

THE GENUS MERYTA (ARALIACEAE) IN SAMOA

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THE GENUS MERYTA, a group of araliaceous trees of the islands of the southwestern Pacific, New Guinea, Micronesia, and Australia, was proposed by J. R. and G. Forster (1775) on the basis of a staminate collection made at an unspecified site during the second voyage of Captain Cook. According to Willis (1973), the genus includes 16 species; according to Harms (1937), it includes 38. Consisting of dioecious trees or shrubs with simple leaves and with flowers either solitary or borne in heads, the genus remains poorly understood and has yet to be monographed. Intrageneric relationships are particularly obscure, and limits between species are difficult to define.

The genus occurs in all of the major archipelagoes of Polynesia except Hawaii, although it is rare in Fiji, where prior to 1971 it was believed to be completely absent (Smith & Stone, 1968). At present, the Fijian species *Meryta tenuifolia* A. C. Smith is known only from the type collection from Viti Levu (Smith, 1971). The ecological and biogeographic factors responsible for the present distribution of the genus remain unknown.

It is hoped that a clarification of the status of the genus in Samoa will prove useful to those concerned with the Samoan flora, as well as to those dealing with the Araliaceae in general. Of the Araliaceae known to be extant in Samoa, species of *Reynoldsia* A. Gray, *Polyscias* J. R. & G. Forster, and *Schefflera* J. R. & G. Forster have been collected in addition to *Meryta*.

Two species, *Meryta macrophylla* (Rich ex A. Gray) Seemann and *M. capitata* Christoph., have been described from Samoa (Seemann, 1862; Christophersen, 1935). However, an analysis of the type specimens and descriptions, as well as of recent and old collections of *Meryta* from Samoa, reveals the existence of two additional taxa and some confusion concerning the two known taxa.

The first species of *Meryta* from Samoa was described as *Botryodendrum macrophyllum* Rich ex A. Gray, based on an unnumbered specimen collected at an unspecified site in Samoa by the U. S. Exploring Expedition. Gray's description (1854, p. 732) was characteristically brief ("B. foliis obovato-lanceolatis basi attenuatis membranaceis ad apicem ramorum confertis"), and it is apparent from his discussion (*ibid.*) that he regarded the specimen as inadequate: "This is said to be 'a simple shrub, from 10 to 25 feet high.' Whether it is really distinct from the preceding species *Botryodendrum taitense* cannot be satisfactorily determined from the present materials which consist of foliage, some badly preserved fertile flowers, a detached portion of male inflorescence (which perhaps belongs to *B. taitense*), and mature fruit."

All of the species in the genus *Botryodendrum* Endl. were transferred by Seemann (1862) to the genus *Meryta*. Subsequently, numerous specimens of a common species of *Meryta* in Samoa have been placed in *M. macrophylla*. However, examination reveals the type to have little in common with these specimens. The fruits of the type specimen are completely free or united only at the base, have sessile stigmas and prominent ridges, and do not exceed 1 cm in length. This contrasts greatly with the fruits of the common Samoan *Meryta*, which are fused to half of their length within the heads, lack prominent ridges, and exceed 1.5 cm in length. It is thus clear that although the most common species of *Meryta* in Samoa has been called *M. macrophylla*, it is actually an undescribed species. It is here designated *Meryta mauuluu* (described below).

The status of *Meryta macrophylla* remains uncertain because of the possibility, mentioned by Gray, that the type is a composite specimen. Only one of the *Meryta* specimens I have examined from Samoa (*Bristol 2118* (BISH), from Salamumu, Upolu) can possibly be ascribed to this species. I cannot exclude the possibility that the type specimen represents a very early developmental stage, although Gray's dissection led him to declare the fruit mature. Another specimen (*Setchell 1253* (BISH)), in which only one fruit per capitulum developed, shows ridges on the fruits similar to those of the U. S. Exploring Expedition specimen, although the fruits themselves are much larger.

Meryta mauuluu can readily be distinguished from the other common Samoan species, *M. capitata*: the fruits of the former species are fused along the lower half only, while those of the latter are completely fused. After periodic observation of several tagged trees in Upolu in 1978 and 1979, I am convinced that *M. capitata* and *M. mauuluu* are indeed different and not merely developmental stages of the same species. The similarity of the erect entomophilous terminal inflorescences of these two sympatric species raises interesting ecological questions concerning the nature of the isolating mechanisms. Perhaps *M. mauuluu* is a relatively recent introduction from Tonga or, alternatively, *M. mauuluu* spread to Tonga from Samoa but *M. capitata* did not. With regard to the latter possibility, it is of interest to note the occurrence of "leaky dioecy" (Baker & Cox, 1984) in *M. mauuluu*: *Christopherson 1254* has both staminate and pistillate flowers borne in different fascicles on the same inflorescence.

Meryta malietoa (described below) can easily be distinguished from the other Samoan species of *Meryta* by its greater degree of ramification, its fruits that are free or united only at the base, and its prominently exerted stigmas. It is apparently confined to the mountain forests of Savaii, although *Whistler 1047*, a specimen collected from Mt. Mariota in Upolu and lacking fruits, may be referable to *M. malietoa*. (In 1980, I climbed Mt. Mariota but did not find any plant similar to *M. malietoa*.)

The four Samoan species of *Meryta* are difficult to distinguish vegetatively. *Meryta malietoa* has a much greater degree of ramification than *M. capitata* or *M. mauuluu*, both of which appear to approximate Chamberlain's model (Hallé *et al.*, 1978). Obtaining decisive foliar characteristics is particularly problematic. Although laminas of *M. capitata* and *M. mauuluu* are somewhat

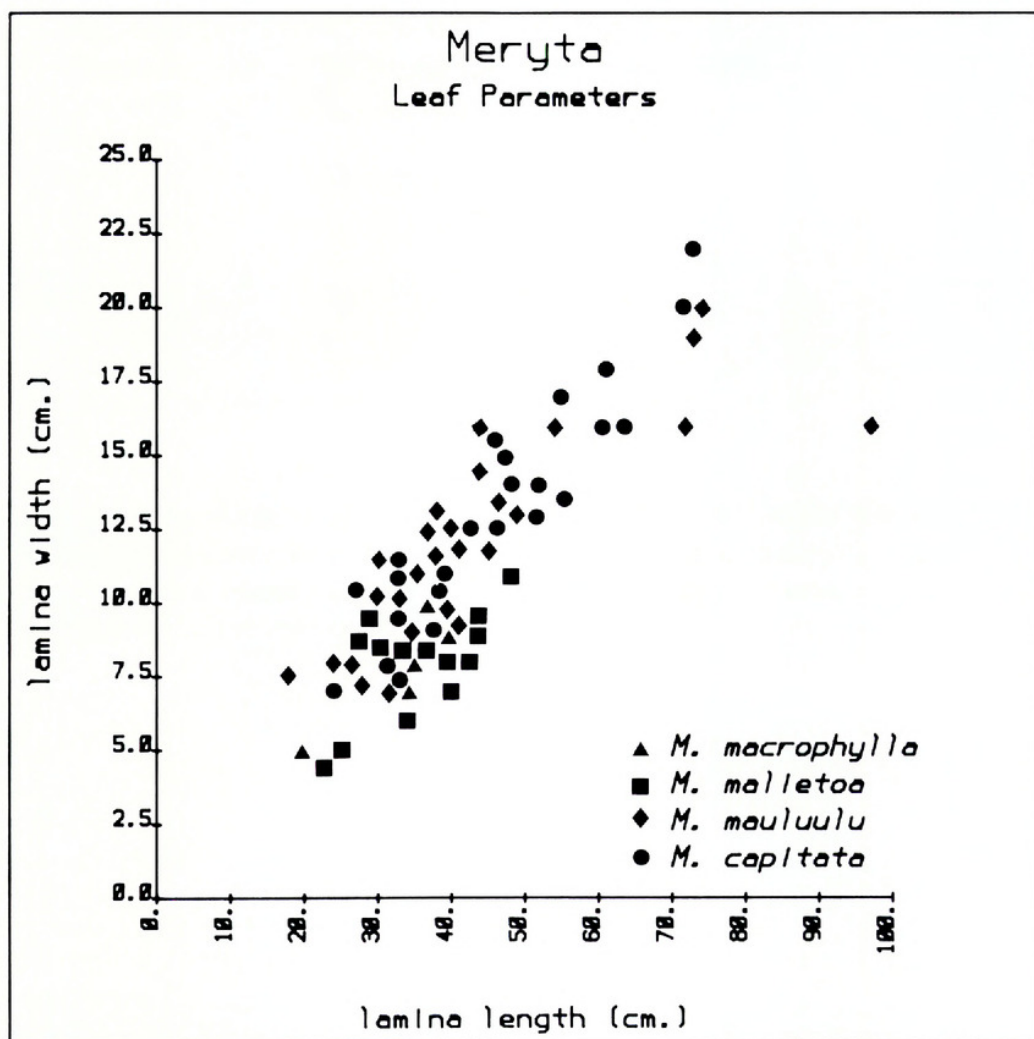


FIGURE 1. Lamina lengths plotted against lamina widths for species of *Meryta* in Samoa.

longer than those of *M. malietoa* or *M. macrophylla*, this character is highly variable (see TABLE 1). Leaves of *M. malietoa* and *M. macrophylla* do appear to be considerably narrower, however (see TABLE 1). A plot of lamina lengths and widths (FIGURE 1) effectively divides the four species into two separate groups, with *M. capitata* and *M. mauuluu* having identical length/width quotients of 3.5, and *M. malietoa* and *M. macrophylla* having quotients of 4.4 and 4.2, respectively (TABLE 1). Thus, while these four species are very similar vegetatively, my observation of tagged individuals over a one-year period leaves little doubt that they are distinct. There was no variation in fruit characters observed through time within any individual, and intermediate fruit character states have not been found. The overall vegetative similarities between these species is perhaps not surprising, given the climatic and relative ecological homogeneity of their habitats (with the exception of the montane *M. malietoa*). The ecological factors that maintain the integrity of these species

TABLE 1. Leaf characteristics of Samoan species of *Meryta*.

| CHARACTERISTICS | SPECIES | | | |
|---|----------------------------|----------------------------|----------------------------|------------------------------|
| | M. capitata (N = 26) | M. mauluulu (N = 27) | M. malietoa (N = 19) | M. macrophylla (N = 6) |
| Mean lamina length (cm)/S.D. | 46.9/13.2 | 43.1/17.2 | 34.1/6.7 | 33.8/6.4 |
| Mean lamina width (cm)/S.D. | 13.3/3.7 | 12.1/3.4 | 8.0/1.6 | 7.8/1.6 |
| Lamina length-width quotient/S.D. | 3.5/0.4 | 3.5/0.7 | 4.4/0.9 | 4.2/0.4 |
| Mean petiole length (cm)/S.D. | 8.5/4.9 | 9.2/4.3 | 11.8/3.9 | 7.6/1.2 |
| Lamina length-petiole length quotient/S.D. | 9.3/11.8 | 6.0/5.7 | 3.2/7.33 | 4.4/0.6 |

and the relationships of Samoan species to the rest of the genus await further study.

KEY TO THE SAMOAN SPECIES OF *MERYTA*

- 1. Fruits free or united only at base.
 - 2. Fruits less than 1 cm long; stigmas sessile. 2. *M. macrophylla*.
 - 2. Fruits greater than 1 cm long; stigmas prominently exserted. 3. *M. malietoa*.
- 1. Fruits completely or partially fused into heads.
 - 3. Fruits completely fused along entire length. 1. *M. capitata*.
 - 3. Fruits fused only along lower half, the upper half free. 4. *M. mauluulu*.

1. *Meryta capitata* Christoph. Bernice P. Bishop Mus. Bull. **128**: 161. 1935.

Few-branched tree 5 m high, with leaves inserted near ends of branches. Leaves with lamina oblanceolate, 20–80 by 6–25 cm, apex short acuminate, base decurrent, margin slightly undulate, glabrous. Infructescence terminal, racemose, with fruits borne in heads. Fruits sessile or short pedicellate, completely fused except for the 2- to 3-mm conical apex, green, with 8 to 12 persistent stigmas.

TYPE. Western Samoa, Savaii, edge of forest back of Vaipouli, 150 m alt., 7 July 1931, *Christophersen & Hume 1913* (holotype, BISH!; isotypes, A!, BISH!, US!).

SPECIMENS EXAMINED. **Western Samoa.** SAVAII: Falealupo, *Christophersen 2802* (BISH); Manase, *Christophersen 2369* (BISH); Taga, *Bristol 2219* (BISH, GH, US), *Christophersen 2839* (BISH, US); Patamea, 280 m alt., *Bristol 2365A* (BISH); Vaipouli, 75 m alt., *Christophersen & Hume 1837* (A, BISH); road to Papa, *Whistler 2184* (BISH); Fatuvalu, *Cox 10* (GH). UPOLU: Tapatapao, 700 m alt., *Cox 78* (GH). **American Samoa.** TAU: top of island, *Whistler 3204* (BISH); 100 m alt., *Yuncker 9162* (BISH); 600 ft alt., *Garber 622* (BISH). OFU: *Yuncker 9545* (BISH). OLOSEGA: 1700 ft alt., *Garber 622* (BISH).

A tree common throughout Samoa, called “lau fagufagu” in Samoan.

2. *Meryta macrophylla* (Rich ex A. Gray) Seemann, *Bonplandia* **10**: 294, 295. 1862.

“Small tree 10 to 25 feet high” (Gray, 1854, p. 732). Leaves with petiole 6–

10 cm long; lamina oblanceolate, 20–40 by 6–10 cm. Fruits free or united only at base, 0.8–1 cm long, with prominent longitudinal ridges, stigmas sessile.

TYPE. "Samoa or Navigator Islands, Herbarium of the U. S. Exploring Expedition, under the command of Captain Wilkes, U.S.N., 1838–1842" (US!).

SPECIMEN EXAMINED. **Western Samoa.** UPOLU: Lefaga-Salamumu, *Bristol 2118* (BISH).

3. *Meryta malietoa* P. A. Cox, sp. nov.

FIGURE 2.

Infructescentia bracteata paniculata, fructibus parum pedicellatis vel sessilibus, solitariis vel in capitulis aggregatis. Fructus virides, discreti vel basitantum conjuncti, diametro 1–1.2 cm, globosi vel ovoidei, cristis longitudinalibus prominentibus 5–8 instructi, baccati, pericarpio carnosulo 5–6 pyrenibus instructi; calyce, stylo, et stigmatibus persistentibus, stigmatibus 6–8, prominentibus, 3–5 mm longis, stylo 2 mm exserto.

Few-branched tree 6 m high, with leaves inserted near ends of branches. Leaves with petiole 10–20 cm long; lamina obovate to oblanceolate, 36–43 by 8–9 cm, apex short acuminate, base decurrent, margin slightly undulate particularly near apex, glabrous, coriaceous, with lateral nerves 25 to 30 on each side, prominent. Infructescence solitary, paniculate, bracteate, with fruits borne singly or aggregated into heads. Fruits short pedicellate or sessile, free or united only at base, baccate, globose to ovoid with 5 or 6 prominent longitudinal ridges, 1–1.2 cm in diameter, green, with calyx, style, and stigmas persistent (stigmas 6 to 8, prominent, 3–4 mm long, styles exserted 2 mm); pericarp fleshy; pyrenes 5 or 6, asymmetrically oblong, 11 by 6 by 1 mm, hard. Seed with 3 or 4 wings, 7 by 3 by 0.2 mm, testa soft, with circular red layer in transection; ovule solitary, pendulous, anatropous; endosperm copious.

TYPE. Western Samoa, Savaii Island, Mt. Silisili, Letui side, above salafa toward summit, 1800 m alt., in cloud forest, 27 June 1979, *Cox 279* (holotype, UC; isotypes, BISH, GH).

SPECIMENS EXAMINED. **Western Samoa.** SAVAII: above Matavanu, wet forest, 1400 m alt., *Christophersen & Hume 2199* (UC); W of Mt. Silili, 1600 m alt., *Whistler 2678* (US); Aopo west, Asau forestry, 300 m alt., *Whistler 1770* (US); inland from Asau, 500 m alt., *Whistler 1047* (US).

The specific epithet of *Meryta malietoa* comes from the chiefly title of His Highness, the Head of the State of Western Samoa, Malietoa Tanumafili II, and is used with his permission. It is hoped that the association of his kingly title with this plant will add impetus to the establishment of a national park in the interior forests of Savaii to which this plant is confined.

4. *Meryta mauluulu* Cox, sp. nov.

FIGURE 3.

Fructus virides, infra conjuncti supra liberi, 5–7 mm alti, calyce persistenti, plerumque 8-partito, stigmatibus persistentibus, plerumque 8, sessilibus, papillois, 1–1.6 mm longis. Fructus baccatus pericarpio carnosulo 8 pyrenibus instructus.

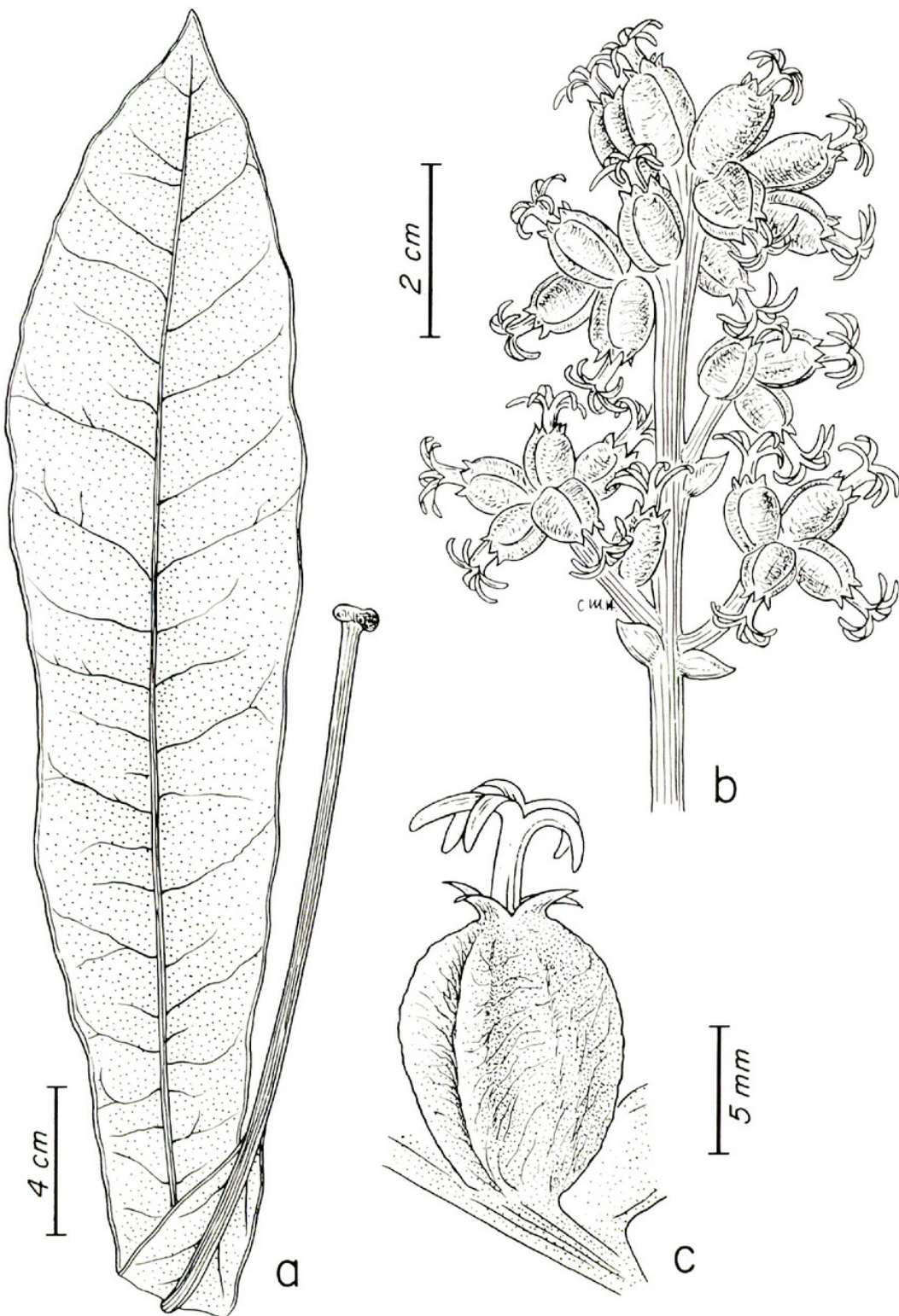


FIGURE 2. *Meryta malietoa*: a, leaf; b, infructescence; c, fruit.

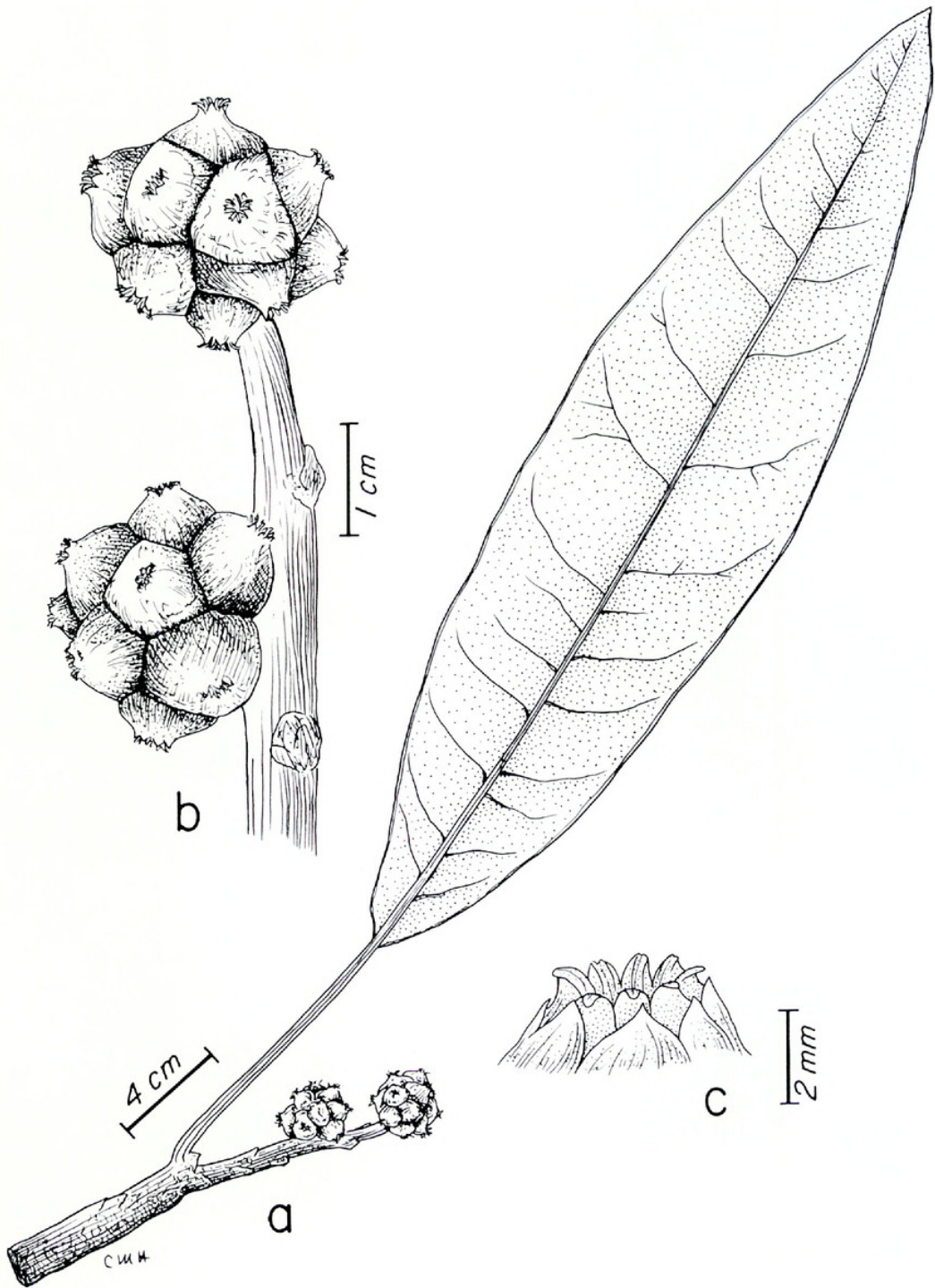


FIGURE 3. *Meryta mauuluu*: a, leaf; b, infructescence; c, apex of fruit.

Few-branched tree 8 m tall, with leaves inserted near ends of branches, apparent phyllotaxis 10/3. Leaves with petiole 9–11 cm long; lamina oblanceolate, 37–40 by 10–11 cm, apex short acuminate, base short decurrent, margin very slightly undulate, glabrous, chartaceous, with lateral nerves 24 to 28 on each side, prominent. Infructescence racemose, bracteate, unbranched, with

fruits borne in heads; heads sessile, globose, 2.5–3 cm in diameter, with 12 to 16 fruits. Fruits sessile, united along lower half, free along upper half, slightly conical, 5–7 mm long, baccate, green, the calyx persistent, calyx members usually 8, the stigmas persistent, usually 8, sessile, 1–1.6 mm long, papillose; pericarp fleshy; pyrenes 8, asymmetrically oblong, 8 by 3 by 1 mm. Ovule solitary, pendulous, anatropous, oblong, 2.2 by 1 mm, smooth; endosperm copious.

TYPE. Western Samoa, Savaii Island, on road between Letui and Aopo in young forest, 24 June 1979, *Cox 252* (holotype, UC; isotypes, BISH, GH).

The specific epithet comes from the Samoan name given this plant by botanically adept Samoans resident in the type area. It is a cognate of “kulukulu,” the Tongan name for this species as noted on several sheets from Tonga (*Yuncker 16050*, *Yuncker 16181*, *Setchell 15652*, *Parks 16231*), and “lutulutu,” the Fijian name noted by Smith (1971) for the type specimen of *Meryta tenuifolia* (*M. J. Berry 97*). The leaves are used to wrap food for baking in stone ovens (“umu”).

SPECIMENS EXAMINED. **Western Samoa.** UPOLU: Malolelei above Apia, 1600 ft alt., *Setchell 15667* (BISH); Mt. Vaea, 150 m alt., *Bryan 99* (BISH); Lefaga–Salamumu, *Bristol 2118* (BISH); Afiamalu, 600 m alt., *Whistler 806* (US); Mt. Mariota, 600 m alt., *Whistler 1269* (US); Tiavi, 700 m alt., *Whistler 715* (US), *Cox 5* (GH); Malolelei, 550 ft alt., *Christophersen 304* (BISH); Lepupupue, *Cox 166* (GH), *Teraoka & Kennedy 87* (US); *Teraoka & Whitaker 340* (US). SAVAII: Avao, *Vaupel 135* (BISH); between Letui and Aopo, *Cox 236* (GH, UC); E of Asau, *Cox 262* (GH); Asau, *Teraoka 342* (US), 300 m alt., *Whistler 962* (US). **American Samoa.** TUTUILA: ridge above Pagopago, *Garber 929* (BISH); Alava ridge, 400 m alt., *Christophersen 1130* (BISH, US); Papatele ridge, 300 m alt., *Christophersen 1006* (BISH, US); Pagopago ridge west, *Setchell 1253* (BISH). TAU: Amouli trail, 600 ft alt., *Garber 622* (A); central mountain, *Cox 312* (BISH, GH, US). **Tonga.** VAVAU: *Setchell 15652* (UC); 150 m alt., *Yuncker 16181* (GH). EUA: *Parks 16231* (US); Anovai Lake, 20 m alt., *Yuncker 16050* (GH).

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