

FIVE NEW *FICUS* SPECIES (MORACEAE) FROM MELANESIA

TIMOTHY J. S. WHITFIELD¹ AND GEORGE D. WEIBLEN^{1,2}

Abstract. During recent ecological studies, five new species of functionally dioecious *Ficus* were identified from the lowland rainforests of northern Papua New Guinea. One species from subgen. *Sycidium*, sect. *Sycidium* (*Ficus sangumae*), three from subgen. *Sycomorus*, sect. *Adenosperma* (*F. rubrijuvenis*, *F. rubrivestimenta*, *F. wamanguana*), and one from subgen. *Sycomorus*, sect. *Sycocarpus* (*F. aurantiacafolia*) are described.

Keywords: *Ficus*, Moraceae, New Guinea, lowland rainforest

Five new *Ficus* L. species (Moraceae) from Melanesia were discovered during recent ecological research on plant-insect interactions in the northern lowland rainforests of Papua New Guinea. The objective of these studies was to quantify turnover in plant and caterpillar species diversity, or beta-diversity, across 75,000 km² of contiguous forest in the Ramu-Sepik river basins (Novotny et al., 2007). In plant surveys at eight sites across the area (Fig. 1), 87 *Ficus* species were encountered including the five described here and one in preparation. The number of *Ficus* species per site averaged 43 and local endemism was low such that most of the new

taxa are known from multiple localities. One of the new taxa was included in previous studies of pollinator specificity and co-phylogeny (Silvieus et al., 2007). Species descriptions were generated by coding information on aspects of growth, branching, leaves, stipules, and figs in DELTA format (Dallwitz et al., 1993). A justification for character states and completely parallel descriptions is provided in Laman and Weiblen (1998), whose regional interactive key has been extended to New Guinea. New species described below raise the total number of *Ficus* species known from New Guinea to 157 (Berg and Corner, 2005; Weiblen, 2006).

SUBGEN. *SYCIDIUM*, SECT. *SYCIDIUM*

1. ***Ficus sangumae*** Weiblen & Whitfeld, *sp. nov.*
TYPE: PAPUA NEW GUINEA, West Sepik Province: Utai, 03°23.043'S, 141°35.153'E, secondary forest, 300 m, 14 November 2003, G. D. Weiblen 2065 (Holotype: LAE; Isotypes: MIN, US, A, KEW, L, CANB, SING, MO, BRC). Fig. 2.

Frutex exiguus in solis infirmis evacuatis et in sylvae marginibus inapertis aulaeis. Fici affixis humili in caule vel in ramis rhizomatosis et maturescentibus rubris claris.

Rhizomatous shrub 20–50 cm. Twigs pubescent, 1.5–2.0 mm in diam., not hollow in cross section; without waxy glands below the nodes; stipules persistent, glabrous or pubescent, 0.25–0.60 cm long. Leaves spirally

arranged; elliptic or obovate, 8.5–21.0 cm long × 3.5–8.5 cm wide; scabrid; chartaceous; margin serrate or dentate; base cuneate or rounded, symmetric; apex pointed; venation pinnate; basal veins paired, as prominent as the secondary veins, 0.16–0.43 times as long as the leaf, departing at angles of 20–70 degrees from the midrib; secondary veins 6–9 pairs, more prominent than tertiary veins, raised above and below in dried leaves; areoles of more or less equal size; petioles glabrous or pubescent, 0.3–2.5 cm long; leaf glands paired in the axils of basal veins and in the axils of secondary veins; cystoliths paraxial; stomata not aggregated. Figs axillary or cauliflorous on short branches; stipitate; stipe surface glabrous or pubescent,

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¹ University of Minnesota, Bell Museum of Natural History and Department of Plant Biology, 1445 Gortner Avenue, St. Paul, Minnesota 55108.

² Author for correspondence. Email: gweiblen@umn.edu

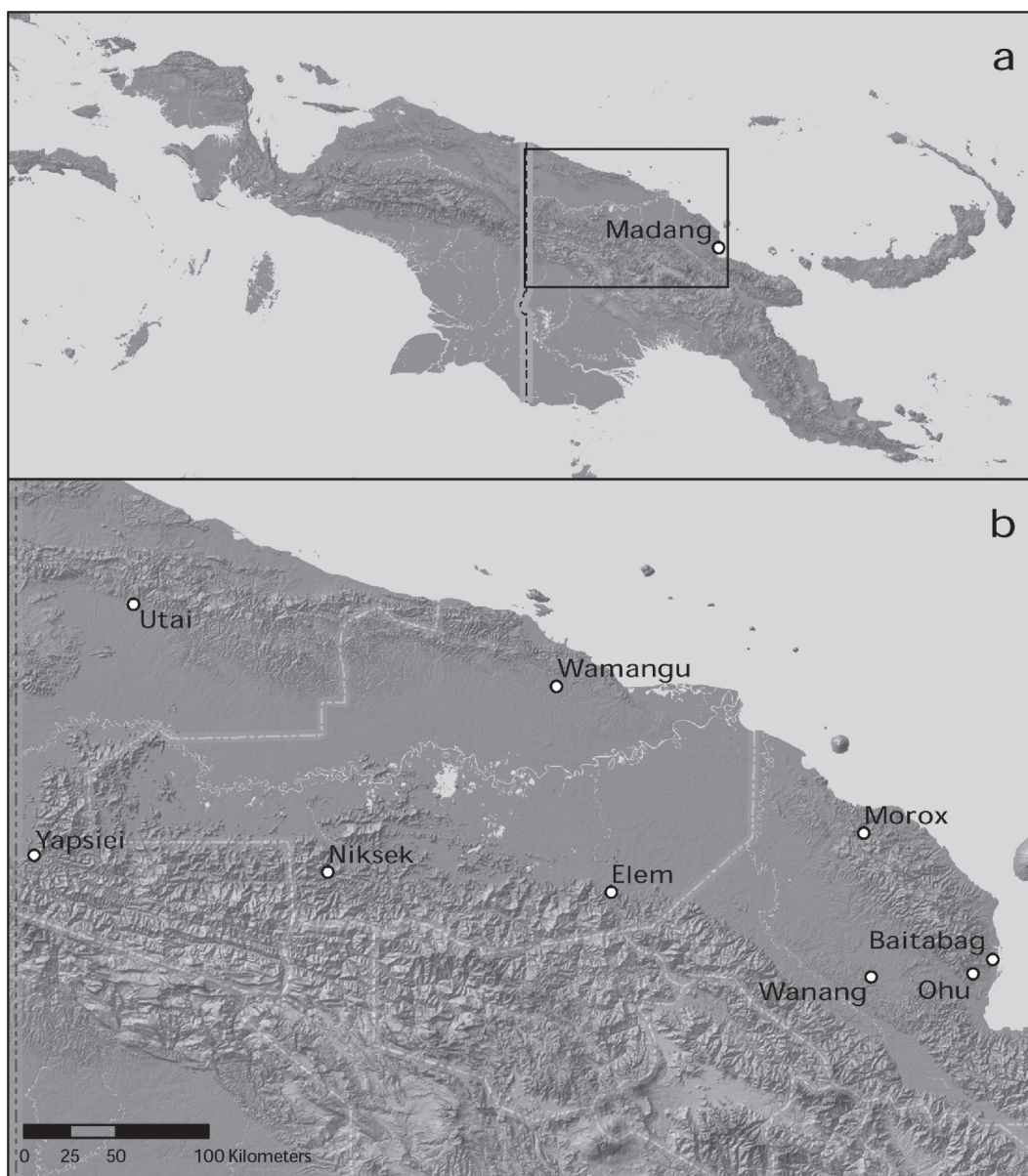


FIGURE 1. Map of New Guinea. **A**, indicating the general collection area; **B**, collection localities for the five new *Ficus* species.

2–4 mm long; globose or obconical, rounded at the apex; 5.0–8.5 mm long \times 6.0–8.2 mm wide; green, yellow, or brown; ripening red; without spots; basal bracts 3 at the bottom of the stipe, persistent in mature figs, glabrous, acuminate, more or less equal in size, 0.5 mm long; lateral bracts several; apical bracts 3, projecting; ostiolar bracts overlapping; inner epidermis without glandular hairs; pistillate florets varying within figs from sessile to pedicellate; pedicels glabrous; perianth glabrous, white, with

free tepals, margins entire; style subterminal; ovary white. *Achene* not flattened; smooth.

Etymology: of black magic or ‘sanguma’ in Melanesian Pidgin English. The plant is reported to have utility in practices concerning the supernatural.

Field characters: a rather slight, scandent shrub of poorly drained soils and closed canopy forest margins. Figs attached low on the stem or on rhizomatous branches and ripening bright red.

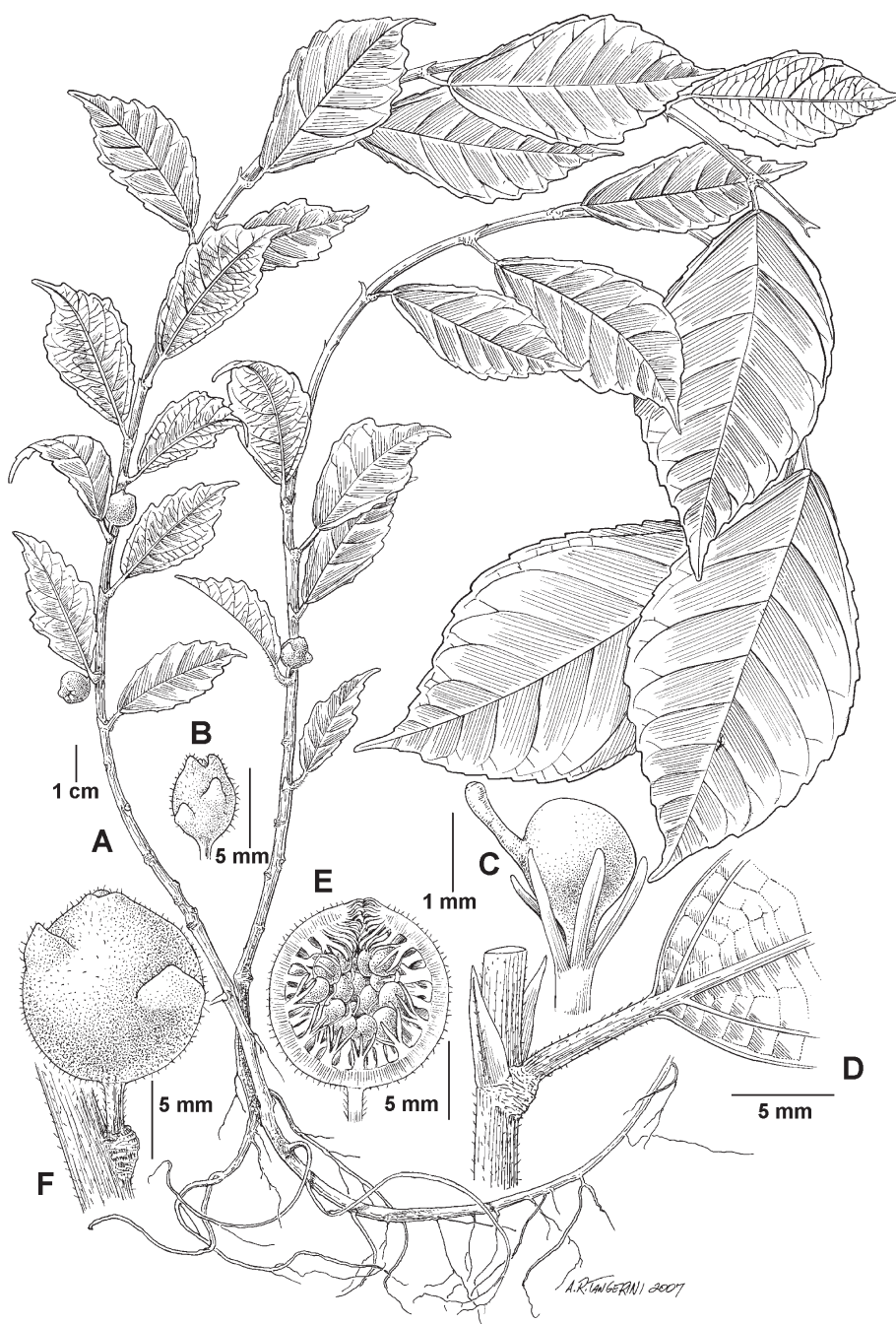


FIGURE 2. *Ficus sangumae* Weiblen & Whitfeld. **A**, habit; **B**, immature fig; **C**, pistillate floret; **D**, detail showing leaf attachment and stipules; **E**, detail of fig interior; **F**, mature fig. From G. D. Weiblen 2065 (MIN). Illustration by Alice Tangerini.

Distribution: Papua New Guinea: Madang Province, East Sepik, Province, West Sepik Province; Indonesia: Papua, Vogelkop Peninsula.

Habitat: primary lowland rainforest with a 30–40 m canopy.

Local names and uses: ‘dawong’ (Wanang language), ‘menafuay’ (Utai language); Utai villagers (West Sepik Province) report that leafy twigs are uprooted and brushed against the legs and feet to detach forest spirits from

the body upon leaving forest. Wanang villagers (Middle Ramu, Madang Province) describe a preparation of boiled twigs that is swallowed to purify the body when witchcraft is suspected.

Additional specimens examined: PAPUA NEW GUINEA. Madang Province: Wanang, 1 October 2006, *G. D. Weiblen 2731* (MIN, LAE, US, A), 16 July 2008, *T. J. S. Whitfeld 753* (LAE, MIN); East Sepik Province: Wamangu, 12 November 2007, *G. D. Weiblen 2791* (LAE, MIN, US, A), Niksek, 4 August 2003, *B. Isua* and *G. D. Weiblen 2811* (MIN); INDONESIA.

SUBGEN. *SYCOMORUS*, SECT. *ADENOSPERMA*

2. ***Ficus rubrijuvenis*** Weiblen & Whitfeld, *sp. nov.* TYPE: PAPUA NEW GUINEA. Madang Province: Ohu Conservation Area, 05°13'S, 143°41'E, 100 m, 3 November 2005, *G. D. Weiblen* and *B. Isua 2692* (Holotype: LAE; Isotypes: MIN, US). Fig. 3.

Differens ex F. erythrosperma Miq. in *praesentia foliorum rubrarum juvenalium et ex fico rubervestimentio in absentia venarum rubrarum in foliis adultis. Laminae glabrae sed venis pilis.*

Tree 5–10 m. Branches orthotropic. Twigs glabrous, 1.2–3.5 mm diam., hollow; without a waxy gland below the node; stipules caducous, pubescent, 0.5–1.5 cm long. Leaves spirally arranged, elliptic, 11–18 cm long × 3.5–8.2 cm wide, glabrous, with hairs on veins; coriaceous; margin entire; base cuneate or rounded, symmetric; apex pointed; venation pinnate; basal veins paired, as prominent as the secondary veins, 0.1–0.3 times as long as the leaf, departing at an angle of 20–65 degrees from the midrib; secondary veins 8–11 pairs, more prominent than tertiary veins, raised below but not above in dried specimens; areoles of more or less equal size; petioles pubescent, 0.7–2.5 cm long; leaf glands none; cystoliths abaxial. Figs axillary or cauliflorous; sessile or pedunculate; peduncle surface pubescent, 1–6 mm long, or absent; globose, rounded at the apex, glabrous, 6.5–8.8 mm long × 6.0–8.6 mm wide, green or yellow; basal bracts 3 scattered along the peduncle, persistent in mature figs, pubescent, rounded, more or less equal in size, 0.5 mm long; lateral bracts few; apical bracts more than 3; ostiolar bracts overlapping; inner epidermis with glandular hairs; pistillate florets varying within figs from sessile to pedicellate; pedicels glabrous; perianth glabrous with free tepals, red, entire; staminate florets ostiolar, 1 stamen per floret, filaments with epidermal

Papua: Gunung Meja, 13 October 2004, *B. B. Bau 016* (MAN, LAE, BO, K); Vogelkop Peninsula, 15 August 1995, *S. Zona and J. Dransfield 670* (FTG, K, BO, MAN, NY, BH, RSA).

A distinctive species of sect. *Sycidium* in New Guinea based on the rhizomatous and nearly prostrate habit. Compared to other lowland shrubs of the section in New Guinea, *Ficus sangumae* lacks the hirtellous, asymmetrical leaf of *F. erinobotrya* Corner, and the dark, strigose pubescence of *F. phaeosyce* Lauterb. & K. Schum.

hairs at the base, anthers not mucronate. Achene not seen.

Etymology: named for the red juvenile leaves.

Field characters: red juvenile leaves.

Distribution: Papua New Guinea: Madang Province.

Habitat: secondary and primary lowland rainforest.

Additional specimens examined: PAPUA NEW GUINEA. Madang Province: Ohu, 28 March 2002, *K. Molem, R. Kutil, and E. Tamitai BRC71* (MIN, LAE, US, A, K, L, CANB), 3 August 1995, *G. D. Weiblen and B. Isua B51* (MIN), 8 September 1995, *G. D. Weiblen and B. Isua B81.1* (MIN), Baitabag, 30 January 2003, *G. D. Weiblen and E. Dumont 1750* (MIN).

Recognized by villagers in Madang Province on the basis of its juvenile red leaves. Differs from *Ficus erythrosperma* Miq. in having larger and broader leaves (11–18 × 3.5–8.2 cm vs. 6.0–10.5 × 1.5–3.0 cm) with less acuminate apices. The short peduncle or absence thereof also distinguishes the species from *F. erythrosperma*.

3. ***Ficus rubrivestimenta*** Weiblen & Whitfeld, *sp. nov.* TYPE: PAPUA NEW GUINEA. Madang Province: Wanang Conservation Area, Usinobundi District, 05°4.824'S, 145°13.516'E, 105 m, 2 November 2009, *G. D. Weiblen & B. Isua 2818* (Holotype: LAE; Isotypes: MIN, US, A, KEW). Fig. 4.

Similaris ad F. erythrospermum Miq. *sed foliis maturis rubellis venis.*

Tree to 4 m and 3–11 cm dbh. Buttresses absent or less than 0.5 m in height. Branches orthotropic. Twigs glabrous, or pubescent, 1.6–3.0 mm in diam., hollow or with spongy pith; without waxy glands below nodes; latex color yellow; stipules caducous, pubescent, 1.2–2.3 cm long. Leaves spirally arranged, elliptic or obovate, 10.5–18.5 cm long × 4–7

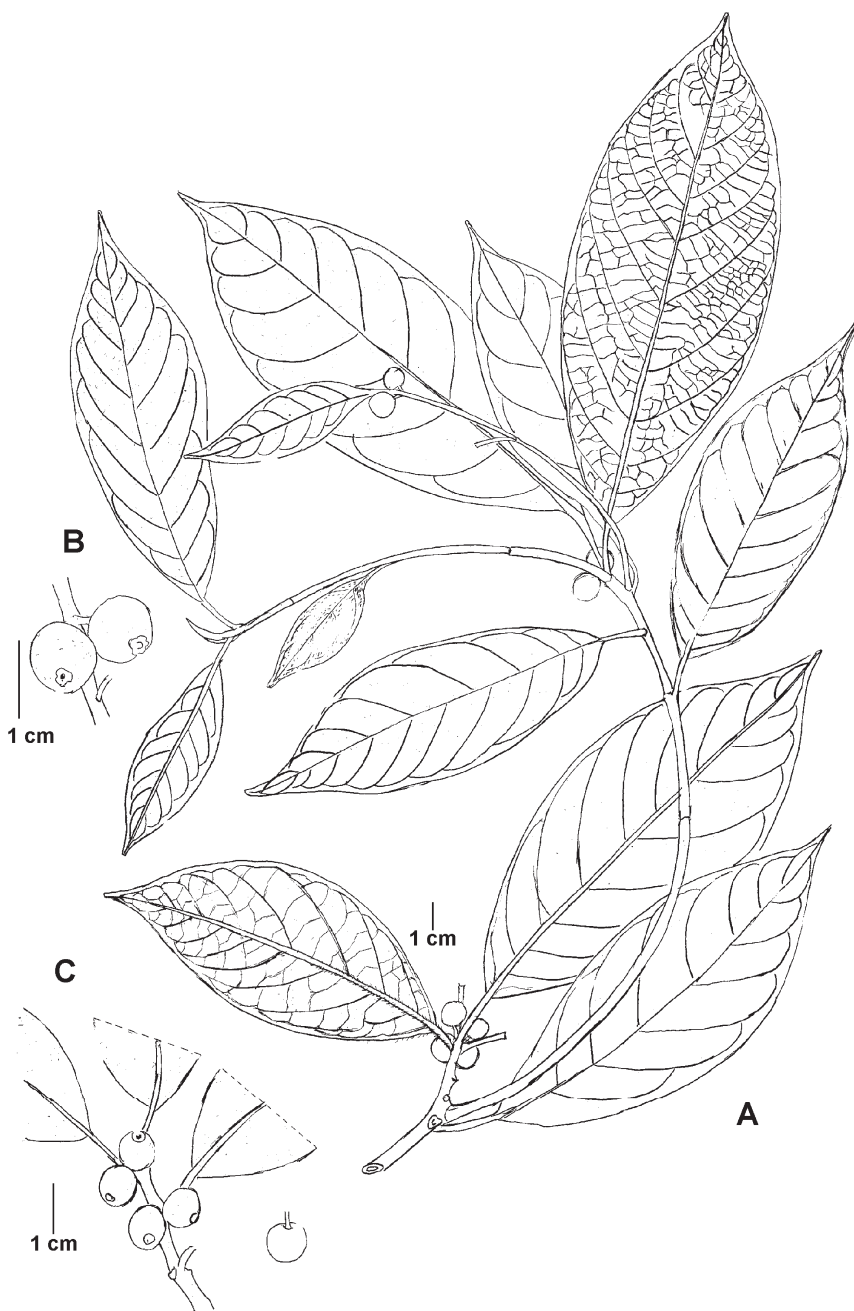


FIGURE 3. *Ficus rubrijuvenis* Weiblen & Whitfeld. A, branchlet; B, detail showing fig attachment; C, detail showing sessile, axillary figs. From G. D. Weiblen 2692 (MIN). Illustration by Lisa McGrath.

cm wide, glabrous except for sparse brown hairs on abaxial surface of veins, coriaceous; margin entire, base cuneate, symmetric; apex pointed; venation pinnate; basal veins paired, as prominent as the secondary veins, 0.1–0.3 times as long as the leaf, departing at an angle of

40–70 degrees from the midrib; secondary veins 9–13 pairs, more prominent than tertiary veins, raised below in dried leaves; aerole of more or less equal size; petioles glabrous or pubescent, 0.7–1.7 cm long; leaf glands none; cystoliths abaxial. Figs axillary; pedunculate; peduncle

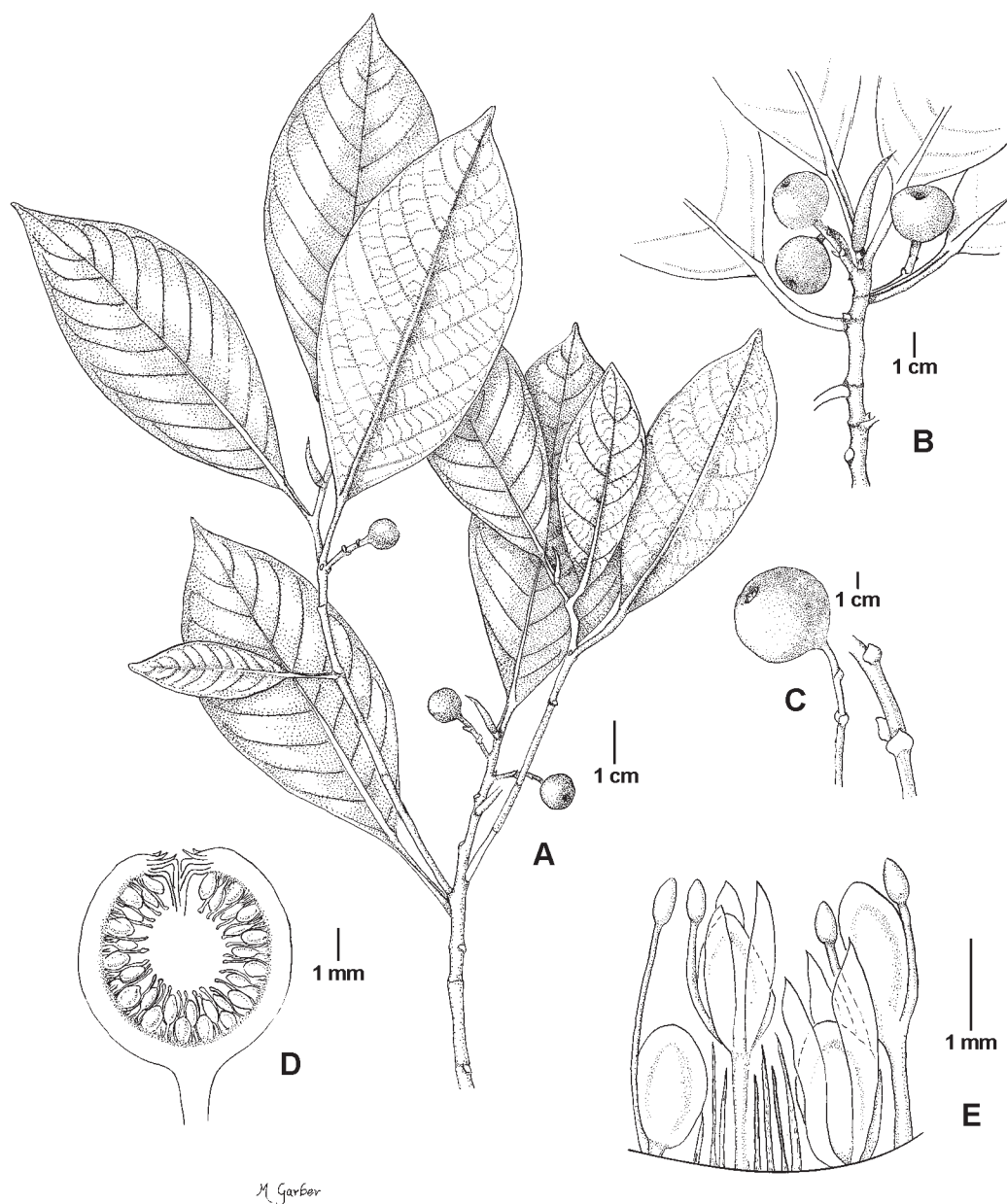


FIGURE 4. *Ficus rubrivestimenta* Weiblen & Whitfeld. **A**, branchlet; **B**, detail showing fig attachment; **C**, mature fig; **D**, detail of fig interior; **E**, detail showing pistillate florets. From *G. D. Weiblen 2310* (MIN). Illustration by Marilyn Garber.

surface pubescent, 12–16 mm long; globose, rounded at the apex, glabrous, 8–12 mm long \times 8–12 mm wide, green, without spots; basal bracts 3 scattered along the peduncle, persistent in mature figs, glabrous, acuminate, more or less equal in size, 0.5–1.0 mm long; lateral bracts none; apical bracts more than 3; ostiolar bracts

overlapping; inner epidermis with glandular hairs; pistillate florets varying within figs from sessile to pedicellate; pedicels glabrous; perianth glabrous with free tepals, white, entire; style subterminal to lateral, glabrous, not divided at the apex; stigma clavate; ovary superior, white. *Achene* flattened, smooth.

Etymology: named for the red dye produced from a boiled preparation of leaves and applied to natural fibers.

Field characters: mature leaves have reddish secondary veins.

Distribution: Papua New Guinea. Morox and Wanang (Madang Province), Wamungu (East Sepik Province).

Habitat: secondary and primary lowland rainforest.

Local names and uses: 'kolenohpakuwe' (Urimo language); 'ramon' (Miani language); 'kamam te' (Wanang language). Leaves are boiled to extract a red dye that is applied to grass skirts and string bags.

Additional specimens examined: PAPUA NEW GUINEA. East Sepik Province: Wamungu, 18 October 2004, *G. D. Weiblen, B. Isua, and B. Andreas* 2172 (LAE, MIN, US); Madang Province: Morox, 28 March 2005, *G. D. Weiblen* 2310 (MIN, LAE, US), Wanang, 28 August 2008, *T. J. S. Whitfeld* PB4C0250 (MIN, LAE), 14 August 2008, *T. J. S. Whitfeld* PA3C0135 (MIN, LAE), Usino subdistrict, 10 January 1970, *D. Foreman, I. Noble, and K. Farley* NGF 45905 (L, BRI, CANB, A, K).

Recognized by villagers in Madang Province on the basis of mature leaves with red lateral veins and juvenile leaves lacking red coloration (vs. *F. rubrijuvenis*). Also distinguished from the latter by fig peduncles exceeding 1.2 cm in length (vs. < 1 cm). Differs from *F. erythrosperma* in having larger leaves (10.5–18.5 × 4–7 cm vs. 6.0–10.5 × 1.5–3.0 cm) with less acuminate apices, and figs with longer peduncles (1.2–1.6 cm vs. less than 1 cm).

4. *Ficus wamanguana* Weiblen & Whitfeld, *sp. nov.* TYPE: PAPUA NEW GUINEA. East Sepik Province: near Wamungu village, 19 October 2004, 03°47.23'S, 143°39.12'E, 100 m, *G. D. Weiblen* 2186 (Holotype: LAE; Isotypes: MIN, US, A, K, L, CANB, SING, MO, NY, F). Fig. 5.

Arbor parva, ramificatione terminali praesente proximis cursibus aquae in sylvae inapertis aulaeis. Similaris ad F. servulum Corner *glabrum sed cum ramunculis pubescentibus ficsque et petiolis ubi juvenibus.*

Tree to 16 m and 15 cm dbh. Twigs pubescent, 1.5–2.5 mm in diam., hollow or with spongy pith; without waxy glands below the nodes; stipules caducous, pubescent, 0.7–1.4 cm long. *Leaves* spirally arranged, elliptic or obovate, 10.5–15.1 cm long × 2.8–5.4 cm wide,

pubescent, chartaceous; margin entire, serrate or dentate; base cuneate or rounded, symmetric; apex pointed; venation pinnate; basal veins paired, as prominent as the secondary veins, 0.1 times as long as the leaf; departing at an angle of 50 degrees from the midrib; secondary veins 12–14 pairs, more prominent than tertiary veins, raised below but not above in dried leaves; areoles of unequal size; leaf glands none; cystoliths abaxial. *Figs* axillary, sessile or pedunculate; peduncle surface glabrous, 0.4–2.0 mm long; globose, rounded at the apex, pubescent, 1.2–1.6 mm long × 1.2–1.7 mm wide; yellow-green at maturity; basal bracts 3 at the top of the peduncle, caducous, pubescent, acuminate, more or less equal in size, 2 mm long; lateral bracts none; apical bracts 3, forming a flattened disc; ostiolar bracts overlapping; inner epidermis with glandular hairs; pistillate florets varying within figs from sessile to pedicellate, pedicels glabrous; pistillate perianth with tepals free, glabrous, white or red, margins entire; style subterminal to lateral, glabrous, not divided at the apex; stigma clavate; ovary red. *Achene* flattened, smooth.

Etymology: named for Wamungu village in East Sepik Province where the species was first collected.

Field characters: small tree along water-courses in closed canopy forests, with 'Terminalia' branch architecture differing from the model of Aubréville in the potential for lateral shoots to overtake the main axis.

Distribution: Papua New Guinea: East Sepik Province.

Habitat: primary lowland rainforest.

Local names and uses: 'kolingipakuli' (Urimo language); sap turns red upon boiling in water and is used to dye grass skirts.

Additional specimen examined: PAPUA NEW GUINEA. East Sepik Province: Wamungu, *G. D. Weiblen* 2741 (MIN, LAE).

The species is similar to *Ficus pilulifera* Corner but differs in the presence of dense, erect, curling, 1 mm long hairs on the figs and adaxial leaf surface, as opposed to the absence of hairs on the figs and the presence of sparse, shorter hairs on the adaxial leaf surface in *F. pilulifera*. The species can be distinguished from *F. subcuneata* Miq. by several characters, most notably by the smaller, narrower leaves (10.5–15.1 × 2.8–5.4 cm vs. up to 20 cm × 9 cm) and smaller figs (1.2–1.6 × 1.2–1.7 mm vs. 1.2–2.2 × 2.1–2.8 mm) at maturity.

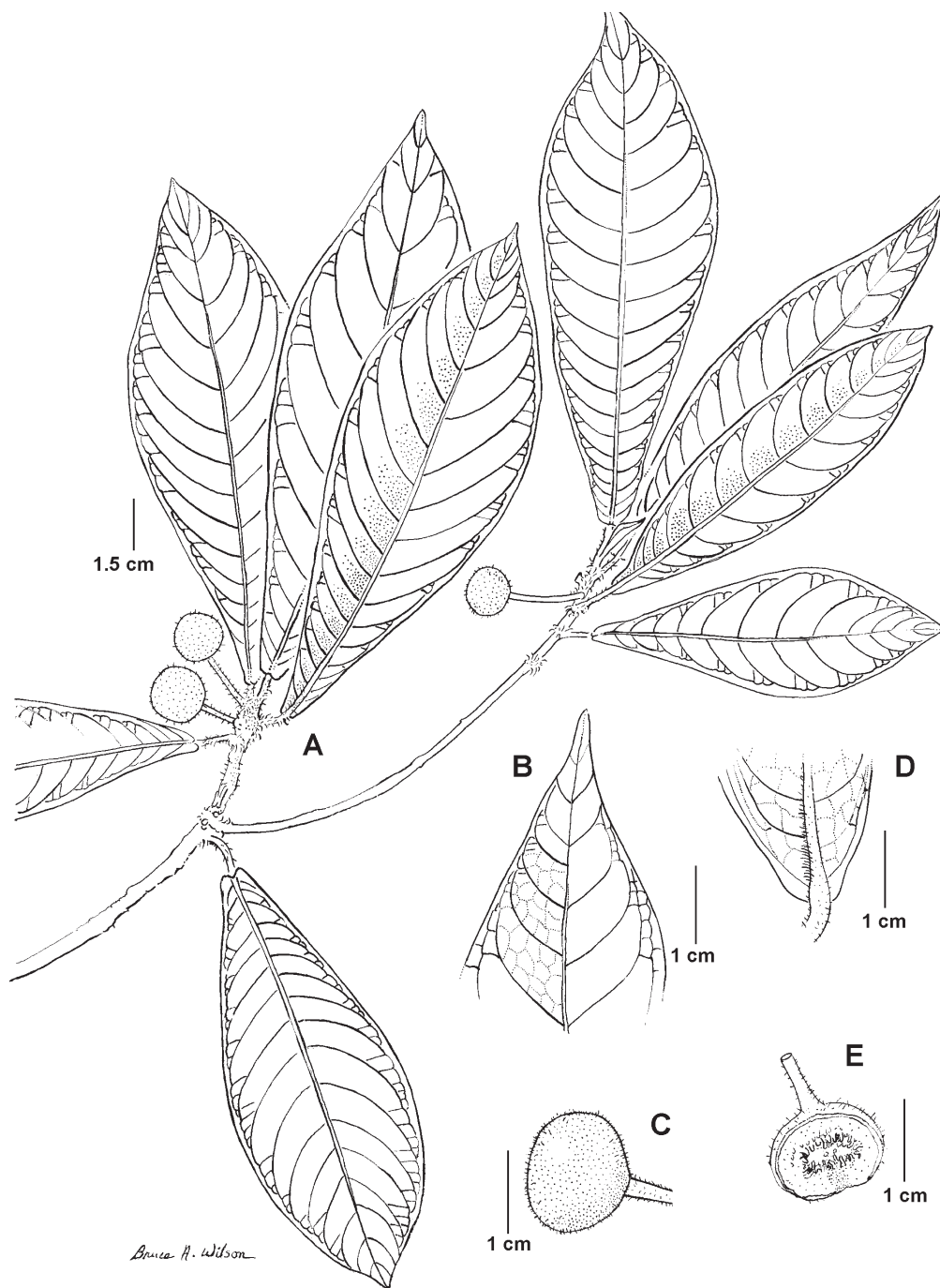


FIGURE 5. *Ficus wamanguana* Weiblen & Whitfield. A, branchlet showing 'Terminalia' branching pattern; B, detail of leaf apex; C, mature fig; D, detail of leaf base; E, detail of fig in cross section. From G. D. Weiblen 2186 (MIN). Illustration by Bruce Wilson.

SUBGEN. *SYCOMORUS*, SECT. *SYCOCARPUS*

5. *Ficus aurantiacafolia* Weiblen & Whitfeld, Bogia, 04°16'S, 144°58'E, 60 m, 28 March 2005, G. D. Weiblen 2337 (Holotype: LAE; *sp. nov.* TYPE: PAPUA NEW GUINEA. Isotype: MIN). Fig. 6.
 Madang Province: Morox village, near Yoro,

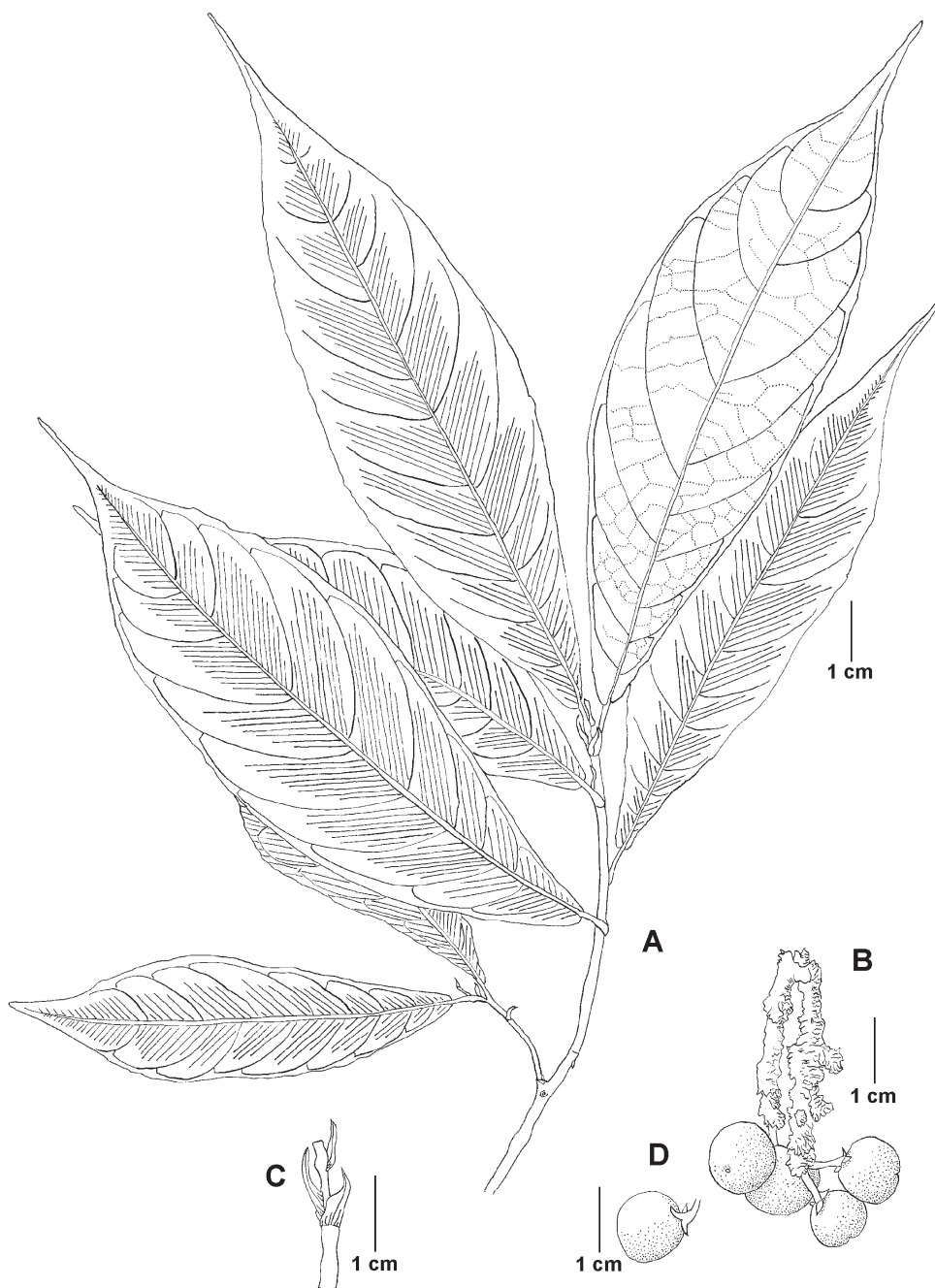


FIGURE 6. *Ficus aurantiacafolia* Weiblen & Whitfeld. **A**, branchlet showing subnodal gland on twig ; **B**, cauliflorous fig-bearing branches; **C**, detail showing stipules; **D**, detail of fig showing basal bracts. From *J. Ericho & D. Wright JE28* (MIN). Illustration by Debra Greenblatt.

Folia siccitate aurantiaca clara, cum rubellis ad aurantiacum venis in paginae folii inferiori.

Tree to 10 m. Twigs glabrous, 2.2–5.0 mm in diam., hollow or with spongy pith; with waxy glands below the nodes; stipules caducous, glabrous, 0.7–1.0 cm long. Leaves spirally arranged, elliptic or lanceolate or obovate, 14–25 cm long × 3.8–6.8 cm wide, glabrous, coriaceous; margin serrate or dentate; base cuneate, symmetric or asymmetric; apex pointed; venation pinnate; basal veins not paired, as prominent as the secondary veins; secondary veins 7–9 pairs, more prominent than tertiary veins, raised below but not above in dried specimens; areoles of more or less equal size; petioles glabrous, 0.7–1.0 cm long; leaf glands in axils of the secondary veins; cystoliths abaxial. Figs cauliflorous on short leafless branches along the main trunk; pedunculate; peduncle surface glabrous, 4–9 mm long; globose or obconical, rounded at the apex, glabrous, 7–12 mm long × 6.8–13 mm wide, ripening yellow; basal bracts 3 at the apex of the peduncle, persistent in mature figs, glabrous, acuminate, more or less equal in size, 1 mm long; lateral bracts none; apical bracts more than 3; ostiolar bracts overlapping; inner epidermis without glandular hairs; pistillate florets varying within figs from sessile to pedicellate; pedicels glabrous; perianth glabrous, with tepals fused at the base, margins entire; style subterminal to lateral, glabrous, stigma funnelliform; ovary superior; staminate florets ostiolar, one stamen per floret, pedicellate; anthers bilocular, not mucronate. Achene not seen.

Etymology: named for the orange color of the dried leaves.

Field characters: leaves drying orange with reddish orange veins on lower leaf surface.

Distribution: Papua New Guinea: Madang Province, West Sepik Province, Chimbu Province; Indonesia: Papua.

Habitat: secondary and primary lowland

rainforest to hill forest.

Local names: ‘ta-tea’ (Nobanob language); ‘tumbi tumbi’ (Miani language).

Additional specimens examined: PAPUA NEW GUINEA. Madang Province: Ohu, 13 August 2003, *D. Stancik and B. Isua 4880* (MIN BRC, LAE, US, A, K, L, CANB, SING), 27 June 1996, *G. D. Weiblen and B. Isua B119* (MIN), 19 August 1996, *G. D. Weiblen and B. Isua B156* (MIN), 8 July 2004, *B. Isua B271* (MIN) and *B272* (MIN), 15 September 2004, *B. Isua B299* (MIN) and *B300* (MIN); Baitabag 28 July 1995, *G. D. Weiblen G087.0* (AAU), 31 May 1996, *G. D. Weiblen G122.0* (A), 25 November 1996, *G. D. Weiblen G123* (K), *G124* (L); Morox, 28 March 2005, *G. D. Weiblen 2337* (MIN, LAE); Chimbu Province: Crater Mountain Biological Research Station, 12 January 1995, *J. Ericho and D. Wright JE28* (MIN), unknown dates, *D. Mack T5165* (MIN), *T5186* (US, K), *T6176* (L); Sandaun Province: Yapsiei, 26 March 2004, *M. Janda, Y056* (MIN); INDONESIA. Papua: Vogelkop Peninsula, Kebar Valley, 7 December 1961, *P. van Royen and H. Sleumer 6751* (L, K, BO, P, MO, RSA).

Differing from *Ficus ternatana* Miq. of the Moluccas in the absence of axillary figs, the absence of hairs on the abaxial surface of the lamina, and the presence of sparse, short, tightly appressed white hairs on the adaxial veins. In New Guinea, the species is distinguished from similar species of sect. *Sycocarpus* in several characters: leaf margins are more crenulate and figs much smaller (1.3 cm wide vs. up to 3 cm wide) than in *F. congesta* Roxb., and leafless branchlets bearing cauliflorous figs are much shorter (1–3 cm vs. 5 cm) and more densely branched than in *F. arfakensis* King. In contrast to *F. adelpha* K. Schum. & Lauterb., the receptacle is completely glabrous (vs. sub-hispid). The species was referred to as *F. cf. ternatana* in Novotny et al. (2007) and Silvieus et al. (2007).

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