

A Revision of *Phyllanthus* (Euphorbiaceae) in Eastern Melanesia¹

GRADY L. WEBSTER²

ABSTRACT: In eastern Melanesia (New Hebrides to Fiji and Tonga), *Phyllanthus* is represented by eight native species in three subgenera (*Isocladius*, *Anisonema*, and *Gomphidium*); in addition, there are three introduced weedy species in the subgenus *Phyllanthus*. Two new species belonging to the section *Gomphidium* are described: *Phyllanthus amicornum* from Eua, Tonga, and *P. smithianus* from Viti Levu, Fiji. The native woody species of *Phyllanthus* from Fiji and Tonga are not closely related to those of New Caledonia but instead show affinities to species of Palau and New Guinea, while the single endemic species from the New Hebrides is closely related to New Caledonian species.

ALTHOUGH THERE IS a great concentration of species of *Phyllanthus* in western Melanesia, especially in New Guinea (Webster and Airy Shaw 1971), the taxonomic diversity sharply declines in the Pacific Islands; only Fiji and Tahiti have a significant number of endemic taxa. The aim of this paper is to review the species of eastern Melanesia—defined in approximately the circumscriptions of Good (1974) and van Balgooy (1971) as including the Santa Cruz Islands, New Hebrides, Fiji, Tonga, and Niue (Figure 1). Most previous treatments of *Phyllanthus* in this area have simply been part of preliminary floristic surveys: New Hebrides (Guillaumin 1948), Tonga (Yuncker 1959 and Hürlimann 1967), and Fiji (Gillespie 1932). The only critical treatment is that of Smith (1981) for Fiji.

As might be expected, the biogeographic affinity of species in the eastern Melanesian area is predominantly with western Melanesia. This is particularly evident for the species of subgenus *Gomphidium* in Fiji (Figure 2) and Tonga, which belong to section *Gomphidium*. In the New Hebrides, the only endemic species, *Phyllanthus myrianthus*, belongs to a different section (*Eleutherogynium*), and the section *Gomphidium* has not been re-

corded. Eastward from Fiji and Tonga, subgenus *Gomphidium* is absent, and all the native species of Samoa, Tahiti, Marquesas, and Hawaii belong to subgenus *Isocladius*.

The striking difference in representation of *Phyllanthus* between the New Hebrides, on the one hand, and Fiji and Tonga on the other conforms to the general pattern noted by Smith (1951), who noted much greater floristic affinities between Fiji and New Guinea than between Fiji and New Caledonia. The remarkable disjunction between two closely related species of section *Gomphidium*—*P. amicornum* of Tonga (Eua) and *P. rupi-insularis* of Palau—is more difficult to explain. It does not appear to be a commonly recorded distribution pattern; indeed, the only distribution I have seen that is at all similar is that of the palm *Clinostigma*, which occurs in Fiji, the New Hebrides, Ponape, and Truk (van Balgooy 1966). As remarked by Hosokawa (1967), however, the flora of Micronesia is rather closely related to that of New Guinea. Although section *Gomphidium* occurs both in New Guinea and in New Caledonia, the Fijian and Tongan species definitely appear to be more similar to those in New Guinea. It is quite possible that the similarities between *Phyllanthus* species in Palau and in Fiji and Tonga may be interpreted as the consequence of independent parallel migrations from a Papuan center.

Cultivated species have not been included in this treatment. However, Smith (1981) cites

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²Department of Botany, University of California, Davis, CA 95616.

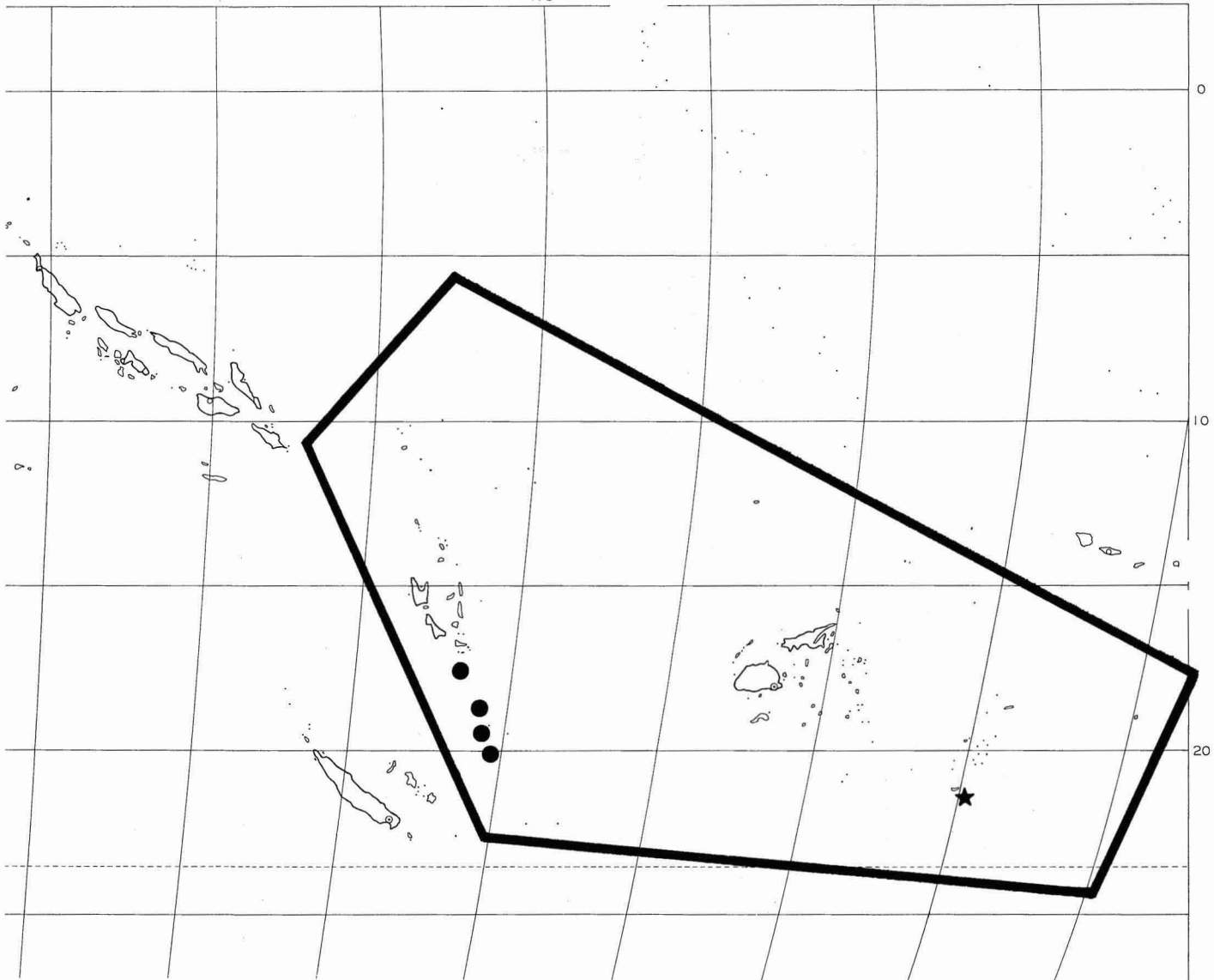


FIGURE 1. Map indicating the boundaries of eastern Melanesia as interpreted in this treatment. Dots indicate the distribution of *Phyllanthus myrianthus*; the star marks the occurrence of *P. amicorum*.



FIGURE 2. Distribution of the native woody species of *Phyllanthus* in the Fiji archipelago: *P. heterodoxus*, five-pointed stars; *P. pergracilis*, dots; *P. smithianus*, six-pointed stars; *P. wilkesianus*, squares.

Phyllanthus emblica L. from Fiji, and doubtless the common myrobalan, *P. acidus* (L.) Skeels, is cultivated on various islands.

Discussions of morphological characters that are systematically important in *Phyllanthus* have been furnished by Webster (1956, 1970) and by Bancilhon (1971), so it does not appear necessary to repeat all of them here. It should be kept in mind, however, that the characters given here for subgenera and sections may apply only to the taxa in eastern Melanesia. For the three introduced species of subgenus *Phyllanthus*, only abbreviated descriptions are given, since these are available elsewhere (Webster 1957, 1970).

A character of particular significance in the Melanesian species of subgenus *Gomphidium* is the ramification pattern. As noted for subgenus *Conami* in the West Indies (Webster 1957), branchlets in subgenus *Gomphidium* may be either pinnatifid or bipinnatifid (in the latter, with flowers and foliage leaves mainly or entirely on the ultimate axes). In eastern Melanesia, most species of section *Gomphidium* have bipinnatifid branchlets, whereas they are pinnatifid in the single species of section *Eleutherogynium*. The floral structure in the two subgenera is also similar, so this represents either parallelism or perhaps an indication of a common ancestry for the two subgenera.

Pollen morphology is an important systematic character in *Phyllanthus*, as indicated by Webster (1956), Punt (1967), and Bancilhon (1971). Recently Punt (1980) has surveyed the pollen of the New Guinea species of *Phyllanthus*. In the present study, pollen of the native species was examined using scanning

electron microscopy (pollen prepared according to the method of Lynch and Webster 1975; voucher slides deposited at DAY). The native eastern Melanesian species are palynologically less diverse but show considerable similarity to some of the pollen types in New Guinea. *Phyllanthus virgatus* Forst. f., of subgenus *Isocladus* (Figure 3A), is very different from the other native species in its spherical pollen grains with an areolate arrangement of confluent shortened colpi (polysyncolporate). In contrast, the other native species belonging to subgenus *Gomphidium* have more or less oblate tricolporate grains with the colpi usually confluent at the poles; the colpi are distinctly marginate and the exine rather irregularly reticulate (rugulate). The grains of *Phyllanthus smithianus* Webster (Figure 3B) and *P. amicorum* Webster (Figure 3C) are typical of this kind of pollen, which is designated by Punt (1980) as the "*Phyllanthus aeneus* type." The pollen of the other Fijian species, *Phyllanthus pergracilis* Gillespie, *P. heterodoxus* Muell. Arg., and *P. wilkesianus* Muell. Arg., are similar; all of them have oblate grains about 20–24 μm broad and 17–22 μm high. The Micronesian species *Phyllanthus rupi-insularis* Hosok., although very similar in habit to *P. amicorum*, has distinctively different pollen grains (Figure 3D) with a strikingly more irregular exine reticulation. Rather surprisingly, the pollen grains of *Phyllanthus myrianthus* Muell. Arg. (Figure 3E, F) are quite similar to those of *P. amicorum* and the Fijian species, even though *P. myrianthus* seems best referred to a separate section (*Eleutherogynium*) because of distinctive floral and vegetative characters.

KEY TO THE TAXA OF *Phyllanthus* IN EASTERN MELANESIA

1. Leaves on main stems distichous, not reduced to scales; ultimate leafy branchlets not deciduous; stamens 3, free, anthers dehiscing horizontally; pollen grains polysyncolporate (subg. *Isocladus*, sect. *Macraea*) 1. *P. virgatus*
1. Leaves on main stems spirally arranged, reduced to scales; foliage leaves distichous on deciduous branchlets; stamens 3–6, free, or connate, dehiscing vertically to horizontally; pollen grains 3- or 4-colporate.
 2. Carpels 5 or more, fruits baccate; stamens 4 or 5; trees or large shrubs with pinnatifid branchlets (subg. *Kirganelia*, sect. *Anisonema*) 2. *P. ciccoides*
 2. Carpels 3, fruits capsular; stamens usually 3; shrubs or herbs.

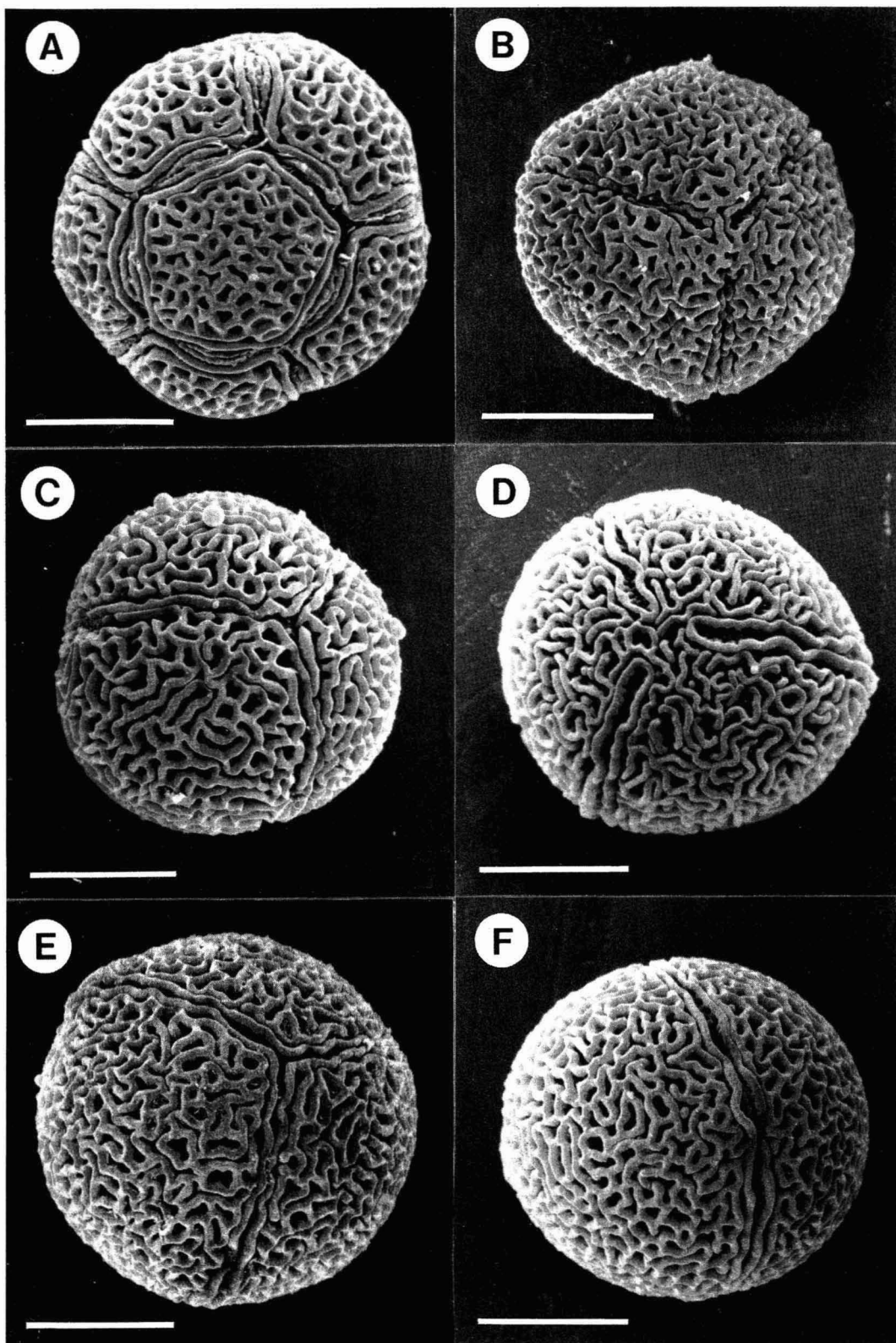


FIGURE 3. Pollen grains of Melanesian species of *Phyllanthus* illustrated by scanning electron micrographs (bars = 10 μ m). A, *P. virgatus* (Fosberg 39195, DAV). B, *P. smithianus* (Smith 9630, US). C, *P. amicorum* (Lister s.n., K). D, *P. rupi-insularis* (Fosberg 32492, DAV). E, F, *P. myrianthus* (Raynal RSNH 16241, BISH), polar and equatorial views.

3. Staminate disk of 3 segments, or absent; pollen grains subglobose to oblate, coarsely reticulate; styles entire or bifid; seeds smooth; shrubs (subg. *Gomphidium*).
4. Floral disk present, the staminate usually of 3 massive segments; outer sepals not scarious-indurate; leaves chartaceous; branchlets bipinnatifid or pinnatifid (sect. *Gomphidium*).
5. Styles entire (or very inconspicuously bifid); monoecious or dioecious.
 6. Pedicels elongated and slender, the staminate at least 1.5 cm long; leaves acuminate; branchlets bipinnatifid 3. *P. pergracilis*
 6. Pedicels (at least the staminate) 1 cm long or less; leaves blunt or emarginate.
 7. Branchlets mostly bipinnatifid, leaves alternate on branchlet axes; filaments connate.
 8. Monoecious; anthers 0.5–0.7 mm long, dehiscent vertically 4. *P. heterodoxus*
 8. Dioecious; anthers ca. 0.2 mm long, dehiscent horizontally 5. *P. wilkesianus*
 7. Branchlets pinnatifid; leaves opposite on branchlet axis; filaments free; anthers 0.3–0.4 mm long, dehiscent vertically 6. *P. smithianus*
 5. Styles bifid; anthers dehiscent vertically; dioecious shrub with bipinnatifid branchlets 7. *P. amicum*
4. Floral disk absent; outer sepals more or less scarious-indurate, denticulate; styles unlobed; branchlets pinnatifid, leaves subcoriaceous (sect. *Eleutherogynium*). 8. *P. myrianthus*
3. Staminate disk of 5 or 6 distinct segments; stamens connate; styles bifid; pollen grains prolate, tectate-perforate; seeds ribbed; monoecious herbs (subg. *Phyllanthus*).
 9. Pistillate flowers distinctly pedicellate (pedicel over 1 mm long), distal on branchlet; ovary smooth; seeds longitudinally ribbed; leaf blades smooth beneath (sect. *Phyllanthus*).
 10. Cymules bisexual, each of 1 staminate and 1 pistillate flower; sepals acute; leaves obtuse or rounded at tip 9. *P. amarus*
 10. Cymules unisexual, staminate cymules at proximal nodes of branchlet, pistillate flowers solitary at distal nodes; sepals obtuse or rounded; leaves usually narrowed to a point 10. *P. debilis*
 9. Pistillate flowers sessile (pedicel less than 1 mm in fruit), proximal on branchlet; ovary roughened; seeds transversely ribbed; leaf blades marginally hispidulous beneath (sect. *Urinaria*). 11. *P. urinaria*

Subg. *Isocladus* Webster, J. Arnold Arb. 37: 345. 1956.—Type: *Phyllanthus maderaspatensis* L.

Herbs or subshrubs without phyllanthoid branching (floriferous branchlets not deciduous); sepals 5 or 6; disk present; stamens 2 or 3, filaments free or connate; anthers dehiscent vertically to horizontally, not apiculate; pollen grains 3- or 4-colporate or areolate; ovary 3-locular; styles bifid; fruit capsular, seeds smooth or verruculose.

This subgenus includes about 60 species in 9 sections, occurring both in the New World and Old World.

Sect. *Macraea* (Wight) Baillon, Etude Gen. Euphorb. 628. 1958. *Macraea* Wight, Icon. Pl. Ind. Orient. 5:27, pls. 1901, 1902. 1852.—Type (lectotype): *Macraea oblongifolia* Wright (= *Phyllanthus simplex* Retz.)

Herbs or subshrubs; sepals 5 or 6; staminate disk dissected; stamens 2 or 3, filaments free, dehiscent horizontally or obliquely; pollen grains areolate; pistillate pedicels straight; pistillate disk cupuliform or dissected; ovary smooth or papillate; seeds smooth or verruculose.

Wright described five new species of *Macraea* without designating a type. His first spe-

cies, *Macraea rheedii*, is not a good choice for the type because Wright identified it with *Niruri* of the Hortus Malabaricus and thereby raised difficult problems of typification. The second species, *Macraea oblongifolia*, was treated by Mueller (1866) as *Phyllanthus simplex* Retz. var. *oblongifolius* (Wright) Muell. Arg. Since this taxon accords well with the sectional diagnosis and represents a widespread and well-known species, it appears to be a logical choice and is here designated as the lectotype of the section.

Section *Macraea* is entirely paleotropical, and indeed except for one species of dubious affinity (*Phyllanthus glaucophyllus* Muell. Arg.) it is unknown from Africa and Madagascar. There are several species in India, a few in Australia, and several in the Pacific, including *P. distichus* H. & A. (*P. sandwicensis* Muell. Arg.) from the Hawaiian Islands.

1. *Phyllanthus virgatus* Forst. f., Fl. Ins. Austral. Prodr. 65. 1786; A. C. Smith, Fl. Vitiensis Nova 2:464. 1981.—Type: Tahiti, Banks & Solander (BM; fide Smith, 1981). Figure 3A.

Phyllanthus simplex var. *virgatus* Muell. Arg., Linnaea 32:32. 1863; in DC. Prodr. 15(2): 392. 1866.

DESCRIPTION: Glabrous annual (or sometimes perennial) herb 2–50 cm high; stems sparsely to copiously branched, sometimes thickened at base, most ascending or erect, below subterete, distally more or less flattened and narrowly wing-angled; lateral branches (where developed) not deciduous. Leaves distichous; blades chartaceous, thin, mostly narrowly elliptic to lanceolate or linear, (5–) 10–15 mm long, 1.5–3 mm broad, obtuse to acute or apiculate at tip, rounded to truncate at base, above olivaceous, beneath often paler; veins ca. 4–7 on a side, connecting to form intramarginal loops, evident and sometimes distinctly raised above, obscure beneath; margins narrowly revolute; petioles 0.4–0.7 mm long; stipules broadly ovate, scarious, entire or denticulate, acuminate, cordate at base, 1–2.5 mm long, 0.5–1 mm broad.

Monoecious; staminate and pistillate flowers usually at separate axils; staminate

flowers in glomerules of 2–4, pistillate flowers solitary.

STAMINATE FLOWER: Pedicel 0.5–1.2 mm long; sepals 5 or 6, obovate or oblong, 0.5–0.7 mm long, 0.4–0.5 mm broad; disk segments 6, angled, ca. 0.2 mm across; stamens 3, free, filaments 0.2–0.3 mm long; anthers rounded, dehiscing horizontally, 0.2–0.5 mm broad.

PISTILLATE FLOWER: Pedicel straight, ascending to reflexed, (1.5–) 2.5–5 (–7) mm long; sepals 6, subequal, oblong, obtuse or acute, reflexed in fruit, 0.7–0.8 mm long, 0.3–0.4 mm broad; disk irregularly dissected; ovary smooth or more or less roughened; styles 0.3–0.5 mm long, free, spreading, bifid, tips slender. Fruit capsular, ca. 2.5 mm across; columella 0.8–1 mm long; seeds angular, light to dark brown, evenly verruculose, 1.1–1.4 mm long, 0.8–1 mm broad.

DISTRIBUTION: *Phyllanthus virgatus*, in the circumscription followed here, is a polytypic species of the Pacific Islands.

REPRESENTATIVE SPECIMENS

Vanuatu (New Hebrides): Malekula, *Cheeseman* 8K (K). Fiji: Taveuni: Wairiki, *Gillespie* 4759 (A, BISH). Vanua Levu: Savu Savu Bay, *Degener & Ordenez* 13881 (A, NY). Viti Levu. Namosi: Namosi, *Weiner* 275 (BISH). Yosawas. Naviti: Kese, *Dept. Agr.* 11765 (BISH). Tonga. Eua: *Parks* 16244 (BISH, NY, UC), *Yuncker* 15339 (BISH). Tongatapu: Niutoua, *Yuncker* 15125 (BISH). Niue: 6 mi E of Alofi, *Yuncker* 9628 (BISH); 2 mi W of Hakupu, *Yuncker* 9666 (BISH, UC); Makefu, *Yuncker* 10009 (BISH); Mualau, *Yuncker* 10014 (BISH, UC).

DISCUSSION: Mueller (1866) interpreted the limits of *Phyllanthus simplex* Retz. very broadly and included *P. virgatus* as a variety. Of the nine varieties recognized by Mueller, five occur in the Pacific Islands, but only var. *virgatus* in eastern Melanesia. Plants from eastern Melanesia strongly resemble those from the type locality in Tahiti and from other Polynesian islands; but they differ markedly from plants of mainland Asia in various characters (such as smaller seeds and shorter fruiting pedicels). It appears that mainland plants

with strongly papillate ovaries and an undissected pistillate disk represent a different species, to which the name *P. simplex* Retz. (s. str.) would apply. There are indeed, in New Guinea and Micronesia, specimens that appear transitional between *P. virgatus* and *P. simplex*, and it is possible that detailed studies might indicate that these taxa should be distinguished at the subspecific level. In the state of our present ignorance, however, it seems most conservative to recognize the insular and mainland populations as different species.

Subg. *Kirganelia* (Juss.) Webster, J. Arnold Arb. 37:344. 1956; 38:51. 1957. *Kirganelia* Juss., Gen. Pl. 387. 1789.—Type: *Kirganelia phyllanthoides* Desf. (= *Phyllanthus casticum* Willem).

Trees, shrubs, or herbs with phyllanthoid branching; sepals 5 or 6; disk dissected in staminate flower, entire or dissected in pistillate; stamens 4–6, filaments free or connate; anthers dehiscing vertically to horizontally; pollen grains 3- or 4-colporate; ovary 3- to 12-locular; styles mostly bifid; fruit capsular or baccate; seeds smooth or verruculose.

Sect. *Anisonema* (A. Juss.) Griseb., Fl. Br. W. Ind. 34. 1859; Webster, J. Arnold Arb. 38:56. 1957.

Anisonema A. Juss., Euphorb. Tent. 19. 1824 (for additional synonyms, see J. Arnold Arb. 38:56. 1957).—Type: *Phyllanthus reticulatus* Poir.

Shrubs or trees; sepals often unequal; staminate disk dissected; stamens 4 or 5, often unequal, filaments more or less connate; anthers dehiscing vertically; pollen grains tricolporate, sometimes syncolporate; pistillate disk usually dissected; ovary smooth; fruit capsular or baccate; seeds smooth or nearly so.

This paleotropical section of about 10–15 species is centered in Southeast Asia; there are 5 species recorded from New Guinea (Webster and Airy Shaw 1971), but only the following one is known from the Pacific Islands.

2. *Phyllanthus ciccoides* Muell. Arg., Linnaea 32:13. 1863; in DC. Prodr. 15(2):345.

1866; Webster & Airy Shaw, Kew Bull. 26:88. 1971.—Type: New Hebrides, Tanna, Forster (s).

Phyllanthus baccatus F. Muell. ex Benth., Fl. Austral. 6:102. 1873.—Type: Australia, Northern Territory, Victoria River, F. Mueller (κ).

Flueggeopsis microspermus K. Schum., Nachtr. Fl. Deutsch. Schutzgeb. 289. 1905.—Type: Papua, Hatzfeldhafen, Hollrung 332 (κ, syntype).

Phyllanthus ciccoides var. *puberulus* Airy Shaw, Muelleria 4:215. 1980.—Type: Australia, Queensland, Cook Distr., near Cooktown, Blake 23229 (κ, holotype; BRI, isotype; not seen).

DESCRIPTION: Tree 7–10 m high; twigs subterete, glabrous or puberulent; cataphylls on main axes scarious, dark, 1.5–2 mm long. Deciduous branchlets pinnatifid, mostly 10–17 cm long, with 9–13 nodes (leaves sometimes reduced at distal nodes). Leaf blades chartaceous, ovate, 3–5 cm long, 2.2–3 cm broad, obtuse to acute and sometimes apiculate at the tip, broadly cuneate to rounded or subcordate at base; midrib plane above, slightly raised beneath; major lateral nerves 8–10 on a side, more conspicuous beneath (but scarcely raised), slightly curving; veinlets tenuous but prominulous beneath; petiole 1–3 mm long; stipules narrowly lanceolate, scarious, entire, truncate at base, 1.2–1.5 mm long.

Dioecious (?; staminate flowers not seen); pistillate flowers 2–5 in each glomerule.

STAMINATE FLOWER: Not seen.

PISTILLATE FLOWER: Pedicel 1.8–3 mm long, somewhat dilated distally; sepals mostly 5, glabrous or hirsutulous, ovate or broadly elliptic, rounded at tip, entire, mostly 1.5–2 mm long, 1.2–1.8 mm broad, deciduous in fruit; disk more or less dissected into 6 segments 1 mm across; ovary glabrous or hirsutulous, locules mostly 6 (rarely 5); styles erect or ascending, free or basally connate, bifid, ca. 0.5–1 mm long. Fruit baccate, 3–3.5 mm

broad when dried; seeds trigonous, smooth, 1.2–1.7 mm long, 0.8–1 mm broad.

DISTRIBUTION: *Phyllanthus ciccooides* is widespread in lowland rain forest in western Melanesia (New Guinea, Solomon Islands) but reaches only the Santa Cruz Islands and New Hebrides within eastern Melanesia.

SPECIMENS EXAMINED

Santa Cruz Islands: Vanikoro, *Kajewski* 590 (A), *Whitmore* 1780 (K). Vanuatu (New Hebrides). Aneityum: Anelgehat Bay, *Kajewski* 908 (A, K, NY). Efate: Tanguélégulé, *Webster & Bennett* 19415 (DAV, P). Erromanga: Dillon Bay, *Kajewski* 274 (A, K, NY). Pentecost: 1896, *Morrison* (K). Tanna: Lenakel, *Kajewski* 73 (A, K). A collection (*Baker* 249) from Espiritu Santo cited by Guillaumin (1938) probably represents this species.

DISCUSSION: The specimens from eastern Melanesia are glabrous and would be referable to var. *ciccooides* if var. *puberulus* Airy Shaw (1980) is recognized. It remains to be seen whether the pubescent variant described from New Guinea is worthy of formal taxonomic status.

Subg. *Gomphidium* (Baillon) Webster, J. Arnold Arb. 48: 338. 1967.

Phyllanthus sect. *Gomphidium* Baillon, Adansonia I.2: 234. 1862.—Type (lectotype): *Phyllanthus chamaecerasus* Baillon.

Trees or shrubs with phyllanthoid branching; branchlets pinnatifid or bipinnatifid; flowers in axillary cymules or thyrses; sepals mostly 6, biseriate; disk usually present; stamens 3–7, free or connate; anthers mostly dehiscing vertically, often apiculate; pollen grains mostly 3-colporate, usually syncolporate, most often oblate and with rugulate exine; ovary 3-locular; styles bifid or entire; fruit capsular; seeds mostly smooth.

Subgenus *Gomphidium* is a large group of some 80–90 species almost confined to the Old World and with the greatest concentration of species in New Guinea and New Caledonia. The monotypic section *Calodictyon* Webster from Central America appears to belong to subgenus *Gomphidium*, however, and a num-

ber of species from South America and Madagascar also show strong resemblances. There is considerable doubt that subgenus *Gomphidium* can be maintained as distinct from the American subgenus *Conami* (Aubl.) Webster; both taxa have mostly bipinnatifid branchlets, six biseriate sepals, often three reniform staminate disk segments, and rather similar pollen grains.

Sect. *Gomphidium* Baillon, Adansonia I. 2: 234. 1862; Muell. Arg. in DC. Prodr. 15(2): 319. 1866; Webster & Airy Shaw, Kew Bull. 26: 93. 1971.—Type (lectotype): *Phyllanthus chamaecerasus* Baillon.

Glochidion sect. *Gomphidium* (Baillon) Muell. Arg. in DC. Prodr. 15(2): 93. 1863.

Shrubs or small trees; flowers in axillary cymules; sepals usually 6, biseriate, the outer often smaller; staminate disk segments 3, massive; stamens 3, filaments free or connate; anthers dehiscing vertically; pollen grains 3-colporate, coarsely reticulate, not syncolporate; ovary 3-locular; styles entire or sometimes bifid; seeds smooth.

As here interpreted, section *Gomphidium* includes about 50–60 species of Australasia and Melanesia, extending from Queensland and New Guinea to Tonga and Fiji; the greatest concentration of species appears to be in New Caledonia. The boundaries of section *Gomphidium* are rather ill-defined, and it is likely that critical studies will lead to realignments of sectional boundaries within subgenus *Gomphidium*. The species in eastern Melanesia form a distinctive subgroup because of their bipinnatifid branchlets; they appear related to New Guinea species such as *P. papuanus* Gage or *P. rheophilus* Airy Shaw.

3. *Phyllanthus pergracilis* Gillespie, Bull. Bishop Mus. 91: 18, fig. 20. 1932; A. C. Smith, Fl. Vitiensis Nova 2: 462. 1981.—Type: Fiji, Viti Levu, *Gillespie* 2122 (BISH, holotype; GH, UC, isotypes).

DESCRIPTION: Glabrous, sparsely branching shrub with treelike habit, 1.5–3 m high; branchlets mostly bipinnatifid; main axis

mostly 5–25 cm long with 3–10 lateral axes, the leaves reduced to obtuse cataphylls ca. 1 mm long; ultimate leafy axes (4–) 10–20 (–30) cm long, with (5–) 10–20 leaves. Leaves distichous on ultimate axes; blade chartaceous, mostly ovate, 5–12 mm long, 3–8 cm broad, prominently narrowed to an acuminate tip, rounded to truncate at base, drying oliveaceous beneath but lucent on both faces; midrib plane or slightly sunken above, raised beneath; major lateral nerves 5–10 on a side, inconspicuous above, distinctly raised beneath, forming with veinlets a prominulous reticulum; margins plane or narrowly revolute; petiole adaxially channeled, 3–10 mm long; stipules ovate, acuminate, thickish and more or less persistent, (0.7–) 1.2–2.3 mm long.

Monoecious; cymules axillary on ultimate leafy axes; staminate flowers several on short (less than 1 mm long) minutely bracteate monochasial cymules; pistillate flowers solitary or occasionally paired.

STAMINATE FLOWER: Pedicel slender, 5–10 mm long; sepals 6, biseriata, subequal, yellow tinged with red (Smith), 1.6–2 mm long and broad; disk segments 3, massive, pitted, 0.7–0.9 mm across; stamens 3; filaments free, 0.2–0.6 mm long; anthers elliptic-oblong, 0.6–0.8 mm long, apiculate, dehiscing vertically.

PISTILLATE FLOWER: Pedicel slender, becoming (10–) 15–35 mm long; sepals 6, biseriata, 1.1–1.8 mm long, 1–1.5 mm broad; disk thin, entire, 0.8–1.3 mm across; ovary 3-locular; styles 0.5–1 mm long, subentire to bifid halfway. Fruit capsular, yellow turning red, ca. 5 mm broad; columella 2 mm long; seeds trigonous, brownish, smooth (faintly striate-reticulate), 2.1–2.8 mm long, 1.7–1.9 mm broad.

DISTRIBUTION: Endemic to Viti Levu, in rain forests at 30–1200 m, flowering through most of the year. *Phyllanthus pergracilis* appears to be the most common of the woody Fijian species.

SPECIMENS EXAMINED

Fiji. Viti Levu. Mba: mountains near Lautoka, 360 m, *Greenwood* 902 (A, NY, UC, US); Mt. Evans Range, E of Lautoka, 600 m,

Greenwood 1280 (BISH); summit of Mt. Loma Langi, 1200 m, *Gillespie* 4334 (UC). Naitasiri: Nasinu, 150 m, *Gillespie* 3596 (GH, NY, UC); Princes Road, 175 m, *Vaughan* 3360 (BISH); Suva Pumping Station, Savura Creek, 30–80 m, *Degener & Ordonez* 13578 (NY, UC, US), *Webster, Hildreth & Koroiveibau* 14108 (DAV); Tamavua village, 150 m, *Gillespie* 2424 (GH, K, UC); Tamavua Falls, *Tohill & Tohill* 712 (BISH); Tholo-i-Suva, *Parham* 1602, 1615 (BISH), *Webster & Hildreth* 14106 (DAV). Namosi: Mt. Voma, 500–850 m, *Gillespie* 2675, 2680, 2906 (GH, UC); Naitarandamu, 1100 m, *Gillespie* 3307.5 (GH, UC); hills N of Wainavindrau Creek, 250–450 m, *Smith* 8466, 8587 (GH, US). Rewa: Mt. Korombamba, 300 m, *Meebold* (BISH), *Webster, Hildreth & Kuruvoli* 14079 (BISH, DAV); 10–11 mi above Suva, *Meebold* 16758 (K); Suva, *Tohill & Tohill* F410, 700, 714 (K). Serua: Tholo West, Mbuyombuyo, near Namboutini, *Tabualewa* 15068 (A, UC, US); hills between Ngaloa and Wainiyambia, 50–100 m, *Smith* 9547 (BISH); near Ngaloa, Vatutavathe, below 150 m, *Degener* 15209 (A, N, UC, US); 5 mi N of Ngaloa, Tawavulu Creek, 500 ft, *Webster, Hildreth & Kuruvoli* 14354 (DAV).

DISCUSSION: Although endemic to Viti Levu, *Phyllanthus pergracilis* is common throughout much of the island and has been collected more than any other woody *Phyllanthus* in eastern Melanesia. Typically it may be easily distinguished from *P. heterodoxus* by its larger, sharply acuminate leaves, longer pedicels, and free stamens. Some aberrant collections, such as *Tabualewa* 15608, resemble *P. heterodoxus* in having blunter, smaller leaves; but these are still more distinctly narrowed to a point than is found in *P. heterodoxus*.

4. *Phyllanthus heterodoxus* Muell. Arg. in DC. Prodr. 15(2): 321. 1866; A. C. Smith, Fl. Vitiensis Nova 2: 463. 1981.—Type: Fiji, U.S. South Pacific Exploring Expedition (G, holotype; GH, isotype).

DESCRIPTION: Glabrous shrub ca. 2–3 m high; branchlets mostly bipinnatifid; main axis 10–18 cm long with 4–7 lateral axes; ulti-

mate leafy axes angular, 11–23 cm long, with 10–20 leaves. Leaves distichous on ultimate axes; blade thinly chartaceous, broadly ovate or suborbicular, obtuse or narrowed to a blunt point at the tip, obtuse or rounded to subcordate at base, 2–5 cm long, 1.5–3.5 cm broad, paler beneath; major lateral nerves 5–8 on a side, visible above, slightly raised beneath; veinlets prominent beneath but scarcely raised; margins plane; petiole adaxially channeled, 2–4 mm long; stipules lanceolate, deciduous, 0.5–1.8 mm long.

Monoecious; cymules axillary on ultimate leafy axes of branchlet; staminate flowers several, pistillate flowers solitary or less often paired at each axil.

STAMINATE FLOWER: Pedicel 2.5–4.5 mm long; sepals 6 (rarely 5), biseriate, the inner (0.8–) 1.2–1.8 mm long, 1–1.2 mm broad; disk segments 3, reniform, 0.2–0.5 mm across; stamens 3; filaments more or less connate, column about equaling anthers or shorter; anthers elliptic, 0.6–0.7 mm long, usually minutely apiculate, dehiscing vertically.

PISTILLATE FLOWER: Pedicel slender, becoming 9–18 (–35) mm long; sepals 6, biseriate, 1–1.2 mm long; disk thin, entire; ovary 3- or 4-locular; styles 0.5–1 mm long, nearly free to connate halfway, the tops recurved, entire to emarginate or shallowly bifid. Fruit capsular, ca. 4.5 mm across; seeds trigonous, brownish, smooth (faintly cross-striate), 2.3–2.6 mm long.

DISTRIBUTION: Endemic to Fiji, where it is definitely known only from two islands.

SPECIMENS EXAMINED

Fiji. Lau Group: Fulanga, limestone, 0–80 m, *Smith 1125* (BISH, GH, K, NY, UC, US). Vanua Levu: without specific locality, *U.S. South Pacific Exploring Expedition 5* (GH). Leta: interior, 2000 ft, *Greenwood 573* (K) Ma-thuata: Tikina Lambasa, 3050 ft, *Dept. Agr. 128718* (K); Lambasa, *Greenwood 573A* (K); Mt. Numbuiloa, 500–590 m, *Smith 6499* (BISH, US). Thakaundrove: Mt. Kasi, Yanawai River, 300–430 m, *Smith 1830* (GH, K, NY, UC, US); Mt. Mariko, 600–866 m, *Smith 444* (BISH, GH, NY, UC, US).

DISCUSSION: The type collection of *Phyllanthus heterodoxus* appears very different from *P. pergracilis* due to its small, broadly ovate leaves rounded at the tip. Other collections more closely approach the species of Viti Levu in having more elongated, pointed leaves, but the leaf tip is always blunt. The collection from Mt. Kasi (*Smith 1830*) has unusually long pedicels, quite agreeing with *P. pergracilis*, but the leaves, although larger and narrowed to the tip, are still blunt. The collection from Fulanga (*Smith 1125*) is vegetatively typical for *P. heterodoxus*, and the stamens are definitely connate. Although *P. heterodoxus* is obviously a closely related sister species of *P. pergracilis*, it appears justified to maintain the two species as distinct.

5. *Phyllanthus wilkesianus* Muell. Arg. in DC. Prodr. 15(2): 396. 1866; A. C. Smith, Fl. Vitiensis Nova 2: 463. 1981.—Type: Fiji, *U.S. South Pacific Exploring Expedition* (G, holotype; GH, isotype).

DESCRIPTION: Glabrous shrub or small tree, sometimes scandent, 1–4 m high; branchlets bipinnatifid; main axis of branchlet 10–28 cm long with (5–) 10–13 lateral axes; ultimate leafy axes 5–11 cm long, with 8–17 leaves. Leaves distichous on ultimate axes; blade thinly chartaceous, broadly obovate or suborbicular, rounded or retuse at tip, obtusely cuneate at base, ca. 1–2 cm long and broad, paler and glaucous beneath; major lateral nerves 5–8 on a side, raised beneath; veins and veinlet reticulum prominent on both faces; margins plane; petiole 1–1.5 mm long; stipules lanceolate, deciduous or somewhat persistent, 0.3–0.7 mm long.

Monoecious (apparently); cymules apparently unisexual, axillary, on ultimate leafy axes of branchlets; staminate flowers several, pistillate flowers solitary at each axil.

STAMINATE FLOWER: Pedicel 2.5–7 mm long; sepals 6, biseriate, the outer oblong or obovate, 0.7–1.5 mm long, 0.5–1 mm broad; disk segments 3, massive, 0.2–0.3 mm across; stamens 3; filaments connate into a column 0.3–0.6 mm high; anthers ovate, 0.2–0.4 mm broad, muticous, dehiscing horizontally.

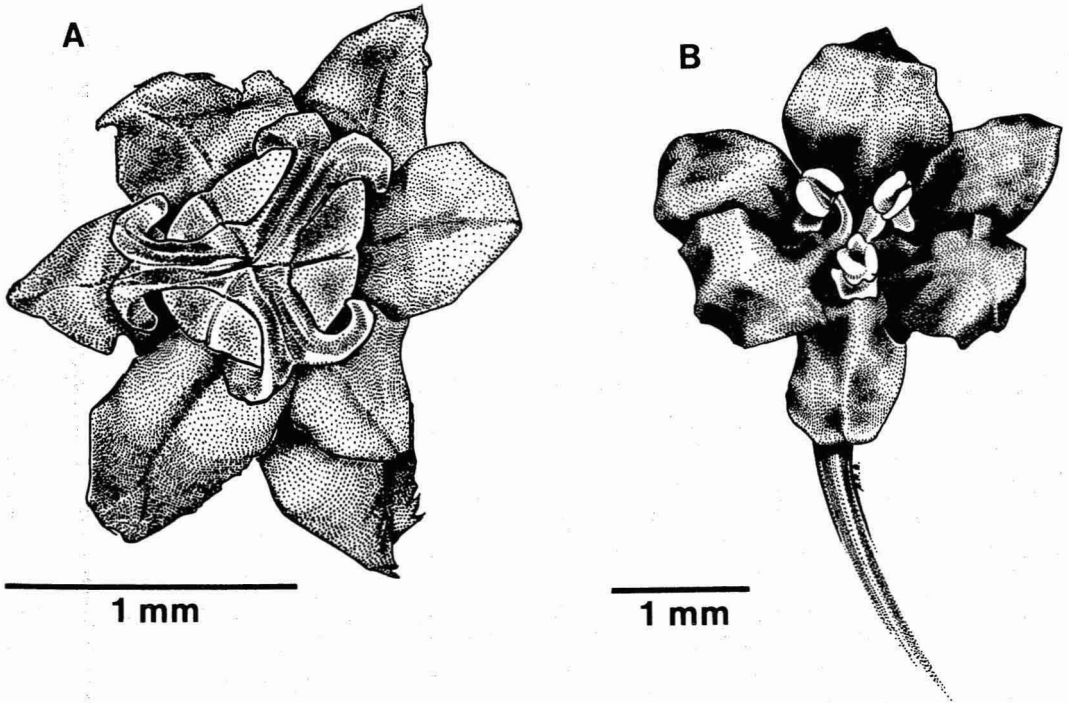


FIGURE 4. Flowers of *Phyllanthus smithianus* (Webster et al. 14078, DAV). A, pistillate flower. B, staminate flower.

PISTILLATE FLOWER: Pedicel slender, becoming 10–17 mm long in fruit; sepals 6, bi-seriate, ca. 0.5 mm long and broad; disk thin, entire, ca. 0.3 mm across; ovary 3-locular; styles bifid, ca. 0.5 mm long, free or nearly so, spreading. Fruit capsular: seeds not seen.

DISTRIBUTION: Endemic to Fiji, where it has been found in rain forests on both Vanua Levu and Viti Levu.

SPECIMENS EXAMINED

Fiji. Vanua Levu. Mathuata: Mathuata Mts., 2000 ft, *U.S. South Pacific Exploring Expedition 7* (GH); S base of Mathuata Range, N of Natua, 100–250 m, *Smith 6841* (BISH, US). Viti Levu. Mba: slopes N of Nandarivatu, 550–800 m, *Smith 6294* (A, BISH, NY, US); Nandarivatu, 800 m, *Gillespie 4159* (BISH, UC).

DISCUSSION: This appears to be a rare species. Although rather similar in aspect to *P. heterodoxus*, it is readily distinguished by the more rounded leaves and larger number of ultimate axes on the branchlets. The smaller

horizontally dehiscent anthers and distinctly bifid styles distinguish *P. wilkesianus* from both *P. heterodoxus* and *P. pergracilis*.

6. *Phyllanthus smithianus* Webster, sp. nov. sect. *Gomphidio*, differt ab aliis speciebus Fijiensibus ramulis pinnatiformibus, foliis ramulorum oppositis, staminibus filamentis liberis.—Type: Fiji, Viti Levu, Webster, Hildreth & Kuruvoli 14078 (DAV, holotype; BISH, GH, NY, US, isotypes). Figures 3B; 4A and B.

DESCRIPTION: Glabrous shrub or small tree 1–4 m high; branches terete, 2–3 mm thick, cataphylls inconspicuous, blade and stipules deltoid, ca. 0.5 m long; branchlets pinnatifid, 5–15 (–25) cm long, with 3–10 nodes. Leaves opposite at branchlet nodes; blade chartaceous, broadly ovate, obtuse to rounded at tip, cordate or rounded at base, 1.5–3 cm long, 1.5–2.7 cm broad, olivaceous above and paler beneath; midrib plane above, raised beneath; major lateral veins mostly 6–8 on

a side, slightly ascending, veinlets forming a prominulous reticulum; margins narrowly revolute; petiole 0.5–1.3 mm long, stipules triangular-lanceolate, 0.5–1.7 mm long.

Dioecious; cymules axillary to leaves on branchlets (i.e., paired at nodes); staminate cymules monochasial, axis to 1 mm long, with 8–10 flowers; pistillate flowers 1 or 2 per cymule.

STAMINATE FLOWER: Pedicel slender, terete, 3.5–5.5 mm long; sepals 6, biseriata, subequal, elliptic to suborbicular (outer sepals narrower), rounded at tip, 1–1.3 mm long, the outer 0.7–1 mm broad, the inner 1–1.3 mm broad; disk segments 3, massive, rectangular, not pitted, 0.3–0.5 mm across; stamens 3 (very rarely 2); filaments free, 0.2–0.4 mm long; anthers elliptic-oblong, muticous or apiculate, 0.25–0.5 mm long, dehiscing vertically.

PISTILLATE FLOWER: Pedicel slender, terete, becoming 5–7 mm long; sepals 6, biseriata, subequal, elliptic-oblong, obtuse at tip, 1–1.2 mm long, 0.5–0.6 mm broad; disk cupuliform, thin, margins entire, 0.5–0.6 mm across; ovary 3-locular, smooth; styles erect, free, ca. 0.5 mm high, shallowly bifid at tip. Fruit capsular; seeds trigonous, smooth, pale brownish, 2.3 mm long, 1.8 mm broad.

DISTRIBUTION: Endemic to rain forest, hills of southern Viti Levu, Fiji.

SPECIMENS EXAMINED

Fiji. Viti Levu. Rewa, woods at summit of Mt. Korombamba, 1400 ft, *Dept. Agr. 16532* (BISH) *Gillespie 2326* (BISH, GH, NY, US), *Parham 1276* (A), *Webster et al. 14078* (BISH, DAV, GH, NY, US). Serua: hills between Ngaloa and Wainiyambia, 50–100 m, *Smith 9630* (GH, NY, UC, US).

DISCUSSION: Although clearly related to *Phyllanthus heterodoxus* and *P. wilkesianus*, the *Phyllanthus* at the summit of Mt. Korombamba is clearly different in its pinnatifid branchlets with opposite leaves (a very rare character in *Phyllanthus*), as well as the free stamens. It is most appropriate to dedicate this striking new species to Dr. Albert C. Smith, the leading expert on the Fijian flora, a discriminating student of Fijian Euphor-

biaceae, and one of the few collectors of the species. The specimen collected in Serua by Dr. Smith differs from those taken on Mt. Korombamba in its longer branchlets with 12–16 nodes instead of 5–10, and by its apiculate rather than muticous anthers; nevertheless, it surely represents the same species.

7. *Phyllanthus amicorum* Webster, sp. nov. sect. *Gomphidio*, a *P. heterodoxo* plantae dioicae filamentis liberis, a *P. wilkesiano* filamentis liberis antheris verticaliter dehiscentibus recedit.—Type: Tonga, Eua, *Soakai 341* (K, holotype). Figures 3C, 5.

DESCRIPTION: Glabrous shrub or small tree to 4 m high; branches terete, ca. 1 cm thick, with elliptic branchlet scars 1–1.5 cm long; branchlets bipinnatifid; main axis of branchlet terete, (2–) 5–20 cm long, with 7–20 lateral axes; ultimate leafy axes proximally terete, distally compressed and narrowly (0.1–0.3 mm) winged, 10–20 cm long, with 12–22 leaves. Leaves distichous on ultimate axes; blade chartaceous, ovate, bluntly obtuse or rounded (and sometimes emarginate) at tip, obtuse to rounded at base, 2–4 cm long, 1.7–3 cm broad, olivaceous on both sides; midrib prominently raised beneath; major lateral veins 5–7 on a side, inconspicuous above, raised and prominent beneath, arching; veinlets obscure above, forming a prominent reticulum beneath; margins usually narrowly revolute; petiole 3–5 mm long; stipules lanceolate, acute or acuminate, 1–2 mm long.

Dioecious; cymules axillary on ultimate axes of branchlet; staminate cymules densely glomerulate (bract clusters at distal axils 1.5–2.5 mm across), with 10 flowers or more; pistillate cymules mostly with 2–5 flowers.

STAMINATE FLOWER: Pedicel stout and rather fleshy, 2–4 mm long; sepals 6, biseriata, subequal, narrowly elliptic to ovate, rounded or obtuse at tip, 1.5–2 mm long, 1–1.5 mm broad; midrib simple (outer lobes) or sparsely branched distally (inner lobes); disk segments 3, more or less reniform, not massive, 0.2–0.3 mm across; stamens 3 (rarely 2); filaments stout, free or united in lower third, 0.3–0.5 mm long; anthers elliptic-oblong,

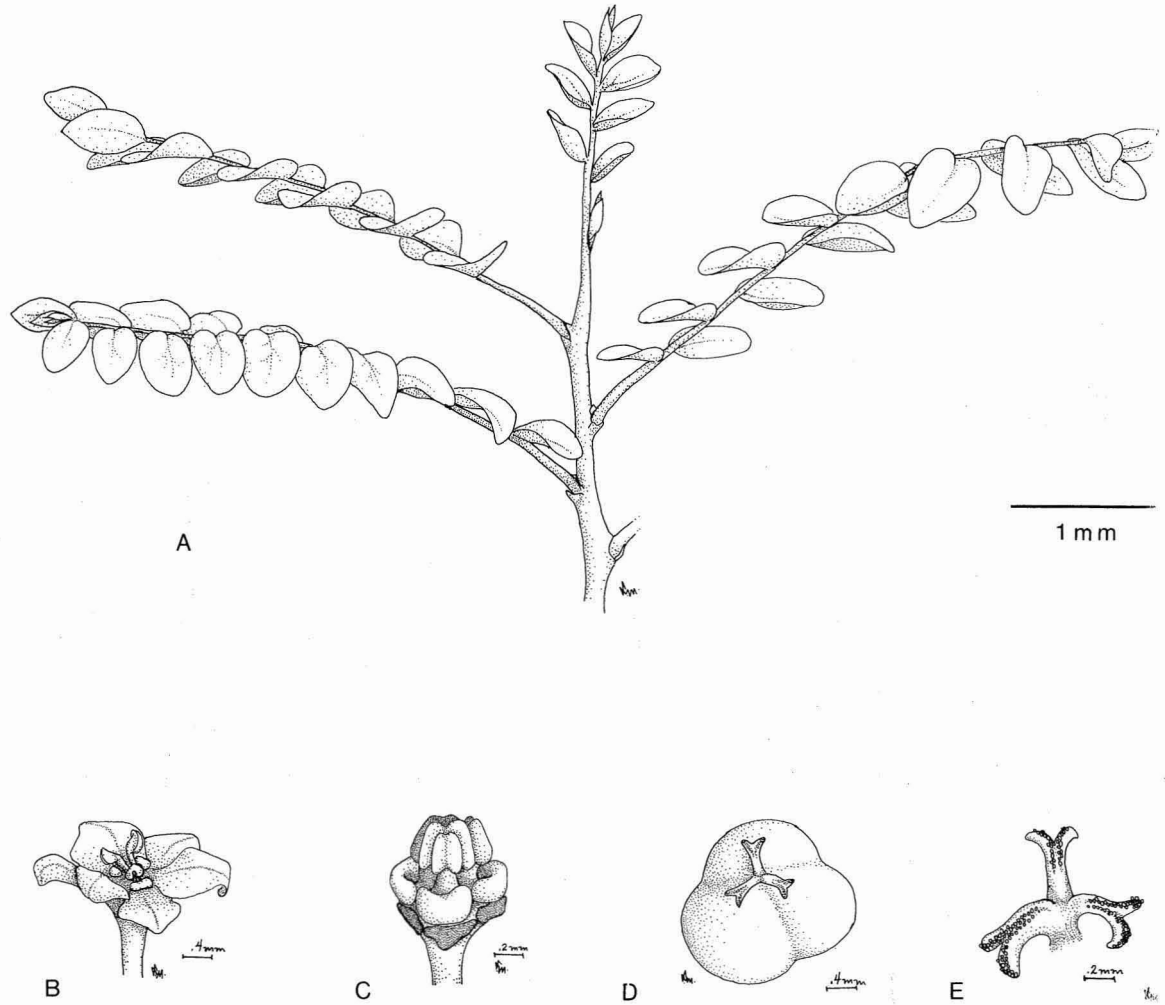


FIGURE 5. *Phyllanthus amicorum*. A, bipinnatifid branchlet (Parks 16152, UC). B, staminate flower. C, androecium and disk (Soakai 341, κ). D, E, immature fruit, enlargement of style (Parks 16287, UC).

0.8–1 mm long, 0.5–0.8 mm broad, bluntly apiculate, dehiscent vertically.

PISTILLATE FLOWER: Pedicel angular, ca. 2.5–3.5 mm long at anthesis, becoming 8–16 mm long in fruit; sepals 6, biseriate, subequal, slightly fleshy, elliptic, obtuse or rounded at tip, 1.3–1.5 mm long, 0.9–1.5 mm broad; disk cupuliform, thin, margins crenulate, ca. 1 mm across; ovary 3-ribbed, smooth, 3-locular; styles erect, free but connivent at base, 0.5–0.6 mm high, distally bifid or almost entire. Fruit capsular, oblate, obscurely ven-

ose, 4.1–4.6 mm in diameter; columella tapering, 1.7–2 mm long; seeds plano-convex (asymmetrically trigonous), light brown, shiny, minutely and obscurely reticulate, 1.9–2.4 mm long; hilum ovate, not invaginated, 0.4–0.6 mm long; rudimentary caruncle ca. 0.1 mm long often present.

DISTRIBUTION: Endemic to the island of Eua, Tonga.

SPECIMENS EXAMINED

Tonga. Eua: without specific locality, Dec. 1889, *Lister* (κ); Liku plateau, margin of

forest and exposed rocks, 300 m, *Parks 16154*, 16287 (UC); Liku terraces, 300 m, *Parks 16181* (UC); near Liku cliffs, *Parks 16152* (κ, UC); foot of cliff, 20 ft, *Soakai 341* (κ).

DISCUSSION: Although collected in 1889 by Lister and rediscovered by Parks in 1926, this species was not recognized in the flora of Tonga by Yuncker (1959), who accepted the misidentification of the Lister specimen as *Glochidion ramiflorum*. Hürlimann (1967) reported it as *Glochidion* cf. *vitiense* (Muell. Arg.) Gillespie. The collections of Parks in the Berkeley herbarium were filed under *Glochidion concolor*, which they indeed resemble in aspect. However, the well-developed floral disk and more or less bifid styles clearly preclude assignment of these Eua specimens to *Glochidion*.

In most characters, *Phyllanthus amicorum* shows the greatest resemblance to Fijian species of section *Gomphidium* such as *P. heterodoxus* and *P. wilkesianus*. It differs, however, in its combination of dioecy, vertically dehiscent anthers, and more or less bifid styles. Apparently the strongest resemblance with *P. amicorum* is shown by *P. rupi-insularis* Hosokawa of Palau, which is vegetatively very similar. The flowers in the Palau plant are also similar; however, *P. rupi-insularis* is monoecious, and the staminate flowers do not occur in dense glomerules, while the styles are entire instead of bifid as in *P. amicorum*. However, the pollen grains of the two species have distinctively different exine sculpturing. It is difficult to explain this remarkable disjunction of more than 5000 km between two similar and evidently rather closely related taxa.

Sect. *Eleutherogynium* Muell. Arg., *Linnaea* 32: 14. 1863; DC. *Prodr.* 15(2): 315. 1866.—Type: *Phyllanthus loranthoides* Baillon.

Glochidion sect. *Chorizogynium* Muell. Arg., *Linnaea* 32: 58. 1863.—Type (lectotype): *Phyllanthus macrochorion* Baillon.

Phyllanthus sect. *Scleroglochidion* Muell. Arg., DC. *Prodr.* 15(2): 317. 1866; syn. nov.—Type: *Phyllanthus myrianthus* Muell. Arg.

Shrubs with phyllanthoid branching; branchlets pinnatifid; flowers in axillary cymes; sepals 5 or 6, outer more or less scarious and denticulate; disk absent or rudimentary; stamens 3–6, filaments free or connate; anthers dehiscing vertically or obliquely; pollen grains 3-colporate, syncolporate, exine verruculate; ovary 3-locular; styles entire or bilobed; fruit capsular; seeds smooth.

As founded by Mueller, section *Scleroglochidion* was monotypic, including only the type species *Phyllanthus myrianthus* from the New Hebrides. In Mueller's treatment, however, the only distinction between section *Eleutherogynium* and section *Scleroglochidion* is the stamen number of 5 and 3, respectively. It is clear that section *Scleroglochidion* must therefore be reduced to synonymy. However, there is still only a single species of section *Eleutherogynium* in eastern Melanesia, *P. myrianthus*; it is the only species of the section recorded from outside New Caledonia.

8. *Phyllanthus myrianthus* Muell. Arg., DC. *Prodr.* 15(2): 317. 1866.—Type: Eromanga, *Cumming* (G, holotype). Figures 3E, F.

Phyllanthus myrianthus α *latifolius* Muell. Arg., op. cit. 318.

Phyllanthus myrianthus β *angustifolius* Muell. Arg., op. cit. 318.—Type: Eromanga, *Cumming* (G).

Phyllanthus fimbriatetepalus Guillaumin, *Bull. Mus. Hist. Nat. Paris* II. 9: 300. 1937.—Type: Eromanga, *Aubert de la Rue* (P; not seen).

DESCRIPTION: Glabrous shrub; branchlets pinnatifid, 5–14 cm long, with 5–10 nodes; branchlet axis. Leaves distichous on branchlet; blade stiffly subcoriaceous, narrowly to broadly lanceolate, obtuse to acute and apiculate at tip, cuneate at base, 3–8 cm long, 1–4 cm broad, plumbeous on both sides; midrib and major lateral veins (5–7 on a side, steeply ascending) raised on both sides; veinlet reticulum prominulous on both faces; margins more or less revolute; petiole 1–2 mm long; stipules lanceolate, thin and scarious, ca. 2–4 mm long, deciduous.

Monoecious; cymules axillary to leaves on branchlets, bisexual or staminate; staminate flowers in dense glomerules 4–6 mm across, pistillate flowers mostly solitary in each cymule.

STAMINATE FLOWER: Pedicel fleshy, 1–1.7 mm long; sepals 5 (rarely 6), oblong or ovate, the outer more or less scarious and denticulate, 1–1.2 mm long and broad, the inner entire, 1.3–1.5 mm long and broad; disk absent; stamens 4–6; filaments free or connate below, 0.8–1.5 mm long; anthers broadly elliptic, mucous, dehiscing obliquely or vertically.

PISTILLATE FLOWER: Pedicel scarcely developed (flower subsessile); sepals 5, similar to the staminate; disk absent; ovary 3-locular; styles free, unlobed, more or less clavate, 1–1.8 mm long. Fruit (not seen, descr. ex Muell. Arg.) capsular, 3.5 mm broad; seeds longitudinally striate.

DISTRIBUTION: Endemic to the New Hebrides (Vanuatu), in rain forest.

SPECIMENS EXAMINED

Vanuatu (New Hebrides): Aneityum: Anelgahaut Bay, *Kajewski* 908 (NY), 912 (A, NY); between Anelgahaut and Anumei, 25 June 1896, *Morrison* (K); summit of Ithumu, 30 June 1896, *Morrison* (K). Efate: Undine Bay, hills toward Mt. Macdonald, 27 August 1896, *Morrison* (K). Eromanga: Unbornale, *Cheeseman* 12 (K); Utuppenbu, *Cheeseman* 17 (K); Riv. Nouankao, *Raynal RSNH 16241* (BISH, K). Tanna: Lenakel, *Kajewski* 73 (NY). Also reported (with some doubt) from Epi by Guillaumin (1937).

DISCUSSION: *Phyllanthus myrianthus* has no close relatives within eastern Melanesia. However, although it has been assigned to a monotypic section, it resembles species of New Caledonia. Mueller (1866) noted a similarity to *P. loranthoides* Baillon of section *Eleutherogynium*, which has similar leaves and would appear to be closely related. Guillaumin (1937) assigned his *P. fimbriatetepalus* to section *Pentaglochidion*, which also has similar foliage but appears more distant because of the 5-locular ovary and distinctly pedicellate flowers.

Subg. *Phyllanthus*.—Type: *Phyllanthus niruri* L.

Herbs or shrubs with phyllanthoid branching; branchlets pinnatifid; sepals 4–6; disk usually dissected in staminate flower, entire or dissected in pistillate; stamens 2 or 3, filaments usually connate; anthers dehiscing vertically to horizontally; pollen grains 3- or 4-colporate; ovary 3-locular; styles mostly bifid; fruits capsular; seeds striate, ribbed, or verruculose.

Most of the weedy herbaceous species of *Phyllanthus* belong to this subgenus, which includes about 100 neotropical and paleotropical species. Probably none of the species in eastern Melanesia are native.

Sect. *Phyllanthus*.—Type: *Phyllanthus niruri* L.

Herbs or shrubs with phyllanthoid branching; staminate flowers proximal on branchlet, pistillate distal; stamens 2 or 3, anthers dehiscing obliquely or horizontally; ovary smooth; styles free; seeds striate, ribbed, or verruculose.

None of the approximately 75 species of this section are native in eastern Melanesia, although there are native species in Micronesia and western Melanesia.

9. *Phyllanthus amarus* Schum., Kongl. Danske Vidensk. Selskr. 4:195. 1829; Webster, J. Arnold Arb. 38:313. 1957; Smith, Fl. Vitiensis Nova 2:465. 1981.—Type: Guinea, *Schumacher & Thonning* (C, holotype, not seen; K, type fragment).

DESCRIPTION: Annual herb 1–5 dm high; branchlets 4–12 cm long, subterete, smooth or slightly scabridulous, with 15–30 leaves; leaf blade elliptic-oblong, obtuse or rounded at tip and base, mostly 5–11 mm long, 3–6 mm broad.

Monoecious; cymules bisexual, each consisting of one staminate and one pistillate flower.

STAMINATE FLOWER: Sepals 5, acute, 0.3–0.6 mm long; stamens 3, filament column 0.2–0.3 mm high; anthers dehiscing more or less obliquely.

PISTILLATE FLOWER: Pedicel 1–2 mm long in fruit; sepals 5, acute, 0.8–1.1 mm long; disk deeply and sometimes irregularly 5-lobed; ovary smooth; styles erect to spreading, not over 0.2 mm long, very shallowly bifid. Capsule ca. 2 mm in diameter, seeds 0.9–1 mm long, with 5–7 parallel ribs on the back.

DISTRIBUTION: Apparently native to the New World, but now a ubiquitous pantropical weed.

SPECIMENS EXAMINED

Vanuatu (New Hebrides). Espiritu Santo: Big Bay, *Raynal RSNH 16405* (K). Tonga. Lifuka: *Yuncker 15719* (GH, US). Tongatabu: Nukualofa, *Setchell & Parks 15329* (UC). Fiji. Ovalau: Lovoni, *Smith 7470* (US). Viti Levu. Lautoka: N of Lomoloma, *Degener & Ordonez 13689* (NY). Serua: Ngaloa, *Smith 9498* (GH, UC, US); Dobuilevu, *Parham 11001* (BISH); Suva, *Pillay 12233* (BISH).

10. *Phyllanthus debilis* Klein ex Willd., Sp. Pl. 4:582. 1804; Webster, J. Arnold Arb. 38:307. 1957; Smith, Fl. Vitiensis Nova 2:465. 1981.—Type: India, Madras, Tranquebar, 1799, *Klein* (B, Willdenow Herb., photographs of syntypes).

DESCRIPTION: Glabrous annual herb; branchlets sharply angled, 4–12 cm long, with 15–35 leaves; leaf blade narrowly elliptic, acute or subacute at tip, 8–20 mm long, 1.5–5 mm broad.

Monoecious; cymules unisexual; those at proximal nodes of branchlet staminate, pistillate flowers solitary at distal nodes.

STAMINATE FLOWER: Sepals 6, rounded to subtruncate at tip, 0.5–0.6 mm long; stamens 3, filament column 0.2–0.3 mm high; anthers dehiscing horizontally.

PISTILLATE FLOWER: Pedicel 1–1.6 mm long; sepals 6, obovate, rounded at tip, mostly 1.2–1.5 mm long; disk patelliform; ovary smooth; styles free, spreading, 0.2–0.3 mm long, bifid to middle. Capsule 2–2.2 mm in diameter; seeds 1–1.1 mm long, with 6 or 7 longitudinal ribs on the back.

DISTRIBUTION: Native to southern India and Ceylon; introduced into Indonesia, the

Pacific Islands, West Indies, and probably other tropical localities; apparently rare in Melanesia and known within eastern Melanesia only from Fiji.

SPECIMENS EXAMINED

Fiji. Viti Levu. Ra: Vaileka, *DA 7165* (BISH). Additional localities are cited by Smith (1981).

11. *Phyllanthus urinaria* L., Sp. Pl. 982. 1753; Muell. Arg. in DC. Prodr. 15(2):364. 1866; Webster, J. Arnold Arb. 38:194. 1957; Brittonia 22:65. 1970; Webster & Airy Shaw, Kew Bull. 26:91. 1971; Smith, Fl. Vitiensis Nova 2:464. 1981.—Type: Ceylon, *Herb. Hermann* (BM, holotype).

DESCRIPTION: Annual herb 1–5 dm high; branchlets compressed-winged, hirsutulous, 3–10 cm long, with 20–35 leaves; leaf blade oblong or obovate-oblong to linear, acute or obtuse and mucronulate at tip, 6–25 mm long, 2–9 mm broad.

Monoecious; cymules unisexual; proximal nodes of branchlet with solitary pistillate flowers, distal nodes with staminate cymules.

STAMINATE FLOWER: Sepals 6, obtuse, 0.3–0.5 mm long; stamens 3, filament column 0.1–0.15 mm high; anthers dehiscing vertically.

PISTILLATE FLOWER: Subsessile, pedicel not over 0.5 mm long in fruit; sepals 6, obtuse, 0.6–0.9 mm long in fruit; disk patelliform; ovary papillate; styles horizontally spreading, fused, bifid. Capsule more or less tuberculate, 2–2.2 mm across; seeds 1.1–1.2 mm long, with 12–15 sharp transverse ridges on back and sides.

DISTRIBUTION: Native to southern Asia but now widely spread as a weed in tropical and subtropical regions.

SPECIMENS EXAMINED

Fiji. Ovalau: Lovoni, *Smith 7471* (GH, NY, US). Viti Levu. Mba: summit of Mt. Nanggaranambulata, *Smith 4851* (BISH, NY); south of Nauwanga, *Smith 5824* (NY). Naitasiri: Koroniva, *DA 3978* (BISH); Tamavua, *Ledua 11220* (BISH); Waindina River, *Weiner 236* (BISH). A number of additional collections from Viti

Levu and Vanua Levu are cited by Smith (1981).

DISCUSSION: *Phyllanthus urinaria* is a variable species with a number of cytologically distinctive races (Nozeran et al. 1978). Until further studies are done, it is not clear whether the Fijian populations merit any taxonomic recognition at the subspecific level.

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