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STUDIES OF PACIFIC ISLAND PLANTS, XXIII. THE GENUS *Diospyros* (EBENACEAE) IN FIJI, SAMOA, AND TONGA¹

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IT IS AN UNDERSTATEMENT to suggest that the genus *Diospyros* L. has seemed complex to taxonomists throughout its pantropical range. In an effort to clarify the taxa occurring in Fiji, the writer has examined the available material and literature bearing on the genus in that archipelago and also in Samoa, Tonga, Niue, and the Horne and Wallis Islands. The New Hebrides would also be included in this natural phytogeographic unit, but too few specimens of *Diospyros* are available from that archipelago to make its inclusion now meaningful.

The first major work on the Ebenaceae, that of Hiern (6), provides much of the basic information on the family, but for the Malesian and Pacific regions Bakhuizen van den Brink's papers (1, 2) are a real starting point. Fosberg (3, 4) has clarified many aspects of *Diospyros* in the Pacific, and recently Green (5) has further discussed some questionable points.

Herbaria cited in the present treatment are indicated as follows: Arnold Arboretum of Harvard University (A); Bernice P. Bishop Museum (BISH); Gray Herbarium of Harvard University (GH); Royal Botanic Gardens, Kew (K); Department of Botany, University of Massachusetts (MASS); New York Botanical Garden (NY); Departments of Agriculture and Forestry, Suva, Fiji (SUVA); University of California, Berkeley (UC); and U.S. National Herbarium (US). Additionally a few specimens are cited that are on deposit at: British Museum (Natural History) (BM); University of California, Davis (DAV); and Muséum National d'Histoire Naturelle, Paris (P). The collaboration of administrators in making material available is greatly appreciated, as is Mr. P. S. Green's willingness to check certain matters in the English herbaria and libraries.

KEY TO SUBGENERA AND SECTIONS OCCURRING IN OUR AREA

Calyx- and corolla-lobes usually 3 (rarely 4); ovary 3- or 6-locular (rarely 4-locular); the ovules 6 (rarely 8) per ovary. Subgen. MABA.

¹Nos. XX, XXI, and XXII of this series were published in Pacific Science, vols. 23 (1969) and 25 (1971). The present paper is based on research partially supported by a grant from the National Science Foundation.

- Ovary 3-locular (rarely 4-locular), the locules 2-ovuled; ovary and fruit pilose but the latter eventually glabrate; fruiting calyx not conspicuously accrescent; stamens (in our species) 3-10 (perhaps rarely as many as 18). Sect. **MABA**.
- Ovary 6-locular, the locules 1-ovuled; ovary and fruit glabrous; fruiting calyx accrescent; stamens (in our species) 8-26. Sect. **RHIPIDOSTIGMA**.
- Calyx- and corolla-lobes usually 4 or 5 (rarely 3); ovary 8- or 10-locular, the locules 1-ovuled, 8 or 10 per ovary; ovary (in our species) sericeous but the fruit soon glabrate; fruiting calyx accrescent; stamens (in our species) 8-20 (perhaps rarely as many as 24). Subgen. **DIOSPYROS**.

Diospyros L. subgen. **Maba** (J. R. & G. Forst.) Bakh. sect. **Maba** P. S. Green in Kew Bull. 23: 339. 1969.

Maba J. R. & G. Forst. Char. Gen. Pl. 121. 1776; Hiern in Trans. Cambr. Philos. Soc. 12: 106. 1873.

Ferreola Roxb. Pl. Corom. 1: 35. 1795.

Diospyros subgen. *Maba* sect. *Forsteria* Bakh. in Bull. Jard. Bot. Buitenz. III. 15: 8. 1936, 50, *nomen illegit.* 1938.

Diospyros subgen. *Maba* sect. *Ferreola* Fosberg in Bull. Torrey Bot. Club 65: 609. 1939; Bakh. in Bull. Jard. Bot. Buitenz. III. 15: 429. 1941.

The type species of *Maba* is *M. elliptica* J. R. & G. Forst., and therefore, as pointed out by Green (5), **MABA** must be used as the epithet for the type-including section (Internat. Code Bot. Nomencl. Art. 22. 1966). This section, under one or another name, was taken by Bakhuizen definitely to include only two species, but it has been pointed out by Fosberg (3: 609) and Green (5: 340) that other taxa merit specific rank within the section. *Diospyros elliptica* (i.e. *D. ellipticifolia*) and *D. ferrea* have been discussed at length by Bakhuizen (1, 2) and the difficulties inherent in their delimitation have been considered. Each of the two species has been assigned an extended range and a perplexing array of varieties and forms. Of the characters utilized by Bakhuizen, those referring to the shape of the calyx and corolla, the styler indument, the shape of the fruiting calyx, and the size and color of the fruit do not seem to hold in separating the complex into two meaningful taxa. What remain as usable characters refer to the type of inflorescence and the number of stamens. Characters of the inflorescence are most apparent in staminate plants, but are also visible in pistillate and fruiting material. In *D. elliptica* the inflorescence is branched, often pedunculate, and basically several- to many-flowered; in fruit this is reflected by a fructiferous axis which, if not branched, has more or less obvious scars. In *D. ferrea* the inflorescence is often sessile and basically one- to few-flowered; in fruit this condition is indicated by a very short pulvinate-cylindric axis without perceptible scars and with a single terminal fruit. In the staminate flowers of *D. elliptica* the stamens are 3, or rarely 6; in those of *D. ferrea* the stamens are 6 to 10 or more (often 9 in our area), or perhaps very rarely reduced to 3. While such characters may not seem entirely convincing, I believe that they do serve to divide the unwieldy complex into two taxa, which one may well maintain as species in view of prevailing custom.

KEY TO SPECIES

Foliage, flowering, and fruiting parts comparatively small; leaf-blades usually $2.5-16 \times 1.5-9$ cm.; staminate and pistillate inflorescences with inconspicuous bracts not more than 4×3 mm., the calyx at anthesis 2-4 mm. long and broad, the corolla at anthesis 3-6 mm. long, the stamens about 3 mm. long; fruiting calyx 4-9 mm. in diameter; fruits $8-28 \times 6-16$ mm., the seeds 10-16 mm. long.

Flowering inflorescences (both staminate and pistillate) cymose, branched from base or often pedunculate, several- to many-flowered (flowers usually 3-15 or more, very rarely 2); fruiting inflorescences branched, or if simple composed of a peduncle-branchlet axis with usually obvious lateral scars, this at least 4 mm. (rarely only 2 mm.) long, with 1 to several fruits; stamens in staminate flowers 3 or occasionally 6. 1. *D. elliptica*.

Flowering inflorescences usually simple, the pistillate composed of a pulvinate or cylindric peduncle 0.2-1 (-3) mm. long and 1-flowered (or flowers very rarely more than 1), the staminate similar or rarely 2- or 3-branched, the branchlets then 0.5-1 mm. long and each 1-flowered; fruiting inflorescences composed of a stout pulvinate-cylindric axis 0.5-3 mm. long without perceptible lateral scars and with a single terminal fruit; stamens in staminate flowers 6-10 or more, possibly rarely 3 (but not so noted in our area). 2. *D. ferrea*.

Foliage, flowering, and fruiting parts comparatively robust; leaf-blades usually $7-21 \times 3.5-11$ cm.; staminate and pistillate inflorescences with a pulvinate or cylindric peduncle 1-6 mm. long, the bracts conspicuous, 6-8 mm. long, 4-6 mm. broad, the calyx at anthesis 5-9 mm. long and broad, the corolla at anthesis 14-15 mm. long, the stamens 6-9, at anthesis 6-7 mm. long; fruiting calyx 9-15 mm. in diameter; fruits solitary, at maturity $25-45$ (-60) $\times 15-30$ mm., the seeds 15-33 mm. long.

Fruits copiously pilose with short hairs and also hispidulous with stiff hairs 1-2 mm. long; fruiting inflorescences composed of a pulvinate-cylindric glomerule 1-3 mm. long; leaf-blades with 6-13 secondary nerves per side; branchlets stout, distally 2-5 mm. in diameter. 3. *D. major*.

Fruits sparsely strigose with hairs 0.2-0.5 mm. long (without longer hispidulous indument); fruiting inflorescences composed of a stout cylindric peduncle 3-6 mm. long; leaf-blades with 12-22 secondary nerves per side; branchlets comparatively slender, distally 1.5-3 mm. in diameter. 4. *D. christophersenii*.

1. *Diospyros elliptica* (J. R. & G. Forst.) P. S. Green in Kew Bull. 32: 340. 1969.

Maba elliptica J. R. & G. Forst. Char. Gen. Pl. 122. t. 61. 1776.

Tree 2-10 m. high, the young parts variously pilose, soon or eventually glabrate; petioles semiterete, rugulose, rarely exceeding 6 mm. in length (to 12 mm. in var. *savaiiensis*); leaf-blades coriaceous to chartaceous, in our varieties not exceeding 16×9 cm.; inflorescences cymose, branched from base or often pedunculate, usually 3-15-flowered, the bracts small and caducous, the flowers sessile; calyx cupuliform to narrowly campanu-

late or urceolate, comparatively small, at anthesis, to 4 mm. in length and diameter, the lobes 3, ovate to deltoid; corolla usually cylindric to urceolate, at anthesis 3–6 mm. long, deeply 3-lobed, often copiously sericeous without, glabrous within; staminate flowers with 3 or occasionally 6 stamens; pistillate flowers with an ovoid, sericeous or strigose ovary, the locules 2 or 3, each with 2 ovules; fruiting inflorescences usually branched, or if simple composed of a peduncle-branchlet axis with usually obvious lateral scars, this rarely less than 4 mm. long, the fruits often more than 1; fruiting calyx sessile, shallowly campanulate or rotate, not exceeding 5 mm. in length and 9 mm. in diameter, 3-lobed; fruits in our varieties not exceeding 28×16 mm., the seeds 1–4 maturing, black, triquetrous or semi-ellipsoid or terete.

Green's combination based on *Maba elliptica* appears to be correct to replace *D. ellipticifolia* (Stokes) Bakh. The prior binomial "*Diospyros elliptica* Hort. ex E. André" (1887) was proposed at the rank of variety and is therefore inadmissible (Internat. Code Bot. Nomencl. Art. 24. 1966). Also, *Ferreola ellipticifolia* Stokes (1812) is illegitimate (Arts. 66, 68) because *Maba elliptica* was cited in synonymy and that epithet should have been utilized. The pertinent references to the type-including taxon of *D. elliptica* are listed below under var. *elliptica*.

Although one can agree with Green in his basic circumscription of *D. elliptica*, he has, with other authors, not clearly distinguished the species from *D. ferrea*. Some of the Fijian material often referred to the latter clearly represents *D. elliptica*, which in the inclusive sense has a broad distribution from Malesia to Tonga and Samoa. In our area there appear to be seven fairly discrete varieties, all of them except var. *elliptica* requiring new trinomials.

KEY TO VARIETIES

Leaf-blades elliptic or oblong-elliptic to ovate, usually about twice as long as broad, $2.5\text{--}16 \times 1.5\text{--}9$ cm.; fruits not larger than 24×16 mm.

Petioles 1–6 mm. long; leaf-blades elliptic to oblong- or ovate-elliptic, the lowermost nerves not conspicuous nor sharply ascending, the venation not conspicuous, immersed or plane, sometimes slightly prominulous beneath; fruiting calyx with ascending or spreading lobes.

Young parts appressed-strigose or strigose-hispidulous with hairs 0.1–1 mm. long, the foliage and fruiting parts soon glabrate; leaf-blades acute to obtuse at base and often decurrent on the petiole.

Petioles 2–6 mm. long; leaf-blades $4\text{--}16 \times 2\text{--}9$ cm., obtuse or obtusely cuspidate or rounded at apex; fruiting calyx 5–7 mm. in diameter.

Fruiting inflorescences pedunculate with 2–several lateral branchlets, or reduced to a simple peduncle-branchlet axis, sometimes with a single maturing fruit; fruits $13\text{--}20 \times 6\text{--}12$ mm., the seeds 10–13 mm. long; young parts and inflorescences strigose-hirtellous with hairs 0.3–1 mm. long; leaf-blades usually $4\text{--}10 \times 2\text{--}4.5$ cm. 1a. var. *elliptica*.

Fruiting inflorescences congested-cymose, epedunculate, usually irregu-

larly 3-8-branched from base and with several maturing fruits; fruits $18-24 \times 10-13$ mm., the seeds 14-16 mm. long; young parts and (presumably) inflorescences closely appressed-strigose with hairs 0.1-0.3 mm. long; leaf-blades usually $10-16 \times 5-9$ cm.

..... 1b. var. *fructuosa*.
Petioles 1-2 mm. long; leaf-blades usually $3-5.5 \times 1.5-2.5$ cm., narrowed to an obtusely acuminate or cuspidate apex; inflorescences sericeous on external surfaces with hairs 0.2-0.3 mm. long; fruiting calyx 4-5 mm. in diameter. 1c. var. *fijiensis*.

Young parts copiously tomentellous-villose or hispidulous with hairs 0.6-1 mm. long, the foliage and fruiting parts subpersistently pilose; petioles 1-2.5 (-4) mm. long; leaf-blades usually $2.5-4.7 \times 1.5-2.5$ cm., subcordate or rounded at base. 1d. var. *foliosa*.

Petioles 5-12 mm. long; leaf-blades ovate to broadly ovate, usually $5-10 \times 3-8.5$ cm., abruptly narrowed at base and decurrent on the petiole, the lowermost 2 or 3 secondary nerves sharply ascending from near base, the venation conspicuous and prominulous on both sides; fruiting calyx persistently sericeous within, the lobes strongly reflexed or revolute; fruits $15-17 \times 10-16$ mm., strigose with hairs 0.3-1 mm. long, at length glabrate. 1e. var. *savaiiensis*.

Leaf-blades lanceolate, about 4 times as long as broad, usually $8-11 \times 2-3.5$ cm.

Petioles 3-6 mm. long, narrowly winged nearly to base; leaf-blades chartaceous, nitid above, very early glabrate; axis of fruiting inflorescence 10-12 mm. long; fruits comparatively large, $23-28 \times 13-16$ mm. 1f. var. *iridea*.

Petioles 2-4 mm. long, not obviously winged; leaf-blades coriaceous, dull on both sides, often persistently strigose-hispidulous on lower surface of costa; axis of fruiting inflorescence 4-6 mm. long; fruits smaller, $13-16 \times 8-10$ mm. 1g. var. *opaca*.

1a. *Diospyros elliptica* var. *elliptica*.

Maba elliptica J. R. & G. Forst. Char. Gen. Pl. 122. t. 61. 1776; A. Gray in Proc. Amer. Acad. Arts 5: 326, p.p. 1862; Hiern in Trans. Cambr. Philos. Soc. 12: 122. 1873; Drake, Ill. Fl. Ins. Mar. Pac. 230, p.p. 1892; Hemsl. in Jour. Linn. Soc. Bot. 30: 184. 1895; Burkill in Jour. Linn. Soc. Bot. 35: 45. 1901; Christophersen in Bishop Mus. Bull. 128: 172. 1935. Non "*D. elliptica* nov. var." Hort. ex E. André, 1887.

Ferreola ellipticifolia Stokes, Bot. Mat. Med. 4: 556, *nomen illegit.* 1812.

Ebenus elliptica Kuntze, Rev. Gen. Pl. 2: 408. 1891.

Maba buxifolia sensu Hemsl. in Jour. Linn. Soc. Bot. 30: 184. 1895; non Pers.

Diospyros ellipticifolia Bakh. in Gard. Bull. Str. Settle. 7: 162. 1933, in Bull. Jard. Bot. Buitenz. III. 15: 65, sensu typi. 1938; Yuncker in Bishop Mus. Bull. 178: 94. 1943, in op. cit. 184: 57. 1945.

Diospyros ellipticifolia var. *elliptica* Fosberg in Bull. Torrey Bot. Club 65: 611. 1939; Bakh. in Bull. Jard. Bot. Buitenz. III. 15: 431, 437. 1941; Yuncker in Bishop Mus. Bull. 220: 212. 1959.

Diospyros major var. *elliptica* Bakh. in Bull. Jard. Bot. Buitenz. III. 15: 431. 1941.

Diospyros ferrea sensu Yuncker in Bishop Mus. Bull. 220: 213. 1959; non Bakh.

Tree 2.5–10 m. high, the young parts copiously strigose-hispidulous with hairs 0.3–1 mm. long, the branchlets, petioles, and leaf-blades soon glabrate; petioles 2–6 mm. long; leaf-blades subcoriaceous, elliptic to oblong-elliptic, (3–) 4–10 (–11.5) cm. long, (1.3–) 2–4.5 (–5.5) cm. broad, acute to obtuse at base, obtuse or rounded at apex, thickened and narrowly revolute at margin; inflorescences (staminate and pistillate superficially similar and distinguished only by dissection) irregularly cymose, 10–15 mm. long (including flowers), 2- or 3-times branched, usually 6–15-flowered (flowers rarely reduced to 2 or 3), some flowers often early caducous, the indument (of peduncle, branchlets, bracts, and calyx) strigose-hirtellous with hairs 0.4–0.7 mm. long, the flowers in ultimate clusters of 1–3 at tips of branchlets; calyx cupuliform, 3–4 mm. long and in diameter, copiously and closely sericeous within, the lobes ovate to deltoid, $1-2 \times 2-2.5$ mm.; corolla infundibular-campanulate, 5–6 mm. long, sericeous distally without, otherwise glabrous, the tube 2–2.5 mm. in diameter, the lobes oblong-ovate, 3–3.5 mm. long, 1.5–2.5 mm. broad; staminate flowers with 3 (or occasionally 6) stamens, these about 3 mm. long, glabrous, the filaments 0.6–0.8 mm. long, the anthers 2.2–2.5 mm. long, the ovary-rudiment obvious, ovoid, copiously sericeous; pistillate flowers with a sericeous ovary; fruiting inflorescences composed of a peduncle 1.5–5 mm. long and 2–several branches, with 1–several maturing fruits but with obvious scars, sometimes reduced to a peduncle and branch axis bearing 1 terminal fruit, this axis then at least 4 mm. long and with obvious lateral scars; fruiting calyx 3–5 mm. long, 5–7 mm. in diameter, glabrate; fruits ellipsoid to oblong-ellipsoid or ovoid, sometimes slightly curved, 13–20 mm. long, 6–12 mm. broad, rounded at base, obtuse at apex, glabrate; seeds 10–13 mm. long, 4–7 mm. broad.

TYPE LOCALITY: Tonga; according to Green (5) the holotype (BM) was collected by the Forsters on Tongatapu or Nomuka.

DISTRIBUTION: In discussing the typical variety (as *D. ellipticifolia* var. *elliptica*), Fosberg (3) indicated it to be widespread from Samoa to Malesia and southeastern Asia. Bakhuizen, however, in 1941(2) suggested its occurrence only in Tonga and Samoa. Specimens are now available from Tonga, Niue, Samoa, and the Wallis Islands, and a single collection from the Lau Group of Fiji shows that it also occurs there. I doubt if this natural and compact range should be further extended westward, as material from west of Lau is probably referable to other varieties as suggested by Bakhuizen (2: 429–431), although his several trinomials and quadrinomials, if accepted, will require new combinations under *D. elliptica* rather than *D. ellipticifolia*. The available specimens are from trees 2.5–10 m. high, occurring in various types of forest or thickets, or in grassland, often on limestone, at elevations from sea-level to 300 m. The trunk may attain a diameter of 25 cm.; the corolla is white to greenish yellow; and the fruit is yellow, turning orange-yellow or red.

LOCAL NAMES AND USES: The taxon is uniformly known in Tonga as *kanume*, and this name is also reported from Niue, as is *kanume uli*. In

Samoa the name is reported as *anume* or *Samoaan ebony*. Yuncker reports a variety of uses in Tonga: the timber is considered good for posts, the stems are used for handicraft work, the bark is used in medicines, and the fruit is sometimes considered edible.

Fiji. VANUA MBALAVU: On limestone ridges at north end of island, *Bryan 579A* (BISH).

Wallis Islands. UVEA: Mt. Afala, *McKee 19922* (BISH, P).

Tonga. NIUAFO'OU: *Jaggar*, Oct. 1930 (BISH). NIUATOPUTAPU: Falehau, *Soakai 761* (K). VAVA'U: *Crosby 97* (K); summit of Talau, west of Neiafu, *Yuncker 16144* (BISH, GH, US); east of Neiafu, *MacDaniels 1103* (BISH); below Houma Village, *Yuncker 16131* (BISH, GH, US); near Oko'a Village, *Hotta 4925* (BISH). "VAVA'U and LIFUKA": *Harvey*, in 1855 (K). HA'APAI: Ha'ano, *Soakai 300* (K). LIFUKA: North of Pangai Village, *Yuncker 15735* (BISH, GH, US). NOMUKA: Near shore of central lake, *Yuncker 15842* (BISH, GH, US). ATATA: *Soakai 473* (K). TONGATAPU: *Graeffe 1372* (K), *1531* (K), *Lister*, Apr. 5, 1889 (K), *Setchell & Parks 15448* (K, UC); Kologa Point, *Setchell & Parks 15390* (BISH, GH, K, UC); Van Diemen's Point, *Setchell & Parks 15504* (K, UC); between Niutoua Village and the sea, *Yuncker 15124* (BISH, GH, US); 6 miles from Nuku'alofa, *MacDaniels 1083* (BISH); Hofoa, *Soakai 709* (K). 'EUA: *Lister*, Dec. 1889 (K), *Soakai 388* (K); above Houma, *Yuncker 15493* (BISH, GH, US). TONGA, WITHOUT FURTHER LOCALITY: *Graeffe* (GH, NY), *Matthews 144* (K), *Soakai 932* (K).

Niue. Near Makefu Village, *Yuncker 10104* (BISH); Vaiea Farm, *Sykes 1009* (K).

Samoa. UPOLU: Lalumanu, *Christophersen 966* (BISH, K, NY, UC, US). TUTUILA: Pago Pago, *Wilder 46* (BISH), *Diefenderfer 11* (BISH); Breakers Pt., *Wisner 123* (BISH). OFU: Top of Nu'u Islet, *Garber 1102* (BISH, NY). TAU: Siulagi Point, *Garber 773* (A, BISH, K, NY, UC). SAMOA, WITHOUT FURTHER LOCALITY: *U.S. Expl. Exped.* (GH, K, NY, US), *Whitmee 249* (GH, K), *Powell 192* (K).

1b. *Diospyros elliptica* var. *fructuosa* A. C. Sm., var. nov.

Arbor ad 10 m. alta, partibus novellis pilis 0.1–0.3 mm. longis arcte strigosis, ramulis foliisque mox glabratis; petiolis crassis 2–6 mm. longis, foliorum laminis subcoriaceis, ellipticis vel elliptico-oblongis, (8–) 10–16 cm. longis, (3.5–) 5–9 cm. latis, basi obtusis, apice obtusis vel obtuse cuspidatis, margine incrassatis et anguste revolutis, costa supra subplana vel elevata subtus prominente, nervis secundariis utrinsecus 5–8 supra paullo subtus valde elevatis, rete venularum utrinque subimmerso vel plano; inflorescentiae ♀ corolla urceolata ad 4 mm. longa et 2.5 mm. diametro extus copiose sericea, lobis ovatis ad 1 mm. longis obtusis; inflorescentiis sub fructu axillaribus congesto-cymosis e basi irregulariter 3–8-ramulosis vel breviter pedunculatis, fructibus plerumque pluribus maturis exclusis 5–10 mm. diametro, ramulis et calyce pilis 0.1–0.3 mm. longis subpersistenter et arcte strigosis demum glabratis; calyce sub fructu 3–4 mm. longo 5–6 mm. diametro intus copiose sericeo, lobis late deltoideis 1.5–2 × 3–4 mm. obtusis; fructibus ellipsoideis vel obovoideis maturitate 18–24 mm. longis et 10–13 mm. latis, basi et apice obtusis vel rotundatis, seminibus 14–16 mm. longis, 5–7 mm. latis.

TYPE LOCALITY: Serua Province, Viti Levu, Fiji; the type is *Smith 9185*.

DISTRIBUTION: Known only from southern Viti Levu, Fiji, where it appears to be an infrequent component of the wet forest. Only the type collection bears detailed notes; it was taken from a tree about 10 m. high at an altitude of 30–150 m.; the mature fruit is yellow to orange or red. A few detached pistillate corollas were entangled in fruiting inflorescences. The Horne collection bears young fruits and was collected in June.

Fiji. VITI LEVU: SERUA: Hills north of Ngaloa, in drainage of Wainiggere Creek, Nov. 19, 1953, *Smith 9185* (US 2192180 holotype; isotypes at BISH, K, SUVA, UC). REWA: Between Veisari River and Na Vesi, *Horne 1050a* (GH, K).

Although clearly falling within reasonable limits of *D. elliptica*, this new taxon is less closely related to other Fijian varieties than it is to var. *elliptica*, from which it is distinguished by its consistently larger leaf-blades, fruits, and seeds, the more closely appressed indument of its young parts, and its more amply branched and spreading fruiting inflorescences.

1c. *Diospyros elliptica* var. *fijiensis* (Bakh.) A. C. Sm., comb. nov.

Diospyros ellipticifolia var. *fijiensis* Bakh. in Bull. Jard. Bot. Buitenz. III. 15: 431, 437. 1941.

Diospyros ferrea var. *nandarivatensis* sensu P. S. Green in Kew Bull. 23: 342. 1969; non sensu typi.

Tree 3–10 m. high; young parts strigose with pale brown appressed hairs 0.1–0.4 mm. long, the branchlets and leaves soon glabrate, the branchlets fusco-cinereous, copiously lenticellate; petioles 1–2 mm. long; leaf-blades subcoriaceous, obscurely glandular-punctate, elliptic or ovate-elliptic, (2–) 3–5.5 (–7) cm. long, (1–) 1.5–2.5 cm. broad, acute at base and decurrent on the petiole, narrowed to an obtusely acuminate or cuspidate apex, thickened and narrowly revolute at margin, the venation immersed above, prominulous or plane beneath; staminate inflorescences short-cymose, in bud compact but to 6 mm. long and 3–10-flowered, ependunculate but several-branched, sericeous on external surfaces with hairs 0.2–0.3 mm. long, the bracts oblong, 0.6–1 mm. long, glabrous within; calyx in bud ovoid, to 2.5 mm. long, sericeous without, essentially glabrous within; corolla sericeous without; stamens 3, the anthers in bud about 1 mm. long; fruiting inflorescences 2- or 3-branched from base, with 1–4 maturing fruits, or composed of a pseudo-peduncle with obvious lateral scars, this 2–6 mm. long, 0.5–1 mm. in diameter, swollen at apex, persistently strigose or glabrate; fruiting calyx 2–3 mm. long, 4–5 mm. in diameter, strigose without or glabrate, the lobes broadly deltoid, subacute; fruits ellipsoid or oblong-ellipsoid, 14–20 mm. long, 7–10 mm. broad, rounded at base, obtuse at apex, at length glabrate, the seeds 11–15 mm. long.

TYPE LOCALITY: Mbua Province, Vanua Levu, Fiji; as lectotype I designate *Smith 1564*, cited below. In establishing this taxon, Bakhuizen cited

three specimens from Vanua Levu, *Smith* 544, 1564, and 1982, without indicating a holotype; all three are represented by duplicates in the herbarium at Bogor, where Bakhuizen presumably examined them. Since most specimens of *Diospyros* seem to be collected in fruiting rather than in flowering condition, I designate as lectotype a good fruiting specimen rather than no. 544, which bears young staminate inflorescences.

DISTRIBUTION: Fiji, and thus far known only from Ovalau and Vanua Levu, where it has been noted as an often compact tree 3–10 m. high, growing in dense or dry forest or in ridge forest at elevations of 100–900 m. The flower-buds are pale pink, and the only flowering specimen was obtained in November; fruits were observed in April, June, and July.

LOCAL NAMES: On Vanua Levu I recorded the names *sisiruwai* (no. 1564) and *lato* (no. 544).

Fiji. OVALAU: Summit and adjacent slopes of Mt. Korotolutolu, west of Thawathi, *Smith* 8033 (BISH, GH, K, SUVA, UC, US); slopes above Levuka, *Gillespie* 4508 (BISH). VANUA LEVU: MBUA: Southern portion of Seatovo Range, in ridge forest, alt. 100–350 m., Apr. 20, 1934, *Smith* 1564 (isolectotypes at BISH, GH, K, NY, UC, US). MATHUATA-THAKAUNDROVE boundary: Crest of Korotini Range, between Navitho Pass and Mt. Ndelaikoro, *Smith* 544 (BISH, GH, K, NY, UC, US). THAKAUNDROVE: Uluingala, Natewa Peninsula, *Smith* 1982 (BISH, GH, K, NY, UC, US).

As mentioned above, Bakhuizen originally cited three collections from Vanua Levu as representing his new variety. These same numbers had previously been cited by Fosberg (3: 610) as *D. ferrea* var. *nandarivatensis*, and Bakhuizen unfortunately repeated this (2: 441). One may assume that Bakhuizen had his 1941 manuscript already advanced when he decided to propose the new variety of *D. ellipticifolia*; although he made the proper insertions in his key (p. 431) and text (p. 437), he neglected to remove the specimen citations from p. 441. Green (5: 342), reducing Bakhuizen's variety to *D. ferrea* var. *nandarivatensis*, indicated that "examination of duplicates in the Kew Herbarium confirms that their correct disposition is under *Diospyros ferrea*." Nevertheless, as *D. elliptica* and *D. ferrea* are currently interpreted, and as maintained by Bakhuizen, these three specimens definitely belong with the former. The branching inflorescence is clearly seen in *Smith* 544 (staminate) and 1564 (fruit), and furthermore no. 544 has three stamens in the staminate flower. The Fijian taxon must be referred to *D. elliptica* as a relative of var. *elliptica*, from which the distinctive leaf-shape and apex, the closer indument, and the slightly smaller fruiting calyx distinguish it as a reasonably obvious variety.

1d. *Diospyros elliptica* var. *foliosa* (Rich ex A. Gray) A. C. Sm.,
comb. nov.

Maba foliosa Rich ex A. Gray in Proc. Amer. Acad. Arts 5: 326. 1862; Seem. Fl. Vit. 152. 1866; Hiern in Trans. Cambr. Philos. Soc. 12: 113. 1873; Drake, Ill. Fl. Ins. Mar. Pac. 230. 1892.

Ebenus foliosa Kuntze, Rev. Gen. Pl. 2: 408. 1891.

Diospyros foliosa Bakh. in Bull. Jard. Bot. Buitenz. III. 15: 444, 447. 1941;
A. C. Sm. in Jour. Arnold Arb. 33: 110. 1952; J. W. Parham, Pl. Fiji Isl.
160. 1964.

Tree 2–10 m. high; young parts copiously brown-tomentellous-villose or hispidulous with hairs 0.6–1 mm. long, the branchlets and leaves glabrate but sometimes tardily so, the branchlets fusco-cinereous, inconspicuously or obviously lenticellate; petioles stout, 1–2.5 (–4) mm. long; leaf-blades subcoriaceous, elliptic-oblong, (2–) 2.5–4.7 (–9) cm. long, (1.2–) 1.5–2.5 (–5.5) cm. broad, subcordate or rounded at base, obtuse or rounded at apex (rarely narrowed and short-acuminate), thickened and slightly revolute at margin, sometimes subpersistently tomentellous beneath, the venation immersed or prominulous beneath; pistillate inflorescences short-cymose, in bud compact and 3–6-flowered, copiously sericeous-tomentellous on external surfaces with golden-brown hairs 0.3–0.7 mm. long, the bracts elliptic, 1.5–2.5 mm. long, sericeous within; calyx deeply lobed, sericeous within, the lobes thick-carnose, ovate, obtuse; corolla glabrous within, the lobes sericeous without; ovary sericeous; fruiting inflorescences branched from base or short-pedunculate, with (1–) 2–5 maturing fruits, the ultimate branchlets stout, 2–4 mm. long, like the calyx subpersistently sericeous-tomentellous; fruiting calyx 2–5 mm. long, 4–7 mm. in diameter, persistently sericeous within, shallowly lobed or with obsolete lobes; fruits oblong- or ovoid-ellipsoid, 12–21 mm. long, 8–12 mm. broad, rounded at base, obtuse at apex, with subpersistent indument but eventually glabrate, the seeds 10–16 mm. long.

TYPE LOCALITY: Fiji; Gray cited the Exploring Expedition type as from "Muthuata and Ovolau" (i.e. the northern part of Vanua Levu and the island of Ovalau). It is probable that the type material came from Mathuata, from which other specimens are at hand; no collections of the taxon are definitely known from Ovalau.

DISTRIBUTION: Fiji, and known definitely only from Viti Levu and the northern part of Vanua Levu. The available specimens are noted as trees 2–10 m. high occurring in rocky forest, thin forest, or ridge forest at altitudes of 30–1100 m. The fruit is yellow, at length becoming orange or red. Pistillate flowers were obtained in December and fruits between July and November.

LOCAL NAMES: *Nganga ni sau* (Gillespie 4062); *ulalo* (Smith 6439).

Fiji. VITI LEVU: MBA: Mt. Lomalangi (Nanggaranambuluta), Gillespie 4062 (A, BISH). NAITASIRI (?): Waimanu River basin, watershed southeast of Nasele, Fiji Dept. Agr. 15439 (MASS, SUVA). VANUA LEVU: MATHUATA: U.S. Expl. Exped. (US 65907 holotype; isotype at GH); vicinity of Lambasa, Greenwood 486 (K); Mt. Numbuiloa, east of Lambasa, Fiji Dept. Agr. 14630 (BISH, K, SUVA); southern slopes of Mt. Numbuiloa, Smith 6439 (A, BISH, K, US), 6443 (A, BISH, K, US). VANUA LEVU, without further data: R. B. H. Parham 18 (A, NY).

This taxon falls within a reasonable concept of *D. elliptica*, and it can scarcely be maintained as a separate species. Its closest relationship seems to be with var. *elliptica*, from which it differs in its more copious, longer, and subsistent indument, and in having its short-petiolate leaf-blades subcordate to rounded at base.

Bakhuizen (2: 444, 447) did not understand *Maba foliosa*, nor did he see type material. He indicated his species to be limited to New Caledonia and to include three varieties, all of which will eventually require other dispositions. Also, he placed *Diospyros foliosa* (a correct combination in spite of the misidentifications) in Sect. CUPULIFERA Fosberg, which was based (Fosberg, 3: 613) on *D. rufa* (Labill.) Fosberg; the latter binomial is to be replaced by *D. parviflora* (Schlechter) Bakh. (cf. Bakhuizen, 2: 445). Whatever the eventual circumscription of Sect. CUPULIFERA, it obviously does not extend eastward into our area. Prior to Bakhuizen's work Hiern (6: 113) had cited, in addition to the Fijian type, a New Caledonian specimen for *Maba foliosa*; this was doubtless a misidentification and it may have influenced Bakhuizen's concept of the taxon. This specimen was also probably the source of Hiern's description of the staminate inflorescence, since the original material is in fruit only; none of the specimens now at hand bears staminate inflorescences.

1e. *Diospyros elliptica* var. *savaiiensis* (Christophersen) A. C. Sm.,
comb. nov.

Maba savaiiensis Christophersen in Bishop Mus. Bull. 128: 173. fig. 26. 1935.
Diospyros ferrea var. *savaiiensis* Fosberg in Bull. Torrey Bot. Club 65: 611.
1939.

Small tree 3–4 m. high, the young parts sparsely cinereous-strigose with hairs 0.2–0.4 mm. long, the branchlets and foliage soon glabrate, the branchlets slender, terete, cinereous, conspicuously lenticellate; petioles brownish to glaucous, 5–12 mm. long; leaf-blades chartaceous, ovate or broadly ovate, (4–) 5–10 cm. long, (2.5–) 3–8.5 cm. broad, abruptly narrowed at base and decurrent on the petiole, obtuse to rounded or sometimes emarginate at apex, thickened and slightly revolute at margin, the costa plane or shallowly canaliculate above, prominent beneath, the secondary nerves 5–7 per side, the lowermost 2 or 3 sharply ascending from near base, the venation conspicuous and prominulous on both sides; staminate inflorescences axillary, in very young bud composed of a copiously strigose axis 5–6 mm. long bearing 3–5 lateral sessile flowers, each subtended by an obovate bract 3–4 mm. long, this strigose without, glabrous within; calyx-bud ovoid, copiously sericeous without, with deltoid acute lobes; corolla-bud sericeous without, glabrous within; stamens minute in bud, apparently 6; fruiting inflorescences congested-cymose, sometimes borne on short defoliate branchlets suggesting racemes, composed of a stout cylindric peduncle 2–4 mm. long, this with lateral or subterminal scars and sometimes shortly branched distally or occasionally branched from base, at length glabrate, the fruits often solitary and terminal but sometimes 2 or

3 per inflorescence; fruiting calyx 2–3 mm. long, 6–9 mm. in diameter, subpersistently strigose without and copiously and persistently sericeous within with cinereous or golden hairs 0.2–0.3 mm. long, the lobes ovate, acute, about 4×4 –5 mm., strongly reflexed or revolute; fruits ellipsoid, 15–17 mm. long, 10–16 mm. broad, rounded at base and apex, strigose with hairs 0.3–1 mm. long, at length glabrate; seeds 10–12 mm. long.

TYPE LOCALITY: Near Fangalele, Savaii, Samoa; the type is *Christophersen 3404*, cited below.

DISTRIBUTION: On the basis of presently available collections, this taxon has a remarkably limited range in the northwestern part of the island of Savaii, where it is often associated with subrecent lava flows, according to Christophersen. It has been noted as a small tree 3–4 m. high, growing in open scrub forest or low coastal forest at elevations from near sea-level to 200 m.; the fruits are orange to orange-yellow and orange-red. Young staminate inflorescences were obtained in December and fruits in November and December.

LOCAL NAME AND USE: Christophersen has noted the name as *anume* and the fruit as edible.

Samoa. SAVAII: Near Falealupo, *Christophersen 3320* (A, BISH); between Falealupo and Fangalele, *Christophersen 3328* (BISH, K, NY, UC); near Fangalele, alt. 5 m., in open scrub forest, Nov. 21, 1931, *Christophersen 3404* (BISH holotype; isotypes at A, K, NY, UC, US); Cape Puava, *Annette K. Walker*, Dec. 31, 1968 (BISH); between Aopo and Asau, *Christophersen 3428* (BISH, US).

Maba savaiiensis cannot be referred to *Diospyros ferrea*, since it has the cymose, often several-fruited inflorescences characteristic of *D. elliptica*. Rather than maintaining Christophersen's taxon as a separate species, it seems reasonable to include it in *D. elliptica*, in which it is noted as a well marked variety characterized by long petioles, broad leaf-blades with ascending lower secondaries and conspicuous venation, and a fruiting calyx persistently sericeous within and with strongly reflexed or even revolute lobes.

All the available specimens are in fruit except *Walker s.n.*, which bears very young staminate inflorescences. In this stage the inflorescences seem unusual in being basically racemose rather than cymose, but the true structure cannot yet be determined. The above description of the staminate inflorescences is based on this single specimen.

1f. *Diospyros elliptica* var. *iridea* (Fosberg) A. C. Sm., comb. nov.

Maba aff. *elliptica* Christophersen in Bishop Mus. Bull. 128: 173. 1935.

Diospyros ellipticifolia var. *iridea* Fosberg in Bull. Torrey Bot. Club 65: 612. 1939; Bakh. in Bull. Jard. Bot. Buitenz. III. 15: 431, 437. 1941.

Diospyros major var. *iridea* Bakh. in Bull. Jard. Bot. Buitenz. III. 15: 431. 1941.

Tree to 6 m. high, the young parts golden-sericeous, the branchlets soon

glabrate, very sparsely lenticellate; petioles slender, 3–6 mm. long, narrowly winged nearly to base; leaf-blades chartaceous, nitid above, lanceolate, (6–) 8–11 cm. long, (1.7–) 2–3.5 cm. broad, attenuate toward base and there revolute, obtuse at apex; pistillate inflorescences laxly cymose, 10–25 mm. long including flowers, 3–25-flowered, the peduncle (to 4 mm. long) and branchlets slender, like the calyx densely sericeous, the flowers sessile at ends of ultimate branchlets; calyx narrowly campanulate, 2–3 mm. long, the lobes deltoid, about 1 mm. long, acute; corolla cylindric, 4–5 mm. long, 1–1.5 mm. broad, sericeous on the lobes without, otherwise glabrous, the lobes ovate, about 1.5 mm. long and broad, obtuse; ovary narrowly ovoid-ellipsoid, copiously sericeous, tapering to a short style; fruiting inflorescences reduced (by loss of lateral flowers) to a combined peduncle and branch axis 10–12 mm. long, this subflexuose and marked by scars or aborted branchlets, 1–1.5 mm. in diameter, sparsely strigose, glabrate, bearing a single terminal fruit; fruiting calyx glabrate, about 5 mm. long and 7–9 mm. in diameter, the lobes broadly deltoid, obtuse; fruit ellipsoid, 23–28 mm. long, 13–16 mm. broad, rounded at base, obtuse at apex.

TYPE LOCALITY: Near Tufutafoe, Savaii, Samoa; the type is *Christophersen 3310*, cited below.

DISTRIBUTION: On the basis of the few available collections this taxon occurs sparingly on Savaii and Tutuila. It is indicated as a tree to 6 m. high, growing in forest at about 10 m. elevation; the fruits are at first yellow, becoming red when ripe. Flowers have been obtained in November and fruits in September.

Samoa. SAVAII: Near Tufutafoe, Sept. 30, 1931, *Christophersen 2772* (A, BISH, K, NY, UC, US); same locality, Nov. 22, 1931, *Christophersen 3310* (BISH holotype; isotypes at K, NY, UC, US). TUTUILA, without further data: *U.S. Expl. Exped.* (GH, US 2607582).

This well marked taxon, correctly referred to *D. elliptica* (i.e. *D. ellipticifolia*) by Fosberg, is distinct from the other varieties of our area in its lanceolate, chartaceous, shining leaf-blades, its comparatively elongate pistillate and fruiting inflorescences, and its large fruits. Although Fosberg mentions staminate flowers, a dissection indicates that the type bears pistillate inflorescences. The other originally cited collection, according to Christophersen's notes, had been obtained earlier in fruiting condition from the same tree as the type. The cited Exploring Expedition collection is indicated as from Tutuila and also bears pistillate inflorescences; it had been recognized by Gray as a variety of *Maba elliptica*, but the varietal epithet was not published.

1g. *Diospyros elliptica* var. *opaca* A. C. Sm., var. nov.

Arbor 2–3 m. alta, partibus novellis pilis 0.3–1 mm. longis copiose brunneo-strigosis, ramulis foliisque demum glabratis sed indumento costae pagina inferiore interdum persistenter strigoso-hispidulo, ramulis teretibus

fusco-cinereis saepe manifeste lenticellatis; petiolis crassis 2–4 mm. longis, laminis coriaceis utrinque opacis supra saepe impresso-glanduloso-punctatis, lanceolatis, (6–) 8–11 cm. longis, 1.8–2.5 cm. latis, basim versus angustatis et in petiolum decurrentibus, apicem subacutum angustatis, margine incrassatis et valde recurvatis, costa supra plana subtus prominente, nervis secundariis utrinsecus 12–20 et rete venularum supra immersis subtus prominulis; inflorescentiis ♀ reducto-cymosis, axe cylindrico ad 4 mm. longo strigoso-hispidulo cum cicatricibus lateralibus 2 vel 3 vel e basi 2–4-ramuloso, floribus maturitate plerumque 1 vel 2; calyce urceolato ad 3 mm. longo et 2.5 mm. diametro ut pedunculo extus piloso, intus glabro, profunde 3-lobato, lobis ovatis; corolla cylindrico-urceolata maturitate ad 3 mm. longa extus copiose sericea, lobis ovatis 1.5–2 mm. longis et 1.5 mm. latis; ovario ovoideo parce strigoso in stylum brevem angustato; inflorescentiae sub fructu axe cylindrico 4–6 mm. longo cum cicatricibus lateralibus plerumque manifestis interdum e basi 2-ramuloso et calyce saepe subpersistenter strigosis demum glabratis, fructibus 1 vel 2; calyce sub fructu coriaceo campanulato vel subrotato 3–4 mm. longo 7–8 mm. diametro, lobis late ovatis circiter 2×4 mm. obtusis; fructu ovoideo, 13–16 mm. longo, 8–10 mm. lato, basi rotundato, apice obtuso, mox glabrato, seminibus ad 12 mm. longis.

TYPE LOCALITY: Serua Province, Viti Levu, Fiji; the type is *Fiji Dept. Agr.* 14883.

DISTRIBUTION: Known only from the type collection, indicated as a small tree 2–3 m. high growing in forest; the fruit is green, becoming yellow to dark red.

Fiji. VITI LEVU: SERUA: Bank of upper Navua River, Apr. 22, 1966, *Fiji Dept. Agr.* (coll. *D. Koroiveibau & I. Qoro*) 14883 (BISH holotype; isotypes at MASS, SUVA).

Although known from a single collection, this taxon seems definitely to fall into *D. elliptica*, but it is not close to other Fijian varieties. It is more suggestive of the Samoan var. *iridea*, with which it closely agrees in leaf-shape. However, var. *opaca* is well characterized by its short, unwinged petioles, its comparatively thick and dull leaf-blades with subpersistent indument, its shorter fruiting inflorescences, and its substantially smaller fruits.

2. *Diospyros ferrea* (Willd.) Bakh. in Gard. Bull. Straits Settlement. 7: 162. 1933, in Bull. Jard. Bot. Buitenz. III. 15: 50. 1938, in op. cit. III. 15: 431, p. p. 1941.

Ehretia ferrea Willd. Phytographia 4. t. 2, fig. 2. 1794.

Tree 2–15 m. high, the young parts strigose, the branchlets and foliage soon glabrate; petioles in our varieties not exceeding 5 mm. in length; leaf-blades coriaceous to chartaceous, in our varieties not exceeding 21×8 cm. and rarely more than 12×5.5 cm.; pistillate inflorescences composed of

a pulvinate or cylindric peduncle usually no more than 1 mm. long and usually bearing a single sessile flower subtended by 2 bracts; staminate inflorescences similar or reduced-cymose, rarely 2- or 3-branched, the branchlets then not more than 1 mm. long and each 1-flowered; calyx cupuliform to campanulate, comparatively small, at anthesis to 3.5 mm. in length and 4 mm. in diameter, the lobes 3, ovate to deltoid; corolla usually urceolate to campanulate-infundibular, at anthesis 4.5–5.5 mm. long, 3- or occasionally 4-lobed, sericeous without, glabrous within; staminate flowers with 6–10 stamens, these sometimes more or rarely 3 (but not so noted in our area); pistillate flowers with an ovoid to globose, strigose or sericeous ovary, the locules usually 3 (sometimes 2 or 4), each with 2 ovules; fruiting inflorescences simple, composed of a stout pulvinate-cylindric axis 0.5–3 mm. long, this without perceptible lateral scars and with a solitary terminal fruit; fruiting calyx sessile, broadly campanulate or rotate, not exceeding 4 mm. in length and 8 mm. in diameter, 3-lobed; fruits in our varieties not exceeding 20×15 mm., the seeds 1–3 (or to 6) maturing, black, triquetrous or semi-ellipsoid or oblong-ellipsoid.

In the inclusive sense and under various trinomials *D. ferrea* has been accredited with a wide distribution, extending at least from Malesia into Polynesia and Hawaii. However, as here circumscribed the species does not occur in Tonga or Samoa; material from those archipelagos so identified is better referred to *D. elliptica*.

With the removal of certain western Polynesian taxa that have sometimes been referred to an extended concept of *D. ferrea* (i. e. the taxa in this paper discussed as *D. elliptica* var. *savaiensis*, *D. major*, and *D. christophersenii*), it appears that true *D. ferrea* occurs within our area only in Fiji. Even here it is less complex and diverse than the related *D. elliptica*, being represented by three varieties as noted below. Nomenclatural complications have been caused by misidentifications and by disagreement as to the limits of taxa. An extended consideration of the trinomial *Diospyros ferrea* var. *glabrescens* (Seem.) P. S. Green is required.

Green's trinomial is based on *Maba elliptica* var. *glabrescens* Seem., which appears to me to be a provisional name under the definition of Art. 34 (Internat. Code Bot. Nomencl. 1966). Seemann's entire entry is here-with quoted:

"My nos. 295, 296, and 297, and Storck's n. 898, might be distinguished as a variety *glabrescens* of *M. elliptica*, as the nascent branches very quickly become glabrous."

Use of the word "might" seems to indicate that Seemann did not accept this trinomial, but merely proposed it in anticipation of the future acceptance of the group concerned. In his prior discussion of *M. elliptica* as a species he had listed the same four numbers, pointing out that *M. elliptica* had also been collected in the Tongan Islands, Isle of Pines, and New Caledonia.

In such marginal cases, when it is not entirely clear whether an author was actually "accepting" a name in the nomenclatural sense, it seems ad-

visible to consider his method of working and publishing. For his period Seemann was a meticulous botanist, and he leaves no doubt in the reader's mind when he wishes to "accept" a taxon. Seemann seems not to have made much use of the rank of "variety" in *Flora Vitiensis*, but nevertheless one finds some 30 or 40 instances in which varietal combinations are accepted; these trinomials are invariably followed by Latin descriptions or diagnoses and by the unequivocal citation of specimens. Most such varieties are those of prior authors but for an example of Seemann's treatment of one of his own new varieties, the reader is referred to *Hibiscus tiliaceus* var. *purpurascens* (page 18). In view of the uniformly meticulous presentation of "accepted" varieties in *Flora Vitiensis*, one may regard the casual note on *Maba elliptica* var. *glabrescens* as provisional and not as a nomenclaturally acceptable proposal of a trinomial. In this interpretation Green's trinomial and also his quadriminomial (f. *glabrescens* and f. *impressa*) are to be rejected as illegitimate under the provisions of Art. 63.

Among the specimens cited by Seemann in the above quotation, *Storck 898* has been indicated by Green as the lectotype and may therefore be taken as the source of the name *Maba elliptica* var. *glabrescens*, regardless of the provisional status of that name. This specimen falls into var. *phlebodes* of the present treatment. The other three numbers cited by Seemann, although "paratypes," have no bearing on the disposition of the name. Two of these numbers, *Seemann 296* and *297*, also fall into var. *phlebodes*; the third, *Seemann 295*, falls into var. *gillespiei*. It must be noted that Green equated *Storck 898* with *D. ferrea* var. *subimpressa* Fosberg, typified by *Gillespie 2324*. However, Green did not examine the latter collection but based his concept of var. *subimpressa* on *Degener & Ordonez 13634* and *14196*. These latter collections indeed agree with *Storck 898* and are here referred to var. *phlebodes*. My proposed reduction of var. *subimpressa* to var. *gillespiei* is discussed under the latter.

KEY TO VARIETIES

- Peduncle (or peduncle-branchlet axis) of fruiting inflorescences 0.5–3 mm. long, the fruiting calyx soon glabrate on both surfaces, the lobes not reflexed, the fruit closely strigose and very early glabrate; petioles 1–5 mm. long; leaf-blades with inconspicuous and often immersed venation, the lowermost secondary nerves not conspicuously ascending.
- Petioles 1–3 mm. long; leaf-blades coriaceous, elliptic to oblong-elliptic, about twice as long as broad, obtuse at base, obtuse to rounded at apex. 2a. var. *gillespiei*.
- Petioles 2–5 mm. long, conspicuously winged distally; leaf-blades thin-coriaceous or chartaceous, lanceolate or oblong-lanceolate, about three times as long as broad, narrowed to a subacute base and long-decurrent on the petiole and there conspicuously revolute, narrowed to an obtusely acuminate or cuspidate apex. 2b. var. *nandarivatensis*.
- Peduncle of fruiting inflorescences pulvinate-cylindric, less than 1 mm. long, the fruiting calyx copiously strigose without and persistently densely sericeous within, the lobes spreading or reflexed, the fruit copiously and subpersistently sericeous with hairs 0.3–1 mm. long; petioles inconspicuous, essen-

tially none or to 2 mm. long; leaf-blades with conspicuous and often prominulous venation, the lowermost 2 or 3 secondary nerves sharply ascending from near base of blade or from petiole. 2c. var. *phlebodes*.

- 2a. *Diospyros ferrea* var. *gillespiei* Fosberg in Bull. Torrey Bot. Club 65: 610. 1939; Bakh. in Bull. Jard. Bot. Buitenz. III. 15: 435, 441. 1941; J. W. Parham, Pl. Fiji Isl. 160. 1964.

Diospyros ferrea var. *subimpressa* Fosberg in Bull. Torrey Bot. Club 65: 611. 1939; J. W. Parham, Pl. Fiji Isl. 160. 1964.

Diospyros ferrea var. *gillespiei* f. *impressa* Bakh. in Bull. Jard. Bot. Buitenz. III. 15: 435, *nomen illegit.* 1941.

Diospyros ferrea var. *gillespiei* f. *subimpressa* Bakh. in Bull. Jard. Bot. Buitenz. III. 15: 435. 1941.

Diospyros ferrea var. *glabrescens* f. *impressa* Bakh. ex P. S. Green in Kew Bull. 23: 341, *nomen illegit.* 1969.

Tree 2–15 m. high, the young parts inconspicuously brown-strigose with hairs 0.2–0.4 mm. long, the branchlets slender, cinereous, conspicuously lenticellate; petioles semiterete or shallowly canaliculate, 1–3 mm. long; leaf-blades coriaceous, elliptic to oblong-elliptic, (3–) 3.5–12 (–21) cm. long, (1.2–) 1.5–5 (–8) cm. broad, obtuse at base and decurrent on the petiole, obtuse or obtusely cuspidate to rounded or faintly emarginate at apex, thickened and slightly revolute at margin, the costa depressed or impressed above, prominent beneath, the other venation immersed or the secondaries slightly impressed above; pistillate inflorescences axillary, simple (rarely minutely branched and with second or third soon caducous flowers), the peduncle 0.5–1 (–3) mm. long and 0.5–1 mm. in diameter, glabrate, the bracts ovate-oblong, about 1.5 mm. long, obtuse; calyx at anthesis 3–3.5 mm. long, sparsely strigose without, closely sericeous within; corolla urceolate, at anthesis 5–5.5 mm. long, the lobes ovate-oblong, obtuse, 2.5–3 mm. long; ovary ovoid, closely strigose; fruiting inflorescences composed of a peduncle 0.5–2 (–3) mm. long and 1.5–2 mm. in diameter, glabrate, slightly swollen at apex; fruiting calyx 3–4 mm. long, 5–8 mm. in diameter, soon glabrate on both surfaces, the lobes broadly ovate, rounded or obtuse; fruit ellipsoid to oblong-ellipsoid, sometimes slightly curved, 13–20 mm. long, 8–15 mm. broad, rounded at base and apex, soon glabrate; seeds 12–15 mm. long.

TYPE LOCALITY: Naitasiri Province, Viti Levu, Fiji; the type is *Gillespie* 2146, cited below. The type of *D. ferrea* var. *subimpressa*, here reduced to synonymy, is *Gillespie* 2324, also cited below, from Rewa Province, Viti Levu.

DISTRIBUTION: The variety is endemic to Fiji and is thus far known from the islands of Viti Levu, Kandavu, Ovalau, and Vanua Levu, where it has been recorded as an often slender tree 2–15 m. high; it occurs in open or dense forest or in woods at altitudes of 15–960 m. Flowering specimens seem infrequently collected and have been noted only in November, but fruiting material has been obtained between April and November; the fruits are yellow to orange or red.

LOCAL NAMES: Recorded only once each are the names *mathendre* (Smith 7169) and *mamba* (Fiji Dept. Agr. 791); the latter is more or less generic in Fiji.

Fiji. VITI LEVU: MBA: Mountains nears Lautoka, *Greenwood* 200 (K). SERUA: Near summit of Mt. Tikituru, *Fiji Dept. Agr.* 14481 (BISH, SUVA). NAMOSTI: Hills north of Wainavindrau Creek, *Smith* 8443 (BISH, GH, K, SUVA, UC, US); summit of Mt. Nambui, *Fiji Dept. Agr.* 14549 (BISH, SUVA); Nakavu, on Navua River, *Horne* 823 (K). NAITASIRI: Nanggarathangithangi, Mendrausuthu Range, *Fiji Dept. Agr.* 15031 (BISH, SUVA); Waindrandra Creek, *Fiji Dept. Agr.* 791 (A, SUVA); vicinity of Tamavua, *Gillespie* 2450 (BISH, NY); beyond Tamavua Village, alt. 150 m., Aug. 9, 1927, *Gillespie* 2146 (BISH holotype; isotypes at A, US). TAILEVU: Hills east of Wainimbuka River, vicinity of Ndakuivuna, *Smith* 7169 (BISH, GH, K, US). REWA: Nggoya Forest Reserve, *Fiji Dept. For.* 475 (SUVA); Mt. Korombamba, Aug. 23, 1927, *Gillespie* 2324 (BISH holotype of *D. ferrea* var. *subimpressa*); same locality, *Webster & Hildreth* 14045 (DAV, MASS), *Fiji Dept. Agr.* 17368 (A, MASS, NY, SUVA). KANDAVU: Hills above Namalata and Ngaloa Bays, *Smith* 126 (BISH, GH, K, NY, UC, US). OVALAU: Hills west of Lovoni Valley, on ridge south of Mt. Korolevu, *Smith* 7644 (BISH, GH, K, SUVA, UC, US); Mt. Ndelaiovalau, east of Lovoni Valley, *Fiji Dept. Agr.* 14501 (BISH, SUVA). VANUA LEVU: MATHUATA: Southern slopes of Mt. Numbuiloa, east of Lambasa, *Smith* 6367 (A, BISH, K, US). FIJI, without further locality, *Seemann* 295 (GH, K).

I have found no possible way to maintain Fosberg's two varietal taxa even as forms; the type specimens are scarcely distinguishable. Of var. *subimpressa* Fosberg notes: "Very close to var. *gillespiei*, differing chiefly in the shape of the fruit and in the less conspicuously impressed veins." In fact, however, some of the fruits on the two types are practically indistinguishable. The secondary nerves in var. *gillespiei* are more sharply impressed above, and in general the leaf-blades are more coriaceous and with more immersed reticulation, but these characters lose significance when other representatives of the Fijian population are examined.

In first combining the two varieties and reducing them to forms, Bakhui-zen (2: 435) used the varietal epithet *gillespiei* and must therefore be followed. His type form of this variety was newly named "*f. impressa*," an inadmissible procedure.

- 2b. *Diospyros ferrea* var. *nandarivatensis* (Gillespie) Fosberg in Bull. Torrey Bot. Club 65: 610. 1939, in op. cit. 67: 417. 1940; Bakh. in Bull. Jard. Bot. Buitenz. III. 15: 435, 441. 1941; J. W. Parham, Pl. Fiji Isl. 160. fig. 61, B (err. legend as A). 1964.

Maba nandarivatensis Gillespie in Bishop Mus. Bull. 74: 13. fig. 15. 1930.

Slender tree 3–8 m. high, the young parts inconspicuously strigose with hairs 0.2–0.5 mm. long, the branchlets slender, fusco-cinereous, inconspicuously or obviously lenticellate; petioles slender, semiterete, narrowly winged distally, 2–5 mm. long; leaf-blades thin-coriaceous or chartaceous, lanceolate or oblong-lanceolate, (3–) 4–9 cm. long, (1–) 1.5–3 cm. broad,

narrowed to a subacute base and long-decurrent on the petiole and there conspicuously revolute, narrowed to an obtusely acuminate or cuspidate apex, slightly thickened and often undulate at margin, the costa impressed above, prominent beneath, the secondaries numerous, spreading, with the veinlets subimmersed or prominulous beneath; staminate inflorescences reduced-cymose, the peduncle simple, slender, about 0.5 mm. long, sparsely strigose, with 2 or 3 minute branchlets at apex, these 0.5–1 mm. long, the bracts oblong, 0.8–1.5 mm. long, glabrate; flowers usually 2 or 3; calyx in bud ovoid, about 3 mm. long, obscurely strigillose without; corolla urceolate in bud, copiously sericeous without; stamens 9 or 10, glabrous, the ovary-rudiment minute, hispidulous; pistillate inflorescences simple, the peduncle about 0.5 mm. long, or perhaps sometimes branched like the staminate inflorescences, the calyx and corolla in bud as in the staminate flower; fruiting inflorescences simple, the peduncle-branchlet axis 0.5–3 mm. long and swollen at apex, soon glabrate; fruiting calyx 2–4 mm. long, 4–8 mm. in diameter, soon glabrate on both surfaces, the lobes broadly ovate-deltoid; fruit ellipsoid or obovoid to oblong-ellipsoid, 11–20 mm. long, 7–11 mm. broad, rounded at base and apex, soon glabrate; seeds 12–13 mm. long.

TYPE LOCALITY: Nandarivatu, Mba Province, Viti Levu, Fiji; the type is *Gillespie* 3848, cited below.

DISTRIBUTION: Endemic to Fiji, and thus far known only from upland Viti Levu at altitudes of 725–1050 m. It is noted as an often slender tree 4–8 m. high, occurring in dense forest; the fruits are yellow to red. Seasons do not appear marked, as flowers have been obtained in July and November and fruits in various months.

LOCAL NAMES: Recorded only once each are the names *vaundrai ni singa* (*Gillespie* 3848), *mbama* (*Degener* 14434), and *mbamathendru* (*Smith* 5564).

Fiji. VITI LEVU: MBA: Slopes and summit of Mt. Ndelaioö, on escarpment west of Nandarivatu, *Smith* 5074 (A, BISH, K, US); Nandarivatu, Nov. 17, 1927, *Gillespie* 3848 (BISH holotype; isotype at UC); vicinity of Nandarivatu, *Parks* 20602 (BISH, UC, US), *Gillespie* 3764 (BISH, NY, UC); Mt. Lomalangi (Nanggara-nambuluta), *Fiji Dept. Agr.* 14447 (BISH, SUVA); Mt. Matomba, Nandala, *Degener* 14434 (A, K, NY, US). NANDRONGA & NAVOSA: Northern portion of Rairaimatuku Plateau, between Nandrau and Nanga, *Smith* 5564 (A, BISH, K, US).

These first two Fijian varieties of *D. ferrea* are only questionably separable; no differences in inflorescences or fruits are of consequence, and the foliage differences pointed out in my key are far from strong. In general, however, the few specimens listed as var. *nandarivatensis* are distinguishable in their thinner, narrower leaf-blades, which are conspicuously revolute proximally and long-decurrent on the petiole, and more gradually narrowed apically. However, some of these distinctions are weakened by the two Ovalau collections cited under var. *gillespiei*.

It is interesting to look into the past interpretations of the present taxon. In proposing it as a species, *Maba nandarivatensis*, Gillespie cited his no. 3848 (type) and 3764 and Parks 20602; all come from Nandarivatu and clearly belong together. In 1939 Fosberg cited the type, three Vanua Levu collections of Smith (544, 1564, 1982) which actually represent *D. elliptica* var. *fijiensis*, and a Kandavu specimen (Smith 126) which I refer to *D. ferrea* var. *gillespiei*. In view of this mixture, it is not surprising that Fosberg remarked that this taxon seemed to connect *D. ferrea* and *D. ellipticifolia*. The Micronesian specimens cited as *D. ferrea* var. *nandarivatensis* by Fosberg in 1939 and also later (4: 417) appear to have no close relationships to any of the Fijian varieties. Green (5: 342), in maintaining *D. ferrea* var. *nandarivatensis*, cited only the three Smith collections from Vanua Levu mentioned above, and consequently he was not impressed by the close similarity of Gillespie's taxon to the other two Fijian varieties proposed by Fosberg.

It is quite clear that much of the Fijian material of *D. ferrea* (once the components really belonging to *D. elliptica* are removed) is so closely similar that vars. *gillespiei* and *nandarivatensis* are with difficulty maintainable. However, a third variety, the following, appears to be much stronger.

2c. *Diospyros ferrea* var. *phlebodes* A. C. Sm., var. nov.

Maba elliptica sensu Seem. Fl. Vit. 152, p. p. 1866; non J. R. & G. Forst.

Maba elliptica var. *glabrescens* Seem. Fl. Vit. 152, *nomen provis.* 1866; Hiern in Trans. Cambr. Philos. Soc. 12: 118, *nomen.* 1873.

Maba buxifolia sensu A. C. Sm. in Bishop Mus. Bull. 141: 121, p. p. 1936; non Pers.

Diospyros ferrea var. *glabrescens* P. S. Green in Kew Bull. 23: 341, *nomen illegit.* 1969.

Diospyros ferrea var. *glabrescens* f. *glabrescens* P. S. Green in Kew Bull. 23: 341, *nomen illegit.* 1969.

Arbor 4–8 m. alta, partibus novellis pilis pallidis vel fuscis 0.2–0.5 mm. longis strigosis, ramulis gracilibus saepe conspicue lenticellatis; petiolis complanatis crassis rugulosis subnullis vel ad 2 mm. longis, laminis subcoriaceis, ovatis vel oblongo-ellipticis vel oblongo-lanceolatis, (3–) 4–10 cm. longis, (1.5–) 2–5.5 cm. latis, basi rotundatis vel obtusis abrupte angustatis et in petiolum decurrentibus, apice obtusis vel obtuse cuspidatis margine incrassatis saepe pallidis, costa supra plana vel canaliculata subtus elevata, nervis secundariis utrinsecus 4–9, inferioribus 2 vel 3 basim versus vel e petiolo valde adscendentibus cum rete venularum utrinsecus conspicuis et subplanis vel prominulis; inflorescentiae ♀ pedunculo 0.2–0.8 mm. longo ad 1 mm. diametro apice incrassato, bracteis oblongo-ovatis 1.2–1.8 mm. longis ad 3 mm. latis apice rotundatis mox glabratibus et caducis; calyce cupuliformi ad 3 mm. longo et 4 mm. diametro utrinque pilis ad 0.2 mm. longis copiose sericeo, lobis late ovatis circiter 1 × 3 mm. apice obtusis; corolla campanulato-infundibulari 4.5–5 mm. longa ad 3

mm. diametro extus superne copiose sericea intus glabra, lobis 3 vel 4 ovatis subacutis circiter 2.5×2 mm.; ovario ovoideo-globoso pilis pallidis 0.3–0.5 mm. longis copiose sericeo; inflorescentiae sub fructu pedunculo minus quam 1 mm. longo; calyce sub fructu 2–3 mm. longo 5–8 mm. diametro extus copiose strigoso intus pilis 0.3–0.5 mm. longis persistenter dense sericeo, lobis patentibus vel reflexis late ovatis ad 2×4 –5 mm. apice rotundatis; fructu subgloboso vel oblongo-ellipsoideo 8–13 mm. longo 6–13 mm. lato, basi rotundato, apice obtuso, pilis 0.3–1 mm. longis copiose et subpersistenter sericeo, seminibus 8–9 mm. longis.

TYPE LOCALITY: Nggalito Island, Malolo Group, Mamanuthas, Fiji; the type, *O. & I. Degener* 32224, cited below, is a specimen with good pistillate inflorescences as well as fruits.

DISTRIBUTION: The new variety, endemic to Fiji, is widely distributed within the group, often found in coastal areas or on smaller islands, where it occurs at altitudes from sea-level to 300 m. It has been noted as a sometimes spreading tree 4–8 m. high, in beach thickets, dry or dense forest, or on open hillsides; the fruit is yellow to pinkish yellow or red. No periodic flowering or fruiting season is apparent.

LOCAL NAMES: *Kaukauloa* (Fiji Dept. Agr. 13725) or *kauloa* (Tothill F436); both these names are more or less generic in Fiji.

Fiji. MAMANUTHAS (west of Viti Levu): MALOLO GROUP: Nggalito Island, in forest near coast, near sea-level, Feb. 7, 1969, *O. & I. Degener* 32224 (BISH holotype). VITI LEVU: MBA: North of Lomolomo, *Degener & Ordenez* 13634 (A, BISH, K, NY, UC, US). RA: Near Penang, *Greenwood* 761 (K); vicinity of Rewasa, near Vaileka, *Degener* 15496 (A, NY, US). MBENGGA: Ndakuimbengga, *Fiji Dept. Agr.* 13721 (BISH, K, SUVA); Lalati, *Fiji Dept. Agr.* 13725 (BISH, K, SUVA); Uthuinanggaratu, *Fiji Dept. Agr.* 2087 (A, SUVA). OVALAU: Waililevu, *Fiji Dept. Agr.* 17020 (BISH, K, SUVA). KORO: *Tothill* 577b (K). VANUA LEVU: MATHUATA: *Seemann* 297 (GH, K); Ndreketi River, *Fiji Dept. For.* 251 (BISH, MASS, SUVA); Nanduri, *Tothill* F436 (K); vicinity of Lambasa, *Greenwood* 565 (K). THAKAUNDROVE: Maravu, near Salt Lake, *Degener & Ordenez* 14196 (A, BISH, K, NY, UC, US). TAVEUNI: Vicinity of Somosomo, *Seemann* 296 (GH, K). MATUKU: On rocky shore, *Tothill* 577a (K); on summit ridge, *Bryan* 267 (BISH). KANATHEA: *Graeffe* 1364 (K). FIJI, without further locality: *U.S. Expl. Exped.* (US 653978), *Storck* 898 (source of the name *Maba elliptica* var. *glabrescens*, GH, K), *Horne* 390 (GH, K).

Of the components of *D. ferrea* in Fiji, the variety here described is the most distinct, differing from the only other two varieties that can be maintained, vars. *gillespiei* and *nandarivatensis*, in distinctive foliage and fruit characters as noted in my key. The new variety is curiously suggestive of the Samoan *D. elliptica* var. *savaiiensis*, although in inflorescence characters the latter cannot be placed with *D. ferrea*. Like *D. elliptica* var. *savaiiensis*, the new variety has its fruiting calyx persistently pilose and with reflexed lobes, its fruits also subpersistently pilose with unusually long hairs, and the lowermost secondary nerves of its leaf-blades

similarly sharply ascending. The two taxa differ not only in their inflorescence-type and in their fruiting peduncles, but obviously in the length of their petioles. Nevertheless, the occurrence of such similar general aspects in adjacent archipelagos indicates a complex and reticulate relationship among taxa of the *D. elliptica* — *D. ferrea* group.

Reasons for describing the present taxon as new, rather than accepting for it the varietal epithet *glabrescens*, were discussed above in my introductory comments on *D. ferrea*.

3. *Diospyros major* (Forst. f.) Bakh. in Bull. Jard. Bot. Buitenz. III. 15: 429. 1941.

Maba major Forst. f. Pl. Esculent. Ins. Oc. Austr. 54, "maior." 1786, Fl. Ins. Austr. Prodr. 92, "maior." 1786; A. DC. in DC. Prodr. 8: 242. 1844; Hiern in Trans. Cambr. Philos. Soc. 12: 125. 1873.

Maba andersonii Seem. Fl. Vit. 152, *nomen*. 1866.

Maba andersoni Soland. ex Hiern in Trans. Cambr. Philos. Soc. 12: 124. 1873.

Maba lateriflora Hiern ex Baker in Jour. Linn. Soc. Bot. 20: 366. 1883; Burkill in op. cit. 35: 45. 1901.

Ebenus andersoni Kuntze, Rev. Gen. Pl. 2: 408. 1891.

Diospyros lateriflora Bakh. in Bull. Jard. Bot. Buitenz. III. 15: 8. 1936; Fosberg in Bull. Torrey Bot. Club 65: 612. 1939, in op. cit. 67: 417. 1940; Yuncker in Bishop Mus. Bull. 220: 213. 1959; J. W. Parham, Pl. Fiji Isl. 160. 1964.

Maba globosa sensu A. C. Sm. in Bishop Mus. Bull. 141: 121, p. p. fig. 63, non sensu typi. 1936.

Diospyros ellipticifolia var. *major* Bakh. in Bull. Jard. Bot. Buitenz. III. 15: 431. 1941.

Diospyros major var. *andersoni* Bakh. in Bull. Jard. Bot. Buitenz. III. 15: 431. 1941.

Diospyros ferrea var. *lateriflora* Bakh. in Bull. Jard. Bot. Buitenz. III. 15: 435, 442. 1941.

Diospyros andersonii P. S. Green in Kew Bull. 23: 339. 1969.

Tree 3–15 m. high, or occasionally a shrub, the branchlets subterete, stout, distally 2–5 mm. in diameter, with projecting lenticels, glabrous except on strigose innovations; petioles 2–15 mm. long, stout, 1.5–3 mm. in diameter, subterete or shallowly canaliculate; leaf-blades coriaceous or subcoriaceous, oblong or elliptic to ovate-oblong, (4–) 7–21 cm. long, (2.5–) 4–11 cm. broad, narrowly subcordate or rounded to cuneate at base, obtuse or rounded at apex, the costa usually plane above and prominent beneath, the secondary nerves 6–13 per side, plane or slightly raised on both surfaces, the veinlet-reticulation often immersed, usually slightly raised on both surfaces; staminate inflorescences axillary or borne along branchlets, glomerulate, the peduncle woody, irregularly subglobose or short-cylindric, 1–3 mm. long, hispidulous-sericeous distally; flowers sessile, often congested, 3–5, bracteate, the bracts conspicuous, obovate, 6–8 mm. long, 4–6 mm. broad, obtuse at apex, copiously sericeous without, glabrous within, caducous; calyx cupuliform, 5–9 mm. long and in

apical diameter, copiously sericeous on both sides (except on tube within) with hairs 0.5–0.8 mm. long, the lobes 3, deltoid-ovate, 2–5 mm. long and broad, subacute; corolla cylindric-campanulate, at anthesis 14–15 mm. long and about 5 mm. in diameter at middle, copiously sericeous like the calyx without, glabrous within, the lobes 3, ovate-oblong, $5-6 \times 3-4$ mm., subacute; stamens 6–9, free or sometimes coherent at base, 6–7 mm. long, the filaments slender, glabrous, about 3 mm. long, the anthers 3–4 mm. long, the ovary rudimentary, with associated marginal hairs; pistillate inflorescences similar but with a solitary apical flower, the flowers similar to the staminate, the ovary sericeous, 3-locular, the locules 2-ovulate; fruiting inflorescences composed of a pulvinate-cylindric glomerule 1–3 mm. long and 2–3.5 mm. broad, often hispidulous and slightly swollen distally, sometimes borne on defoliate branchlets; fruiting calyx sessile, not conspicuously accrescent, coriaceous, 9–15 mm. in diameter, copiously strigose-hispidulous without and sericeous within, the lobes broadly ovate, $3-5 \times 5-8$ mm., rounded at apex; fruit solitary, ellipsoid or ovoid, at maturity 25–45 (–60) mm. long and 15–30 mm. broad, obtuse at base, apically subacute to base of the stylar remnant, closely pilose with copious short hairs and also hispidulous with stiff hairs 1–2 mm. long, eventually but tardily subglabrescent, the seeds oblong, triquetrous, 15–25 mm. long.

TYPE LOCALITY: Tonga. Mr. P. S. Green has kindly sought for an extant Forster type in the British Museum collections, but none has been disclosed. This is not surprising, since the description was based entirely on a fruit, or perhaps was even a second-hand description taken from Cook (Voyage to the Pacific Ocean, 393. 1784): “. . . a smaller tree, that bears a rounded oval nut, two inches long, with two or three triangular kernels, tough and insipid, called *mabba*, most frequently planted near their houses.” Forster’s original reference is here quoted in full:

“Huius fructus cum illo Mabae ellipticae nostrae in omnibus convenit, praeterquam quod triplo maior sit, bipollicaris scilicet, in loculamentis fovens nucleos triquetros, tenaces et insipidos, tamen inter edulia ab incolis usurpatos. Incolae insularum Tongatabu, Namoka, E-uwa, Hapa-i, et ceterarum quae ad archipelagum amicorum pertinent, hanc arborem teste Cookio in noviss. itin. tom. I. p. 393. circa tuguria plantare solent. Nobis non nisi drupa, ab incolis iisdem venum asportata innotuit, cui nomen *Maba* imposuerunt.”

In the absence of an extant type specimen, his description may be taken as the type (Internat. Code Bot. Nomencl. Art. 9, Note 1, 1966).

Two other epithets are involved in the synonymy of *D. major*. The type specimen of *Maba andersoni*, discussed by Green (5: 339), was collected by or for Capt. Cook (BM) on his third voyage, in Tonga.

In the original description of *Maba lateriflora*, Baker (on behalf of Hiern) cited three Horne collections from Fiji: 201 (Ovalau), *s.n.* (Rambi), and 1013 (Viti Levu). The Kew sheet of the last of these is an excellent fruiting specimen, which bears a handwritten note from Hiern to Baker; I designate this as the lectotype, although perhaps unnecessarily

since the name falls into synonymy, as discussed by Green (5: 330). Horne's field label for no. 1013 indicates "common in the province of Navosa," implying the Singatoka drainage; it was very probably obtained within the present Province of Nandronga & Navosa, but further placement seems impossible. A numbered Horne specimen from Rambi (473) was not listed by Baker. However, he did indicate as a possible representative of the species *Horne* 823 (Viti Levu: Namosi), which I now refer to *D. ferrea* var. *gillespiei*.

DISTRIBUTION: The species seems endemic in our area and is clearly indigenous in Fiji, Tonga, and the Horne and Wallis Islands. The only Samoan collection at hand, *Wilder* 401, taken from a small cultivated tree in Apia, is sterile, but Wilder's notes indicate the local name *mapa* and the fact that the fruit, said to measure 40×18 mm., is used for scenting oil. From the name it may be assumed that the species was brought to Samoa either from Tonga or the Horne or Wallis Islands.

The species has been noted as a tree 3–15 m. high, the trunk attaining a diameter of 35 cm. or perhaps more, growing in beach thickets or in various types of forest (dense, dry, or open) at altitudes of sea-level to 1130 m. It is sometimes cultivated in villages, presumably for its fruits. The flower-buds and corollas are white or cream-colored and sometimes purple-tinged, and the fruits are yellow to brownish. Throughout its range flowering and fruiting specimens may be found at practically any season.

LOCAL NAMES AND USES: In Fiji the following names, some of which are more or less generic, have been recorded: *kauloa*, *kaukauloa*, *mamba*, *mbamba*, *mbama*, and *mbuka ni singa*. In Tonga and the Horne and Wallis Islands the local name *mapa* seems universal and well known. Uses of the species are many. The hard timber is considered valuable and is often used in house-building. The fruits are widely used to scent oil, and the seeds are frequently noted as edible. In Tonga and the Horne and Wallis Islands the fruits are sometimes used in making leis. In one instance (recorded by Yen for Futuna) the fruits were noted as medicinal, used for infants' mouth infections.

Fiji. YASAWAS: WAYA ISLAND: Nangua, *St. John* 18167 (A, BISH, K, UC, US). VITI LEVU: MBA: Mountains near Lautoka, *Greenwood* 897 (A, K, NY, UC, US), 897A (A, BISH, K); Mt. Evans Range, *Greenwood* 1278 (BISH, K, NY, UC, US); Naloto Range, *Fiji Dept. Agr.* 14781 (BISH, SUVA); vicinity of Tumbenasolo, valley of Namosi Creek, *Smith* 4619 (A, BISH, K, US); Mt. Lomalangi (Nanggaranambuluta), *Gillespie* 3923 (BISH, UC), 4294 (BISH, K, UC, US); Nandala Valley, *Gillespie* 4266 (BISH). NANDRONGA & NAVOSA: *Horne* 1013 (K lectotype of *Maba lateriflora*; islectotype at GH). NAMOSI: Northern slopes of Korombasambasanga Range, in drainage of Wainavindrau Creek, *Smith* 8724 (BISH, GH, K, SUVA, UC, US); vicinity of Nanggarawai Village, *Gillespie* 3203 (BISH). RA: Vicinity of Rewasa, near Vaileka, *Degener* 15388 (A, BISH, K, NY, UC, US), 15415 (A), 15462 (A, NY, US). TAILEVU: Waikombulu Creek, *Berry* (*E. Damanu*) 295 (K, SUVA); Nakalawatha, *Fiji Dept. Agr.* 2677 (BISH, SUVA). REWA: Rewa delta, *Tothill* 373 (BISH, K). KANDAVU: Mt. Mbuke Levu, *Smith* 243 (BISH,

GH, K, NY, UC, US), *Fiji Dept. Agr.* 14918 (BISH, SUVA), 14919 (K, MASS, SUVA). OVALAU: Lovoni Valley, *Horne* 201 (GH, K); hills near Levuka, *Gillespie* 4416 (BISH, K, NY, UC). KORO: Main ridge, *Smith* 1045 (BISH, GH, K, NY, UC, US). NGAU: Shore of Herald Bay, vicinity of Sawaieke, *Smith* 7893 (BISH, GH, K, SUVA, UC, US). VANUA LEVU: MBUA: Koromba Forest, *Fiji Dept. Agr.* 15143 (MASS, SUVA). MATHUATA: Mt. Ndelaikoro, *Fiji Dept. Agr.* 13422 (BISH, K, SUVA); Mt. Numbuiloa, east of Lambasa, *Smith* 6358 (A, BISH, K, US), *Fiji Dept. Agr.* 14624 (BISH, K, MASS, SUVA). THAKAUNDROVE: Maravu, near Salt Lake, *Degener & Ordenez* 14208 (A, BISH, K, NY, UC, US). RAMBI: *Horne* (GH, K), 473 (GH, K). TAVEUNI: Vicinity of Wairiki, *Gillespie* 4751 (BISH, NY, UC); slopes of Mt. Manuka, east of Wairiki, *Smith* 8170 (BISH, K, SUVA, UC, US). KAMBARA: On limestone formation, *Smith* 1242 (BISH, GH, K, NY, UC, US). ONGEA NDRIKI: Interior forest, *Bryan* 405 (A, BISH, K). FIJI, without further locality: *Tothill* 374 (K), *Greenwood* 503 (K).

Horne Islands. FUTUNA: Vaisei, *Yen* 454 (BISH), *McKee* 19773 (BISH, P).

Wallis Islands. UVEA: Inland forest, *Burrows* W23 (BISH).

Tonga. VAVA'U: *Crosby* 96 (K). LIFUKA: Near southern end of island, *Yuncker* 15777 (BISH, US). TONGATAPU: Mua, *Setchell & Parks* 15266 (K, UC, US), 15624 (GH, K, UC, US); Ha'ake, *Setchell & Parks* 15349 (BISH, K, UC), 15520 (UC); below Niulei Village, south of Nuku'alofa, *Yuncker* 15236 (BISH, GH, US). 'EUA: Near center of island, *Yuncker* 15355 (BISH, US); Liku terrace, *Parks* 16291 (K, NY, UC, US). TONGA, without further locality: *McKern* 99 (BISH).

Samoa. UPOLU: Apia, cultivated, *Wilder* 401 (BISH).

The taxonomic position of *D. major* is certainly in Section MABA, but it is well differentiated from *D. elliptica* and *D. ferrea* on the basis of its comparatively robust habit and large flowers and fruits. Green (5: 340) correctly indicates that Bakhuizen's concept (2: 442) of *D. ferrea* var. *lateriflora* was too inclusive. Not only is the taxon quite distinct from *D. ferrea*, but from it must be excluded *Maba savaiiensis* Christophersen, a comparatively small-fruited taxon of a very different alliance, which I have discussed above as a well marked variety of *D. elliptica*.

Since in the present treatment the binomial *D. major* is used in place of the long-established *D. lateriflora* and the more recently proposed *D. andersonii*, for a species that is abundant and widespread in our area, a justification is required. The basionym of *D. major* is *Maba major* Forst. f., a binomial based on a fruit observed in Tonga. Forster's description may have called on the brief discussion of "mabba" by Captain Cook, quoted above in my consideration of the types of the three competing names. It appears that no specimen was kept to serve as a type for *Maba major*, but this does not detract from the nomenclatural validity of Forster's name. Three taxa of *Diospyros* are known to occur in Tonga, and it is important to decide which one of these was the basis of Forster's and Cook's descriptions.

Diospyros samoensis has a globose to oblate fruit, up to 30×30 mm., and the local names in Tonga are *tutuna*, *pekepeka*, *kolivao*, and *kakala'uli*. No notes indicate the edibility of the seed. This species may safely be discarded as a possible candidate for *Maba major*.

Diospyros elliptica var. *elliptica* has an ellipsoid to ovoid fruit no larger

than 20×12 mm., and the modern local name in Tonga is *kanume* throughout. A few specimens do indicate that the seed is edible. According to J. R. & G. Forster's original description the native name in Tonga was *maba*; this could have been used as a generic name, or in recording it the Forsters could have had mixed recollections.

There remains the taxon now passing as *D. andersonii*, which has an ellipsoid to ovoid fruit sometimes as large as 60×30 mm., and the local name is consistently *mapa* in Tonga, the Horne and Wallis Islands, and Samoa (in cultivation). In Fiji it is often called *mamba* and is sometimes cultivated in villages. Some modern collections note that the seed is edible.

The above data, in reference to the common name, the size of the fruit, and the occasional cultivation, seem to exclude any taxon except *D. andersonii*, which agrees perfectly with the comments provided by both Forster and Cook. In my opinion *Maba major* can no longer be considered a *nomen dubium*, as suggested by Bakhuizen (2: 429), and must be accepted as the oldest basionym for the now well known species *D. andersonii*. It must be admitted that Bakhuizen (2) covered the nomenclatural possibilities for this taxon quite thoroughly. After proposing the combination *D. lateriflora* in 1936, he suggested *D. major* in 1941 with three alternatives: *D. ellipticifolia* var. *major*, *D. major* var. *andersoni*, and *D. ferrea* var. *lateriflora*. These names, which create an involved synonymy, are certainly alternative names in the sense of Art. 34 (Internat. Code Bot. Nomencl. 1966), but since the publication was prior to 1 Jan. 1953 they must be considered valid.

The occasional spelling of the epithet as "*maior*", as by Forster, is corrected to *major* in accord with Art. 73, Note 6, of the Code.

4. *Diospyros christophersenii* Fosberg in Bull. Torrey Bot. Club 65: 613. 1939.

Maba samoensis Hiern in Jour. Bot. 15: 99. pl. 186. 1877; Christophersen in Bishop Mus. Bull. 128: 174. 1935; non *Diospyros samoensis* A. Gray.

Diospyros ferrea var. *samoensis* Bakh. in Bull. Jard. Bot. Buitenz. III. 15: 435, 443. 1941.

Tree at least to 6 m. high, the branchlets dark-cinereous, comparatively slender, distally 1.5–3 mm. in diameter, conspicuously lenticellate, glabrous; petioles robust, semiterete, 3–7 mm. long; leaf-blades subcoriaceous, immersed-glandular-punctate, ovate- to oblong-elliptic, 10–21 cm. long, 3.5–8.5 cm. broad, obtuse to subacute at base, narrowed to an obtuse or emarginate apex, the costa sharply impressed above, prominent beneath, the secondary nerves 12–22 per side, spreading, curved, with the veinlet-reticulation raised or prominulous on both sides or plane above; flowering inflorescences not known; fruiting inflorescences axillary or borne on defoliate branchlets, composed of a stout cylindric peduncle 3–6 mm. long and 2–3 mm. in diameter, this with 2 or 3 lateral bract-scars indicating fallen flowers, subpersistently strigose with pale brown hairs 0.2–0.5 mm. long, slightly swollen at apex; fruiting calyx sessile, solitary,

terminal, not conspicuously accrescent, rotate, 9–12 mm. in diameter, strigose without and glabrescent, copiously sericeous within with hairs 0.2–0.5 mm. long, the lobes deltoid, reflexed or spreading, $4-5 \times 7-8$ mm., obtuse at apex; fruit solitary, oblong-ellipsoid to subfusiform, at maturity 35–40 mm. long and 15–22 mm. broad, often curved, truncate-rounded at base, apically subacute to the styler base, sparsely strigose with hairs 0.2–0.5 mm. long (but without longer hispidulous indument), tardily glabrate, 2- or 3-locular, the seeds fusiform, triquetrous, 25–33 mm. long.

TYPE LOCALITY: Samoa; the type is *Whitmee* 3, cited below.

DISTRIBUTION: Endemic to Samoa and apparently rare, known with certainty only from Savaii, where Christophersen noted it as a tree 6 m. high growing in wet forest at about 600 m. altitude; his specimen, collected in November, bears fruits that were yellow to slightly orange-yellow.

Samoa. SAVAII: Siuvao-Auala, *Christophersen* 3379 (BISH, K, NY, UC, US). SAMOA, without further locality: *Whitmee* 3 (K holotype).

As indicated by Bakhuizen (2: 435, 442–444), *Maba samoensis* is allied to his concept of *D. ferrea* var. *lateriflora*, but both taxa merit specific status. Hiern's epithet not being available in *Diospyros*, Fosberg correctly proposed a new name. *Diospyros christophersenii* appears to be the Samoan ally of the Fijian-Tongan *D. major*, differing primarily in the indument of its fruit, but also in its comparatively slender branchlets, the more numerous secondary nerves of its leaf-blades, and its slightly longer fruiting peduncles.

Diospyros L. subgen. *Maba* (J. R. & G. Forst.) Bakh. sect. *Rhipidostigma* (Hassk.) Bakh. in Bull. Jard. Bot. Buitenz. III. 15: 370, 382. 1941.

Rhipidostigma Hassk. Retzia 1: 103. 1855.

Maba sect. *Rhipidostigma* Hiern in Trans. Cambr. Philos. Soc. 12: 107, 110. 1873.

Diospyros subgen. *Maba* sect. *Hasseltia* Bakh. in Bull. Jard. Bot. Buitenz. III. 15: 9, 10. 1936, 78. 1938.

According to the treatments of Bakhuizen, Sect. RHIPIDOSTIGMA includes four species distributed from southeastern Asia through Malesia to Queensland and New Caledonia; the easternmost of these species has recently been discovered in Fiji.

5. *Diospyros fasciculosa* (F. v. Muell.) F. v. Muell. Austral. Veg. in Intercolon. Exh. Ess. 1866–67: 35. 1867; Bakh. in Bull. Jard. Bot. Buitenz. III. 15: 78. 1938; P. S. Green in Kew Bull. 23: 342. 1969. *Maba fasciculosa* F. v. Muell. Fragm. Phytogr. Austral. 5: 163. 1866; Benth. Fl. Austral. 4: 290. 1868; Hiern in Trans. Cambr. Philos. Soc. 12: 135. 1873.
- Ebenus fasciculosa* Kuntze, Rev. Gen. Pl. 2: 408. 1891.

Tree to 20 m. high, the young parts minutely strigose, the branchlets and foliage soon glabrate, the branchlets slender, obviously lenticellate; petioles semiterete, 5–12 mm. long; leaf-blades subcoriaceous or chartaceous, ovate- or elliptic- or lanceolate-oblong, 5–20 cm. long, 1.5–7 cm. broad, cuneate to subrounded at base and short-decurrent on the petiole, obtuse or obtusely cuspidate at apex, narrowly reflexed at margin, the lateral nerves 7–10 per side, the veinlet-reticulation subimmersed or prominulous beneath; inflorescences axillary, dichotomo-cymose, the staminate 10–25-flowered, branched from base, the branchlets and bracts (ovate, 0.5–1 mm. long) minutely hirtellous-strigose, the pistillate inflorescences more compact, 3- to many-flowered; flowers sessile at apices of ultimate branchlets, the calyx cupuliform or campanulate, 1.5–3 mm. in diameter, minutely strigose and glabrate without, glabrous within, shortly 3-lobed, the lobes obtuse or rounded; corolla campanulate-cylindric, 4–6 mm. long, minutely strigose without and glabrous within, 3-lobed, the lobes ovate, 2–3 mm. long, obtuse; stamens 8–26, slightly unequal, 1.5–2.5 mm. long, the filaments slender, minutely hispidulous, the anthers 1–1.5 mm. long; pistillate flowers essentially similar but sometimes apparently with 4 calyx-lobes, perhaps slightly larger than the staminate, the ovary ovoid, glabrous, 6-locular, each locule 1-ovulate; fruiting calyx cupuliform or campanulate, accrescent, 10–17 mm. in diameter, glabrate, 3- or 4-lobed; fruits subglobose, glabrous, nitid, 7–20 mm. in diameter.

TYPE LOCALITY: In the original publication Mueller lists four specimens from Queensland: Tweed River, *C. Moore*; Brisbane River, *F. v. Mueller*, *W. Hill*; Rockhampton, *Thozet*. The original material is probably deposited in Mueller's herbarium at Melbourne, but apparently some of it is duplicated at Kew. Neither Bentham (1868), Hiern (1873), nor Bakhuizen (1938) have specified a lectotype, but I have not checked all the many other mentions of the species to see if this has been done by another author.

DISTRIBUTION: Bakhuizen (2) records the species from Java, Queensland, and New Caledonia; its occurrence in Fiji was first noted by Green (5). The single available Fijian collection was taken from a tree 12–13 m. high, growing on the edge of forest near sea-level; its white staminate flowers were obtained in January.

Fiji. VATULELE: Nawai, *Fiji Dept. Agr.* 13801 (BISH, K, MASS, SUVA).

The interesting discovery cited above, as discussed by Green, extends the range of Section RHIPIDOSTIGMA eastward to Fiji. The species is quite unlike any other species of *Diospyros* known from our area, and its occurrence on the small island Vatulele, off the south coast of Viti Levu, is puzzling. My description is abstracted from Bakhuizen's, with the addition of data from the Fijian collection, which bears staminate inflorescences.

Diospyros L. subgen. **Diospyros**.

The subgenus that includes *D. lotus* L. (Sp. Pl. 1057. 1753) must bear the epithet *Diospyros*. In Bakhuizen's treatment, the species of this alliance in our area fall into *Diospyros* subgen. **EUDIOSPYROS** (L.) Bakh. sect. **EBENUS** Bakh. (in Bull. Jard. Bot. Buitenz. III. 15: 19, 32. 1936). Clarification of the sections of *Diospyros* requires the attention of a world-wide specialist on the genus, to whom the appropriate sectional combination in subgen. **DIOSPYROS** (rather than *Eudiospyros*) may be left.

The species of subgen. **DIOSPYROS** of our area have had applied to them four epithets: *samoensis*, *vitiensis*, *longisepala*, and *globosa*. In the basic part of his revision Bakhuizen (2) keyed and described only *D. samoensis*, remarking in passing that *D. vitiensis* and *D. longisepala* are doubtless closely allied. In 1939 Fosberg accepted *D. globosa*, and in 1940 he accepted *D. samoensis* in an inclusive sense, reducing *D. vitiensis* outright and proposing varietal status for *D. longisepala*. Bakhuizen, in his "Addenda et Corrigenda" (2), first (p. 407) accepted Fosberg's treatment, but later (p. 457) he reinstated *D. vitiensis*, reducing to it outright *D. longisepala* and *D. globosa*. The last of these treatments appears to me closest to the facts, as good differences between *D. samoensis* and *D. vitiensis* are apparent, although such differences are not emphasized in Bakhuizen's supplementary key (2: 456, 457). The reduction of the type of *D. globosa* to the latter of these concepts (as also pointed out by Green, 5: 340) seems correct. Like Fosberg, I prefer to maintain *D. longisepala* as a variety, but of *D. vitiensis* rather than of *D. samoensis*.

In recognizing two taxa of this relationship at the specific level, it is apparent that foliage and floral characters are not useful. However, *D. samoensis* has its inflorescences, both staminate and pistillate, obviously pedunculate, while in *D. vitiensis* the inflorescences are more congested, often glomerulate. This character is more obviously reflected in fruiting condition: in the former taxon the often solitary fruit is borne on a slender peduncle-branchlet axis 4–15 mm. long, while in the latter the fruit appears sessile, the supporting peduncle (or branchlet) being stouter and only 2–4 mm. long. An even more dependable difference is noted in the fruiting calyx, which in *D. samoensis* has the limb so abruptly reflexed that a sharp margin of the flattened disk is very obvious; in *D. vitiensis* the limb may be spreading or reflexed, but in this case the angle between the limb and the disk is merely rounded or obtuse.

As thus circumscribed, the two taxa have geographic reality, with an overlap of range only in the Lau Group of Fiji.

KEY TO SPECIES

Inflorescences pedunculate, the fruits borne on a simple peduncle or a combined peduncle-branchlet axis 4–15 mm. long, this comparatively slender, 1.5–2.5 mm. in diameter, abruptly swollen at apex to 3–5 mm.; fruiting calyx

composed of a conspicuously flattened coriaceous sharp-margined disk 12–17 mm. in diameter, the limb sharply reflexed at an abrupt right angle, the lobes coriaceous but striate with coarse veins, ovate or broadly ovate, slightly broader than long, $5-10 \times 7-12$ mm., obtuse or rounded at apex.

..... 6. *D. samoensis*.

Inflorescences congested-cymose, often glomerulate, the fruits borne on a simple peduncle (or branchlet) 2–4 mm. long, 2–5 mm. in diameter, gradually swollen toward apex; fruiting calyx composed of a flattened disk 11–15 mm. in diameter, the limb, if reflexed, less sharply so, at less than a right angle, the lobes thick-coriaceous, not striate (venation fully immersed), deltoid to oblong-ligulate, $5-18 \times 3-12$ mm., subacute to obtuse at apex.

..... 7. *D. vitiensis*.

6. *Diospyros samoensis* A. Gray in Proc. Amer. Acad. Arts 5: 326. 1862; Hiern in Trans. Cambr. Philos. Soc. 12: 245. 1873; Drake. Ill. Fl. Ins. Mar. Pac. 230. 1892; Burkill in Jour. Linn. Soc. Bot. 35: 45. 1901; Christophersen in Bishop Mus. Bull. 128: 174. 1935; Bakh. in Bull. Jard. Bot. Buitenz. III. 15: 224. 1938, 407. 1941; Fosberg in Bull. Torrey Bot. Club 67: 417. 1940; Yuncker in Bishop Mus. Bull. 178: 94. 1943, in op. cit. 184: 57. 1945, in op. cit. 220: 214. 1959.

Tree to 25 m. high, the young parts sericeous-strigose, the branchlets terete, soon glabrate, usually obviously lenticellate; petioles semiterete, 3–15 mm. long; leaf-blades chartaceous or thin-coriaceous, opaque, glabrous, ovate-oblong to ovate-elliptic or ovate-lanceolate, 5–20 cm. long, 2.5–9 cm. broad, obtuse to rounded at base, short-acuminate to obtuse at apex, the costa prominent beneath, the lateral nerves 6–10 per side, the veinlet-reticulation prominulous or immersed; inflorescences axillary, cymose, sometimes borne on short defoliate branchlets, short-pedunculate, the staminate 3–13-flowered, pale-strigose or glabrescent, with small deciduous bracts, the flowers sessile on short ultimate branchlets, 4- or 5-merous; calyx campanulate or subcupuliform, 3–5 mm. long and in diameter, strigose without and sericeous within, glabrate; corolla urceolate, 8–15 mm. long, sericeous and glabrate without, glabrous within, the lobes ovate, 2–6 mm. long, obtuse; stamens 8 or 10 (or rarely to 24), free or subfasciculate in pairs, 3–5 mm. long, the rudimentary ovary none or minute and hispidulous; pistillate inflorescences simpler, the peduncle 4–12 mm. long, the flowers usually in threes, sometimes 1 or 2, sessile on the peduncle or on short branchlets; calyx and corolla similar to the staminate, the ovary sericeous, 8- or 10-locular, the ovules solitary; fruiting inflorescences composed of a simple peduncle or an obscurely jointed peduncle-branchlet axis 4–15 mm. long, this slender, usually with a solitary terminal fruit; fruiting calyx accrescent, the tube forming a flattened or depressed-cupuliform disk 12–17 mm. in diameter, this often sericeous within, the limb sharply reflexed at an abrupt right angle, the lobes ovate or broadly ovate, 5–10 mm. long, 7–12 mm. broad, striate with coarse veins, obtuse or rounded at apex; fruit soon glabrate, globose to oblate,

20–30 mm. long, 25–30 mm. broad, the seeds 8 (or perhaps 10), 10–15 mm. long.

TYPE LOCALITY: Samoa; the type, without definite locality other than "Tutuila and Savaii," is a U.S. Exploring Expedition specimen cited below.

DISTRIBUTION: Eastern Fiji (Lau Group), Horne and Wallis Islands, Tonga, Niue, and Samoa. The species is also accredited to the Solomon Islands and New Guinea by Bakhuizen (2: 224), but it is likely that these records should be more carefully examined, since a logical western boundary for the taxon is noted in the Lau Group of Fiji. The species has been noted as a tree 3–25 m. high, with a trunk 8–45 cm. in diameter, occurring in often dry forest, woodland, or thickets, frequently near the sea on limestone but also on overgrown lava fields. Altitudes from sea-level to 600 m. have been recorded. The corolla is white to cream-colored or yellowish white; the fruit is yellow to pink, red, or dark brown, with blackish or dark brown seeds. A vaguely seasonal rhythm is noted in that flowers have been obtained from September to March, fruits from May to November.

LOCAL NAMES AND USES: In Lau the name *kaukauloa* has been recorded, and it is noted that the wood furnishes a hard black "ebony." On Alofi (Horne Islands) the species is known as *kau kau uuli* or *tutunu*, and the wood is used for construction. Common names in Tonga, recorded by Yuncker and other collectors, are *tutuna*, *pekepeka*, *kolivao*, and *kaka-la'uli*; there the species is used for firewood. On Niue both Yuncker and Sykes indicate the name as *kieto*; the hard black wood is used for spears. Variant names in Samoa are *aoaoli*, *aoauli*, *auaouli*, *au'auli*, and *au'a'uli*, with a single record of *anume* (Christophersen 1000); the last more commonly refers to *D. elliptica*.

Fiji. VANUA MBALAVU: Southern limestone section, Malatta, *Smith 1451* (BISH, GH, K, NY, UC, US). FULANGA: In ridge forest, *Bryan 448* (A, BISH, K, UC, US); on limestone, *Smith 1226* (BISH, GH, K, NY, UC, US). ONGEA LEVU: Interior forest and also near sea, *Bryan 430* (A, BISH).

Horne Islands. ALOFI: *McKee 19807* (P), *19822* (BISH, P), *19866* (BISH, P); Mt. Nuku, *Yen X55* (BISH).

Wallis Islands. UVEA: Mt. Afala, *McKee 19921* (P).

Tonga. NIUAFO'OU: *Jaggard*, Oct. 1930 (BISH). VAVA'U: *Crosby 98* (K); below Leimatua, northwest of Neiafu, *Yuncker 16191* (BISH, GH, US); Tuanikavale, *Soakai 765* (K). "VAVA'U and LIFUKA:" *Harvey*, in 1855 (K). KAO: *Yuncker 15967* (BISH, US). TOFUA: Northern side of island, *Scarth-Johnson 162* (K). 'EUA: Near Lokupo, northeastern side, *Yuncker 15521* (BISH, US); above Houma, northwestern side, *Yuncker 15495* (BISH, GH, US), *15496* (BISH, US); Liku terrace, *Parks 16321* (BISH, GH, K, NY, UC, US).

Niue. East of Alofi, *Yuncker 10064* (A, BISH, K, UC, US); Vaipapahi farm, *Sykes 472* (K); Tuhia'atua-Hakupu track, *Sykes 774* (K).

Samoa. SAVAII: Between Aopo and Asau, *Christophersen 3432* (BISH, UC); Tanga, *Christophersen 2821* (BISH, K); Salailua-Lataitai, *Christophersen &*

Hume 2620 (BISH, K, NY, UC, US), 2624 (BISH, UC); Safotu, *Vaupel* 483 (BISH, NY), *Christophersen & Hume* 2531 (BISH, K, NY, UC, US); Safune, *Christophersen* 2396 (BISH, K, US); Matavanu lava field, *Christophersen & Hume* 1875 (BISH, US); Neiafu, *Bristol* 2203 (BISH); Gataivai, *Bristol* 2249 (BISH, K), 2271 (BISH). UPOLU: Falese'ela, Lefaga, *Bristol* 2316 (BISH, K); vicinity of Apia, *Reinecke* 107 (BISH, K, US), *Eames* 121 (BISH, NY); Lanutoo, *Christophersen* 387 (BISH, K, NY); Vaea Mt., *Christophersen* 465b (BISH, NY); below Malololelei, *Christophersen* 291 (BISH, UC, US). TUTUILA: Papatele ridge, *Christophersen* 1000 (BISH, K, NY, UC); vicinity of Pago Pago, *Diefenderfer* 16 (BISH); Fagasa trail, *Setchell* 63 (UC); trail to Vatia, *Setchell* 333 (BISH, UC, US); road to Nuuli Village, *Yuncker* 9378 (BISH, UC, US); Breakers Pt., *Wisner* 121 (BISH). OFU: Toanga, *Garber* 1095 (BISH); Nuu islet, *Garber* 1103 (BISH, US); southeast shore trail, *Yuncker* 9514 (BISH, K), 9516 (BISH). SAMOA, without further locality: *U.S. Expl. Exped.* (US 67253 & 67254 holotype; isotypes at K, NY), *Horne* (GH, K), *Whitmee* 20 (K).

The overly inclusive nature of some past interpretations of *D. samoensis* has been discussed above in my comments on Subgenus DIOSPYROS. In fact, this species is sharply demarcated from its closest ally, *D. vitiensis*, and has a very natural distribution.

7. *Diospyros vitiensis* Gillespie in Bishop Mus. Bull. 74: 14. fig. 17. 1930; Bakh. in Bull. Jard. Bot. Buitenz. III. 15: 457. 1941.

Tree 3–15 m. high, the young parts minutely strigose, the branchlets and foliage very early glabrate, the branchlets terete, usually copiously and conspicuously lenticellate; petioles semiterete, 3–14 mm. long; leaf-blades chartaceous or subcoriaceous, glabrous, often punctulate-glandular, ovate-oblong or elliptic or elliptic-lanceolate, 7–18 cm. long, 3.5–12.5 cm. broad, obtuse to cuneate at base, obtusely short-acuminate at apex, the costa prominent beneath, the lateral nerves 5–10 per side, usually conspicuous at least beneath, the veinlet-reticulation prominulous or immersed; inflorescences axillary, congested-cymose, the staminate short-pedunculate or glomerulate and short-branched from base, 3–10-flowered, pale-sericeous, the bracts deltoid, about 1 mm. long; calyx 3- or 4-lobed, sparsely strigillose without and soon glabrate, about 4 mm. long and in diameter, the lobes broadly ovate, apiculate; corolla cylindric-urceolate, 10–12 mm. long, the lobes 3 or 4, ovate-deltoid, obtuse; stamens 15–20, free or fasciculate in pairs, 3–6.5 mm. long, the anthers somewhat longer than the filaments; rudimentary ovary minute, glabrous; pistillate inflorescences simpler, the flowers 1–3 and 4- or 5-merous, similar to the staminate or the corolla somewhat shorter and broader, the ovary soon glabrate; fruiting inflorescences axillary or borne on defoliate branchlets, composed of 1 or 2 simple peduncles (or branchlets) 2–4 mm. long and 2–5 mm. in diameter, these gradually swollen toward apex, the fruit solitary, terminal; fruiting calyx accrescent, glabrous, the tube forming a flattened disk 11–15 mm. in diameter, the limb spreading or reflexed, the lobes thick-coriaceous, 4 or 5 (very rarely 3), deltoid to oblong-ligulate, 5–18 mm. long, 3–12 mm. broad, subacute to obtuse at apex; fruit soon

glabrate, ellipsoid to obovoid to globose or oblate, 20–40 mm. long, 20–30 mm. broad, the seeds usually 8, about 15 mm. long.

Although in my observation this species is a Fijian endemic, Bakhuizen (2: 457) cites in the synonymy, with question, *D. acris* Hemsl. (in Kew Bull. 1895: 136. 1895), typified by *Comins* 311, from the Torres Islands, New Hebrides. At the moment no evidence indicates the advisability of giving up the Fijian binomial for Hemsley's older one. Points of separation between *D. vitiensis* and *D. samoensis* are discussed above.

I have not discovered a reliable means of separating the two suggested varieties of *D. vitiensis* in the absence of mature fruits, but the extremes of the fruiting calyx are such that it seems inadvisable to ignore them. Fortunately specimens of *Diospyros* are more often collected in fruit than in flower. It must be acknowledged that the fruiting calyces are somewhat variable on a few collections, and some of these have been referred to one or the other variety without much conviction. The type of *D. globosa*, with staminate flowers, is referred to var. *longisepala* because another Kambara collection, *Smith* 1272, has obviously elongate fruiting calyx-lobes. Future material from Lau will hopefully indicate whether only var. *longisepala* occurs there.

KEY TO VARIETIES

- Calyx-lobes associated with mature fruit reflexed, deltoid, often about as broad as long, 5–10 (–12) mm. long, 5–12 mm. broad at base. 7a. var. *vitiensis*.
 Calyx-lobes associated with mature fruit spreading or reflexed, oblong-ligulate or deltoid-oblong, conspicuously longer than broad, 8–18 mm. long, 3–10 mm. broad at base. 7b. var. *longisepala*.

7a. *Diospyros vitiensis* var. *vitiensis*.

Diospyros vitiensis Gillespie in Bishop Mus. Bull. 74: 14. fig. 17. 1930.

Diospyros samoensis var. *longisepala* sensu J. W. Parham, Pl. Fiji Isl. 161, quoad fig. 61, A (err. legend as B), non sensu typi. 1964.

The typical variety, characterized by having the calyx-lobes associated with the mature fruit reflexed, deltoid, often about as broad as long, 5–10 (–12) mm. long, 5–12 mm. broad at base.

TYPE LOCALITY: Province of Namosi, Viti Levu, Fiji; the type is *Gillespie* 3083, cited below.

DISTRIBUTION: Endemic to Fiji, and known definitely only from Viti Levu and Vanua Levu, where it has been noted as an often slender tree 3–15 m. high in dense, dry, or secondary forest at altitudes of 100–1120 m. The fruit is greenish yellow to dull yellow, becoming yellowish brown or brown. Fruiting specimens have been obtained between May and December.

LOCAL NAMES: *Kauloa*, *mbaumbulu*, *mbulumate*, *mbole*.

Fiji. VITI LEVU: MBA: *Fiji Dept. Agr.* 14468 (BISH, SUVA); northern slopes of Mt. Namendre, east of Mt. Koromba, *Smith* 4543 (A, BISH, K, US); vicinity

of Nandarivatu, *Gillespie* 4207 (BISH, UC), *Fiji Dept. For.* 262 (*Watkins* 784) (K, SUVA); hills between Nggaliwana and Nandala Creeks, *Smith* 5817 (A, BISH, K, US); vicinity of Nandala, *Degener* 14835 (A). NANDRONGA & NAVOSA: Northern portion of Rairaimatuku Plateau, between Nandrau and Rewasau, *Smith* 5446 (A, BISH, K, US). SERUA: Hills between Wainiggere and Waisese Creeks, between Ngaloa and Wainiyambia, *Smith* 9379 (BISH, GH, K, SUVA, UC, US); hills east of Navua River, near Nukusere, *Smith* 9086 (BISH, GH, K, SUVA, UC, US); Navua River near Namata Rapids, *Gillespie* 2950 (BISH). NAMOSI: Mt. Naitarandamu, at Navunitaruilau, on wooded ridge between the watersheds of the Wainimala and the Wainikoroilua, alt. 900 m., Sept. 27, 1927, *Gillespie* 3083 (BISH holotype; isotypes at K, NY, UC, US); east of Namosi Village, *Gillespie* 2829 (BISH, UC). VANUA LEVU: MATHUATA: Nakoroutari, *Fiji Dept. Agr.* 15239 (BISH, K, SUVA). THAKAUNDROVE: Hills between Vatukawa and Wainigio Rivers, Ndrekeniwai Valley, *Smith* 584 (BISH, GH, K, NY, UC, US); hills west of Korotasere, Natewa Bay region, *Smith* 1946 (BISH, GH, K, NY, UC, US).

7b. *Diospyros vitiensis* var. *longisepala* (Gillespie) A. C. Sm., comb. nov.

Diospyros longisepala Gillespie in Bishop Mus. Bull. 74: 14. fig. 16. 1930.

Diospyros samoensis var. *longisepala* Fosberg in Bull. Torrey Bot. Club 67: 418. 1940; Bakh. in Bull. Jard. Bot. Buitenz. III. 15: 407. 1941; J. W. Parham, Pl. Fiji Isl. 162, excl. fig. 61, A. 1964.

Maba globosa A. C. Sm. in Bishop Mus. Bull. 141: 121, sensu typi, excl. fig. 63. 1936.

Diospyros globosa Fosberg in Bull. Torrey Bot. Club 65: 612. 1939; J. W. Parham, Pl. Fiji Isl. 160. 1964.

Scarcely separable from the typical variety in foliage or flowers, but characterized by having the calyx-lobes associated with the mature fruit often spreading, sometimes reflexed, oblong-ligulate or deltoid-oblong, conspicuously longer than broad, 8–18 mm. long, 3–10 mm. broad at base.

TYPE LOCALITY: Mba Province, Viti Levu, Fiji; the type is *Gillespie* 4360, cited below. The type of *Maba globosa* is *Smith* 1241, cited below, from the island of Kambara in Lau.

DISTRIBUTION: Endemic to Fiji, and thus far known from several islands, apparently being more widespread than var. *vitiensis*. This variety has been recorded as an often slender or spreading tree 3–10 m. high, occurring from sea-level to 970 m. in various types of forest, sometimes on limestone. The corolla is noted as white and the fruit as greenish yellow; flowers have been obtained in March and fruits more or less throughout the year.

LOCAL NAMES: *Kaukauloa*, *kailoa*, *mbama*, *mulu*, *sawira*.

Fiji. YASAWAS: WAYA ISLAND: North of Yalombi, along Olo Creek, *St. John* 18121 (A, BISH). VITI LEVU: MBA: Mt. Evans Range, *Greenwood* 444 (K), 954 (A, BISH, K, NY, UC), 1253 (A, BISH, K, NY, UC, US); Mt. Mbatilamu, *Fiji Dept. Agr.* 14810 (BISH, SUVA), 14812 (BISH, SUVA); Nandendelewa, *Fiji Dept. Agr.* 14851 (BISH, K, MASS, SUVA); Savundamatau Creek, west of Nandarivatu,

Webster & Hildreth 14255 (DAV, MASS); southern slopes of Mt. Ndelainathovu, on escarpment west of Nandarivatu, *Smith 4943* (A, BISH, K, US); slopes of Mt. Lomalangi (Nanggaranambuluta), near Nandarivatu, alt. 950 m., Dec. 20, 1927, *Gillespie 4360* (BISH holotype); hills between Nandala and Nukunuku Creeks, along trail from Nandarivatu toward Lewa, *Smith 6200* (A, BISH, K, NY, US); Nandala, *Degener 14741* (A, BISH, K, NY, UC, US). NANDRONGA & NAVOSA: *Horne 904* (K); Nausori Highlands, *Fiji Dept. Agr. 12649* (A, K, SUVA). NAITASIRI: Nanggarathangithangi, Mendrausuthu Range, *Fiji Dept. Agr. 15028* (MASS, SUVA). OVALAU: Hills west of Lovoni Valley, on ridge south of Mt. Korolevu, *Smith 7631* (BISH, GH, K, SUVA, UC, US); Lovoni Valley, *Horne 195* (GH, K), *Fiji Dept. Agr. 14504* (BISH, SUVA). NGAU: Hills east of Herald Bay, inland from Sawaieke, *Smith 7775* (BISH, GH, K, SUVA, UC, US). VANUA LEVU: MBUA: Upper Ndama River valley, *Smith 1608* (BISH, GH, K, NY, UC, US). KAMBARA: On limestone formation, in forest, alt. 0-100 m., *Smith 1241* (BISH holotype of *Maba globosa*; isotypes at GH, K, NY, UC, US); same locality, *Smith 1272* (BISH, GH, K, NY, UC, US).

CULTIVATED SPECIES

8. *Diospyros discolor* Willd. Sp. Pl. 4(2): 1108. 1806; Hiern in Trans. Cambr. Philos. Soc. 12: 260. 1873; Bakh. in Bull. Jard. Bot. Buitenz. III. 15: 145. 1938.

Samoa, without further locality: *Guest 5* (BISH).

The cultivated occurrence of *D. discolor* in our area is indicated by a single sterile specimen. The species, placed by Bakhuizen in his subgen. EUDIOSPYROS sect. EBENASTER, is endemic to the Philippines, now widely cultivated for its edible fruit, usually with the common name *mabolo*.

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