 953. Savaii: plantation above Letui, altitude 100 meters, flower, fruit, September 27, 1929, Christophersen no. 764; low coastal forest near Fangalele, flower, November 21, 1931, Christophersen no. 3403.

A small tree common in openings and open forests at low and medium elevations.

## 2. COMMERSONIA Forster

**Commersonia bartramia** (Linnaeus) Merrill: Interpret. Herb. Amb., p. 362, 1917.

*Commersonia echinata* Forster.

Upolu: edge of forest near Malololelei, altitude 550 meters, flower, fruit, August 6, 1929, Christophersen no. 66. Savaii: lava field Letui-Aopo, altitude 100 meters, flower, fruit, May 15, 1924, Bryan no. 142; open "fern country" near Manase, altitude 100 meters, flower, fruit, September 18, 1929, Christophersen no. 691; forested "island" in Matavanu lava field, altitude 200 meters, flower, fruit, July 6, 1931, Christophersen and Hume no. 1876.

A shrub or small tree to 8 meters high growing in open places in the lowlands.

## 3. KLEINHOVIA Linnaeus

**Kleinhovia hospita** Linnaeus: Sp. Pl., 2d ed., p. 1365, 1763.

Tau: Fitiuta trail, altitude 125 meters, fruit, August 4, 1921, Garber no. 565. Upolu: Apia-Vailima, flower, fruit, February 16, 1921, Eames no. 7; forest, Vaea, altitude 100 meters, flower, fruit, April 25, 1924, Bryan no. 100; forest below Malololelei, altitude 500 meters, fruit, August 16, 1929, Christophersen no. 293. Savaii: coastal bluff, Safotu-Manase, flower, fruit,

August 20, 1931, Christophersen and Hume no. 2449; edge of forest, Salailua, altitude 75 meters, flower, fruit, October 26, 1931, Christophersen no. 2953. Native name, *fua fua* (*fu'a fu'a*) nos. 565, 7, 293, 2953).

A medium-sized or large tree in open places and forests of the lowlands and foothills.

#### 4. STERCULIA Linnaeus

*Sterculia fanaiho* Setchell: Am. Samoa, p. 69, 1924.

Tau: plateau back of Luma, altitude 100 meters, fruit, September 21, 1922, Garber no. 775. Ofu: Nuu Islet, fruit, July 4, 1925, Garber no. 1112. Savaii: open forest near Vaisala, altitude 10 meters, fruit, November 21, 1931, Christophersen no. 3348. Native name, *fanaio* (*fana'io*) (nos. 775, 1112, 3348).

A medium-sized tree not uncommon in the coastal forests. The inner bark is used, like the bark of the *fau*, for dancing skirts (*titi*).

Sterile specimens, probably belonging to another species of *Sterculia* were collected on Tutuila and Savaii (Christophersen nos. 1134, 2840).

### FAMILY 60. THEACEAE

#### I. EURYA Thunberg

*Eurya japonica* Thunberg: Fl. Jap., p. 191, pl. 25, 1784.

Tutuila: Matafao Ridge, altitude 500-600 meters, November 3, 1929, Christophersen nos. 1049 (bud, fruit) and 1069 (fruit); scrub forest, top of Le Pioa, altitude 500 meters, January 2, 1932, Christophersen nos. 3510 (fruit), 3513 (flower, fruit) 3530 (flower, fruit). Savaii: edge of forest near Matavanu lava field, altitude 200 meters, flower, September 12, 1929, Christophersen no. 621; forest above Safotu-Letui, altitude 1600-1700 meters, flower, fruit, September 25-26, 1929, Christophersen nos. 794 and 816; forest above Vaipouli, altitude 150 meters, flower, July 7, 1931, Christophersen and Hume no. 1905; forest above Matavanu Crater, altitude 900 meters, flower, July 15, 1931, Christophersen and Hume no. 2070; forest above Matavanu Crater, altitude 1550 meters, July 30, 1931, Christophersen and Hume no. 2240.

The relation of the Samoan specimens to the typical form and other forms of this species, and also to *E. acuminata* de Candolle needs further study. Melchior (39, p. 148) follows Reinecke (46, p. 656) in reducing *E. Pickeringii* A. Gray and *E. Richii* A. Gray to *E. japonica*.

A shrub to 4 meters high growing in the forests at all altitudes.

## FAMILY 61. GUTTIFERAE

## I. OCHROCARPUS Thouars

?**Ochrocarpus excelsus** (Planchon et Triana) Vesque: DC Mon. Phanerog., vol. 8, p. 525, 1893.

Savaii: Falealupo, September 1931, Christophersen (by E. Stehlin) no. 2664; forest near Falealupo, November 22, 1931, Christophersen no. 3318. Native name, *manapau* (nos. 2664, 3318).

The sterile specimens most probably belong to this widely distributed shore species. Two specimens from the forests above Matavanu Crater at an altitude of 900 meters (Christophersen and Hume nos. 2029, 2053) have smaller, elliptic or ovate leaves. Immature fruits are present. They may belong to an undescribed species.

## 2. CALOPHYLLUM Linnaeus

**Calophyllum inophyllum** Linnaeus: Sp. Pl., p. 513, 1753.

Tau: forest back of Luma, altitude 3 meters, fruit, January 11, 1922, Garber no. 704. Savaii: Lelepa, July 8, 1931, Christophersen and Hume no. 1941; shore, Salailua-Lata-itai, October 19, 1931, Christophersen no. 2870. Native name, *fetau* (nos. 704, 1941, 2870).

A common tree in the coastal forests. The wood is used for a variety of purposes: house building, canoes, kava bowls. A bath taken in salt water in which leaves of the *fetau* are macerated will give relief for chicken pox (Garber, field notes on Tau).

**Calophyllum samoense**, species nova (fig. 20).

Arbor mediocris (vel magna). Ramuli quadrangulares dein teretes glabri pruinosi. Folia petiolata glabra, laminis coriaceis lanceolatis vel oblongis vel ellipticis breviter acuminatis apice obtuso basi acuta vel leviter acuminata margine integro revoluta nervis primariis parallelis fere 0.5 mm. inter se distantibus 7-14 cm. longis 2.5-5.2 cm. latis, petiolis leviter alatis 13-23 mm. longis. Racemi axillares 6-10 cm. longi circiter 10-flori pedunculo basi ferrugineo-tomentella pedicellis glabris ad anthesin 15-22 mm. longis. Sepala 4 valde imbricata concava ovalia glabra 6-8 mm. longa. Petala 4 obovata apice rotundato glabra 7-8 mm. longa 4 mm. lata. Stamina numerosa glabra filamentis basi vix connata 3 mm. longis antheris oblongis fere 1 mm. longis. Stylus 3 mm. longus stigmatibus peltato. Ovarium subglobosum glabrum 2.5 mm. diametro.

Drupa exemplaris 2417 late ellipsoidalis pruinosa endocarpio duro ellipsoidali utrinque rotundato 18 mm. longo 15 mm. lato 1 mm. crasso. Semina ovata leviter brunnea 13 mm. longa 11 mm. lata.

Differt a *C. vitiensi* nervis primariis propioribus pedicellis longioribus sepalis petalisque minoribus stylis brevioribus.

Tree of medium (or large) size. Branches quadrangular, terete with age, glabrous, pruinose. Leaves petiolate, glabrous; blades leathery, lanceolate or oblong or elliptical, shortly acuminate, obtuse at apex, acute or slightly acuminate at base, 7-14 cm. long,

2.5-5.2 cm. broad, margin entire, revolute, primary veins parallel, almost 0.5 mm. apart; petiole slightly winged, 13-23 mm. long. Racemes axillary, 6-10 cm. long, about 10-flowered; peduncle rusty tomentulose at base; pedicels glabrous, at anthesis 15-22 mm. long. Sepals 4, strongly imbricate, concave, oval, glabrous, 6-8 mm. long. Petals 4, obovate, rounded at apex, glabrous, 7-8 mm. long, 4 mm. broad. Stamens numerous, glabrous; filaments hardly connate at base, 3 mm. long; anthers oblong, almost 1 mm. long. Style 3 mm. long; stigma peltate. Ovary subglobose, glabrous, 2.5 mm. in diameter.—Drupe (from specimen no. 2417) broadly ellipsoid, pruinose; endocarp hard, ellipsoid, rounded at both ends, 18 mm. long, 15 mm. broad, wall 1 mm. thick. Seeds ovate, light brown, 13 mm. long, 11 mm. broad.

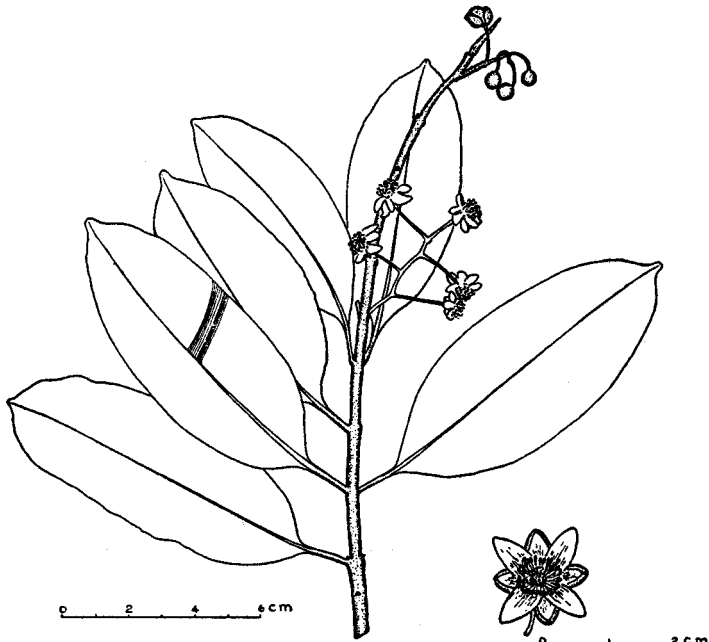


FIGURE 20.—Flowering branch and flower, *Calophyllum samoense*.

Upolu: forest above Malololelei, altitude 650 meters, August 10, 1929, Christophersen no. 162a; forest near Malololelei, altitude 550 meters, fruit, August 17, 1929, Christophersen no. 305. Savaii: edge of forest, Vaipouli-Manase, altitude 100 meters, flower, September 21, 1929, Christophersen no. 720, type in B. P. Bishop Museum; forested "island" on Matavanu lava field, altitude 200 meters, July 6, 1931, Christophersen and Hume no. 1871; forest above Vaipouli, altitude 150 meters, July 7, 1931, Christophersen and Hume no. 1916; forest near Manase, altitude 25 meters, fruit, August 17, 1931, Christophersen and Hume no. 2417; open plantation ground, Salailua, altitude 150 meters, bud, October 28, 1931, Christophersen no. 2991. Native name, *tamanu* (nos. 162, 305, 720, 1916, 2991).

This species is closely related to the Fijian *C. vitiense* Turrill but differs distinctly from this species as originally described in the much more closely spaced primary veins, the 3-4 times longer pedicels, the half as long sepals and petals, and in the shorter style. It belongs in the section *Inophyllum* and is, therefore, totally different from the Malaysian *C. spectabile* Willdenow which has been attributed to Samoa by several authors.

A medium-sized to large tree 20 meters high growing in the inland forests at low and medium elevations. The wood is favored by the Samoans for canoes.

### 3. GARCINIA Linnaeus

?*Garcinia sessilis* (Forster) Seemann: Viti, p. 433, 1862.

Upolu: forest near Apia, altitude 100 meters, flower, February 27, 1921, Eames no. 71. Native name, *seilala* (no. 71).

The specimen agrees with the description of Seemann (50, p. 10) and with various Fijian specimens. I have not seen Forster's type or other specimens from Tonga. Eames notes on the field label that the corolla is rose-pink, that the fragrant flowers are used for scenting coconut oil, and that the bark is used in medicine.

## FAMILY 62. BIXACEAE

### I. BIXA Linnaeus

*Bixa orellana* Linnaeus: Sp. Pl., p. 512, 1753.

Tutuila: cultivated, Nuuuili, fruit, January 3, 1923, Garber no. 956. Savaii: cultivated, Fangamalo, fruit, September 16, 1929, Christophersen (by native) no. 665; coconut plantation, Safune, fruit, August 13, 1931, Christophersen no. 2444. Native name, *loa* (nos. 665, 2444).

Cultivated on all the islands for the red dye extracted from the seeds and used in tapa decoration. On Upolu it is grown commercially for the coloring matter used in confectionery. Occasionally found as an escape.

## FAMILY 63. VIOLACEAE

### I. MELICYTUS Forster

*Melicytus ramiflorus* Forster varietas **samoensis**, varietas nova (fig. 21).

Differt a typo foliis subintegris vel obscure crenatis ad 20 cm. longis floribus majoribus ad 5 mm. altis calyce lobato.

Differs from the type in its sub-entire or indistinctly crenate leaves, to 20 cm. long, larger flowers to 5 mm. high, lobed calyx.

Savaii: forest above Matavanu Crater, altitude 800 meters, male flower, September 15, 1929, Christophersen no. 651; forest at Olo, above Safotu,

altitude 700-800 meters, male flower, August 8, 1931, Christophersen and Hume no. 2315, type in B. P. Bishop Museum; open forest at Olo, above Safotu, altitude 700 meters, female flower, young fruit, August 26, 1931, Christophersen and Hume no. 2519; forest above Salailua, altitude 1450

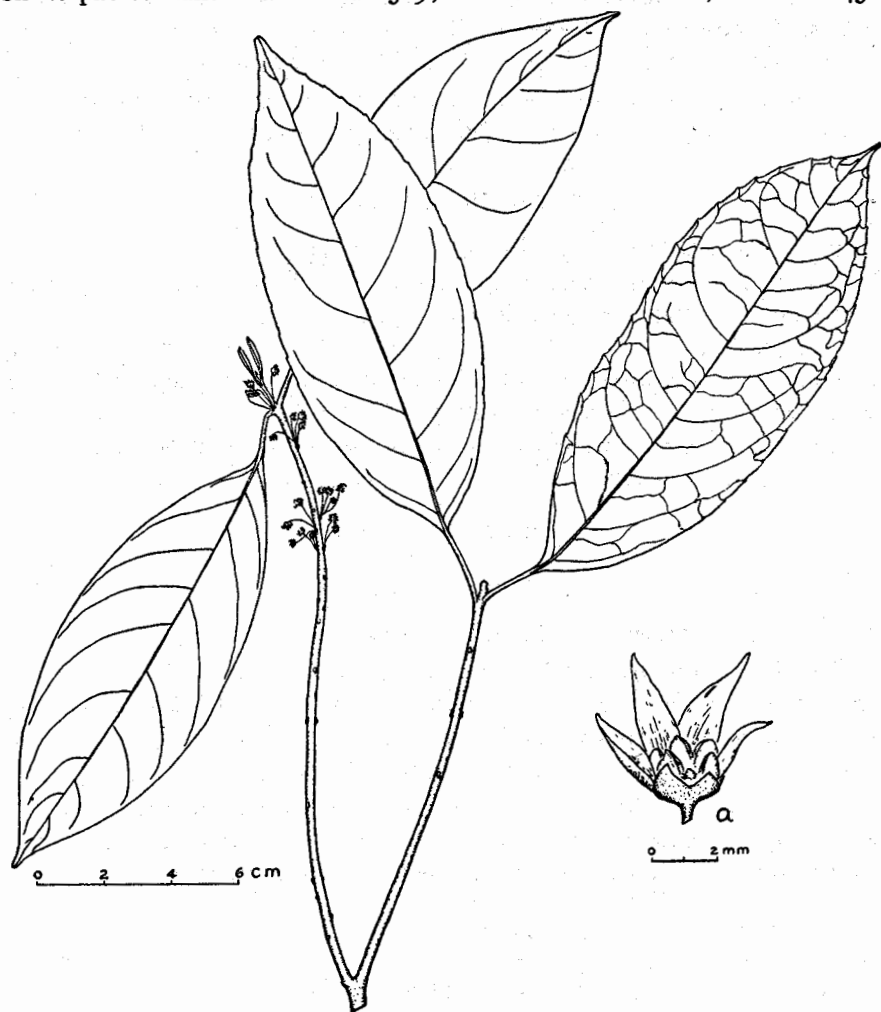


FIGURE 21.—Flowering branch, *Melicytus ramiflorus* varietas *samoensis*: a, male flower.

meters, November 6, 1931, Christophersen no. 3094; forest, Aopo-Nganga-malae, altitude 1000-1100 meters, male flower, December 8, 1931, Christophersen no. 3437.

The calyxes of the Samoan specimens differ from the original drawing of Forster (21, pl. 62) in the deeper lobes. However, New Zealand specimens



examined show the same type of lobed calyx as seen in the Samoan specimens. The New Zealand specimens have larger, more prominently crenate leaves, and the flowers are smaller. This variety is closely related to *M. fasciger* Gillespie but differs in the larger and relatively narrower leaves, fewer-flowered fascicles, and smaller flowers.

A small tree to 7 meters high growing in Savaii in openings and forests at medium and high elevations.

#### FAMILY 64. FLACOURTIACEAE

##### I. ERYTHROSPERMUM Lamarck

**Erythrospermum polyandrum** Oliver: in Hook. Ic. Pl., vol. 14, p. 24, pl. 1333, 1881.

Tutuila: forest, Papatele Ridge, altitude 300 meters, bud, fruit, October 31, 1929, Christophersen no. 999; low scrub forest, top of Le Pioa, altitude 500 meters, young fruit, January 2, 1932, Christophersen nos. 3487 and 3542.

##### 2. XYLOSMA Forster f.

**Xylosma suaveolens** Forster f. varietas **samoensis**, varietas nova (fig. 22).

Differt a typo foliis truncatis vel rotundatis longe acuminatis stigmatibus in ovariis fecundis sessilibus profunde 2-vel 3-partitis lobis orbicularibus.

Differs from the type in its truncate or rounded, long-acuminate leaves, fertilized ovaries with sessile, deeply 2- or 3-lobed stigmas, orbicular stigmatic lobes.

Savaii: low forests on rim of Papafu Crater, altitude 1500 meters, male flower, September 22, 1931, Christophersen no. 2728; forest above Salailua, altitude 1350 meters, female flower, fruit, November 7, 1931, Christophersen no. 3074, type in B. P. Bishop Museum.

No independent native name has been obtained for this plant. The names *filimoto* and *langaali* (*langa'ali*) *vao* were given by two informants, obviously on account of the similarity of the plant to *Flacourtia rukam* and *Aglaia samoensis*.

This Samoan variety of the Polynesian *Xylosma suaveolens* is a small tree to 5 meters high, growing in the forests at high elevations.

##### 3. FLACOURTIA L'Heritier

**Flacourtia rukam** Zollinger et Morren: Syst. Verz., p. 33, 1854.

Tau: plateau back of Luma, altitude 125 meters, fruit, December 15, 1921, Garber no. 646; plateau back of Luma, altitude 100 meters, fruit, September 21, 1922, Garber no. 776. Tutuila: back of Pago Pago village, fruit, December 26, 1924, Garber no. 920. Upolu: forest near Apia, February 28, 1921,

Eames no. 120; open forest, Moa Moa plantations, altitude 300 meters, fruit, March 2, 1921, Eames no. 209; forest, top of Vaea, September 13, 1923; Swezey and Wilder no. 33; forest, Vaea, altitude 150 meters, fruit, April 9, 1927, MacDaniels no. 1123; edge of forest near Malololelei, altitude 550 meters, male flower, August 6, 1929, Christophersen no. 64; edge of forest, near Malololelei, altitude 550 meters, male flower, August 17, 1929, Christophersen no. 321; forest below Malololelei, altitude 500 meters, fruit, August 19, 1929, Christophersen (by native) no. 341; edge of coastal forest, Saungo, male flower, September 6, 1929, Christophersen no. 545. Savaii: rocky coast, Falealupo-Fangalele, November 22, 1931, Christophersen no. 3333. Native name, *filimoto* (nos. 646, 776, 920, 120, 321, 341).

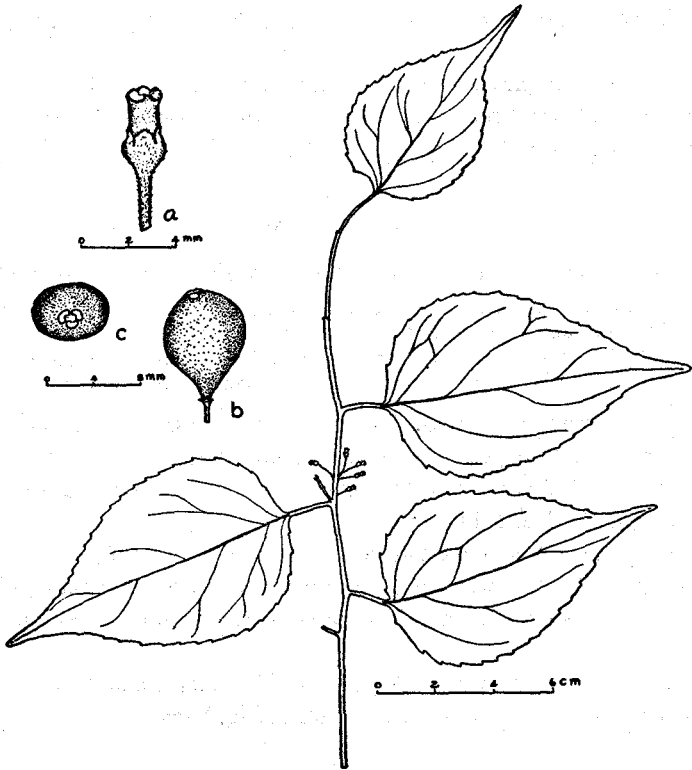


FIGURE 22.—Flowering branch, *Xylosma suaveolens* varietas *samoensis*: a, female flower; b, fruit; c, top view of fruit.

A small or medium-sized tree in openings and forests from the lowlands to middle elevations. The fruits are eaten, the inner bark is prepared into an internal medicine for filariasis, and the strong, durable, and heavy wood is used for a variety of purposes, especially for clubs.

## FAMILY 65. PASSIFLORACEAE

## I. PASSIFLORA Linnaeus

**Passiflora foetida** Linnaeus: Sp. Pl., p. 959, 1753.

Upolu: roadside, Apia, fruit, February 27, 1921, Eames no. 87; Vaialele, flower, fruit, August 20, 1929, Christophersen (by native) no. 354.

The fruits are said to be eaten by the Samoans.

**Passiflora samoensis** Exell: Jour. Bot., vol. 63, p. 203, 1925.

Upolu: roadside below Malololelei, altitude 400 meters, flower, fruit, May 26, 1924, Bryan no. 181; forest above Malololelei, altitude 700 meters, August 12, 1929, Christophersen no. 192; forest above Malololelei, altitude 750 meters, flower, fruit, August 15, 1929, Christophersen no. 260. Savaii: forest above Matavanu Crater, altitude 900 meters, July 15, 1931, Christophersen and Hume no. 2027. Native name, *pasio vao* (no. 2027).

A vine not uncommon in open places in the forests at middle elevations.

## FAMILY 66. CARICACEAE

## I. CARICA Linnaeus

**Carica papaya** Linnaeus: Sp. Pl., p. 1036, 1753.

Tutuila: Fanganeanea, male flower, January 3, 1925, Garber no. 972. Native name, *esi* (no. 972).

The papaya is cultivated in all native plantations and is also commonly met with as an escape. The Samoans usually eat the fruit before maturity, raw or cooked.

## FAMILY 67. THYMELAEACEAE

## I. WIKSTROEMIA Endlicher

**Wikstroemia foetida** (Linnaeus f.) A. Gray: Seem. Jour. Bot., vol. 3, p. 302, 1865.

Tutuila: top of Le Pioa, altitude 500 meters, flower, August 10, 1924, Garber no. 786; above Vatia, flower, December 17, 1924, Garber no. 878; scrub forest, top of Le Pioa, altitude 500 meters, flower, fruit, January 2, 1932, Christophersen no. 3555. Upolu: edge of forest near Malololelei, altitude 550 meters, flower, August 10, 1929, Christophersen no. 137. Savaii: lava field, Letui-Aopo, altitude 200 meters, flower, fruit, May 15, 1924, Bryan no. 144; open "fern country" near Manase, altitude 100 meters, flower, fruit, September 18, 1929, Christophersen no. 679; open forest near Vaipouli, altitude 75 meters, flower, fruit, July 3, 1931, Christophersen and

Hume no. 1850; forested "island," Matavanu lava field, altitude 200 meters, flower, fruit, July 6, 1931, Christophersen and Hume no. 1877; open scrub, lava field between Aopo and Asau, altitude 200 meters, flower, December 6, 1931, Christophersen no. 3429.

A shrub 3-4 meters high growing in openings and open forests of the lowlands and middle elevations.

#### FAMILY 68. LYTHRACEAE

##### I. PEMPHIS Forster

**Pemphis acidula** Forster: Char. Gen., p. 68, pl. 34, 1776.

Savaii: rocky shore, Ave Ave, between Salailua and Tanga, flower, October 10, 1929, Christophersen no. 931.

This widely distributed shore shrub is here recorded for Samoa for the first time.

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*Punica granatum* Linnaeus (*Punicaceae*), the pomegranate, is cultivated by the Samoans. Native name, *limoni* (Savaii, Christophersen no. 2399).

#### FAMILY 69. LECYTHIDACEAE

##### I. BARRINGTONIA Forster

**Barringtonia asiatica** (Linnaeus) Kurz: Jour. As. Soc. Beng., vol. 45, 2, p. 131, 1876.

*Barringtonia speciosa* Forster; Linnaeus f.

Tau: Fitiuta trail, altitude 125 meters, flower, August 4, 1921, Garber no. 564. Upolu: mangrove swamp, Matautu, August 30, 1929, Christophersen no. 477. Savaii: rocky shore, Salailua-Lata-itai, flower, September 18, 1931, Christophersen no. 2634. Native name, *futu* (nos. 564, 2634).

This widely distributed shore tree is common in Samoa, especially on rocky coasts. It grows at altitudes up to about 200 meters where this elevation can be attained near the sea, as in Pago Pago harbor. The Samoans use the bark and the fruit of the *futu* as a fish poison.

**Barringtonia samoensis** A. Gray: Bot., Phanerog., U. S. Expl. Exped., vol. 15, pt. 1, p. 508, 1854.

Tau: trail back of Luma, altitude 30 meters, flower, fruit, August 8, 1921, Garber no. 543. Tutuila: ridge above Pago Pago village, altitude 2-250 meters, flower, April 18, 1924, Bryan no. 87; near summit of Aua-Afono trail, December 17, 1924, Garber no. 851; back of Afono, altitude 20 meters, December 17, 1924, Garber nos. 857 (fruit), 860 (flower); summit of Vatia-

Leloaia trail, fruit, December 17, 1924, Garber no. 883; Fangatongo, altitude 10 meters, flower, fruit, December 27, 1924, Garber no. 944; swampy ground near Leone, flower, fruit, November 4, 1929, Christophersen no. 1036. Upolu: Moa Moa plantations, altitude 250 meters, fruit, March 2, 1921, Eames no. 201; forest above Malololelei, altitude 750 meters, flower, August 15, 1929, Christophersen no. 264. Savaii: opening in plantation, Salailua, altitude 25 meters, flower, fruit, October 8, 1931, Christophersen no. 2846; coastal forest, Salailua-Lata-itai, October 19, 1931, Christophersen no. 2865; forest, Sili-Lata-iuta, altitude 50 meters, flower, November 14, 1931, Christophersen no. 3141; river bank above Sili, altitude 400 meters, fruit, November 12, 1931, Christophersen no. 3175. Native name, *falanga* (nos. 543, 851, 944, 1036, 201, 2846, 3141, 3175).

Some variation is exhibited by this species in length of pedicels and in size and shape of fruit. Specimen no. 944 from Tutuila has pedicels to 20 mm. long, and oblong fruits 9.5 by 3.7 cm. Specimen no. 857, also from Tutuila, has pedicels not more than 12 mm. long, and the fruit is shorter and broader, 6.5 by 5 cm. A similar type of fruit is found also in the other Tutuilan specimens nos. 851, 883, 1036. Specimen no. 264 from Upolu has pedicels not more than 6 mm. long; the immature fruits of no. 201, also from Upolu, are of the elongated type, 6.5 by 2.5 cm. The pedicels of the Savaiian specimens vary to 23 mm. in length (specimen no. 2846) and the immature fruits are of the broad type. The leaves in all specimens are distinctly petiolate, oblanceolate or obovate, acuminate with serrulate margin. They vary in size from 16 by 6 cm. to 36 by 13.5 cm. (no. 87, Tutuila), and 40 cm. long (no. 201, Upolu).

It is possible that distinct forms or varieties are present, but the material at hand does not permit of any definite conclusions. The relation of this species to *B. racemosa* (Linnaeus) Blume needs further study.

## FAMILY 70. RHIZOPHORACEAE

### I. CROSSOSTYLIS Forster

*Crossostylis biflora* Forster: Char. Gen., p. 88, pl. 44, 1776.

Tutuila: forest, Alava Ridge, altitude 500 meters, flower, April 19, 1924, Bryan no. 93; forest above Pago Pago, altitude 50-100 meters, flower, November 3, 1929, Christophersen no. 1038; Matafao Ridge, altitude 500-600 meters, bud, November 3, 1929, Christophersen no. 1045; scrub forest, top of Le Pioa, altitude 500 meters, flower, January 2, 1932, Christophersen no. 3512. Upolu: edge of forest near Malololelei, altitude 550 meters, flower, August 7-10, 1929, Christophersen nos. 105 and 144. Savaii: forest above Matavanu Crater, altitude 900 meters, flower, July 14, 1931, Christophersen

and Hume no. 1995; forest above Matavanu Crater, altitude 1050 meters, flower, July 22, 1931, Christophersen and Hume no. 2122; forest above Matavanu Crater, altitude 1300 meters, July 24, 1931, Christophersen and Hume no. 2145.

The specimen from Tutuila figured by Gray (25, pl. 77) differs from Forster's manuscript description of *C. biflora* as given by Guillemain (27, vol. 17, p. 354) and from specimens examined from Raiatea in its distinctly acuminate leaves with acute apex and the longer lobes of the disc. All the specimens in Bernice P. Bishop Museum have distinctly acuminate leaves with acute or obtuse apex, and the lobes of the disc vary from one third to one half of the length of the filaments. The lobes of the disc are unsatisfactorily illustrated by Forster (21, pl. 44). In specimens from Raiatea (Moore nos. 172, 478, B. P. Bishop Museum) the lobes are densely pilose, hardly exceeding one fourth of the length of the filaments. The number of carpels in the Samoan specimens varies from 11 to 14; in Moore no. 478 it is 15. It is possible that the Samoan plants belong to a distinct variety, but this can not be settled until the range of variation in the Society Islands plants is better known.

A shrub or small tree to 10 meters high growing in open places and in the forests at all altitudes.

## 2. RHIZOPHORA Linnaeus

**Rhizophora Mangle** Linnaeus varietas **samoensis** Hochreutiner: Candollea, vol. 2, p. 447, 1925.

Tutuila: tidal swamp, Aua, flower, January 2, 1932, Christophersen no. 3479. Upolu: shallow salt water, Apia, fruit, February 10, 1921, Eames no. 3; tidal swamp, Mulinuu, flower, fruit, August 27, 1929, Christophersen no. 439. Savaii: mouth of river, Avau, flower, fruit, July 8, 1931, Christophersen and Hume no. 1922; rocky, sandy shore, Pua Pua, December 28, 1931, Christophersen no. 3475. Native name, *tongo* (nos. 3479, 3, 3475).

Hochreutiner (31, p. 447) discusses at length the affinity of the Samoan *Rhizophora*, arriving at the conclusion that the specimens collected by him are more closely related to the South American *R. Mangle* Linnaeus than to the Old World *R. mucronata* Lamarck. The Samoan specimens in Bernice P. Bishop Museum agree with the original description of this variety except for the broadly oblanceolate, not elliptic leaves. I have observed no plants in Samoa with mucronate leaves. Identical, small-flowered specimens have been collected in Fiji (Gillespie no. 2070, B. P. Bishop Museum), and other Fijian specimens have both mucronate and emarginate leaves and larger flowers (Bryan no. 196, B. P. Bishop Museum). The Samoan specimens are certainly different from specimens collected in the New Hebrides (Kajewski

no. 183, B. P. Bishop Museum) by F. M. Salvoza referred to *R. mucronata* Lamarck variety *stylosa* (Griffith) Schimper. Guillaumin (26, p. 252) records this variety as growing in Samoa.

### 3. BRUGUIERA Lamarck

*Bruguiera conjugata* (Linnaeus) Merrill: Philipp. Jour. Sci., Bot., vol. 9, p. 118, 1914.

Tutuila: mouth of river, Aua, flower, January 2, 1925, Garber no. 953; tidal swamp, Aunuu Island, flower, November 12, 1929, Diefenderfer no. 1250. Upolu: salt marsh, Apia, flower, February 10, 1921, Eames no. 2; tidal swamp, Apia, flower, fruit, May 27, 1924, Bryan no. 182; near Fangualii, flower, fruit, August 20, 1929, Christophersen (by native) no. 359. Savaii: river mouth, Avau, flower, fruit, July 8, 1931, Christophersen and Hume no. 1930; rocky, sandy shore, Pua Pua, flower, December 28, 1931, Christophersen no. 3476. Native name, *tongo* (nos. 953, 1250, 2, 359, 3476).

In tidal swamps and at the mouths of rivers. More common and more abundant than the other mangrove species.

Guillaumin (26, p. 252) records *B. eriopetala* Wight and Arnott as growing in Samoa. However, the Samoan specimens in B. P. Bishop Museum have almost glabrous petals with 2 to 4 filiform appendages on each lobe.

## FAMILY 71. COMBRETACEAE

### I. TERMINALIA Linnaeus

*Terminalia Catappa* Linnaeus: Mant., vol. 1, p. 128, 1767.

Ofu: slope of mountain at Aaofa, altitude 15 meters, fruit, May 26, 1925, Garber no. 980. Upolu: roadside, Apia, flower, August 27, 1929, Christophersen no. 435. Savaii: forest, Salailua-Lata-itai, altitude 10 meters, September 17, 1931, Christophersen no. 2623; edge of forest, Salailua, altitude 150 meters, October 28, 1931, Christophersen no. 2989; coastal bluff, Sataua-Papa, fruit, November 21, 1931, Christophersen no. 3416; rocky coast, Saipipi, bud, fruit, December 22, 1931, Christophersen no. 3471. Native name, *talie* (nos. 980, 435, 2623, 2989, 3416, 3471).

The *talie* is a common tree in the coastal forests, and is also found in the lowland forests some distance from the shore. It grows to great size, trees 25 meters high having been observed. The fruits are much relished by the Samoans.

*Terminalia affinis litoralis* Seemann: Fl. Vit., p. 94, 1865.

Tutuila: shore of lagoon north of Tafuna, flower, fruit, November 9, 1929, Christophersen no. 1176. Native name, *talie* (no. 1176).

A small tree 2 meters high. Ends of branches, petioles, peduncles, and

young leaves silky, yellowish-white tomentose. Leaves clustered in the upper part, petiolate, obovate, apex rotundate, truncate or emarginate, base broad, rounded or subcordate, midrib pubescent on both sides, leaf blade sparingly pubescent, glabrate on the upper surface, primary veins 9-10, margin entire or slightly undulate; leaf blade 11.5-19 cm. long, 7.5-13 cm. broad, petioles 2-3 cm. long. Spikes about 8 cm. long, peduncle silky tomentose, rachis glabrescent; flowers sessile, stipitate, expanded 7 mm. long, 3 mm. broad; calyx campanulate with 5 triangular, acute lobes, glabrous outside; ovary with scattered hairs. Fruit red, sessile, compressed, ellipsoid, without wings, dry 21-25 mm. long, 13-15 mm. broad, 8-9 mm. thick.

This tree comes close to Seemann's *T. littoralis* from Fiji, being identical in leaf form with the type in Kew Herbarium (Seemann no. 188). It differs in its longer petioles, pubescent leaf blades, and more numerous primary veins. The peduncles and rachis are pubescent. It differs from *T. samoensis* Rechinger in its larger, more elongated leaves, more numerous primary veins, longer petioles, and larger fruits.

**Terminalia Richii** A. Gray: Bot. Phanerog., U. S. Expl. Exped., vol. 15, pt. 1, p. 616, 1854.

Upolu: forest above Apia, altitude 50 meters, September 15, 1923, Wilder no. 5. Savaii: forest grove in coconut plantation, Salailua, September 14, 1931, Christophersen no. 2594; forest, Falelima, altitude 5 meters, flower, October 7, 1931, Christophersen no. 2816; forest, Salailua-Lata-itai, altitude 10 meters, flower, young fruit, October 19, 1931, Christophersen no. 2864; edge of forest, Salailua, altitude 150 meters, passée flower, young fruit, October 28, 1931, Christophersen no. 2988; forest Siuvao-Auala, altitude 600 meters, November 19, 1931, Christophersen no. 3294. Native name, *malili* (nos. 2594, 2816, 2864, 2988, 3294).

I have not seen authentic specimens of this species, but no. 2816 agrees exactly in all points with the original description. The other specimens have slightly larger mature leaves, and the leaves of seedlings (no. 2594) are up to 24 cm. long and 7 cm. broad.

The *malili* is one of the largest trees in the lowland forests. Trees 25 meters high, with a diameter of 1 meter above the buttress, are not uncommon.

#### FAMILY 72. MYRTACEAE

##### I. PSIDIUM Linnaeus

**Psidium guajava** Linnaeus: Sp. Pl., p. 470, 1753.

Savaii: open "fern country" near Manase plantation, altitude 100 meters, flower, fruit, September 18, 1929, Christophersen no. 689.

In openings and waste fields, not common.



## 2. DECASPERMUM Forster

**Decaspermum fruticosum** Forster: Char. Gen., p. 74, pl. 37, 1776.

Tutuila: low forests, top of Le Pioa, altitude 500 meters, flower, fruit, November 10, 1929, Christophersen no. 1183; scrub forest, top of Le Pioa, altitude 500 meters, January 2, 1932, Christophersen nos. 3511 (fruit) and 3575 (flower). Savaii: open "fern country" near Manase plantation, altitude 100 meters, August 13, 1931, Christophersen and Hume no. 2380; Vaipua village, flower, fruit, August 25, 1931, Christophersen (by E. Stehlin) no. 2540. Native name, *nu'a nu'a* (nos. 2380 and 2540).

The leaves vary from long-acuminate in no. 2540, less so in no. 2380; the leaves of the specimens from Tutuila are acuminate to acute. The Samoans use the leaves for their fragrance in scenting coconut oil. For that reason the shrub is found cultivated in the villages.

## 3. METROSIDEROS Banks

**Metrosideros collina** (Forster) A. Gray: Bot., Phanerog., U. S. Expl. Exped., vol. 15, pt. 1, p. 558, pl. 68, 1854.

Form 1. Tutuila: forest at reservoir above Naval Station, altitude 200-300 meters, flower, fruit, October 30, 1929, Christophersen no. 988; top of Le Pioa, altitude 500 meters, November 10, 1929, Christophersen nos. 1184 (flower) and 1198 (bud); scrub forest, top of Le Pioa, altitude 500 meters, January 2, 1932, Christophersen nos. 3569 (flower) and 3577 (bud); low forest, Alava Ridge, altitude 400 meters, January 5, 1932, Christophersen no. 3585.

Form 2. Tutuila: low forest, top of Le Pioa, altitude 500 meters, November 10, 1929, Christophersen nos. 1188 (flower, fruit), 1194 (fruit), 1197 (flower, fruit), and 1205 (flower, fruit); low forest, top of Le Pioa, altitude 500 meters, Christophersen nos. 3494, 3500 (flower).

Native name, *anume* (nos. 1184, 1188, 1197, 1205).

Two forms of this collective species are present in the collections. Form 1 has narrow, elliptic or oblanceolate, glabrous leaves, and glabrous or glabrescent inflorescence. The stamens are coral red or bright red. With the exception of the glabrous inflorescence it agrees with the original description and illustration of *M. collina* variety *vitiensis* A. Gray. Form 2 has ovate, broadly elliptic or rounded, glabrous leaves and silky canescent inflorescence. *The stamens are bright red.*

*Metrosideros* has been found in Samoa only on the mountains surrounding Pago Pago harbor in Tutuila. This local distribution and the paucity of forms are interesting phenomena in view of the general distribution and wealth of forms of these plants in other islands groups, as Fiji and Hawaii.

## FAMILY 73. ONAGRACEAE

## I. JUSSIEUA Linnaeus

**Jussieuva erecta** Linnaeus: Sp. Pl., p. 388, 1753.

Olosenga: taro swamp back of Olosenga village, flower, fruit, June 23, 1925, Garber no. 1091. Tutuila: wet place, Pago Pago, flower, February 8, 1921, Eames no. T29; roadside, Pago Pago, fruit, December 26, 1924, Garber no. 898. Upolu: roadside near Malololelei, altitude 650 meters, flower, fruit, August 10, 1929, Christophersen no. 154. Savaii: swampy place, Fangamalo, fruit, August 25, 1931, Christophersen and Hume no. 2510.

Common in moist places.

## FAMILY 74. ARALIACEAE

## I. REYNOLDSIA A. Gray

**Reynoldsia lanutoensis** Hochreutiner: Candollea, vol. 2, p. 482, 1925.

Upolu: forest above Malololelei, altitude 750 meters, young flower, August 15, 1929, Christophersen no. 262; top of Fao mountain, altitude 680 meters, fruit, September 6, 1929, Christophersen no. 551; open grassland near Malololelei, altitude 650 meters, flower, October 18, 1929, Christophersen no. 951. Native name, *vi vao* (no. 262).

This species is distinguished from *R. pleiosperma* in the strictly umbellate arrangement of the flowers. The inflorescence is shorter and the leaflets are generally more deeply dentate. As flowers have not yet been described for this species, a description of those of specimen no. 951 is here given:

Calyx entire, truncate or slightly wavy, about 0.5 mm. high. Lobes of corolla 12, valvate, 4.5-5 mm. long, 1 mm. broad at base, free or irregularly united. Stamens 12 in one series, alternating with and shorter than the lobes of the corolla. Anthers oblong, inserted at about the middle, 2 mm. long. Styler column laterally flattened, about 1.5 mm. high. Stigmas 24 or less, densely crowded. Ovary 24-(23)-celled with one ovule in each cell. Branches of inflorescence 2-3.5 cm. long, pedicels 7-9 mm. long.

Hochreutiner (31, pp. 483-484) points out that the styler column is bilobed. This is true at the fruiting stage only. The stigmas enlarge and diverge in two rows after anthesis. The fruiting specimen no. 551 shows bilobed styler column; in the flowering specimen no. 951 the stigmas are all close together.

**Reynoldsia pleiosperma** A. Gray: Bot., Phanerog., U. S. Expl. Exped., vol. 15, pt. 1, p. 725, pl. 93, 1854, pro parte fructifera.

Savaii: forest above Letui, altitude 1600-1700 meters, fruit, September 26, 1929, Christophersen no. 772; open woodland, Olo, above Safotu, altitude 700 meters, fruit, August 9, 1931, Christophersen and Hume no. 2319;

forest at Le To, above Salailua, altitude 750 meters, October 21, 1931, Christophersen no. 2935. Native name, *vi vao* (nos. 772, 2319, 2935).

Gray (25, p. 725) states that the material on which this species is founded consists of two specimens, one in bud, another in fruit, which may prove to be distinct. There seems to be no doubt but that the two specimens represent different species. The illustrations of the specimen in bud with part of a mature leaf show that it is closely related to *R. lanutoensis* in the umbellate arrangement of the flowers, but differs from it in the sparser inflorescence with longer primary branches and pedicels, fewer flowers in the umbel, and fewer (8-10) stamens (Christophersen no. 951 has 12 stamens). The leaf shows leaflets closely resembling those of Christophersen no. 551. From the fruiting specimen of the original *R. pleiosperma* it differs distinctly in the umbellate flowers, longer primary branches and pedicels, and the broader leaflets with rounded base. The specimen in bud with mature leaf has priority over the original name in the sense that it is mentioned earlier than the fruiting specimen. However, the specific name *pleiosperma* more appropriately applies to a specimen in fruit. It is here proposed, therefore, that *Reynoldsia pleiosperma* A. Gray be based on the fruiting specimen, and that the specimen in bud and the mature leaf (25, p. 725, pl. 93) be referred to a new species: *Reynoldsia Grayana*. In his original description A. Gray (25, pp. 725-26) has kept the two specimens apart.

*Reynoldsia pleiosperma* is a common tree of great size in the forests of Savaii at middle and high elevations. At an altitude of 1600-1700 meters a tree measured was 10 meters high with a diameter breast high of 70 cm. At high altitudes it exceeds all the associating trees in height and forms a striking element of the forest. At lower altitudes trees 1-2 meters in diameter are common. The fleshy fruits make it a favorite tree for pigeons, and is as such well known by the natives.

### **Reynoldsia** species.

Tau: top of peak back of Tau, altitude 600-700 meters, January 28, 1922, Garber no. 752.

This plant, in bud only, comes close to *R. lanutoensis* in the umbellate arrangements of the flowers. The bracts, however, are much longer and the leaves are inconspicuously crenate-dentate.

## 2. MERYTA Forster

### **Meryta capitata**, species nova (fig. 23).

Arbor dioica pauciramosa 5 m. alta. Folia versus apicem ramorum suffulta, laminis oblanceolatis glabris 42-62 cm. longis 13-19 cm. latis, apice breviter acuminato, basi angusta decurrente, margine leviter undulato, nervis lateralibus prominentibus divergentibus, utrinque 25-30, petiolis supra sulcatis glabris 2-5 cm. longis. Capitula feminea in inflorescentia glabra racemosa terminalia 12-17 cm. longa disposita breviter pedunculata

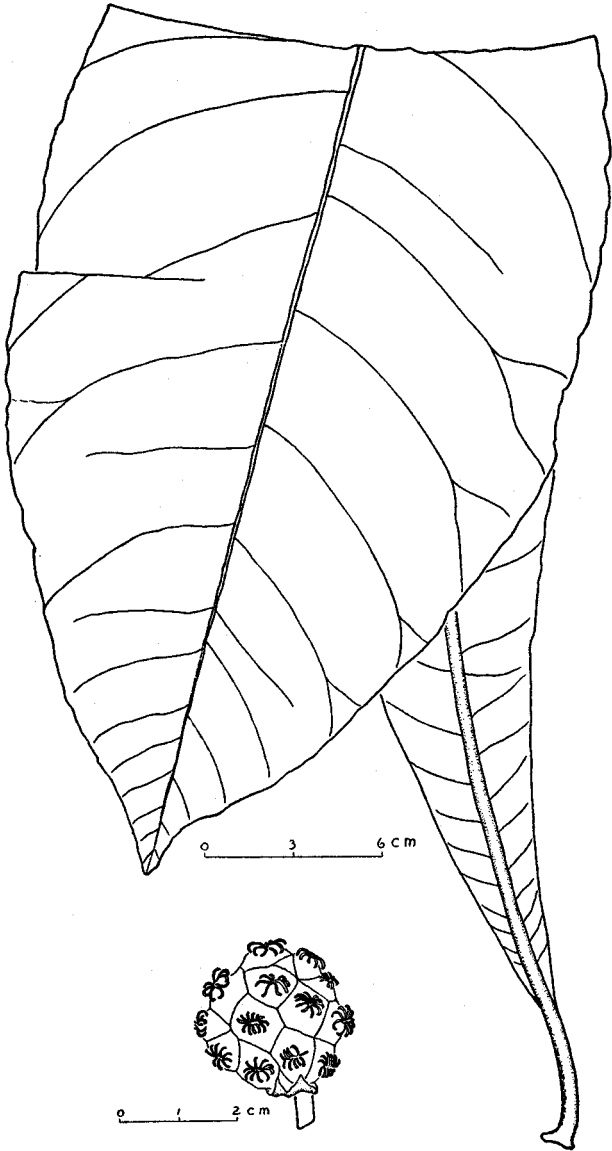


FIGURE 23.—Leaf and fruit, *Meryta capitata*.

vel sessilia bracteis lanceolatis ad 2 cm. longis. Fructus immaturi 11-18 in capitulis subglobois 2-3 cm. diametro conjuncti apice conico libero 2-3 mm. alto stigmatibus 8-12 loculis 8-12.

Differt a *M. macrophylla* (Rich) Seemann foliis latioribus breviter petiolatis fructibus valde conjunctis, a *M. macrocarpa* Baillon stigmatibus paucioribus.

Diocious, few-branched tree, 5 m. high. Leaves inserted near end of branches; blades oblanceolate, glabrous, 42-62 cm. long, 13-19 cm. broad, apex shortly acuminate, base narrow, decurrent, margin slightly undulate, lateral veins 25-30 on each side, divergent, prominent; petiole grooved above, glabrous, 2-5 cm. long. Female heads shortly pedunculate or sessile, arranged in glabrous, racemose, terminal, 12-17 cm. long inflorescences; bracts lanceolate, to 2 cm. long. Immature fruits 11-18, united in subglobose heads of 2-3 cm. diameter, upper part conical, free, 2-3 mm. high; stigmas 8-12; cells 8-12.

Savaii: forest near Vaipouli, altitude 75 meters, male flower, July 3, 1931, Christophersen and Hume no. 1837(?); edge of forest back of Vaipouli, altitude 150 meters, fruit, July 7, 1931, Christophersen and Hume no. 1913, type, in B. P. Bishop Museum; forest at Manase plantation, altitude 100 meters, male flower, August 13, 1931, Christophersen and Hume no. 2369(?); shore forest near Tanga, fruit, October 6, 1931, Christophersen no. 2839, Native name *fangu fangu* (nos. 2369, 2839).

This species is readily distinguished from *M. macrophylla* in its subglobose heads of united fruits and its broader leaves. In the characteristics of the fruit it comes close to *M. macrocarpa* Baillon from New Caledonia, from which it differs in the fewer stigmas. The two specimens with male flowers do not agree with the type in leaf characters. They agree with each other in their smaller, narrower, elliptic-oblanceolate leaves, with non-decurrent base. They may perhaps exhibit sexual dimorphism, but I do not feel sure about it, as male and female specimens with identical leaf characters have been found at Malololelei on Upolu (see *M. macrophylla*). The male inflorescence of Christophersen no. 1837 is a terminal, glabrous panicle 10-13 cm. long with 7 to 10 primary branches to 10 cm. long and sessile heads of flowers crowded on short, secondary branches. (In the specimen from Upolu the flower heads are borne on tertiary branches.) The bracteoles supporting the flower heads are broadly ovate, as broad or broader than long, broadly acute, 1.5-2 mm. long, 1.5-2.5 mm. broad. Lobes of corolla four, oblanceolate, acuminate, hooded, about 2.5 mm. long. Stamens four, exserted, anthers short, oblong, inserted above the base, less than 1 mm. long.

The species is common in the lowland forest of Savaii.

***Meryta macrophylla*** (Rich) Seemann: Bonplandia, vol. 10, p. 294, 1862.

Upolu: open forest on Vaea mountain, altitude 150 meters, fruit, April 25, 1924, Bryan no. 99. Native name, *fangu fangu*.

This specimen agrees closely with the original description and illustration of Gray (25, p. 732, pl. 97). The fruits are 8-10-celled, free or united only

at the base. The leaves are oblanceolate with somewhat longer petioles than described.

Other specimens of *Meryta* collected on Upolu and the islands to the east are affinities of *M. macrophylla* but differ from this species in certain respects. It is very probable that distinct forms are represented, but no attempt will be made to circumscribe them until the limits of individual variation can be ascertained from a larger material. A specimen from Malololelei, Upolu (Christophersen no. 304), is distinguished by broader leaves (to 19 cm.) with a narrow decurrent base and short petioles (3-5 cm.). The male flowers are densely clustered on branchlets of the third order, the entire inflorescence being 34 cm. long. In leaf form this specimen is identical with a specimen in young fruit collected by Setchell in the same locality (no. 15667, B. P. Bishop Museum). The young fruits are united at the base or to the middle into heads of 10-15, of a form intermediate between the type of *M. macrophylla* and *M. capitata*. Two fertile specimens from the ridge west of Pago Pago on Tutuila (Christophersen nos. 1253, 1254) show smaller leaves than the type of *M. macrophylla* but of the same form. The female flowers are free to the base, 5 to 9 in each head but only one developing into fruit. Specimen no. 1254 is polygamous (monoecious) with male flowers in the lower part of the inflorescence. Specimens from Tau (Garber no. 622) and Olosenga (Garber no. 1079), both with male flowers, have broader leaves than those of the type of *M. macrophylla*. Specimen no. 1079 has obovate or elliptic leaves.

The plants of this affinity are small, dichotomously branched trees 2.5-6 (8) meters high, growing at middle elevations.

#### ***Meryta* (?) species.**

Savaii: forest above Matavanu Crater, altitude 1400 meters, July 30, 1931, Christophersen and Hume no. 2199.

At high elevations on Savaii is commonly found a small tree of the habit of *Meryta*, with narrow, thick, leathery leaves showing the irregular, divergent venation characteristic for the Samoan species of this genus. The leaves are oblong-lanceolate, acute or shortly acuminate, with acuminate base and wavy margin, the young ones at the end of the branches about 25 cm. long, 4.5-5 cm. broad, the mature ones 40 cm. long, 7-8 cm. broad on petioles 13-16 cm. long. No flowers or fruits have been observed.

### 3. SCHEFFLERA Forster

***Schefflera samoensis*** (A. Gray) Harms: Engl. et Prantl, Nat. Pflanzenf., vol. 3, pt. 8, p. 39, 1898.

Upolu: forest above Malololelei, altitude 700 meters, fruit, August 14, 1929, Christophersen no. 234. Savaii: forest above Matavanu Crater, altitude

750 meters, flower, September 15, 1929, Christophersen no. 634; forest on inner slopes of crater, above Matavanu Crater, altitude 1500 meters, flower, fruit, July 30, 1931, Christophersen and Hume no. 2225; forest near Olo, above Safotu, altitude 800 meters, flower, fruit, August 6, 1931, Christophersen and Hume no. 2270.

A shrub or small tree to 5 meters high not uncommon in the forests at middle and high elevations.

#### 4. POLYSCIAS Forster

**Polyscias Reineckei** Harms: Engl. Bot. Jahrb., vol. 25, p. 663, 1898.

Savaii: open forest near Matavanu Crater, altitude 600-700 meters, flower, July 10, 1931, Christophersen and Hume no. 1951; forest near Salailua, altitude 100 meters, flower, young fruit, September 15, 1931, Christophersen no. 2616; coastal forest, Falelima-Samata, fruit, October 1, 1931, Christophersen no. 2764; forest above Sili, altitude 100 meters, fruit, November 11, 1931, Christophersen no. 3280. Native name, *afia* (no. 3280).

A small or medium-sized tree to 12 meters high, growing in open forests or at the edge of forests in the lowlands and at middle elevations.

**Polyscias samoensis** (A. Gray) Harms: Engl. et Prantl, Nat. Pflanzenf., vol. 3, pt. 8, p. 45, 1898.

Tutuila: edge of forest, Pago Pago, September 23, 1923, Wilder no. 44; wet place in forest near Leone, flower, fruit, September 9, 1923, Wilder no. 87.

*Nothopanax Guilfoylei* is common in the villages, planted especially in hedges. The native name is *tangi tangi*. A variety with deeply cut leaflets (variety *laciniata* [Hort.] Bailey?) is also cultivated for ornamental purposes (Aunuu, Diefenderfer no. 1239).

### FAMILY 75. UMBELLIFERAE

#### I. CENTELLA Linnaeus

**Centella asiatica** (Linnaeus) Urban: Mart. Fl. Bras., vol. 11, 1, p. 287, 1879.

Tutuila: moist place, near Fanganeanea, flower, fruit, January 3, 1925, Garber no. 965. Savaii: open "fern country" near Manase, altitude 100 meters, fruit, September 18, 1929, Christophersen no. 695; open "fern country," Vaipouli-Manase, altitude 100 meters, fruit, July 12, 1931, Christophersen and Hume no. 1981. Native name, *tongo*.

Common in open places in the lowlands and foothills. The leaves are used in native medicine for sore eyes.

## FAMILY 76. ERICACEAE

## I. VACCINIUM Linnaeus

*Vaccinium Whitmeei* F. Mueller: Pap. Proc. Rep. Roy. Soc. Tasm., 1875, p. 163, 1876.

*Vaccinium antipodum* Reinecke.

Savaii: forest above Matavanu Crater, altitude 1300-1400 meters, flower, fruit, September 24, 1929, Christophersen no. 827; on *Pandanus*, shore of Mataulanu Lake, altitude 900 meters, flower, fruit, October 3, 1929, Christophersen no. 867; open lava field above Aopo, altitude 1200-1400 meters, flower, fruit, October 7, 1929, Christophersen no. 885; forest above Matavanu Crater, altitude 900 meters, flower, July 15, 1931, Christophersen and Hume no. 2071; crater bottom, above Matavanu Crater, altitude 1500 meters, flower, July 29, 1931, Christophersen and Hume no. 2215.

A low shrub found at middle and high elevations in Savaii. It is commonly an epiphyte but grows on the ground in the lava field above Aopo.

## FAMILY 77. MYRSINACEAE

## I. MAESA Forskål

*Maesa samoana* Mez: Pflanzenr., IV, 236, p. 53, 1902.

Tau: Luma-Faleasao trail, altitude 40 meters, flower, fruit, January 8, 1922, Garber no. 686. Ofu: beach at Vaoto, flower, fruit, June 23, 1925, Garber no. 1097. Tutuila: Pago Pago harbor, flower, fruit, 1929, Diefenderfer no. 3. Upolu: edge of forest near Malololelei, altitude 650 meters, flower, August 10, 1929, Christophersen no. 163; forest, Malololelei-Lanutoo, altitude 700 meters, flower, August 21-22, 1929, Christophersen no. 384. Savaii: forest above Matavanu Crater, altitude 750 meters, fruit, July 16, 1931, Christophersen and Hume no. 2001; forest above Matavanu Crater, altitude 900 meters, flower, July 14, 1931, Christophersen and Hume no. 2052.

The specimens from Tau, Ofu, and Tutuila vary with relatively broader, almost rounded leaves, those from Savaii with relatively narrower leaves and acute base. A shrub or small tree to 5 meters high in open places and forests of the lowlands and middle elevations.

## 2. ARDISIA Swartz

*Ardisia humilis* Vahl: Symb. Bot., vol. 3, p. 40, 1794.

Upolu: open forests near Apia, altitude 50-150 meters, flower, September 15, 1923, Wilder no. 79.

Probably an escape from cultivation.



3. *RAPANEA* Aublet

*Rapanea samoensis* Lauterbach: Engl. Bot. Jahrb., vol. 41, p. 232, 1908.

Tutuila: top of Matafao, altitude 650 meters, fruit, November 3, 1929, Christophersen no. 1024; forest, Matafao Ridge, altitude 500-600 meters, November 3, 1929, Christophersen nos. 1046 (fruit), 1053 (fruit), 1065; forest, top of Le Pioa, altitude 500 meters, fruit, November 10, 1929, Christophersen no. 1202; low forest, top of Le Pioa, altitude 500 meters, January 2, 1932, Christophersen nos. 3547 (fruit) and 3574. Savaii: lava field between Letui and Aopo, altitude 150 meters, fruit, May 15, 1924, Bryan no. 147; shore of Mataulanu Lake, altitude 900 meters, October 3, 1929, Christophersen no. 865; low forest on rim of Papaafu Crater, altitude 1500 meters, fruit, September 22, 1931, Christophersen no. 2720; low coastal shrub forest, Fangalele-Falealupo, fruit, November 21, 1931, Christophersen no. 3394; open scrub, lava field between Aopo and Asau, altitude 200 meters, December 6, 1931, Christophersen nos. 3434 and 3435 (fruit).

These specimens, none of which are in flower, have been compared with a cotype of *R. samoensis* (Vaupel no. 173, B. P. Bishop Museum). Specimen 1065 from the Matafao Ridge on Tutuila is in its vegetative parts almost identical with the cotype. The other specimens from the same locality (nos. 1024, 1046) have smaller leaves, so also the specimens from Le Pioa (nos. 1202, 3547, 3574). Most of the specimens from Savaii (nos. 147, 3394, 3434, 3435) have larger leaves up to 11 by 3.5 cm. (no. 3394). Specimen no. 2720 has narrower leaves than the type (to 6 by 2 cm.), and no. 865 has small leaves comparable to those of the specimens from Le Pioa. It is possible that more than one form is represented, but as all intergradations of leaf size occur, and as there are no flowers and the fruit of the type is not known, forms can not be distinguished.

*Rapanea* species.

Savaii: forest above Letui, altitude 1600-1700 meters, September 26, 1929, Christophersen nos. 779 (fruit), 791; forest above Matavanu Crater, altitude 1550 meters, July 29-30, 1931, Christophersen and Hume nos. 2205 (fruit), 2238.

The leaves of these specimens agree with the original description of *Rapanea myricaefolia* (A. Gray) Mez except for the prominent, reticulate venation. They are identical to Fijian specimens of this species (Gillespie nos. 3908, 4119, B. P. Bishop Museum). The Samoan specimens differ, however, in their 5-merous calyx, longer fruiting pedicels (to 9 mm. long), and larger fruits (about 8 mm. in diameter). They may belong to an undescribed species, but flowering specimens are absent. A shrub or small tree to 5 meters high, found only on Savaii at the highest elevations.

## FAMILY 78. PLUMBAGINACEAE

## I. PLUMBAGO Tournefort

**Plumbago zeylanica** Linnaeus: Sp. Pl., p. 151, 1753.

Olosenga: rocky shore, Lotofanga by Sili, flower, fruit, May 29, 1925, Garber no. 987. Native name, *lau tafifi* (no. 987).

This widely distributed plant is here for the first time recorded for Samoa.

## FAMILY 79. SAPOTACEAE

## I. PALAQUIUM Blanco

**Palaquium Stehlinii**, species nova (fig. 24).

Arbor 15 m. alta laticifera. Ramuli validi teretes glabri circiter 1 cm. crassi. Stipulae caducae. Folia versus apicem ramulorum congesta, laminis oblongo-ovalibus abrupte et breviter acuminatis basi acuta vel subrotundata coriaceis supra glabris nitidis subtus glabris margine integro leviter undulato nervis primariis utrinque 11-12 subtus prominentibus 19-32 cm. longis 10-14.5 cm. latis, petiolis pubescentibus vel glabris supra breviter sulcatis vel planis 3.5-6 cm. longis. Inflorescentiae fasciculatae sub foliis dispositae uni- vel pauciflorae pedicellis ferrugineo-villosis 3.5-4.5 cm. longis. Calyx 5-6 mm. altus lobis 3 exterioribus triangulari-ovatis acutis ferrugineo-villosis lobis 3 interioribus ovatis obtusis margine excepto hirsutis. Corolla glabra tubo 2 mm. alto petalis 6 lanceolatis obtusis 10-12 mm. longis ad 4 mm. latis. Stamina 12 (vel ultra?) filamentis glabris ad 3 mm. longis antheris pilosis oblongis 5 mm. longis. Stylus subulatus parce pilosus per anthesin ad 3 cm. longus dein paullo longior. Ovarium hirsutum per anthesin 3 mm. altum. Fructus ignotus.

Differt a *P. macrocarpo* Burck, *P. Hornei* (Hartog) Dubard, *P. fidjiense* Pierre foliis valde majoribus.

Tree 15 m. high, lactescent. Branches stout, terete, glabrous, about 1 cm. thick. Stipules caducous. Leaves crowded toward end of branches; blades oblong-oval, abruptly and shortly acuminate, acute or roundish at base, leathery, glabrous and shining above, glabrate below, 19-32 cm. long, 10-14.5 cm. broad, margin entire, shallowly undulate, primary veins 11-12 on each side, prominent below; petiole pubescent or glabrate, shortly grooved or plane above, 3.5-6 cm. long. Inflorescence fasciculate, inserted below leaves, one- or few-flowered; pedicels rusty villose, 3.5-4.5 cm. long. Calyx 5-6 mm. high; 3 outer lobes triangular-ovate, acute, rusty villose; 3 inner lobes ovate, obtuse, hirsute except for margin. Corolla glabrous; tube 2 mm. high; petals 6, lanceolate, obtuse, 10-12 mm. long, to 4 mm. broad. Stamens 12 (or more?); filaments glabrate, to 3 mm. long; anthers pilose, oblong, 5 mm. long. Style subulate, sparsely pilose, at anthesis to 3 cm. long, afterward slightly longer. Ovary hirsute, at anthesis 3 mm. high. Fruit unknown.

Savaai: forest above Sili, altitude 300 meters, flower, November 11, 1931, Christophersen no. 3255, type in B. P. Bishop Museum. Native name, *ngasu* (no. 3255).

This species is named in honor of my friend Edmund Stehlin, Jr., Government Inspector of Plantations, an ardent student and able interpreter of everything Samoan. It differs from the Malaysian *P. macrocarpum*, previously reported from Samoa, and from the Fijian species *P. Hornei* and

*P. fijiense* among other characters in its much larger leaves. A tree 15 meters high, collected only once in the foothill forests above Sili on Savaii. The wood is said to be used for houseposts.

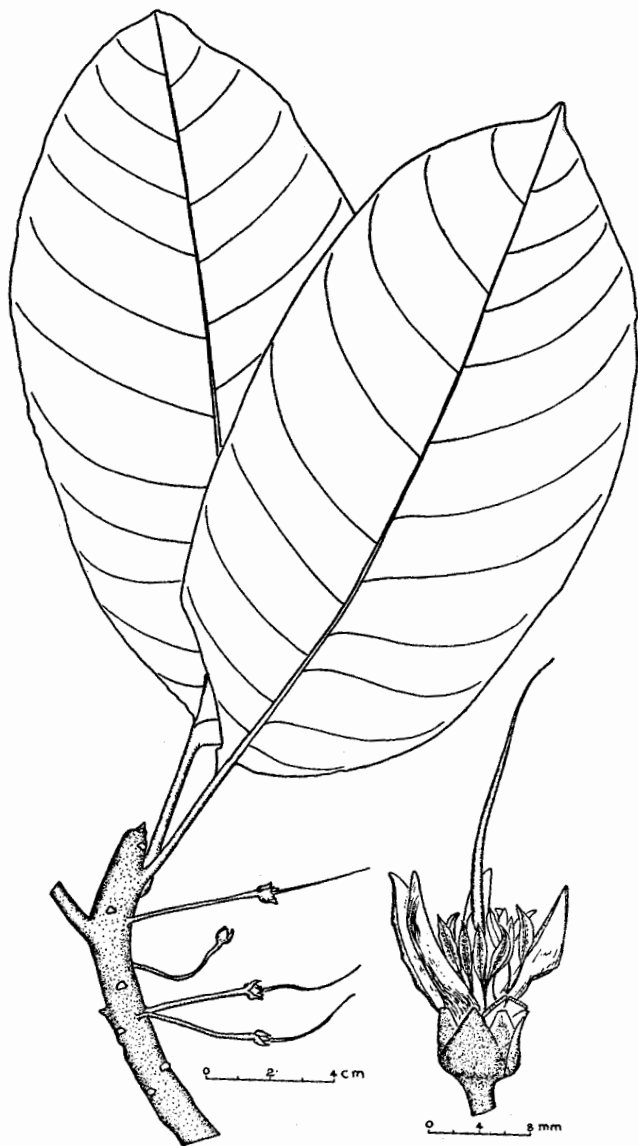


FIGURE 24.—Flowering branch and flower, *Palaquium Stehlinii*.

**Palaquium** (?) species.

Specimens with young fruits and persistent calyx were collected on Upolu (near Malololelei, Christophersen no. 29). There are 6 sepals in 2 series. The young fruit is hirsute at base with a relatively long, subulate style. The leaves are broadly elliptic with retuse apex, to 12 cm. long, 5.5 cm. broad.

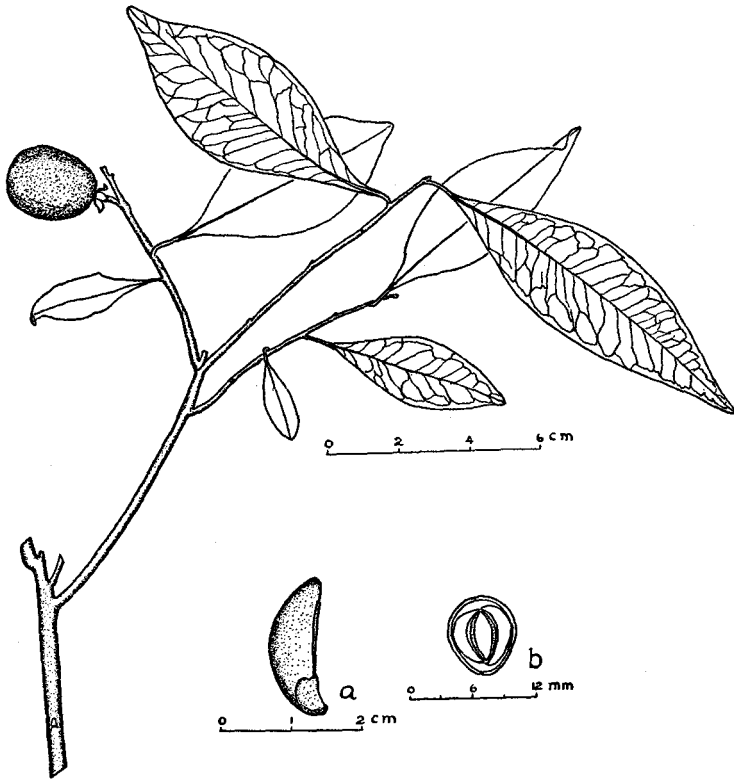


FIGURE 25.—Fruiting branch, *Planchonella Garberi*: a, seed; b, cross section of seed.

## 2. PLANCHONELLA Pierre

### *Planchonella Garberi*, species nova (fig. 25).

Arbor mediocris. Ramuli glabri teretes cortice griseo-fulvo. Folia alterna petiolata glabra, laminis ellipticis vel oblanceolatis acuminatis apice obtuso basi acuminata decurrente margine integro leviter revoluta coriaceis nervis primariis utrinque circiter 11 supra prominentibus 5-11.5 cm. longis 2-4.3 cm. latis, petiolis subalatis ad 1.5 cm. longis. Fructus maturus axillaris solitarius glaber late ellipsoidalis in sicco rugosus 2.5-2.7 cm. longus 1.9-2 cm. latus pedicello 8 mm. longo calyce persistente 5-lobato lobis hirsutis late ovatis apice rotundato 2-3 mm. longis. Semina 5 nitida brunnea 21 mm. longa 8 mm. lata 7 mm. crassa cotyledonibus foliaceis albumine copioso.

Flores ex exemplario 3275 in fasciculis paucifloris lateralibus. Pedicelli sericeo-hirsuti 3-4 mm. longi. Calyx sericeo-hirsutus 2.5 mm. altus 5-lobatus lobis imbricatis late

ovatis apice rotundato. Corolla glabra tubo 2 mm. alto lobis 5 apice rotundato vel truncato 1.5 mm. altis. Stamina 5 epipetala infra faucem tubi inserta filamentis brevibus. Staminodia 5 alternipetala in fauce tubi inserta. Stylus cylindricus glaber 1.5 mm. longus. Ovarium dense hirsutum.

Differt a *P. vitiensi* Gillespie foliis latioribus longius acuminatis fructibus majoribus lobis corollae vix imbricatis stylis longioribus.

Tree of medium size. Branches glabrous, terete, slender, bark grayish yellow. Leaves alternate, petiolate, glabrous; blades leathery, elliptical or oblanceolate, acuminate, obtuse at apex, acuminate and decurrent at base, 5-11.5 cm. long, 2-4.3 cm. broad, margin entire, slightly revolute, primary veins about 11 on each side, prominent above; petiole somewhat winged, to 1.5 cm. long. Mature fruit axillary, solitary, glabrous, broadly ellipsoid, in dried condition rugose, 2.5-2.7 cm. long, 1.9-2 cm. broad; pedicel 8 mm. long; calyx persistent, 5-lobed; sepals hirsute, broadly ovate, rounded at apex, 2-3 mm. long. Seeds 5, shining, brown, 21 mm. long, 8 mm. broad, 7 mm. thick; cotyledons foliaceous; albumen ample.—Flowers (from specimen no. 3275) in lateral, few-flowered fascicles. Pedicels silky hirsute, 3-4 mm. long. Calyx silky hirsute, 2.5 mm. high, 5-lobed; lobes imbricate, broadly ovate, apex rounded. Corolla glabrous; tube 2 mm. high; lobes 5, rounded or truncate at apex, 1.5 mm. high. Stamens 5, epipetalous, inserted below throat of tube; filaments short. Staminodes 5, alternating with petals, inserted at throat of tube. Style cylindrical, glabrous, 1.5 mm. long. Ovary densely hirsute.—Differs from *P. vitiensis* Gillespie in its broader, longer, acuminate leaves, larger fruits, hardly imbricate lobes of corolla, longer style.

Ofu: top of Nuu Islet, altitude 75 meters, fruit, July 4, 1925, Garber no. 1101, type in B. P. Bishop Museum. Savaii: forest, Salailua-Lata-itai, altitude 10 meters, fruit, September 18, 1931, Christophersen no. 2652; forest, Falealupo, altitude 25 meters, September 29, 1931, Christophersen no. 2791; coastal forest, Salailua-Lata-itai, October 16, 1931, Christophersen no. 2853; forest above Sili, altitude 200 meters, fruit, November 11, 1931, Christophersen no. 3235; forest above Sili, altitude 100 meters, flower, November 11, 1931, Christophersen no. 3275. Native name *alaa* (*ala'a*) (nos. 2791, 3235, 3275).

This species is named in honor of D. Wesley Garber, Chief Pharmacist, U.S.N., whose extensive collection of plants from Tutuila and the Manua Islands is a valuable contribution to our knowledge of the flora of those places. It is a tree growing to 15 meters high in the forests of the lowlands and foothills. Lam (37, p. 218) has published a new combination, *Planchonella* (?) *samoensis* (Reinecke) H. J. Lam, from a manuscript name on a sheet of Reinecke's Samoan collection deposited in the herbarium at Buitenzorg. No description is given.

The star apple, *Chrysophyllum Cainito* Linnaeus, is cultivated in a few places. The Samoan name is *pipi o eva* (Savaii, Christophersen nos. 2475, 3380)..

On the Falealupo peninsula of Savaii a sapotaceous tree is found, the native name of which is *pau*. The reddish wood of this species is the favorite material for war clubs and spears and is as such known all over Samoa, though the tree is said to grow nowhere else but on this peninsula. Only sterile specimens were collected (Christophersen nos. 2660, 3319).

## FAMILY 80. EBENACEAE

## I. MABA Forster

**Maba elliptica** Forster: Char. Gen., p. 122, pl. 61, 1776.

Tau: top of bluff, north side of Siulangi Point, fruit, August 26, 1922, Garber no. 773. Ofu: top of Nuu Islet, altitude 75 meters, fruit, July 4, 1925, Garber no. 1102. Tutuila: garden at Governor's residence, fruit, Sep-

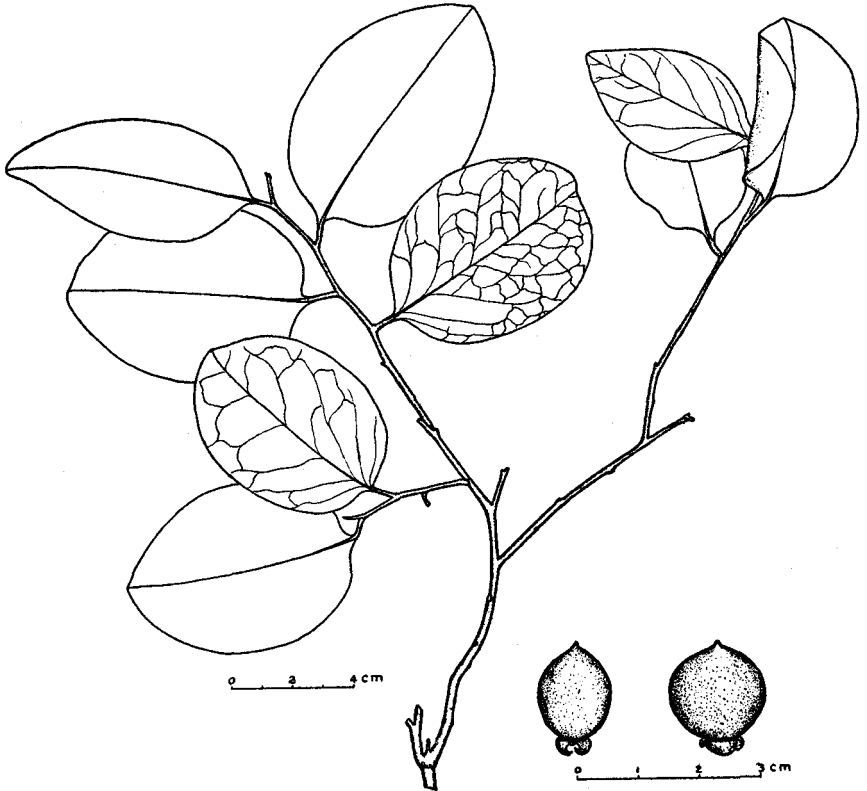


FIGURE 26.—Branch and fruits, *Maba savaiiensis*.

tember 25, 1923, Wilder no. 46; Pago Pago harbor, bud, 1929, Diefenderfer no. 11. Upolu: at the Police Post, Lalumanu, male flower, October 24, 1929, Christophersen no. 966. Native name *anume* (no. 773).

The leaves of these specimens are elliptic, acuminate, obtuse, 4-7.5 cm. long, 1.8-3.5 cm. broad, petioles short. Young branches, petioles, and veins are hirsute, leaf blade glabrate. Calyx and corolla of male flowers densely

hirsute, corolla more deeply cut than figured by Forster (21, pl. 61). Fruit ellipsoid, 15-17 mm. long to 11 mm. broad.

The *anume* is a small or medium-sized tree growing at low elevation.

***Maba affinis elliptica*** Forster: Char. Gen., p. 122, pl. 61, 1776.

Savaii: forest near Tufutafoe, altitude 10 meters, fruit, September 30, 1931, Christophersen no. 2772; same tree in flower, November 22, 1931, Christophersen no. 3310.

Only a single, medium-sized tree of this description has been observed. It differs from the specimens of *M. elliptica* Forster from the other Samoan islands in its longer and relatively narrower, glabrous leaves, 5.5-10.5 cm. long, 1.4-3.3 cm. broad, and in its larger fruits, to 28 by 13 mm. when fresh, to 26 mm. long when dry.

***Maba savaiiensis***, species nova (fig. 26).

Arbor parva 3 m. alta. Rami teretes cinerei glabri, lenticellis numerosis parvis prominentibus. Folia alterna petiolata glabra, laminis chartaceis ovatis vel late ovalibus fere orbicularibus  $6.8 \times 3.7-7.5 \times 5.5-9 \times 8$  cm. longis et latis apice obtuso rotundato vel emarginato basi abrupte acuminata margine leviter revoluta nervis utrinque prominentibus, petiolis validis 7-10 mm. longis. Flores ignoti. Calyx fructifer infra mediam partem laciniatus, laciniis 3 ovatis acutis valde revolutis extus hirsutis intus sericeo-tomentosis 4 mm. longis 4-5 mm. latis. Bacca matura luteo-rubra oblique vel late ellipsoidalis utrinque rotundata apice breviter rostrato in sicco 15-17 mm. longa 10-16 mm. lata. Semina 1-4 rubro-brunnea rugulosa ellipsoidalia teretia vel complanata apice rotundato basi acuta 10 mm. longa.

Differt a speciebus aliis samoensibus foliis late ovalibus baccis crassioribus interdum fere globosis.

Small tree, 3 m. high. Branches terete, ash-colored, glabrous; lenticels numerous, small, prominent. Leaves alternate, petiolate, glabrous; blades chartaceous, ovate or broadly oval, almost orbicular,  $6.8 \times 3.7-7.5 \times 5.5-9 \times 8$  cm. long and broad, apex obtuse, rounded, or emarginate, base abruptly acuminate, margin slightly revolute, veins prominent on both sides; petiole stout, 7-10 mm. long. Flowers unknown. Fruiting calyx lobed below the middle; lobes 3, ovate, acute, strongly revolute, outside hirsute, inside silky tomentose, 4 mm. long, 4-5 mm. broad. Mature berry yellowish red, obliquely or broadly ellipsoid, rounded at both ends, apex shortly beaked, dried specimens 15-17 mm. long, 10-16 mm. broad. Seeds 1-4, reddish brown, rugulose, ellipsoid, terete or flattened, apex rounded, base acute, 10 mm. long.—Differs from the other Samoan species in its broadly oval leaves, and its thicker berries, which may become almost globose.

Savaii: low coastal forest, near Falealupo, fruit, November 22, 1931, Christophersen nos. 3320, 3328; open scrub forest, near Fangalele, altitude 5 meters, fruit, November 21, 1931, Christophersen no. 3404, type in B. P. Bishop Museum; open scrub, lava flow between Aopo and Asau, altitude 200 meters, fruit, December 6, 1931, Christophersen no. 3428. Native name, *anume* (nos. 3320, 3328, 3428).

This species is characterized by its glabrous, broad leaves and its fruits which may become almost globose. It is a small tree 3 to 4 meters high, growing on the subrecent lava flows between Aopo and Falealupo.

**Maba samoensis** Hiern: Jour. Bot., vol. 15, p. 99, pl. 186, 1877.

Savaii: forest, Siuvao-Auala, altitude 600 meters, fruit, November 20, 1931, Christophersen no. 3379.

A small, straggling tree about 6 meters high.

## 2. DIOSPYROS Linnaeus

**Diospyros samoensis** A. Gray: Proc. Am. Acad., vol. 5, p. 326, 1861.

Ofu: along beach at Toanga, June 23, 1925, Garber no. 1095; Nuu Islet, fruit, July 4, 1925, Garber no. 1103. Tutuila: forest, Papatele Ridge, altitude 300 meters, bud, October 31, 1929, Christophersen no. 1000; Pago Pago harbor, March 18, 1930, Diefenderfer (by native) no. 16. Upolu: forest, rocky place, near Apia, altitude 200 meters, February 28, 1921, Eames no. 121; forest below Malololelei, altitude 500 meters, fruit, August 16, 1929, Christophersen no. 291; forest, Lanutoo, altitude 700 meters, fruit, August 21-22, 1929, Christophersen no. 387; forest, Vaea, altitude 150 meters, August 28, 1929, Christophersen no. 465b. Savaii: forested "island" in Matavanu lava field, altitude 200 meters, July 6, 1931, Christophersen and Hume no. 1875; plantation, Safune, fruit, August 13, 1931, Christophersen and Hume no. 2396; open woodland, above Safotu (below Olo), altitude 600 meters, fruit, August 27, 1931, Christophersen and Hume no. 2531; forest, Salailua-Lata-itaï, altitude 10 meters, September 17, 1931, Christophersen nos. 2620 (flower), 2624 (fruit); coastal forest, Tanga, fruit, October 6, 1931, Christophersen no. 2821; scrub, lava flow between Aopo and Asau, altitude 200 meters, flower, December 6, 1931, Christophersen no. 3432. Native name, *auauli* (*au'auli*) (nos. 1095, 1103, 1000, 16, 121, 291, 387, 2396, 2531, 2821).

The *auauli* is a tree common in open forests or openings at low and middle elevations. It is usually of medium size, a maximum height of 15 meters having been observed.

## FAMILY 81. OLEACEAE

### I. JASMINUM (Tournefort) Linnaeus

**Jasminum didymum** Forster f.: Prodr., p. 3, 1786.

Ofu: Nuu Islet, fruit, July 4, 1925, Garber no. 1106. Tutuila: forest, ridge west of Pago Pago, altitude 300 meters, November 14, 1929, Christophersen no. 1262. Savaii: open forest near Manase plantation, altitude 100 meters, fruit, July 12, 1931, Christophersen and Hume no. 1982; forest near Safotu, altitude 50 meters, fruit, August 13, 1931, Christophersen and Hume no. 2365; low coastal forest, Falealupo-Fangalele, November 21-22, 1931, Christophersen nos. 3325 (flower), 3391 (fruit).

A common vine in the lowland forests.



**Jasminum multiflorum** (Burmam f.) Andrews: Bot. Repos., vol. 8, pl. 496, 1799-1811.

Tutuila: cultivated, Pago Pago, flower, January 1, 1925, Garber no. 948; Aunuu Island, cultivated, flower, November 12, 1929, Diefenderfer no. 1232. Upolu: thicket, near Apia, flower, March 2, 1921, Eames no. 203.

Cultivated for ornament by the Samoans, and also growing as an escape (according to Eames, information on field label).

*Jasminum sambac* (Linnaeus) Aiton is also cultivated for ornament in the villages (Tutuila, Eames no. T-28).

**Jasminum simplicifolium** Forster f.: Prodr., p. 3, 1786.

Savaii: coastal forest, Salailua-Lata-itai, fruit, September 18, 1931, Christophersen no. 2654; coastal forest, Salailua-Lata-itai, fruit, October 19, 1931, Christophersen no. 2863.

**Jasminum** species.

Sterile specimens of a trifoliolate *Jasminum* with long-acuminate leaflets were collected on Upolu (Christophersen no. 198) and Savaii (Christophersen and Hume nos. 2158, 2316) at altitudes of 700 to 1300 meters.

## FAMILY 82. LOGANIACEAE

### I. GENIOSTOMA Forster

?**Geniostoma biseriale** Rechinger: Fedde Rep. Nov. Sp., vol. 6, p. 325, 1909.

Savaii: low forest on rim of Papafu Crater, altitude 1500 meters, fruit, September 22, 1931, Christophersen no. 2727.

This specimen agrees with *G. biseriale* in its large, almost sessile leaves, which, however, are more abruptly acuminate and not strictly biseriate.

**Geniostoma Fleischmanni** Rechinger: Fedde Rep. Nov. Sp., vol. 7, p. 17, 1909.

Savaii: forest above Matavanu Crater, altitude 1030 meters, fruit, July 22, 1931, Christophersen and Hume no. 2124.

The branches are distinctly 4-angled with narrow wings, and the leaves are gradually tapering in the lower part with acute or narrowly rounded base. The mature capsules are 7-8 mm. long, 4 mm. broad, with strongly recurved valves.

**Geniostoma gracile** Rechinger: Fedde Rep. Nov. Sp. vol. 6, p. 325, 1909.

Tutuila: Pago Pago harbor, fruit, 1929, Diefenderfer no. 29. Upolu: forest, Vaea, altitude 100 meters, fruit, April 9, 1927, MacDaniels no. 1121. Savaii: forest above Letui, altitude 1300 meters, flower, September 26, 1929, Christophersen no. 775; forest above Matavanu Crater, altitude 1400 meters,

flower, July 30, 1931, Christophersen and Hume no. 2200; forest above Salailua, altitude 1300-1400 meters, fruit, September 23, 1931, Christophersen no. 2675; forest above Salailua, altitude 1400 meters, flower, fruit, November 7, 1931, Christophersen no. 3118; at river, above Sili, altitude 400 meters, fruit, November 12, 1931, Christophersen no. 3152; forest, Siuva-Auala, altitude 600 meters, flower, November 20, 1931, Christophersen no. 3375.

This species is characterized by its few-flowered cymes and slender pedicels. The leaves vary from rounded to cuneate at base. A shrub or tree to 10 meters high, usually 3-5 meters high, growing in the forests at medium and high elevations.

**Geniostoma affinis rupestris** Forster: Char. Gen., p. 24, pl. 12, 1776.

Tau: altitude 650 meters, flower, fruit, January 28, 1922, Garber no. 755. Upolu: top of Fao mountain, altitude 680 meters, September 6, 1929, Christophersen nos. 556 (fruit) and 569 (flower). Savaii: Matavanu lava field, altitude 200 meters, flower, fruit, September 12, 1929, Christophersen no. 609; lava field, Letui-Aopo, altitude 100-200 meters, fruit, October 6, 1929, Christophersen no. 906; Matavanu lava field, altitude 200 meters, July 6, 1931, Christophersen and Hume nos. 1878 (flower, fruit) and 1898; coastal bluff, Safotu-Manase, flower, fruit, August 20, 1931, Christophersen and Hume no. 2451; Matavanu lava field, near Saleaula, flower, August 21, 1931, Christophersen and Hume no. 2467. Native name, *tai tai ipu* (no. 906).

Rechinger (45, pp. 328-329) has compared the specimens of his Samoan collections with the type of *G. rupestris* (from Tanna, New Hebrides) and refers one of them to this species. I have not seen the type nor Rechinger's specimen. A specimen collected in Aneityum Island, New Hebrides, by S. F. Kajewski (no. 728, B. P. Bishop Museum) comes close to some of the Samoan specimens. The limits of variation within this species have yet to be determined by studying material from the entire range given to it: New Hebrides to the Society Islands.

## 2. FAGRAEA Thunberg

**Fagraea Berteriana** A. Gray: Jour. Linn. Soc., vol. 1, p. 98, 1857.

Tau: plateau back of Luma, altitude 125 meters, fruit, August 4, 1921, Garber no. 580. Tutuila: near summit, Vatia-Leloaloa trail, flower, December 17, 1924, Garber no. 882; scrub forest, top of south Pioa, altitude 500 meters, flower, fruit, November 10, 1929, Christophersen no. 1208. Upolu: forest, Malololelei-Lanutoo, altitude 700 meters, flower, fruit, August 5, 1929, Christophersen no. 63; forest above Malololelei, altitude 700 meters, August 14, 1929, Christophersen no. 239. Savaii: lava field, Letui-Aopo, altitude 125

meters, flower, fruit, May 15, 1924, Bryan no. 150; Matavanu lava field, altitude 400 meters, flower, fruit, September 12, 1929, Christophersen no. 588; forested "island," Matavanu lava field, altitude 200 meters, fruit, July 6, 1931, Christophersen and Hume no. 1888; coconut plantation, Safune, fruit, August 13, 1931, Christophersen and Hume no. 2435. Native name, *pua lulu* (nos. 882, 1208, 239, 2435).

A common forest tree at low and medium elevations. The fragrant flowers are used for necklaces ('*ula*) and the wood is used for house posts.

### FAMILY 83. APOCYNACEAE

#### I. ALLAMANDA Linnaeus

**Allamanda cathartica** Linnaeus: Mant., vol. 2, p. 214, 1771.

Tutuila: moist place, ridge west of Pago Pago, altitude 300 meters, flower, November 14, 1929, Christophersen no. 1258.

A plant common in cultivation, occasionally found as an escape.

#### 2. ALSTONIA R. Brown

**Alstonia affinis plumosa** Labillardière: Sert. Austr. Caled. p. 28, pl. 32, 1824-25.

*Alstonia Reineckeana* Stapf: Setchell, Am. Samoa, p. 58, pl. 12, fig. A, 1924; non Lauterbach.

Tutuila: Matafao Ridge, altitude 500-600 meters, flower, November 3, 1929, Christophersen nos. 1042, 1061.

These specimens are identical with Setchell's specimen no. 381 collected in the same locality, and by Stapf (51) referred to *A. Reineckeana*. They have been compared with a cotype of this species in Bernice P. Bishop Museum, and they differ in their heavier, leathery leaves with rounded or broadly acute apex and more abruptly contracted base, in their more open inflorescence, and longer pedicels. The lobes of the corolla are about 8 mm. long. They may represent a new species related to *A. plumosa* Labillardière or a variety of this species. I have not seen the original description and illustration of *A. plumosa*, but Stapf (51, p. 58) states that *A. Reineckeana* (to which he refers Setchell's specimen no. 381) is distinct from *A. plumosa*.

?**Alstonia Reineckeana** Lauterbach: Engl. Bot. Jahrb., vol. 41, p. 233, 1908.

Savaii: forest above Matavanu Crater, altitude 800 meters, flower, September 15, 1929, Christophersen no. 646; forest near Vaipouli, altitude 150 meters, flower, fruit, July 7, 1931, Christophersen and Hume no. 1903; forest above Salailua, altitude 1300 meters, flower, November 7, 1931, Christophersen no. 3071.

All these specimens differ in some respects from a cotype of *A. Reineckeana* in the herbarium of Bernice P. Bishop Museum. No. 1903 is identical with the cotype in the dense inflorescence, short pedicels, length of corolla, length of follicle, and in the shortly bifid upper tail of the seed. The leaves, however, are relatively broader, acute or slightly acuminate, not distinctly acuminate as some of the leaves of the cotype. The size of the leaves of the flowering branches is very variable, on an average about 10 cm. long and 4.5 cm. broad, the largest leaves being 19 cm. long and 10.5 cm. broad. No. 646 differs from the cotype of *A. Reineckeana* in the larger flowers, the length of the corolla lobes being about 1 cm. The leaves are relatively broader, acuminate with obtuse apex. No. 3071 differs also in the larger flowers, being of the same size as those of no. 646. It is identical with *A. Reineckana* in the shape of the leaves, which, however, are on an average larger.

It is possible that some or all of these specimens represent distinct varieties, but until the range of variation can be ascertained from a larger amount of material it seems best to refer the specimens to this species proper.

***Alstonia Setchelliana*, species nova (fig. 27).**

Arbor 3-4 m. alta. Rami glabri teretes vel leviter alati. Folia opposita. Petioli validi costati glabri 3-5 cm. longi. Laminae ellipticae vel late oblanceolatae chartaceae utrinque glabrae excepta costa inferiore lateraliter villosa discolores 13-25 cm. longae 5-8 cm. latae, nervis lateralibus utrinque 11-13 subtus prominentibus, basi cuneata leviter decurrente, apice acuto vel leviter acuminato, margine revoluta leviter undulata. Inflorescentiae axillares patentes glabrae 9-15 cm. longae, pedunculis 5.5-10.5 cm. longis, pedicellis 3-5 mm. longis bracteolis 1-2 instructis. Calyx 1.5-2 mm. longus infra dimidium laciniatus, laciniis 5 acutis triangularibus. Folliculus arcuatus glaber striatus acutus 20-38 cm. longus 4 mm. crassus. Semina villosa-ciliata complanata utrinque subulata 12-15 mm. longa sine subulis 5 mm. longa 1.5 mm. lata, subulis superioribus plerumque fere ad basin bifurcatis.

Differt a *A. costata* (Forster) R. Brown foliis acutis vix acuminatis chartaceis vix coriaceis costa subtus lateraliter villosa basi angustiore, laciniis corollae brevioribus, seminibus longe subulatis; a *A. plumosa* Labillardiere foliis acutis majoribus floribus minoribus (?) folliculis longioribus; a *A. Reineckeana* Lauterbach foliis majoribus floribus minoribus subulis superioribus seminorum profunde furcatis.

Tree 3-4 m. high. Branches glabrous, terete or slightly winged. Leaves opposite; petioles stout, ribbed, glabrous, 3-5 cm. long; blades elliptical or broadly oblanceolate, chartaceous, glabrous except for laterally villose midrib on lower surface, upper and lower surface of different color, 13-25 cm. long, 5-8 cm. broad, lateral veins 11-13 on each side, prominent below, base cuneate, slightly decurrent, apex acute or slightly acuminate, margin revolute, slightly undulate. Inflorescence axillary, spreading, glabrous, 9-15 cm. long; peduncle 5.5-10.5 cm. long; pedicels 3-5 mm. long, with 1-2 bracteoles. Calyx 1.5-2 mm. long, lobed below the middle; lobes 5, acute, triangular. Follicle curved, glabrous, striate, acute, 20-38 cm. long, 4 mm. thick. Seeds villosa-ciliate, flattened, subulate at both ends, 12-15 mm. long, without acumens 5 mm. long, 1.5 mm. broad; upper acumen mostly bifurcate almost to the base.—Differs from *A. costata* (Forster) R. Brown in its acute, hardly acuminate, chartaceous, hardly leathery leaves with narrower base, laterally villose, lower midrib, shorter lobes of corolla, long subulate seeds. Differs from *A. plumosa* Labillardiere in its larger, acute leaves, smaller (?) flowers, longer follicles. Differs from *A. Reineckeana* Lauterbach in its larger leaves, smaller flowers, deeply furcate upper acumen of seed.



FIGURE 27.—Fruiting and flowering branch, *Alstonia Setchelliana*: a, seed.

Tutuila: forest, Alava Ridge, altitude 400 meters, flower, November 7, 1929, Christophersen no. 1139; forest, ridge west of Pago Pago, altitude 300 meters, November 14, 1929, Christophersen no. 1257; forest, ridge west of Pago Pago, altitude 300 meters, young flower, fruit, November 14, 1929, Christophersen no. 1265, type in B. P. Bishop Museum.

This species is named in honor of Dr. W. A. Setchell, Professor of Botany at the University of California. The flowers of the type are not open, but those of no. 1139 are mature, about 9 mm. long, tube of the corolla 2-3 mm. long, lobes 4 mm. long, aestivation dextrorse. A small tree, growing on the ridge north of Pago Pago harbor.

#### **Alstonia** species.

Tutuila: Scrub forest, top of Le Pioa, altitude 500 meters, young flower, January 2, 1932, Christophersen no. 3540.

The specimens have young, unopened flowers and some in which the corolla has dropped. No fruits are present. The leaves are thick and leathery, glabrous, on flowering branches about 10 cm. long and 4.5 cm. broad, on sterile branches to 12.5 cm. long and 6 cm. broad, acuminate with rather abruptly acuminate base, petioles 2-3 cm. long; calyx 2 mm. long with obtuse lobes, aestivation of corolla lobes dextrorse, style short. They may belong to *A. costata* (Forster) R. Brown.

### 3. **LOCHNERA** Reichenbach

**Lochnera rosea** (Linnaeus) Reichenbach: Conspect., p. 134, 1828.

Tutuila: plantation, Aunuu Island, flower, November 12, 1929, Diefenderfer no. 1238. Savaii: coconut plantation, Safune, flower, August 13, 1931, Christophersen and Hume no. 2393.

A common plant in waste land and plantations. An escape from cultivation.

### 4. **TABERNAEMONTANA** Plumier

**Tabernaemontana orientalis** R. Brown: Prodr. Fl. Nov. Holl., p. 468, 1810.

Savaii: forest above Safotu, altitude 100 meters, flower, August 13, 1931, Christophersen and Hume no. 2366; coconut plantation, Safune, flower, August 13, 1931, Christophersen and Hume no. 2432; forest near Aopo, altitude 250 meters, fruit, December 6, 1931, Christophersen no. 3425.

A shrub in the lower forests.

### 5. **ALYXIA** Banks, ex R. Brown

**Alyxia bracteolosa** Rich: ex Gray, Proc. Am. Acad., vol. 5, p. 332, 1862.

Tau: plateau back of Faleasao, altitude 200 meters, fruit, August 4, 1921, Garber no. 577. Tutuila: forest, Pago Pago, altitude 100 meters, flower, Sep-

tember 21, 1923, Swezey and Wilder no. 35; near summit of Aua ridge, Aua-Afono trail, altitude 200 meters, fruit, December 17, 1924, Garber no. 856. Native name, *maile* or *lau maile* (nos. 577, 35).

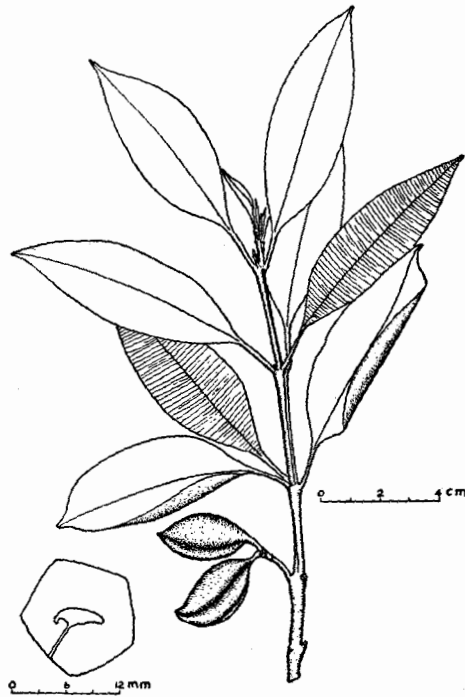


FIGURE 28.—Branch with dried fruit, and cross section of seed, *Alyxia erythrosperma* varietas *samoensis*.

The specimens are characterized by their globose or subglobose fruits, corresponding to the type of this species as originally described. The seeds are rounded, not angled. The dried fruits of no. 856 are slightly longer than broad: 1.4 by 1.3 cm. — 1.5 by 1.4 cm., those of no. 577 are globose: 1.5 by 1.5 cm. — 1.6 by 1.6 cm. In characters of the fruit the specimens are identical with Setchell's nos. 211 and 279 (in the herbarium of University of California). The leaves are elliptic-oblong to narrowly obovate, acuminate with obtuse apex, but differ in size from about 5 by 2 cm. (no. 856) to 10 by 3 cm. (no. 577).

***Alyxia erythrosperma* Gillespie varietas *samoensis*, varietas nova (fig. 28).**

Differt a typo ramulis 3-angularibus foliis plerumque ternatis petiolatis angustioribus perspicue acuminatis nervis lateralibus pluribus.

Differs from the type in its triangular branches, mostly ternate, petiolate, narrower, distinctly acuminate leaves, more numerous lateral veins.

Upolu: forest, Malololelei-Lanutoo, altitude 700 meters, flower, August 5, 1929, Christophersen no. 39; forest above Malololelei, altitude 700 meters, flower, August 14, 1929, Christophersen no. 229; forest below Malololelei, altitude 500 meters, bud, August 19, 1929, Christophersen no. 335; edge of forest, Lanutoo, altitude 700 meters, fruit, August 21-22, 1929, Christophersen no. 388; forest, Malololelei-Lanutoo, altitude 700 meters, bud, fruit, August 21-22, 1929, Christophersen no. 391; forest, Vaea mountain, altitude 350 meters, bud, August 28, 1929, Christophersen no. 463. Savaii: forested "island" in Matavanu lava field, altitude 200 meters, flower, July 6, 1931, Christophersen and Hume no. 1873; forest above Matavanu Crater, altitude 1300 meters, bud, fruit, July 24, 1931, Christophersen and Hume no. 2157, type in B. P. Bishop Museum; forest above Matavanu Crater, altitude 1600 meters, bud, fruit, September 6, 1931, Christophersen and Hume no. 2563. Native names, *lau maile* (no. 335), *lau maile vao* (nos. 388, 391).

A stout vine with elliptic to broadly oblanceolate leaves, distinctly acuminate with obtuse apex, shiny above, variable in size, on an average about 9 cm. long, 3 cm. wide, the largest leaf 11.5 cm. long, 3.8 cm. wide. Mature fruits purplish blue, submature fruits greenish purple, naturally terete, distinctly 5-angled when dry, 2.5-3.1 cm. long, 1.6-1.7 cm. broad. Seed single, 5-angled, dull red, 1.9 cm. long, 1.2 cm. broad. The mature, purplish-black fruits of no. 2563 are in a natural state 3 to 3.2 cm. long, 1.8-2 cm. broad, when dry 2.8-3 cm. long, 1.6-1.7 cm. broad. The flowers of no. 1873 are yellowish white, darker in the upper part of corolla tube, 12 mm. long; calyx divided to the base, about 2 mm. high, lobes acute, keeled, ciliate; tube of corolla dilated below the apex, 8 mm. long, lobes acute, 3.5-4 mm. long, 2 mm. broad.

The specimens from Upolu differ in their thinner, less leathery leaves, their longer flowers, 14-19 mm. long, and their longer fruits, to 3.5 cm. long, 2 cm. broad. However, the individual variation in size within this group indicates rather wide limits of forms.

The following specimens from Savaii correspond in their vegetative characters to the type of this variety, but the fruits and flowers are too young for a definite identification: near Manase, Christophersen and Hume no. 2418; Papafu Crater, altitude 1500 meters, Christophersen no. 2722; Falealupo, Christophersen no. 2800; near Salailua, Christophersen no. 2954 (native name: *lava*).

### ***Alyxia septangularis*, species nova (fig. 29).**

Frutex scandens. Rami subteretes lenticellati apicem versus triangulares glabri. Folia ternata vel quaternata petiolata. Lamina anguste elliptica acuminata apice obtuso basi acuminata contracta supra glabra lucida reticulata obscure viridis subtus pilosiuscula illustrior nervis lateralibus 50 vel pluribus margine leviter revoluta. Petioli canaliculati 1-1.5 cm. longi. Flores immaturi. Pedunculus fructifer ad 12 mm. longus. Pedicellus



ad 7 mm. longus bracteolatus bracteolis acuminatis carinatis ciliolatis 2 mm. longis. Fructus ellipsoidaliter 7-angularis 18-20 mm. longus 13-15 mm. latus. Semina rubro-brunnea 7-angularia 14 mm. longa 10 mm. lata.

Flores submaturi ex exemplario 2567 flavo-albi ad 14 mm. longi calyce 2 mm. longo laciniis acutis carinatis ciliatis tubo corollae ad 9 mm. longo laciniis 4 mm. longis.

Differt a speciebus omnibus notis samoensibus seminibus 7-angularibus.



FIGURE 29.—Fruiting branch, *Alyxia septangularis*: a, seed; b, cross section of seed.

Climbing shrub. Branches subterete, lenticellate, triangular toward apex, glabrous. Leaves ternate or quaternate, petiolate; blades narrowly elliptical, acuminate, apex obtuse, base acuminate, contracted, above glabrous, shining, reticulate, dark green, below slightly pilose, lighter, lateral veins 50 or more, margin slightly revolute; petioles grooved, 1-1.5 cm. long. Flowers immature. Fruiting peduncle to 12 mm. long. Pedicels to 7 mm. long, bracteolate; bracteoles acuminate, keeled, ciliolate, 2 mm. long. Fruit ellipsoid; living specimens terete, greenish purple; dried specimens irregularly rugose, indistinctly longitudinally 7-angular, 18-20 mm. long, 13-15 mm. broad. Seeds reddish brown, 7-angular, 14 mm. long, 10 mm. broad.—Submature flowers (from specimen no. 2567) yellow.

lowish white, to 14 mm. long; calyx 2 mm. long, lobes acute, keeled, ciliate; tube of corolla to 9 mm. long, lobes 4 mm. long.—Differs from all other Samoan species known in its 7-angular seeds.

Upolu: forest, Malololelei-Lanutoo, altitude 700 meters, bud, fruit, August 21-22, 1929, Christophersen no. 390. Savaii: forest, northeast of Salailua, altitude 1200 meters, flower, fruit, September 8, 1931, Christophersen no. 2567; forest, Falealupo, altitude 10 meters, fruit, September 29, 1931, Christophersen no. 2785; forest, Siuvao-Auala, altitude 600 meters, bud, fruit, November 19, 1931, Christophersen no. 3297, type in B. P. Bishop Museum. Native name, *lau maile vao* (no. 390).

This species is a vine similar to *A. erythrosperma* variety *samoensis* in habit. It is easily recognized by its 7-angled seeds. The specimens from Falealupo (no. 2785) differ from the type in the size of its fruits. The fruits are apparently submature with well-developed seeds, the largest fruit being 14 mm. long and 10 mm. broad.

***Alyxia stellata*** (Forster) Roemer et Schultes: Syst. Veg., vol. 4, p. 439, 1819.

Tutuila: forest above Matuu, altitude 100 meters, flower, fruit, April 16, 1924, Bryan no. 84; scrub forest, top of Le Pioa, altitude 500 meters, bud, fruit, January 2, 1932, Christophersen no. 3551. Upolu: Vailele, fruit, August 20, 1929, Christophersen (by native) no. 357. Savaii: forest above Matavanu Crater, altitude 800 meters, fruit, September 15, 1929, Christophersen no. 648; forest above Safotu-Letui, altitude 1600-1700 meters, fruit, September 25, 1929, Christophersen no. 784a; lava field between Letui and Aopo, altitude 100-200 meters, fruit, October 6, 1929, Christophersen no. 905; forest back of Vaipouli, altitude 150 meters, fruit, July 7, 1931, Christophersen and Hume no. 1904; forest above Vaipouli, altitude 200 meters, fruit, July 10, 1931, Christophersen and Hume no. 1963; forest above Matavanu Crater, altitude 900 meters, flower, fruit, July 14, 1931, Christophersen and Hume no. 1989; forest above Matavanu Crater, altitude 1500-1600 meters, flower, July 29, 1931, Christophersen and Hume no. 2204; rocky bluff, Safotu-Manase, fruit, August 20, 1931, Christophersen and Hume no. 2459; coastal forest, Salailua-Lata-itai, fruit, September 18, 1931, Christophersen no. 2651; low forest on rim of Papafu Crater, altitude 1500 meters, bud, fruit, September 22, 1931, Christophersen no. 2729; coastal scrub forest, Falealupo-Fangalele, flower, fruit, November 21-22, 1931, Christophersen nos. 3326 and 3393; open scrub, lava field between Aopo and Asau, altitude 200 meters, fruit, December 6, 1931, Christophersen no. 3433. Native names, *lau maile* (nos. 357, 1963, 1989, 2651, 3326, 3393, 3433), *lava* (no. 905), *ngau* (no. 2729).

This shrub with twining branches is characterized by its habit, its small flowers, and its terete seeds. It is closely related to the Hawaiian *A. olivae-*

*formis* Gaudichaud but differs in its usually ternate leaves being more often opposite in *A. olivaeformis*, in its shorter corolla tube, and relatively larger corolla lobes, which usually are five in number. It is also related to *A. elliptica* Cheeseman from Rarotonga, but that species has larger flowers. I have not seen Forster's type of *A. stellata* or any other specimens from the Society Islands, but some of the Samoan specimens agree closely with Forster's original description as given by Guillemain (27, p. 247). The leaves are in all the specimens lanceolate or elliptical and bluntly acuminate, but vary considerably in size and relative width, from 35 by 13 and 42 by 24 to 72 by 26 mm. long and broad. The extremely narrow-leaved form commonly cultivated in the villages for decoration is possibly distinct (Ofu, Garber no. 977; Savaii, Christophersen no. 3057). With regard to fruits there seem to be two types: 1, shape almost globose; 2, shape ellipsoid. This character is not correlated with leaf form. Whether or not it is correlated with characters of the flower the material does not show.

This shrub is common in the forests at all elevations.

## 6. OCHROSIA Jussieu

**Ochrosia parviflora** (Forster) Henslow: *Ann. Nat. Hist.*, vol. 1, p. 345, 1838.

Savaii: sandy beach, Vangenga, between Salailua and Lata-itai, flower, fruit, September 18, 1931, Christophersen no. 2635; shore forest, Tanga, flower, October 6, 1931, Christophersen no. 2823; shore, Salailua-Lata-itai, flower, October 19, 1931, Christophersen no. 2867. Native name, *fao* (nos. 2635, 2823, 2867).

A small shore tree observed in only a few places between Salailua and Tanga on Savaii. In one place it grows with *Xylocarpus moluccensis*, another shore tree rare in Samoa.

## 7. CERBERA Linnaeus

**Cerbera manghas** Linnaeus: *Sp. Pl.*, p. 208, 1753.

Tau: plateau back of Luma, altitude 60 meters, flower, August 2, 1921, Garber no. 546. Tutuila: Pago Pago harbor, 1929, Diefenderfer no. 20. Upolu: near seashore, Apia, flower, February 10, 1921, Eames no. 4; on beach, Apia, flower, fruit, August 27, 1929, Christophersen no. 432. Savaii: rocky bluff, Safotu-Manase, flower, August 20, 1931, Christophersen and Hume no. 2454; forest, Salailua-Lata-itai, altitude 10 meters, flower, September 17, 1931, Christophersen no. 2625. Native name, *leva* (nos. 4, 432, 2056, 2625).

The specimens are characterized by large flowers, as are also specimens

from other Polynesian islands in the herbarium of Bernice P. Bishop Museum. The lobes of the calyx in no. 432 are lanceolate, abruptly acuminate or cuspidate, 2-3 cm. long and 4-7 mm. broad. The corolla tube is 3.5-4.5 cm. long with broadly lanceolate to obovate lobes 2 cm. long and less than 1 cm. broad. These flowers, therefore, appear to represent a combination of the long-tubed flowers of *C. lactaria* Hamilton and the large-lobed flowers of *C. odollam* Gaertner, with longer calyx lobes than either. I am following Merrill (40, p. 432) in treating this affinity group as one polymorphic species.

The *leva* is a common tree in the shore forests of all the large islands.

### 8. THEVETIA Linnaeus

**Thevetia peruviana** (Persoon) Merrill: Philipp. Jour. Sci., vol. 9, p. 130, 1914.

Tutuila: cultivated, Nuuuli, flower, fruit, January 3, 1925, Garber no. 959.

A common tree in cultivation for ornamental purposes. Rare as an escape.

Cultivated, but not established, are *Nerium oleander* Linnaeus (Garber no. 833) and *Plumiera acuminata* Aiton (Garber, August 11, 1921). The native name for *Nerium oleander* is *oliana* (an obvious adaption from "oleander"). For *Plumiera acuminata* it is *pua fiti*.

## FAMILY 84. ASCLEPIADACEAE

### I. ASCLEPIAS Linnaeus

**Asclepias curassavica** Linnaeus: Sp. Pl., p. 215, 1753.

Tutuila: back of Pago Pago, flower, fruit, December 26, 1924, Garber no. 890. Upolu: roadside near Malololelei, altitude 650 meters, flower, fruit, August 10, 1929, Christophersen no. 138. Native names, *pepe toa* (no. 890), *vao mumu* (no. 138) meaning "red plant."

A common weed in waste places, in pastures, and in plantations. By some this plant is claimed to be poisonous to cattle. Mr. C. A. Anunsen of Manase, Savaii, has observed that the cattle eat it on his plantation, but he has noticed no ill effects.

### 2. TYLOPHORA R. Brown

**Tylophora samoensis** A. Gray: Proc. Am. Acad., vol. 5, p. 334, 1862.

*Tylophora samoensis* Schlechter: Engl. Bot. Jahrb., vol. 40, Beibl. 92, p. 4, 1908.

Savaii: forest on inner slopes of crater, above Matavanu Crater, altitude 900 meters, July 15, 1931, Christophersen and Hume no. 2026; edge of for-

est, Salailua, altitude 75 meters, flower, October 26, 1931, Christophersen no. 2955.

A vine not uncommon in the forests at low and middle elevations.

### 3. HOYA R. Brown

**Hoya attenuata**, species nova (fig. 30).

Frutex scandens. Caules ad 4 mm. crassi ramique glabri. Folia elliptico-lanceolata attenuato-acuminata apice acuto vel obtuso basi rotundata vel late acuta utrinque glabra

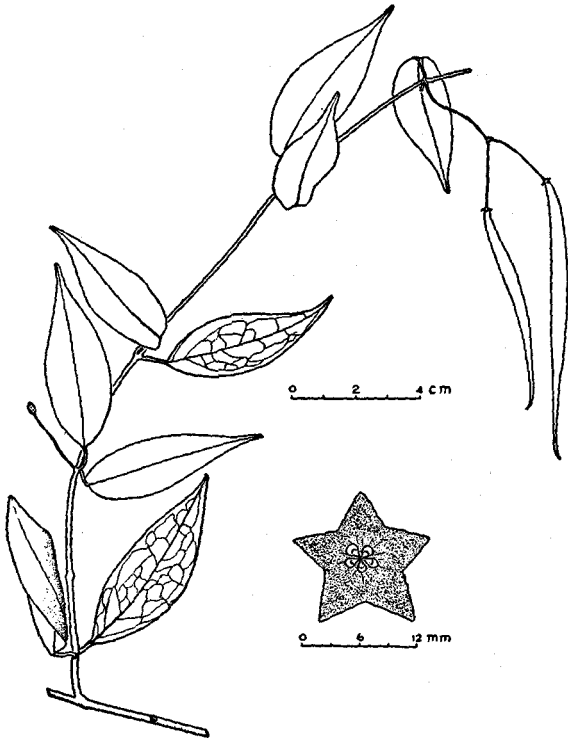


FIGURE 30.—Branch with young fruits, and flower, *Hoya attenuata*.

penninervia nervis vix prominentibus margine revoluta, lamina  $5 \times 1.6-6.5 \times 1.9-8 \times 2.8$  cm. longis et latis, petiolo sulcato glabro 8-11 mm. longo. Inflorescentia umbellata axillaris, pedunculo puberulo vel glabrato 1-2 cm. longo. Pedicelli puberuli vel glabrati graciles 2 cm. longi fructiferi paullo longiores. Sepala triangulari-ovata obtusa glabra in sicco purpurea 1-1.5 mm. longa. Corolla cremo-alba 1 cm. lata extus glabra intus pubescens pilis brevibus crassis ad mediam partem laciniata laciniis triangularibus 3.5 mm. longis. Coronae radii parvi extus rotundati intus acuti 1.5 mm. longi. Fructus immaturus glaber ad 9 cm. longus longe attenuatus.

Differt a *H. chlorantha* foliis longe attenuatis pedunculis et pedicellis et floribus minoribus.

Climbing shrub. Stems to 4 mm. thick; stems and branches glabrous. Leaves

elliptical-lanceolate, attenuate-acuminate, apex acute or obtuse, base rounded or broadly acute, glabrous on both sides, pinnately veined, veins hardly prominent, margin revolute; blades  $5 \times 1.6-6.5 \times 1.9-8 \times 2.8$  cm. long and broad; petiole grooved, glabrous, 8-11 mm. long. Inflorescence umbellate, axillary; peduncle puberulous or glabrate, 1-2 cm. long. Pedicels puberulous or glabrate, slender, 2 cm. long; fruiting pedicels slightly longer. Sepals triangular-ovate, obtuse, glabrous, in dried condition purple, 1-1.5 mm. long. Corolla creamy white, 1 cm. broad, outside glabrous, inside pubescent with short, thick hairs, lobed to the middle; lobes triangular, 3.5 mm. long. Rays of corona small, outside rounded, inside acute, 1.5 mm. long. Immature fruit glabrous, to 9 cm. long, long attenuate.—Differs from *H. chlorantha* in its long attenuate leaves, smaller peduncles, pedicels, and flowers.

Savaii: forest above Letui, altitude 1000 meters, flower, September 27, 1929, Christophersen no. 759; forest above Matavanu Crater, altitude 1300 meters, flower, young fruit, July 24, 1931, Christophersen and Hume no. 2164, type in B. P. Bishop Museum; forest, Le To, above Salailua, altitude 750 meters, fruit, October 21, 1931, Christophersen no. 2896.

A slender vine common in the forests of Savaii at high altitudes. It is recognized by its narrow, long attenuate, pinnately veined leaves.

***Hoya bicarinata*** A. Gray: Proc. Am. Acad., vol. 5, p. 335, 1862.

Tau: Fitiuta trail, altitude 100-125 meters, flower, August 4, 1921, Garber nos. 556 and 566; Amouli trail, altitude 100 meters, fruit, September 16, 1921, Garber no. 615. Savaii: forested "island" on Matavanu lava field, altitude 400 meters, flower, fruit, September 12, 1929, Christophersen no. 589; forest between Puapua and Samalaeulu, fruit, October 13, 1929, Christophersen no. 917; edge of forest at Matavanu lava field, altitude 200 meters, flower, July 6, 1931, Christophersen and Hume nos. 1867 and 1869; Matavanu lava field, altitude 500 meters, flower, July 10, 1931, Christophersen and Hume no. 1942; Lelepa village, flower, July 8, 1931, Christophersen and Hume no. 1970; edge of forest, Vaipouli-Manase, altitude 100 meters, flower, July 12, 1931, Christophersen and Hume nos. 1973, 1974. Native names, *fue se le la* and *olive vao*. Both names I have obtained repeatedly in Savaii from actual specimens used by natives for decoration.

This species comes close to *H. australis* R. Brown. In fact, it has been included in that species by Bentham (6, p. 346). I have seen only a photograph of Brown's type in the British Museum, but the Samoan specimens do not agree in all points with Bentham's interpretation or with Australian specimens examined. The young part of the stems of the Samoan plants is always pubescent; the peduncles are usually longer than the petioles, pubescent; pedicels also pubescent (glabrate in the specimens from Tau); lobes of corolla red or brownish red at the base, otherwise creamy white, glabrous or glabrate on the outside, densely pubescent with short, broad hairs on the entire inner surface. According to Bentham's interpretation, *H. australis* is glabrous, peduncles rarely exceeding the petioles, lobes of corolla pink at

base, the inner surface nearly smooth and glabrous except toward the edges, which are slightly papillose.

These differences may not all prove to be of specific importance, but until the many Pacific forms of this affinity can be studied in their entirety the best procedure is to uphold *H. bicarinata* A. Gray.

**Hoya chlorantha** Rechinger: Fedde Rep. Nov. Sp., vol. 5, p. 131, 1908.

Savaii: in cracks, Matavanu lava field, altitude 300 meters, September 12, 1929, Christophersen no. 599; edge of Matavanu lava field, altitude 200 meters, flower, September 12, 1929, Christophersen no. 610; edge of forested "island" in Matavanu lava field, altitude 200 meters, flower, July 6, 1931, Christophersen and Hume no. 1870; edge of forest, Le To, above Salailua, altitude 750 meters, flower, October 21, 1931, Christophersen no. 2881.

The specimens have been compared with Rechinger's specimen no. 356 from Upolu (in Vienna herbarium). They conform closely in form, venation, and size of the leaves and in the large, pubescent flowers. This species is characterized by its pinnately veined, oblong leaves and its large, greenish-yellow flowers, pubescent inside, not red in the center. The lobes of the corona are narrow, 4 mm. long, the outer end rounded.

**Hoya chlorantha** Rechinger varietas **tutuilensis**, varietas nova (fig. 31).

Differt a typo floribus rubidis coronae radiis brevioribus ovalibus 2.5 mm. longis.

Differs from the type in its reddish flowers, and its shorter, oval, 2.5 mm. long rays of corona.

Tutuila: forest, Papatele Ridge, altitude 300 meters, flower, October 31, 1929, Christophersen no. 1011, type in B. P. Bishop Museum; scrub forest, top of Le Pioa, altitude 500 meters, January 2, 1932, Christophersen no. 3562 (?).

This variety, found on the slopes and top of Le Pioa on Tutuila, differs from the type of the species in its reddish flowers and shorter, oval lobes of the corona. The specimen from the top of Le Pioa is sterile, agreeing in characters of the leaf with the type of the variety.

?**Hoya pycnophylla** Rechinger: Fedde Rep. Nov. Sp., vol. 5, p. 133, 1908.

Savaii: forest, Salailua, altitude 100 meters, flower, September 15, 1931, Christophersen no. 2605; forest, Papa-Fangalele, altitude 10 meters, flower, November 21, 1931, Christophersen no. 3409.

This species is closely related to *H. samoensis* Seemann, differing in the narrower leaves (which are prominently 5-veined) and slightly smaller flowers. The specimens in Bernice P. Bishop Museum differ from the original description in their slightly larger flowers.

**Hoya samoensis** Seemann: Fl. Vit., p. 163, 1866.

Ofu: top of Tumu mountain, altitude 450 meters, flower, September 3, 1925, Garber no. 1116. Tutuila: forest, Papatele Ridge, altitude 300 meters, flower, October 31, 1929, Christophersen no. 1007. Upolu: forest, Malolelei-Lanutoo, altitude 700 meters, August 21-22, 1929, Christophersen no. 370 (?). Savaii: plantation above Tanga, altitude less than 100 meters, flower, October 10, 1929, Christophersen no. 916; forest, Le To, above Sa-lailua, altitude 750 meters, flower, October 21, 1931, Christophersen no. 2899.

A description of the specimen from Tanga (no. 916) is here given:



FIGURE 31.—Branch and flower, *Hoya chlorantha* varietas *tutuilensis*.

Climbing shrub with glabrous stem to 3 mm. in diameter; branches glabrous. Leaves elliptic-ovate, acuminate, the base broadly cuneate or rounded, glabrous, leathery when dry, prominently 5-veined; leaf blades 7-10 cm. long, 3.5-5.8 cm. wide; petioles about 1 cm. long, thick, glabrous. Inflorescence umbellate on thick, glabrous peduncles 5.5-6.5 cm. long; pedicels slender, glabrous, 1.5-2 cm. long; calyx glabrous or glabrate; sepals 5, obtuse or acute, 1.5-2 mm. long, 1-1.5 mm. broad; corolla glabrous on the out-



side, pubescent on the inner surface, 10-12 mm. broad unfolded, divided to the middle into 5 triangular, acute lobes; lobes of the corona concave, ovate-elliptic, both ends acute, glabrous, shiny, 3.5-4 mm. long, 1.5-2 mm. broad.

The specimens have been compared with the type in Kew Herbarium, showing good agreement. The leaves of the type are ovate, acuminate, rounded at base, the lobes of the corolla are pubescent on the inside, and the lobes of the corona are long and acute.

## FAMILY 85. BORAGINACEAE

### I. *CORDIA* Linnaeus

***Cordia subcordata*** Lamarck: Tabl. Encycl., vol. 1, p. 421, 1791-97.

Tutuila: shore of lagoon, north of Tafuna, flower, young fruit, November 9, 1929, Christophersen no. 1175. Savaii: tidal swamp, Vangenga, flower, October 10, 1929, Christophersen no. 932; rocky coast, Falealupo-Fangalele, flower, fruit, November 22, 1931, Christophersen no. 3330; rocky shore, Auala-Vaisala, flower, young fruit, November 20, 1931, Christophersen no. 3355. Native name, *tauangave* (nos. 1175, 3355).

This widely distributed shore tree grows on all the big islands of Samoa but is nowhere common.

### 2. *TOURNEFORTIA* Linnaeus

***Tournefortia argentea*** Linnaeus f.: Suppl., p. 133, 1781.

Tau: rocky shore at Amouli, flower, fruit, September 16, 1921, Garber no. 639. Savaii: rocky shore, Vangenga, flower, October 10, 1929, Christophersen no. 929; sandy beach, Salailua-Lata-itai, flower, fruit, September 18, 1931, Christophersen nos. 2637, 2642. Native name, *tausuni* (nos. 2637, 2642).

A small tree, scattered along the shore.

## FAMILY 86. VERBENACEAE

### I. *LANTANA* Linnaeus

***Lantana Camara*** Linnaeus: Sp. Pl., p. 627, 1753.

Upolu: waste place, Apia, flower, fruit, February 28, 1921, Eames no. 116; top of Vaea, altitude 350 meters, flower, fruit, April 25, 1924, Bryan no. 94; roadside near Malololelei, altitude 650 meters, flower, fruit, August 14, 1929, Christophersen no. 225.

This pantropic weed was recorded for Samoa by Reinecke (46, p. 672) as early as in 1898, but it has as yet only been collected on Upolu and is nowhere found in abundance.

## 2. STACHYTARPHETA Vahl

**Stachytarpheta jamaicensis** Vahl: Enum., vol. 1, p. 206, 1804.

Tau: plateau back of Luma, altitude 150 meters, flower, fruit, December 15, 1921, Garber no. 656. Upolu: roadside near Malololelei, altitude 650 meters, flower, August 10, 1929, Christophersen no. 156.

A weed common in plantations and waste places of the lowlands and foothills.

*Duranta repens* Linnaeus (*D. Plumieri* Jacquin) is cultivated for ornament by the Samoans.

## 3. PREMNA Linnaeus

**Premna taitensis** Schauer: DC Prodr., vol. 11, p. 638, 1847.

Tau: Fitiuta trail, altitude 150 meters, fruit, January 24, 1922, Garber no. 708. Tutuila: Goat Island, flower, October 23, 1924, Garber no. 789; back of Pago Pago, fruit, December 26, 1924, Garber no. 901. Upolu: forest, Vailele, altitude 100 meters, flower, March 5, 1921, Eames no. 166. Savaii: lava field, Letui-Aopo, altitude 125 meters, flower, fruit, May 15, 1924, Bryan no. 148; Matavanu lava field, altitude 400 meters, bud, September 12, 1929, Christophersen no. 586; open "fern country" near Manase, altitude 100 meters, flower, September 18, 1929, Christophersen no. 690; coconut plantation, Safune, bud, August 13, 1931, Christophersen and Hume no. 2397; rocky coast, Falealupo-Fangalele, flower, November 22, 1931, Christophersen no. 3337. Native name, *alo alo* (nos. 789, 901, 166, 2397, 3337).

A shrub or small tree in open places of the lowlands and foothills. The leaves are used in native medicine.

## 4. VITEX Tournefort

**Vitex Negundo** Linnaeus varietas **bicolor** (Willdenow) H. Lam: Verb. Malay Arch., p. 191, 1919.

Tau: Luma village, flower, fruit, September 6, 1921, Garber no. 611. Ofu: Aloafao, fruit, June 5, 1925, Garber no. 995. Tutuila: cultivated, Pago Pago, flower, fruit, September 25, 1923, Wilder no. 48. Upolu: thicket near shore, Apia, flower, fruit, February 16, 1921, Eames no. 36. Savaii: at beach, near Asau, October 8, 1929, Christophersen no. 936; near shore, Salailua-Falelima, fruit, October 9, 1931, Christophersen (by J. Bower) no. 2849. Native name, *namulenga* (nos. 611, 995, 36, 936, 2849).

A shrub or small tree common along the seashore. The leaves are used in native medicine as a febrifuge.

## 5. FARADAYA F. Mueller

**Faradaya Powellii** Seemann: Powell, Seem. Jour. Bot., vol. 6, p. 342, 1868.

Tau: Fitiuta trail above Luma, altitude 60 meters, flower, fruit, August 4, 1921, Garber no. 552; Fitiuta trail back of Luma, altitude 100 meters, flower, December 16, 1921, Garber no. 671. Tutuila: ridge back of Pago Pago, flower, December 26, 1924, Garber no. 913; forest above Naval Station, altitude 200-300 meters, flower, fruit, October 30, 1929, Christophersen no. 990; Pago Pago harbor, Diefenderfer nos. 1 (fruit), 12 (flower), 28 (flower); open forest above Aua, altitude 50 meters, flower, fruit, January 2, 1932, Christophersen no. 3478. Upolu: seashore, Apia, flower, September 18, 1923, Wilder no. 77; forest above Malololelei, altitude 700 meters, flower, fruit, August 12, 1929, Christophersen no. 188; roadside near Malololelei, altitude 500 meters, flower, August 17, 1929, Christophersen no. 299; forest below Malololelei, altitude 500 meters, flower, fruit, August 19, 1929, Christophersen (by native) no. 340. Savaii: forest above Safotu-Letui, altitude 1600-1700 meters, September 25, 1929, Christophersen no. 781; forest above Matavanu Crater, altitude 1300 meters, July 25, 1931, Christophersen and Hume no. 2173; forest above Matavanu Crater, altitude 1500 meters, July 30, 1931, Christophersen and Hume no. 2232. Native name, *mamalupe* (nos. 552, 671, 913, 3478).

This species, although validly published, is not recorded in the Kew Index.

A robust vine common in the forests at all elevations. The native pigeons (*lupe*) feed on its fruit, hence its native name.

## 6. CLERODENDRON Linnaeus

**Clerodendron Blumeanum** Schauer varietas **typicum** H. Lam: Verb. Mal. Arch., p. 300, 1919.

*Clerodendron fallax* Lindley.

Tau: pig yard, Faleasao-Fitiuta trail, flower, January 8, 1922, Garber no. 699. Upolu: open forest, Apia, flower, February 16, 1921, Eames no. 10; roadside, Salani-Lepa, flower, October 23, 1929, Christophersen no. 970. Savaii: Safune, flower, fruit, April 30, 1924, Bryan no. 105.

In plantations and waste places.

**Clerodendron inerme** (Linnaeus) Gaertner: Fruct., vol. 1, p. 271, 1788.

Tau: beach at Fitiuta, flower, August 8, 1921, Garber no. 584; Luma-Faleasao trail, altitude 30 meters, flower, January 8, 1922, Garber no. 694. Tutuila: seashore, Pago Pago, flower, September 16, 1923, Wilder no. 74; coast, Matuu, flower, January 3, 1925, Garber no. 963; Pago Pago harbor, flower, 1929, Diefenderfer no. 14. Upolu: salt marsh, Apia, flower, fruit,

February 10, 1921, Eames no. 1; Mulifanua, flower, fruit, July 16, 1925, Wilder no. 428; mangrove swamp, Matautu near Apia, flower, fruit, August 30, 1929, Christophersen no. 478. Savaii: coastal bluff near Manase, flower, July 16, 1931, Christophersen and Hume no. 2006; at lagoon, Safune, fruit, August 13, 1931, Christophersen and Hume no. 2381; coastal bluff, Manase-Safotu, flower, fruit, August 20, 1931, Christophersen and Hume no. 2453; Safune-Aopo, flower, August 14, 1931, Christophersen (by E. Stehlin) no. 2496; edge of tidal swamp, Falealupo, flower, fruit, September 30, 1931, Christophersen no. 2783; shore, Salailua-Lata-itai, flower, October 19, 1931, Christophersen no. 2868. Native name, *alo alo tai* (nos. 694, 2006, 2381, 2496, 2868).

This widely distributed shrub is common in Samoa along the seashore.

**Clerodendron Siphonantus** R. Brown: Ait., Hort. Kew., 2d ed., vol. 4, p. 65, 1812.

Tutuila: roadside, Naval Station, flower, December 26, 1924, Garber no. 942.

## FAMILY 87. SOLANACEAE

### I. PHYSALIS Linnaeus

**Physalis minima** Linnaeus: Sp. Pl., p. 183, 1753.

Upolu: taro plantation near Apia, flower, fruit, February 27, 1921, Eames no. 72; Vailele, flower, fruit, August 20, 1929, Christophersen (by native) no. 352.

**Physalis peruviana** Linnaeus: Sp. Pl., 2d ed., p. 1670, 1763.

Savaii: grassland above Aopo, altitude 800 meters, flower, fruit, December 7, 1931, Christophersen no. 3450.

### 2. CAPSICUM Tournefort

**Capsicum frutescens** Linnaeus: Sp. Pl., p. 189, 1753.

Tau: plateau back of Faleasao, altitude 125 meters, fruit, August 4, 1921, Garber no. 571. Ofu: cultivated, Aloafao, fruit, June 5, 1925, Garber nos. 981, 994. Tutuila: Goat Island, flower, fruit, November 27, 1924, Garber no. 802; reservoir trail above Naval Station, altitude 200 meters, flower, fruit, November 2, 1929, Christophersen no. 1014; Pago Pago harbor, flower, fruit, Diefenderfer (by native) no. 19. Upolu: waste place, Apia, flower, fruit, March 2, 1921, Eames no. 152; forest, Vailele, altitude 100 meters, flower, fruit, March 5, 1921, Eames no. 162; thicket, Moa Moa plantations, altitude 200 meters, fruit, March 2, 1921, Eames no. 197; brookside near Vailima,

altitude 150 meters, flower, fruit, August 28, 1929, Christophersen no. 454. Native name, *polo*. Forms have individual names: *polo ite* (no. 981), *polo ula* (no. 994).

Cultivated for its fruits, which are used as a spice in kava ('*ava*). Common as a spontaneous plant in waste ground, plantations, and open forests of the lowlands and foothills.

*Capsicum annum* Linnaeus is found in cultivation. The fruits in some forms are used for necklaces ('*ula*). Ofu: Garber no. 1011. Savaii: Christophersen no. 3035. Native names, *polo papalangi* (no. 1011) and *polo ula* (no. 3035).

### 3. SOLANUM Tournefort

*Solanum nigrum* Linnaeus: Sp. Pl., p. 186, 1753.

Tau: Sani Ridge back of Fitiuta, altitude 150 meters, fruit, August 9, 1921, Garber no. 597. Ofu: Feaia Point, altitude 75-100 meters, flower, fruit, May 25, 1925, Garber no. 976. Tutuila: edge of forest, near Aua, flower, fruit, September 25, 1923, Wilder no. 45. Savaii: open forest, Olo above Safotu, altitude 700 meters, flower, young fruit, August 5, 1931, Christophersen and Hume no. 2254; forest east of Olo, above Safotu, altitude 700-800 meters, flower, fruit, August 8, 1931, Christophersen and Hume no. 2311; forest above Salailua, altitude 1200-1300 meters, flower, young fruit, September 23, 1931, Christophersen no. 2749; plantation, Salailua, altitude 150 meters, flower, October 28, 1931, Christophersen no. 2985. Native names, *mangalo* (no. 976), *polo vao* (no. 2985).

This cosmopolitan plant is common in Samoa in waste places, plantations, and forests at all elevations.

?*Solanum ornans* Witasek: Fedde Rep. Nov. Spec., vol. 5, p. 165, 1908.

Upolu: thicket, Vailele, altitude 100 meters, flower, fruit, March 5, 1921, Eames no. 168. Savaii: cultivated, Ngangamala, flower, November 4, 1931, Christophersen no. 3053. Native name, *polo ite* (no. 168).

These specimens agree with the original description of *S. ornans* in their large fruits and other characters, but the leaves are thin and vary from entire to sinuately lobed, 5-16 cm. long and 2.5-7 cm. broad.

*Solanum vitiense* Seemann: Fl. Vit., p. 176, pl. 36, 1866.

*Brachistus Feddei* Reinecke.

Upolu: edge of forest near Malololelei, altitude 550 meters, flower, young fruit, August 17, 1929, Christophersen no. 326. Savaii: forest above Salailua, altitude 650 meters, flower, May 22, 1924, Bryan no. 173; open forest, Olo above Safotu, altitude 700 meters, flower, fruit, August 4-9, 1931, Chris-

tophersen and Hume nos. 2249, 2320, 2324; open forest, Olo above Safotu, altitude 700 meters, August 26, 1931, Christophersen and Hume nos. 2518 (flower), 2521 (flower, young fruit), 2528 (flower); forest above Salailua, altitude 900 meters, flower, September 22, 1931, Christophersen no. 2697; forest, Le To, above Salailua, altitude 750 meters, flower, fruit, October 21, 1931, Christophersen no. 2895; forest above Salailua, altitude 1200-1350 meters, flower, fruit, November 5-7, 1931, Christophersen nos. 3116, 3123. Native name, *uangangi* (nos. 2697, 3116).

These specimens agree with the original description and plate of *Solanum vitiense* Seemann except that this species is stated to be glabrous, the Samoan specimens being rusty villose-tomentose on the young parts. They also agree with the original description and figure of *Brachistus Feddei* Reinecke except that this species is also stated to be glabrous. I have seen no authentic specimens of either species, but Witasek (59, p. 342) has examined specimens of the type collections, and she concludes that they are conspecific. She also discusses at length the relation between *Brachistus* and *Solanum* on the basis of the mode of opening of the anthers. The anthers of the Samoan specimens open with a slit in the manner described and figured by Witasek (59, p. 344, fig. 24, no. 10) for *Solanum vitiense*, the walls remaining curved inward.

#### 4. NICOTIANA Linnaeus

**Nicotiana Tabacum** Linnaeus: Sp. Pl., p. 180, 1753.

Tutuila: cultivated, Nuuuli, November 9, 1929, Christophersen nos. 1173, 1174. Savaii: cultivated, Manase, August 24, 1931, Christophersen no. 2489; cultivated, Salailua, October 26-28, 1931, Christophersen nos. 2951, 2952, 2961, 2979; cultivated, Ngangamalae, November 4, 1931, Christophersen nos. 3050, 3059. Native name *tapaa* (*tapa'a*).

The tobacco is extensively cultivated by the Samoans, and smoking plays a prominent part in their daily life. Several forms are recognized:

Lau 'ofe 'ofe. A form with narrow leaves, considered to be one of the best. Leaves measured were 39-51 cm. long and 11-16 cm. broad. Specimen no. 2951.

Lau pua vai. Leaves broader than in *lau 'ofe 'ofe*, fresh leaves measured ranging from 40 to 52 cm. long and 26 to 27.5 cm. broad. This form is said to be a foreign tobacco as contrasted to *lau 'ofe 'ofe*, which is recognized as a "Samoan" tobacco. Specimens nos. 1174, 2952.

Lau siamani. One specimen was collected in Tutuila (no. 1173). The name means "German leaf."

Lau tou. Leaves narrow, much like those of *lau 'ofe 'ofe*. Specimen no. 3059.

Lau vai tini.

Lau vai tou.

Tapa'a fiti. Specimens nos. 2961 and 2979.

Tapa'a sina. This form is stated to be similar to the *lau 'ofe 'ofe* and to be of early introduction.

## FAMILY 88. SCROPHULARIACEAE

## I. LINDERNIA Allioni

*Lindernia crustacea* (Linnaeus) F. Mueller: Census, p. 97, 1882.

Tau: Sani Ridge back of Fitiuta, altitude 150 meters, flower, fruit, August 9, 1921, Garber no. 600; wet rocks, Amouli trail, altitude 175 meters, flower, September 16, 1921, Garber no. 623. Upolu: river canyon near Malololelei, altitude 500 meters, flower, August 6, 1929, Christophersen no. 83. Savaii: open "fern country" between Vaipouli and Manase, altitude 100 meters, flower, September 21, 1929, Christophersen no. 717; dry river bed above Patamea, fruit, October 1, 1929, Christophersen no. 870a; islands in river above Sili, altitude 400 meters, flower, November 12, 1931, Christophersen no. 3147.

A small plant common in moist places of the foothills.

One specimen of *Angelonia Gardneri* Hooker, probably cultivated, is in Garber's collection, brought him by a native (Tutuila, Utulei, Garber no. 834).

## FAMILY 89. ACANTHACEAE

## I. THUNBERGIA Linnaeus

*Thunbergia alata* Bojer: ex Sims, Bot. Mag., vol. 52, pl. 2591, 1825.

Upolu: roadside, Vailima, flower, February 27, 1921, Eames no. 112; roadside near Malololelei, altitude 650 meters, flower, August 10, 1929, Christophersen no. 135. Native name, *tangamimi* (no. 112), a name more commonly applied to *Ipomoea* species.

Not uncommon in plantations and waste places. The flowers are white or yellow with a purple base.

*Thunbergia erecta* (Benth) T. Anderson is cultivated as an ornamental plant (Apia, Eames no. 114).

Cultivated (escaped?) is also found *Pseuderanthemum* species (Fitiuta, Tau, Garber no. 606).

## 2. DICLIPTERA Jussieu

*Dicliptera samoensis* Seemann: Fl. Vit., p. 184, 1866.

Upolu: forest, Malololelei-Lanutoo, altitude 700 meters, flower, August 5, 1929, Christophersen no. 18. Savaii: forest above Salailua, altitude 650 meters, flower, May 23, 1924, Bryan, no. 174; open woodland, Olo above Safotu, altitude 700 meters, flower, August 5, 1931, Christophersen and Hume no. 2253; forest above Salailua, altitude 1200-1300 meters, flower, September 23, 1931, Christophersen no. 2674.

This shrubby plant is common in open parts of the forests of Upolu and Savaii at medium to high elevations.

#### FAMILY 90. PLANTAGINACEAE

##### I. PLANTAGO Linnaeus

**Plantago major** Linnaeus: Sp. Pl., p. 112, 1753.

Tutuila: roadside, Fanganeanea, fruit, January 3, 1925, Garber no. 971. Upolu: roadside, Poutasi-Salani, fruit, October 23, 1929, Christophersen no. 975. Savaii: roadside, flower, fruit, September 1931, Christophersen (by E. Stehlin) no. 2663; waste ground, Salailua, flower, fruit, October 3, 1931, Christophersen no. 2811; sandy place, Falealupo village, flower, fruit, November 22, 1931, Christophersen no. 3324.

#### FAMILY 91. RUBIACEAE

##### I. OLDENLANDIA Linnaeus

**Oldenlandia biflora** Linnaeus: Sp. Pl., p. 119, 1753.

Tau: cliff crevices, near Faleasao, flower, fruit, January 8, 1922, Garber no. 698. Olosenga: taro plantation, back of Olosengauta, altitude 350 meters, fruit, June 17, 1925, Garber no. 1084. Ofu: at beach, Tua, fruit, June 7, 1925, Garber no. 1019. Tutuila: roadside, Fanganeanea, fruit, January 3, 1925, Garber no. 969; Pago Pago harbor, fruit, 1929, Diefenderfer no. 4. Savaii: coastal bluff, roadside, Lealetele, flower, August 18, 1931, Christophersen no. 2485; trailside, rocky coast, Tanga, flower, October 6, 1931, Christophersen no. 2820.

Along roadsides, in rocky places, common in the lowlands.

##### 2. NEONAUCLEA Merrill

**Neonauclea Forsteri** (Seemann) Merrill: Jour. Wash. Acad. Sci., vol. 5, p. 540, 1915.

Tau: back of Luma, altitude 75 meters, bud, December 17, 1921, Garber no. 672. Ofu: Sina, Aloafao, altitude 15 meters, flower, June 5, 1925, Garber no. 997. Tutuila: forest, Alava Ridge, altitude 500 meters, fruit, June 24, 1931, Christophersen and Hume no. 1811. Savaii: Matavanu lava field, altitude 600 meters, bud, old fruit, July 10, 1931, Christophersen and Hume no. 1944; by river, forest above Matavanu Crater, altitude 900 meters, fruit, July 15, 1931, Christophersen and Hume no. 2081; by stream, near Olo, above Safotu, altitude 700-800 meters, flower, fruit, August 8, 1931, Christophersen and Hume no. 2304; by stream, near Samalaeulu, bud, August 18,



1931, Christophersen and Hume no. 2484; shore forest, Tanga, fruit, October 6, 1931, Christophersen no. 2837; forest above Salailua, altitude 900 meters, bud, old fruit, November 5, 1931, Christophersen no. 3066. Native name, *afa* (nos. 672, 997, 2484, 2837).

A tree 20 meters high, commonly growing along streams in the lowlands and at middle elevations. The wood is used for canoe paddles.

### 3. MUSSAENDA Linnaeus

#### **Mussaenda** species.

*Mussaenda frondosa* Reinecke, non Linnaeus.

Tau: Fitiuta trail, altitude 125 meters, flower, August 4, 1921, Garber no. 562; Fitiuta trail back of Luma, altitude 175 meters, flower, fruit, August 11, 1921, Garber no. 610. Tutuila: cultivated, government house, Naval Station, flower, September 30, 1923, Wilder; Goat Island, fruit, November 2, 1924, Garber no. 791. Upolu: edge of forest near Malololelei, altitude 550 meters, bud, August 17, 1929, Christophersen no. 323; open ground near Malololelei, altitude 650 meters, flower, October 18, 1929, Christophersen no. 947. Savaii: edge of forest above Salailua, altitude 150 meters, flower, fruit, October 28, 1931, Christophersen no. 2999; forest above Sili, altitude 150 meters, fruit, November 11, 1931, Christophersen no. 3276. Native name, *alo alo vao* (no. 3276).

These specimens belong to a species distributed in western Polynesia and eastern Melanesia, commonly referred to as *M. frondosa* Linnaeus and variety *pilosissima* Engler. Valeton (56, p. 67), after having examined the type of *M. frondosa* and a large amount of material from New Guinea and the Bismarck Archipelago, reaches the conclusion that this species is not represented in Papua, and he states that Samoan and Fijian plants also probably belong to a different species. This species may be identical with one of the known Melanesian species. It differs from *M. cylindrocarpa* Burck and *M. pilosissima* Valeton (*M. frondosa* variety *pilosissima* Engler) among other characters in its shorter and relatively broader fruits. From the Micronesian *M. sericea* Blume it differs in its less densely hairy inflorescence and ellipsoid, not subglobose fruits.

An epiphytic shrub common in the forests of the lowlands and middle elevations. It is easily recognized by its white, foliar calyx lobes.

### 4. TARENNA Gaertner

**Tarenna sambucina** (Forster f.) Durand: ex Drake del Castillo, Ill. Fl. Mar. Pac., pt. 6, p. 190, 1890.

Tau: Amouli forest trail, altitude 150 meters, flower, September 22, 1922,

Garber no. 778. Savaii: forest near Vaipouli, altitude 75 meters, fruit, July 3, 1931, Christophersen and Hume no. 1851; taro plantation above Paia, altitude 200 meters, flower, July 16, 1931, Christophersen and Hume no. 2084; Safune-Aopo, fruit, August 14, 1931, Christophersen (by E. Stehlin) no. 2494. Native name, *maanunu* (*ma'anunu*) (no. 778).

A small tree in the lowlands and foothills.

### 5. *RANDIA* *Houstoun*

***Randia Graeffei*** Reinecke: Engl. Bot. Jahrb., vol. 25, p. 683, 1898.

Upolu: edge of forest, Moa Moa plantations, altitude 100 meters, flower, March 2, 1921, Eames no. 140; forest, Moa Moa plantations, altitude 300 meters, fruit, March 2, 1921, Eames no. 206. Savaii: edge of forest near Vaipouli, altitude 50 meters, flower, fruit, September 10, 1929, Christophersen no. 578; forest near Vaipouli, altitude 75 meters, flower, fruit, July 3, 1931, Christophersen and Hume no. 1847; edge of forest above Vaipouli, altitude 150 meters, flower, fruit, July 7, 1931, Christophersen and Hume no. 1911; plantation above Paia, altitude 200 meters, flower, July 16, 1931, Christophersen and Hume no. 2007; edge of tidal swamp, Salailua-Lata-itai, flower, fruit, September 18, 1931, Christophersen no. 2643; shore forest, Tanga, flower, fruit, October 6, 1931, Christophersen no. 2833. Native name, *ola mea* (no. 2833).

A shrub or small tree to 4 meters high in open places and forests of the lowlands and foothills. The flowers in all the specimens are white, corresponding to the variety *alba* Reinecke.

Two species of *Gardenia* are cultivated in the villages for ornamental purposes. One is *Gardenia taitensis* de Candolle with relatively short calyx lobes and single flowers (Tutuila, Garber nos. 958, 1117; Savaii, Christophersen nos. 667, 2361, 2570). The Samoan name is *pua samoa*. The other species has long calyx lobes and double flowers, and is probably the widely cultivated *Gardenia jasminoides* Ellis (Upolu, Eames no. 78; Savaii, Christophersen no. 3051).

### 6. *CANTHIUM* *Lamarck*

***Canthium barbatum*** (Forster f.) Seemann: Fl. Vit. p. 132, 1866.

Tutuila: forest, Papatele Ridge, altitude 300 meters, flower, fruit, October 31, 1929, Christophersen no. 1004; scrub forest, top of Le Pioa, flower, young fruit, January 2, 1932, Christophersen no. 3528. Savaii: open scrub on lava, Aopo-Asau, altitude 200 meters, fruit, December 6, 1931, Christophersen no. 3427.

The specimens agree with the original manuscript description of Forster as given by Guillemain (27, p. 252). The leaves vary from relatively narrow and acute to broader and abruptly acuminate. Four varieties based on form of leaf are given in the original description. A shrub or small tree to 4 meters high with creamy white flowers and red fruits.

**Canthium Merrillii** (Setchell), combinatio nova.

*Plectronia Merrillii* Setchell: Am. Samoa, p. 49, 1924.

Tutuila: Pago Pago harbor, March 18, 1930, Diefenderfer (by native) no. 13. Upolu: forest above Malololelei, altitude 700 meters, August 14, 1929, Christophersen no. 242; forest, Vaea, altitude 350 meters, flower, August 28, 1929, Christophersen no. 459. Savaii: coastal forest, Salailua-Lata-itai, flower, fruit, September 17, 1931, Christophersen no. 2619; shore forest, Tanga, flower, October 6, 1931, Christophersen no. 2825; coastal forest, Salailua-Lata-itai, October 19, 1931, Christophersen no. 2860. Native names, *ola vai* (no. 13), *ola sina* (nos. 242, 2619, 2825).

The specimens agree with the original description of *P. Merrillii* except for the slightly shorter calyx and tube of corolla, respectively 2 mm. and 3-4 mm. long. The fruit, hitherto unknown, is green in living condition, black when dry, flattened, reniform, rugose, to 11 mm. long, 13 mm. broad, and 7 mm. thick; seeds 2, obliquely semicircular in outline, with an indentation on the inner surface, rugose on the outer surface, flattened, 9 mm. long, 6-7 mm. broad.

A tree to 15 meters high growing in the forests of the lowlands and middle elevations. The wood is used for building purposes.

## 7. GUETTARDA Linnaeus

**Guettarda speciosa** Linnaeus: Sp. Pl., p. 991, 1753.

Ofu: beach, Nuu Islet, fruit, June 4, 1925, Garber no. 991; beach, Nuu Islet, July 4, 1925, bud, fruit, Garber no. 1109. Savaii: tidal swamp, Vangenga, between Salailua and Lata-itai, October 10, 1929, Christophersen no. 928; sandy shore, Falealupo-Tufutafoe, flower, fruit, September 30, 1931, Christophersen no. 2773; edge of forest, Falealupo, flower, September 30, 1931, Christophersen no. 2781; open forest, Auala-Vaisala, bud, fruit, November 20, 1931, Christophersen no. 3354. Native name, *pua pua* (nos. 991, 1109, 928, 2773, 2781, 3354).

A small or medium-sized tree common on the beach and in the coastal forest.

## 8. ANTIRRHOEA Commerson

**Antirrhoea inconspicua** (Seemann), combinatio nova.

*Guettarda inconspicua* Seemann: Fl. Vit., p. 131, 1866; Gillespie, B. P. Bishop Mus., Bull. 91, p. 29, fig. 32, 1932.

Savaii: coconut plantation, Safune, August 13, 1931, Christophersen and Hume no. 2428; forest, Lealetele, altitude 25 meters, flower, August 22, 1931, Christophersen no. 2470; coastal forest, Salailua-Lata-itai, fruit, September 18, 1931, Christophersen no. 2649; forest, Salailua-Lata-iuta, altitude 50 meters, October 31, 1931, Christophersen no. 3011; coastal scrub forest, near Fangalele, bud, fruit, November 21, 1931, Christophersen no. 3396; shore bluff, Safotu-Manase, fruit, December 27, 1931, Christophersen no. 3472.

Gillespie (24, p. 29, fig. 32) has examined the type specimen of *Guettarda inconspicua* Seemann and gives a detailed description and illustration of this species. The Samoan plants agree with Gillespie's interpretation except that the fruiting calyx is higher, covering one half or more of the style. The persistent calyx places this species in *Antirrhoea*.

A small tree to 6 meters high growing in the lowland forests in the vicinity of the coast. Flowers orange-brown. Mature fruits red.

## 9. TIMONIUS De Candolle

**Timonius affinis** A. Gray: Am. Acad. Sci., Proc., vol. 4, p. 36, 1858.

Savaii: forest above Sili, altitude 400 meters, fruit, November 11, 1931, Christophersen no. 3246.

I have not seen the type of this species, but the specimens agree with the original description except that some of the fruiting peduncles are longer than the petioles. They also agree with the interpretation of this species by Gillespie (22, p. 29, fig. 39) and have been compared with a large amount of material from Fiji. They differ conspicuously from *T. Forsteri* de Candolle in the elliptic leaves acuminate at both ends.

## 10. IXORA Linnaeus

**Ixora amplifolia** A. Gray: Am. Acad. Sci., Proc., vol. 4, p. 40, 1858.

Upolu: forest near Apia, altitude 50 meters, flower, fruit, February 19, 1921, Eames no. 60; open forest, Vaea, altitude 350 meters, flower, fruit, April 25, 1924, Bryan, no. 96; dense forest above Apia, altitude 200 meters, flower, fruit, July 5, 1925, Wilder no. 422; forest, Vaea, altitude 100 meters, fruit, April 9, 1927, MacDaniels no. 1122; forest, Vaea, altitude 150 meters, flower, August 28, 1929, Christophersen no. 465a. Savaii: forest above Sili, altitude 100 meters, flower, November 13, 1931, Christophersen no. 3205. Native name, *filofloa* (nos. 60, 3205).

The leaves may vary on the same plant from short to long acuminate with acute, rounded, or cordate base. The uppermost bracts may vary from narrow lanceolate to almost orbicular. The calyx is constantly pubescent, but the corolla varies within a single inflorescence from densely pubescent to puberulous. The inflorescence is many-flowered. Rechinger (44, p. 229) has described three species of *Ixora* from Upolu. Two of these, *I. inodora* and *I. upoluensis* (45, p. 371) are apparently not to be distinguished from *I. amplifolia* A. Gray. *I. inodora* is stated to differ from this species in the long acuminate leaves with somewhat obtuse base, in the lanceolate bracts, and in the glabrous corolla. All of these characters have been observed to be variable in the material in Bernice P. Bishop Museum which has been compared with a photograph of the type of *I. amplifolia* A. Gray in Gray Herbarium. *I. upoluensis* is stated to differ from *I. amplifolia* in its leaves, which are acuminate in both ends, with a narrow base. This character is not constant in one of the cited specimens (Rechinger no. 782, Vienna herbarium); only one leaf has a slightly acuminate base, and the others are acute or rounded at the base. It is further stated to differ in its pedunculate inflorescence, a variable character, and in its glabrous corolla. However, in the description the corolla is stated to be slightly pubescent! I have examined also a cited specimen of *I. inodora* (Rechinger no. 5058, Vienna herbarium). It appears very probable that we have to do with only one variable species.

A shrub to 4 meters high growing in the lowlands and foothills.

A single specimen collected above Sili on Savaii (Christophersen no. 3261) differs from the specimens of *I. amplifolia* in its larger leaves, glabrous calyx, and longer, glabrous corolla. It probably represents a distinct form.

In cultivation is found *Ixora chinensis* Lamarck (Tutuila, Garber no. 949).

***Ixora samoensis*** A. Gray: Am. Acad. Sci., Proc., vol. 4, p. 40, 1858.

Savaii: forest, Manase plantation, altitude 100 meters, flower, fruit, August 13, 1931, Christophersen and Hume nos. 2367 and 2368; forest near Manase, altitude 25 meters, flower, fruit, August 17, 1931, Christophersen and Hume no. 2419; edge of mangrove swamp, Salailua-Lata-itai, bud, fruit, September 18, 1931, Christophersen no. 2644; edge of forest, Falealupo, altitude 25 meters, flower, September 29, 1931, Christophersen no. 2808. Native name, *filofloa* (nos. 2644 and 2808).

A shrub to 4 meters high growing in openings or open forests in the lowlands. It is distinguished from *I. amplifolia* by its 3-flowered inflorescence.

***Ixora samoensis*** A. Gray varietas **montana**, varietas nova (fig. 32).

Differt a typo foliis minoribus lanceolatis vel anguste ellipticis acutis vel leviter acuminatis apiculatis breviter petiolatis laminis 5-9 cm. longis 2-3 cm. latis petiolis ad 3 mm. longis calycibus puberulis.

Differs from the type in its smaller, lanceolate or narrowly elliptical, acute or slightly acuminate, apiculate, shortly petiolate leaves, with blades 5-9 cm. long, 2-3 cm. broad, and petioles to 3 mm. long, and its puberulous calyx.

Savaii: forest above Matavanu Crater, altitude 1200 meters, bud, July 31, 1931, Christophersen and Hume no. 2190, type in B. P. Bishop Museum.

This variety differs from the typical lowland form of *I. samoensis* in its short-petioled, smaller, acute, and apiculate leaves and in its less densely pubescent calyx. The inflorescence is 3-flowered, corolla glabrous.

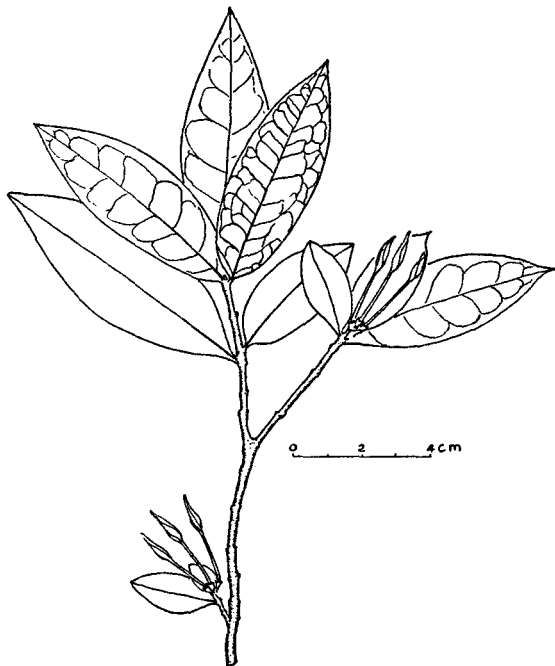


FIGURE 32.—Flowering branch, *Ixora samoensis* varietas *montana*.

***Ixora samoensis* A. Gray varietas (?).**

Tutuila: edge of forest, near Pago Pago, altitude 30 meters, flower, September 28, 1923, Wilder no. 58; Goat Island, flower, fruit, December 16, 1924, Garber no. 835; near old radio station back of Pago Pago, flower, fruit, December 26, 1924, Garber no. 925; forest, Papatele Ridge, altitude 300 meters, flower, October 31, 1929, Christophersen no. 1005; forest, Alava Ridge, altitude 400 meters, flower, November 7, 1929, Christophersen no. 1132; scrub forest, top of Le Pioa, altitude 500 meters, January 2, 1932, Christophersen nos. 3481 (flower, fruit), 3535 (flower), 3549 (flower, fruit), 3554 (flower, fruit). Native name, *filofiloa* (nos. 925 and 1132).

These specimens differ from typical *I. samoensis* in the glabrous or nearly glabrous calyx. The leaves are on an average smaller and relatively broader than those of the specimens in Bernice P. Bishop Museum cited under *I. samoensis*. They also come close to *I. vitiensis* A. Gray, but differ in the larger flowers and subulate teeth of the calyx.

A shrub to 5 meters high growing in Tutuila at all altitudes.

#### 11. GEOPHILA D. Don

**Geophila herbacea** (Jacquin) O. Kuntze: Rev. Gen. Pl., p. 300, 1891.

Tau: Fitiuta trail, altitude 125 meters, fruit, August 4, 1921, Garber no. 567. Tutuila: on rocks, back of Pago Pago, altitude 20 meters, fruit, December 26, 1924, Garber no. 894. Upolu: forest near Apia, altitude 50 meters, fruit, February 19, 1921, Eames no. 64; forest trail, Malololelei-Lanutoo, altitude 700 meters, flower, fruit, August 5, 1929, Christophersen no. 28. Savaii: along trail near Safune, altitude 10-50 meters, fruit, May 1, 1924, Bryan no. 117; forest, Salailua, altitude 100 meters, flower, fruit, September 15, 1931, Christophersen no. 2617.

A prostrate herb common on the forest floor at low and middle elevations.

#### 12. NERTERA Banks et Solander

**Nertera depressa** Banks et Solander: ex Gaertn., Fruct., vol. 1, p. 124, pl. 26, 1788.

Savaii: river bed, forest above Matavanu Crater, altitude 900 meters, July 14, 1931, Christophersen and Hume no. 2050.

#### 13. COPROSMA Forster

Determined by W. R. B. OLIVER

**Coprosma savaiiensis** Rechinger: Fedde Rep. Nov. Spec., vol. 6, p. 326, 1909.

Savaii: forest above Safotu-Letui, altitude 1700 meters, fruit, September 25, 1929, Christophersen no. 815; shrubbery, recent lava field above Aopo, altitude 1200-1400 meters, October 7, 1929, Christophersen no. 886 (determined by E. Christophersen); forest at stream, above Matavanu Crater, altitude 900 meters, July 15, 1931, Christophersen and Hume nos. 2073 (fruit) and 2080 (bud); forest above Matavanu Crater, altitude 1300 meters, fruit, July 24, 1931, Christophersen and Hume no. 2136; forest above Matavanu Crater, altitude 1600 meters, male flower, September 6, 1931, Christophersen and Hume no. 2564 (determined by E. Christophersen).

A shrub to 5 meters high growing in Savaii in the forests and on rims of craters at medium and high elevations.

**Coprosma strigulosa** Lauterbach: Engl. Bot. Jahrb., vol. 41, p. 237, 1908.

Savaii: shrubby, recent lava field above Aopo, altitude 1200-1400 meters, fruit, October 7, 1929, Christophersen no. 903; low forest on rim of Papafu Crater, altitude 1500 meters, September 22, 1931, Christophersen nos. 2709 (fruit) and 2715 (bud).

A shrub to 5 meters high growing in Savaii at high elevations.

#### 14. MORINDA Linnaeus

**Morinda citrifolia** Linnaeus: Sp. Pl., p. 176, 1753.

Tau: plateau back of Luma, altitude 90 meters, flower, fruit, August 4, 1922, Garber no. 771 Upolu: along beach, Apia, flower, February 16, 1921, Eames no. 33; below Malololelei, altitude 500 meters, flower, fruit, August 19, 1929, Christophersen no. 342. Savaii: lava cracks, Matavanu lava field, altitude 200 meters, flower, fruit, September 12, 1929, Christophersen no. 620; coconut plantation, Safune, August 13, 1931, Christophersen and Hume no. 2441; rocky shore, Salailua-Lata-itai, flower, fruit, October 19, 1931, Christophersen no. 2869. Native name, *nonu* (nos. 771, 33, 342, 2869).

A small tree common in open places in the lowlands and foothills. The juice of the flowers is used in treating sore eyes.

#### FAMILY 91-A. CAPRIFOLIACEAE

A honeysuckle (*Lonicera japonica* Thunberg?) is commonly found in cultivation (Tutuila, Garber no. 817; Savaii, Christophersen no. 3041).

#### FAMILY 92. CUCURBITACEAE

##### 1. MELOTHRIA Linnaeus

**Melothria affinis Baueriana** (Endlicher) F. Mueller: Fragm., vol. 6, p. 188, 1868.

Savaii: edge of forest, Salailua, altitude 100 meters, male flower, September 15, 1931, Christophersen no. 2618; shore forest, Tanga, male flower, October 6, 1931, Christophersen no. 2836.

In their large, deeply cordate, ovate, undivided leaves, dioecious habit, long filaments, and other characters of the male flowers, these specimens are identical to *M. Baueriana* as interpreted by Cogniaux (12, p. 109). They differ in their slightly longer petioles, broader leaves, shorter peduncles, and fewer flowers in the inflorescence. Female flowers and fruits have not been seen. They differ widely from a specimen collected in Tutuila (Setchell no. 290) which by Setchell (51, p. 42) is stated to agree closely with the type of



*M. samoensis* A. Gray. They differ from *M. carnosula* Cogniaux in the shorter sepals, the glabrate outer surface of the corolla, and the longer filaments.

## 2. MOMORDICA Tournefort

**Momordica charantia** Linnaeus varietas **abbreviata** Seringe: DC Prodr. vol. 3, p. 311, 1828.

Tutuila: opening in forest, above Naval Station, altitude 200 meters, flower, fruit, October 30, 1929, Christophersen no. 989.

Common in openings in the forests and in abandoned plantations.

## 3. LUFFA Tournefort

**Luffa cylindrica** (Linnaeus) Roemer varietas **insularum** (A. Gray) Cogniaux: DC Mon. Phanerog., vol. 3, p. 459, 1881.

Ofu: along beach at north end of Aloafao, fruit, September 1925, Garber no. 1119. Upolu: Vaialele, bud, fruit, August 20, 1929, Christophersen (by native) no. 361. Savaii: open plantation ground, Salailua, altitude 150 meters, flower, October 28, 1931, Christophersen no. 2996.

This vine is not uncommon in abandoned plantation ground.

## 4. CITRULLUS Forskål

**Citrullus vulgaris** Schrader: Linnaea, vol. 12, p. 412, 1838.

Savaii: sandy beach, Lelepa, bud, July 8, 1931, Christophersen and Hume no. 1929; cultivated, Salailua, flower, young fruit, November 4, 1931, Christophersen no. 3034. Native name, *meleni* (no. 3034).

The watermelon is cultivated by the Samoans and is occasionally found as an escape.

## 5. CUCUMIS Tournefort

**Cucumis Melo** Linnaeus: Sp. Pl., p. 1011, 1753.

Tau: at Faasamene Spring, Faleasao, altitude 4-5 meters, fruit, January 8, 1922, Garber no. 702. Tutuila: clearing near Pago Pago, altitude 15 meters, September 23, 1923, Wilder no. 42. Native names, *atiu* (no. 702), *meleni*.

The mature fruits of no. 702 are less than 4 cm. long. Large-fruited varieties are commonly cultivated by the Samoans. Occasionally found as an escape.

## FAMILY 93. GOODENIACEAE

## I. SCAEVOLA Linnaeus

**Scaevola frutescens** (Miller) Krause: Pflanzenr., IV, 277, p. 125, 1912.

Tutuila: Goat Island, flower, fruit, January 1, 1925, Garber no. 947; Pago Pago harbor, 1929, Diefenderfer no. 6. Savaii: open "fern country" near Manase plantation, altitude 100 meters, flower, September 18, 1929, Christophersen no. 683; same locality, flower, fruit, August 13, 1931, Christophersen and Hume no. 2378; rocky coast, Falealupo-Fangalele, flower, November 22, 1931, Christophersen no. 3343. Native name, *toitōi* (*to'i to'i*) (no. 2378).

A shrub common on rocky shores and also 1 to 2 miles inland at an elevation of 100 meters in the open "fern country" on the mud flows back of Manase (Savaii).

**Scaevola nubigena** Lauterbach: Engl. Bot. Jahrb., vol. 41, p. 238, 1908.

Savaii: forest above Safotu-Ietui, altitude 1600 meters, flower, fruit, September 24, 1929, Christophersen no. 818; rim of crater, above Matavanu Crater, altitude 1000 meters, flower, fruit, July 15, 1931, Christophersen and Hume no. 2010; forest at stream, above Matavanu Crater, altitude 900 meters, flower, fruit, July 15, 1931, Christophersen and Hume no. 2077; forest above Matavanu Crater, altitude 1300 meters, flower, fruit, July 24, 1931, Christophersen and Hume no. 2155; rim of crater, above Matavanu Crater, altitude 1600 meters, fruit, July 29, 1931, Christophersen and Hume no. 2212; low forest on rim of Papafu Crater, altitude 1500 meters, flower, fruit, September 22, 1931, Christophersen no. 2711. Native names, *toi toi* (*to'i to'i*) (nos. 2010, 2077), *toi toi* (*to'i to'i*) *vao* (no. 2711).

A shrub or small tree 3 to 7 meters high growing in the forests of Savaii at medium and high elevations, abundant especially on the rims of old craters. The specimens agree with cotype specimens (Vaupel no. 475) in the herbarium of B. P. Bishop Museum.

## FAMILY 94. COMPOSITAE

## I. VERNONIA Schreber

**Vernonia cinerea** (Linnaeus) Lessing: Linnaea, vol. 4, p. 291, 1829.

Ofu: along trail, Toanga, flower, fruit, June 23, 1925, Garber no. 1096. Tutuila: roadside, Pago Pago, flower, February 7, 1921, Eames no. T-3. Upolu: open, top of Vaea, altitude 360 meters, flower, fruit, August 28, 1929, Christophersen no. 461. Savaii: in lawn, Fangamalo, flower, fruit, July 4,

1931, Christophersen and Hume no. 1861; rocky beach, Lelepa, flower, fruit, July 8, 1931, Christophersen and Hume no. 1939.

A common weed in lawns and waste places.

## 2. ADENOSTEMMA Forster

**Adenostemma Lavenia** (Linnaeus) O. Kuntze: Rev. Gen. Pl., vol. 1, p. 304, 1891.

Tau: Sani Ridge back of Fitiuta, altitude 150 meters, flower, fruit, August 9, 1921, Garber no. 593. Upolu: forest, Malololelei-Lanutoo, altitude 700 meters, flower, fruit, August 5, 1929, Christophersen nos. 24, 32. Savaii: forest, above Safune, at 700-800 meters, flower, fruit, May 2, 1924, Bryan no. 120; forest, Le To, above Salailua, altitude 750 meters, flower, fruit, October 21, 1931, Christophersen no. 2905.

A common plant in open places in the forests at low and middle elevations.

## 3. AGERATUM Linnaeus

**Ageratum conyzoides** Linnaeus: Sp. Pl., p. 839, 1753.

Ofu: along trail at beach, flower, fruit, June 7, 1925, Garber no. 1021. Tutuila: roadside, Pago Pago, flower, fruit, February 7, 1921, Eames no. T-5. Upolu: roadside, Malololelei, altitude 650 meters, flower, August 10, 1929, Christophersen no. 139. Savaii: taro patch, above Salailua, altitude 275 meters, flower, fruit, May 16, 1924, Bryan no. 153; coconut plantation, Safune, flower, fruit, August 13, 1931, Christophersen and Hume no. 2429. Native name, *lau taioti* (nos. 139, 153, 2429).

A common weed in plantations and waste places at low and middle elevations.

## 4. MIKANIA Willdenow

**Mikania micrantha** Humboldt, Bonpland et Kunth: Nov. Gen. Sp. Pl., vol. 4, p. 134, 1820.

Upolu: forest, Vaea, altitude 350 meters, flower, April 25, 1924, Bryan no. 95 (determined by J. Mattfeld); roadside near Malololelei, altitude 650 meters, flower, August 10, 1929, Christophersen no. 158 (determined by J. Mattfeld). Savaii: abandoned plantation, back of Vaipouli, altitude 200 meters, flower, July 6, 1931, Christophersen and Hume no. 1891. Native name, *fue saina* (nos. 158, 1891).

A vigorous creeper and climber especially abundant in abandoned plantations, where it covers the ground and the trees at the edge of the forest. It is commonly found in association with the *vailima* grass (*Paspalum conjugata*).

tum). This weed, now common in Upolu and Savaii, is probably of recent introduction, as it has not previously been recorded.

#### 5. ZINNIA Linnaeus

*Zinnia elegans* Jacquin: Coll., vol. 3, p. 152, 1789.

Savaii: in lawn, Fangamalo, flower, August 15, 1931, Christophersen and Hume no. 2401.

Cultivated by the Samoans and commonly found as an escape.

#### 6. SIEGESBECKIA Linnaeus

*Siegesbeckia orientalis* Linnaeus: Sp. Pl., p. 900, 1753.

Tau: Sani Ridge, back of Fitiuta, altitude 150 meters, flower, August 9, 1921, Garber no. 604. Savaii: open "fern country" near Manase plantation, altitude 100 meters, flower, September 18, 1929, Christophersen no. 684.

#### 7. WEDELIA Jacquin

*Wedelia biflora* (Linnaeus) De Candolle: in Wight, Contrib. Bot. Ind., p. 18, 1834.

Tau: plateau back of Luma, altitude 60 meters, flower, fruit, August 2, 1921, Garber no. 547 (determined by J. Mattfeld). Tutuila: plantation, Aunuu Island, flower, November 12, 1929, Diefenderfer no. 1234; Goat Island, flower, December 14, 1924, Garber no. 812 (determined by J. Mattfeld). Savaii: waste ground, Lelepa, flower, July 8, 1931, Christophersen and Hume no. 1925; rocky coast, Salailua-Lata-itai, flower, September 18, 1931, Christophersen no. 2633; rocky coast Falealupo-Fangalele, flower, fruit, November 22, 1931, Christophersen no. 3341. Native name, *ate ate* (nos. 812, 2633).

A common shrub along the shore.

*Wedelia canescens* (Gaudichaud) Merrill: Philipp. Jour. Sci., Bot., vol. 9, p. 155, 1914.

Savaii: abandoned plantation, Patamea, altitude 100 meters, flower, October 1, 1929, Christophersen no. 869 (determined by J. Mattfeld). Native name, *ate ate* (no. 869).

#### 8. SYNEDRELLA Gaertner

*Synedrella nodiflora* (Linnaeus) Gaertner: Fruct., vol. 2, p. 456, pl. 171, fig. 7, 1791.

Tau: plateau back of Luma, altitude 60 meters, flower, fruit, August 2, 1921, Garber no. 549. Tutuila: waste place, Pago Pago, flower, February 7,

1921, Eames no. T-11; roadside, Pago Pago, flower, fruit, September 21, 1923, Wilder no. 29; Goat Island, fruit, December 14, 1924, Garber no. 814. Upolu: waste place, Apia, flower, fruit, February 16, 1921, Eames no. 40; in road, Malololelei, altitude 550 meters, flower, August 25, 1929, Christophersen no. 425; roadside, Apia, flower, fruit, August 27, 1929, Christophersen no. 429. Savaii: at the beach, Fangamalo, flower, July 4, 1931, Christophersen and Hume no. 1856. Native names, *taioti* (no. 549), *lau oti oti* ('oti 'oti) (no. 814).

A weed common in waste places.

#### 9. *BIDENS* Linnaeus

*Bidens pilosa* Linnaeus: Sp. Pl., p. 832, 1753.

Tutuila: roadside, Pago Pago, flower, fruit, February 8, 1921, Eames no. T-29. Upolu: in road, Malololelei, altitude 550 meters, flower, August 25, 1929, Christophersen no. 427 (determined by J. Mattfeld). Savaii: waste ground in plantation, Salailua, altitude 150 meters, flower, fruit, October 28, 1931, Christophersen no. 2984; coastal scrub forest near Fangalele, flower, fruit, November 21, 1931, Christophersen no. 3398.

In plantations and waste places to middle elevations.

#### 10. *COSMOS* Cavanilles

*Cosmos caudatus* Humboldt, Bonpland et Kunth: Nov. Gen. Sp. Pl., vol. 4, p. 240, 1820.

Savaii: waste ground, Lelepa, flower, fruit, July 8, 1931, Christophersen and Hume, no. 1927.

#### 11. *CENTIPEDA* Loureiro

*Centipeda minima* (Linnaeus) A. Braun et Ascherson: Ind. Sem. Hort. Berol., App. 6, 1867.

Savaii: edge of tidal swamp, near Tufutafoe, flower, November 22, 1931, Christophersen no. 3314.

#### 12. *ERECHTITES* Rafinesque

*Erechtites valerianaefolia* (Wolf) De Candolle: Prodr., vol. 6, p. 295, 1837.

Tutuila: roadside, near Nuuuli, flower, fruit, January 3, 1925, Garber no. 957 (determined by J. Mattfeld). Upolu: forest, Malololelei-Lanutoo, altitude 700 meters, August 5, 1929, Christophersen no. 23 (determined by J. Mattfeld); roadside near Malololelei, altitude 650 meters, flower, August 10, 1929, Christophersen no. 140 (determined by J. Mattfeld). Savaii: forest

above Safune, altitude 700-800 meters, flower, fruit, Bryan no. 121 (determined by J. Mattfeld); open "fern country," Vaipouli-Manase, altitude 100 meters, flower, September 21, 1929, Christophersen no. 712 (determined by J. Mattfeld); open lava field above Aopo, altitude 1200-1400 meters, flower, October 7, 1929, Christophersen no. 888 (determined by J. Mattfeld).

A common weed in waste places and openings in the forests to the highest elevations.

### 13. EMILIA Cassini

**Emilia sonchifolia** (Linnaeus) De Candolle: Prodr., vol. 6, p. 302, 1837.

Tutuila: waste place, Pago Pago, flower, fruit, February 7, 1921, Eames no. T-9; Goat Island, flower, fruit, December 14, 1924, Garber no. 811 (determined by J. Mattfeld). Upolu: waste place, Apia, flower, February 28, 1921, Eames no. 124 (determined by J. Mattfeld). Savaii: cracks in lava, below Matavanu Crater, altitude 300 meters, September 12, 1929, Christophersen no. 603 (determined by J. Mattfeld); cracks in lava, near Samalaeulu, flower, September 20, 1929, Christophersen no. 700-b (determined by J. Mattfeld); rocky coast, Falealupo-Fangalele, flower, fruit, November 22, 1931, Christophersen no. 3332. Native name, *fua lele lili'i* (No. 811).

The following specimens from the Matavanu lava field on Savaii belong to a monstrous form: Christophersen nos. 602 and 700-a (determined by J. Mattfeld); Christophersen and Hume nos. 1900 and 1961.

A common weed in waste places, plantations, and a common pioneer on the Matavanu lava field.

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