

A TAXONOMIC REVISION OF MALLOTUS SECTION PHILIPPINENSES (FORMER SECTION ROTTLERA – EUPHORBIACEAE) IN MALESIA AND THAILAND

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SUMMARY

A revision of *Mallotus* section *Philippinenses* (former section *Rottlera*) in Malesia and Thailand is given. Descriptions, distribution maps, habit drawings, and a key to the species are provided. The diagnostic characters for the section are briefly discussed. Five species (*M. kongkandae*, *M. leptostachyus*, *M. pallidus*, *M. philippensis*, and *M. repandus*) are recognised. *Mallotus chromocarpus* is excluded from the section because it has more shared characters with the monospecific genus *Octospermum*, like the presence of indehiscent fruits, absence of stipules, marginal extrafloral nectaries on the upper side of the leaf blade, broad connectives (shaped umbrella-like), and its occurrence in New Guinea, and is therefore probably closely related to it.

Key words: Euphorbiaceae, Rottlerinae, *Mallotus*, *Philippinenses*, *Rottlera*, *Octospermum*, Malesia, taxonomy.

INTRODUCTION

Mallotus Lour. is a genus of shrubs, trees, and climbers, with c. 150 species. It is classified in the subfamily Acalyphoideae, subtribe Rottlerinae (Euphorbiaceae s.s.), together with six other genera: *Avellanita*, *Cordemoya*, *Neotrewia*, *Octospermum*, *Rockinghamia*, and *Trewia* (Radcliffe-Smith, 2001). *Mallotus* is mainly found in (sub)tropical Asia, Australia, and the Pacific, with only a few species in tropical Africa and Madagascar (Webster, 1994).

The genus *Mallotus* was first described by De Loureiro (1790). He included only one species (*Mallotus cochinchinensis*), which is a synonym of *Mallotus paniculatus* (Lam.) Müll.Arg. Morphologically *Mallotus* can be recognised by the presence of stellate hairs (often in combination with simple hairs), coloured glandular hairs, extrafloral nectaries on the leaves, leaves that are alternate or opposite (then unequal in size), a lack of petals, undivided stigmas, and capsules (often armed with spines). The large number of species in *Mallotus* together with variable morphology has resulted in three main subgeneric classifications. The first was proposed by Müller Argoviensis (1865, 1866), recognising a total of five sections. However, he classified some species in different sections, which are now considered to be synonyms. This shows the large morphological variability within some of the species and also his unclear sectional delimitations. Pax & Hoffmann (1914) proposed a new subdivision into ten sections, which was later refined by Airy Shaw (1968). Airy Shaw subdivided the genus into

eight sections, *Axenfeldia*, *Hancea*, *Mallotus*, *Oliganthae*, *Polyadenii*, *Rottlera*, *Rottleropsis*, and *Stylanthus*.

A taxonomic revision of Malesian species of the separate sections *Hancea*, *Polyadenii*, and *Stylanthus* has been published by Bollendorff et al. (2000) and Slik & Van Welzen (2001a). Phylogenetic studies of *Mallotus* based on morphology have also been performed by the latter two authors (Slik & Van Welzen, 2001b). Their results show that sections *Hancea*, *Oliganthae*, *Polyadenii*, and possibly *Mallotus* are monophyletic, and that all the other sections are either paraphyletic (*Rottlera*, *Stylanthus*) or polyphyletic (*Axenfeldia*, *Rottleropsis*). However, their phylogenetic hypotheses are not stable, because of weak support for most branches and incomplete taxon sampling: only the sections that had previously been taxonomically revised include all the representative species, while the remaining sections include few taxa.

Although the sectional delimitations based on morphological characters are unsatisfactory, we will follow the traditional generic delimitation as circumscribed by Airy Shaw (1968) until the phylogenetic studies of the sections of *Mallotus* based on molecular and morphological data are completed.

Nomenclature follows the rules as accepted by the Botanical Congress of St. Louis (Greuter et al., 1999).

MALLOTUS SECTION PHILIPPINENSES VERSUS ROTTLEA

The section *Philippinenses* was previously named *Rottlera*. However, nomenclatural problems with this name prohibit its further use and the younger name *Philippinenses* Pax & K. Hoffm. should be preferred.

The name *Rottlera* was first used by Willdenow (1798) when he described the species *Rottlera indica* Willd. However, this combination is superfluous: Willdenow cited the validly published name *Tetragastris ossea* Gaertn. (Gaertner, 1790) in the synonymy, meaning, that he should have made the combination *Rottlera ossea*. Therefore, *Rottlera* is a homotypic synonym of *Tetragastris*, which belongs to Burseraceae. Willdenow also mentioned that *M. cochinchinensis* might belong to the same genus, but this does not imply that he should have referred his plant to the genus *Mallotus*, as Airy Shaw (1968) suggested.

Soon after, Roxburgh (1802) described another species: *Rottlera tinctoria* Roxb. In 1806 Willdenow synonymised *Rottlera* (incl. *Tetragastris*!) with *Trewia* and erroneously thought that the name became available again for a different use. Under modern rules this is not allowed and he is considered to have created an illegitimate, later heterotypic homonym. He attributed the authorship to Roxburgh (1802), which is also incorrect, as Roxburgh merely added a species to the first species of *Rottlera*.

Rottlera Roxb. ex Willd. was subdivided into three sections by Reichenbach & Zollinger (1857). Of these, *Rottlera* sect. *Pseudorottlera* and sect. *Stylanthus* are valid, but *Eurottlera* is invalid (Art. 21.3).

Shortly afterwards, Müller Argoviensis (1865) reduced *Rottlera* Roxb. ex Willd. to *Mallotus*, and included *R. tinctoria* in *Mallotus philippensis* (Lam.) Müll.Arg., in sect. *Eumallotus* (also an invalid name).

Later, Pax & Hoffmann (1914: 147, 178) published the new sectional name *Philippinenses* for the group of species centring around *M. philippensis*.

Finally, Airy Shaw (1968) proposed a new sectional subdivision of *Mallotus*. He discussed the nomenclatural relationships between sect. *Philippinenses* and *Rottlera*, rejecting the first name because it would be an erroneous spelling, and because of the earlier *Eurottlera* Rchb.f. & Zoll. (Airy Shaw, 1968; 391, 392). He, therefore, erroneously proposed sect. *Rottlera* “((Willd.) Rchb.f. & Zoll., corr.) Airy Shaw”. He did not realize that the first argument cannot be sustained because a sectional name can be spelled in any way that the authors please, and the presence of a ‘*philippensis*’ does not require one to call the section ‘*philippenses*’. Furthermore, under the present code illegitimate names do not automatically generate autonyms (Art. 22.5). Therefore, sect. *Rottlera* Airy Shaw is a superfluous name for sect. *Philippinenses*.

In this revision we provisionally accept the sectional composition as circumscribed by Airy Shaw and recognise five taxa in Malesia and Thailand: *Mallotus leptostachyus* Hook.f., *M. pallidus* (Airy Shaw) Airy Shaw, *M. philippensis* (Lam.) Müll.Arg., and *M. repandus* (Willd.) Müll.Arg. *Mallotus kongkandae* Welzen & Phattar., belongs to this section as well (Van Welzen & Phattarahirankanok, 2001), while *M. chromocarpus* Airy Shaw is excluded (see under Excluded Species). The section *Philippinenses* can be distinguished by a combination of characters such as the presence of stellate and/or simple hairs, and sessile, globular to disc-shaped, light yellow to red glandular hairs on most parts; alternate leaves, blade not peltate, with two basal or several marginal extrafloral nectaries on the upper surface, 3-nerved; unisexual inflorescences; and a dense layer of glandular hairs on the fruits, which lack spines.

The studies of Slik & Van Welzen concerning the phylogeny of *Mallotus* based on morphology suggested that section *Philippinenses* (*Rottlera*) is paraphyletic and that *M. tiliifolius* (Blume) Müll.Arg. (now *M. papillaris* (Blanco) Merr.) should be included, because it shares some derived characters such as the loss of the fenugreek odour, the densely stellate indumentum, and the sessile stigmas (Slik & Van Welzen, 2001b). However, *M. tiliifolius* differs from section *Philippinenses* in the presence of opposite leaves and fruits with spines. Until more taxa have been added to this study and molecular data have been included in the analyses, it remains unclear whether or not *M. tiliifolius* should be included in section *Philippinenses*.

MALLOTUS section PHILIPPINENSES

Mallotus Lour. sect. *Philippinenses*: Pax & K. Hoffm. (1914) 178. — Type: *Mallotus philippensis* (Lam.) Müll.Arg.

Rottlera Roxb. ex Willd. (1806) 641, 832, non Willd. (1798). — *Rottlera* Roxb. ex Willd. sect. *Eurottlera* Rchb.f. & Zoll. (1857) 314, nom. inval. — *Mallotus* sect. *Eumallotus* Müll.Arg. (1865) 186, nom. inval. — *Mallotus* sect. *Rottlera* ((Willd.) Rchb.f. & Zoll., corr.) Airy Shaw (1968) 392, nom. superfl. — Type: *Rottlera tinctoria* Roxb. [= *Mallotus philippensis* (Lam.) Müll.Arg.].

Woody climbers or small trees, dioecious; branches glabrescent. *Indumentum* composed of stellate, and/or simple hairs, and sessile, globular to disc-shaped, light yellow to red glandular hairs (sometimes drying greenish). *Stipules*: margin entire, apex acuminate. *Leaves* alternate to apically subopposite, simple; petiole basally and apically pulvinate or not; blade not peltate, upper surface glabrous except on midrib and nerves (to rarely hairy all over), extrafloral nectaries basally or marginally, orbicular to elliptic, midrib, nerves and veins occasionally with glandular hairs, prominent, 3-nerved, nerves looping to ending in the margin, veins scalariform, veinlets reticulate. *Inflorescences* panicles or

racemes, the latter axillary (1 or 2 together) or terminally grouped (1 to several), erect, unisexual; bracts 1 per node; bracteoles present or absent, both triangular, margin entire, apex acute to acuminate. *Flowers* actinomorphic, not exceeding 1 cm diam.; pedicels hairy; sepals persistent, valvate, densely hairy outside, subglabrous to sparsely hairy inside, with glandular hairs on both sides, margin entire, apex acute; petals and disc absent. *Staminate inflorescences* with several flowers per bract. *Staminate flowers*: sepals 3–5, ovate to elliptic, free, reflexed; stamens 18–75, glabrous to hairy, anthers basifixed, thecae 2, separate from each other, ovoid to ellipsoid, opening extrorse and lengthwise, sometimes the apex with glandular hairs, connective widened or not, papillose; pistillode present or absent. *Pistillate inflorescences* with one flower per bract. *Pistillate flowers*: sepals 3–6, ovate or narrowly triangular, free, reflexed or erect, persistent in fruits; ovary with glandular hairs, locules 2 or 3, 1 ovule per locule; stigmas sessile or not, narrowly triangular, plumose, densely covered with papillae above, outer surface hairy and with glandular hairs; staminodes absent. *Fruits* dehiscent capsules, surface with glandular hairs; wall glabrous to sparsely hairy inside. *Seeds* globose, somewhat trigonous in transverse section; caruncle or aril absent.

Distribution — From Pakistan to South China and South Japan, throughout Southeast Asia and Malesia to East Australia and New Caledonia.

KEY TO THE SPECIES

- 1a. Shrubs or small trees. Upper leaf surface with usually 2 basal extrafloral nectaries. Fruits (2- or) 3-locular 2
- b. Climbers. Upper leaf surface with more than 2 marginal extrafloral nectaries. Fruits (1- or) 2- or 3-locular. **5. *M. repandus***
- 2a. Extrafloral nectaries next to the basal nerves on the upper leaf surface, lower surface not glabrescent. Fruits opening loculicidally-septicidally. 3
- b. Extrafloral nectaries on the basal nerves on the upper leaf surface, lower surface glabrescent. Fruits opening septicidally-loculicidally. 4
- 3a. Glandular hairs mostly red, conspicuous. Fruit wall less than 1 mm thick.
- b. Glandular hairs yellowish orange, inconspicuous. Fruit wall 2–3 mm thick **4. *M. philippensis***
- b. **1. *M. kongkandae***
- 4a. Leaf blade 16–26 by 6–11.5 cm. Stipules 1.3–1.7 mm long. Glandular hairs orange to light-red. Lower leaf surface indumentum sparse, composed of simple and stellate hairs. Inflorescences more than 13 cm long **2. *M. leptostachyus***
- b. Leaf blade 7–14.5 by 2.2–5.2 cm. Stipules 3–6 mm long. Glandular hairs light yellow. Lower leaf surface indumentum tomentose, composed of stellate hairs. Inflorescences up to 13 cm long **3. *M. pallidus***

1. *Mallotus kongkandae* Welzen & Phattar. — Fig. 1; Map 1

Mallotus kongkandae Welzen & Phattar. (2001) 67. — Type: *Chayamarit et al. 1551* (holo L; iso AAU, BKF, K), Thailand, Northern, Kamphaeng Phet Prov., Mae Wong National Park, Chong Yen.

Small trees up to 8 m high. *Indumentum* tomentose, composed of stellate hairs, and sessile, globular to disc-shaped, orange glandular hairs. *Stipules* triangular, 0.8–1.5 by

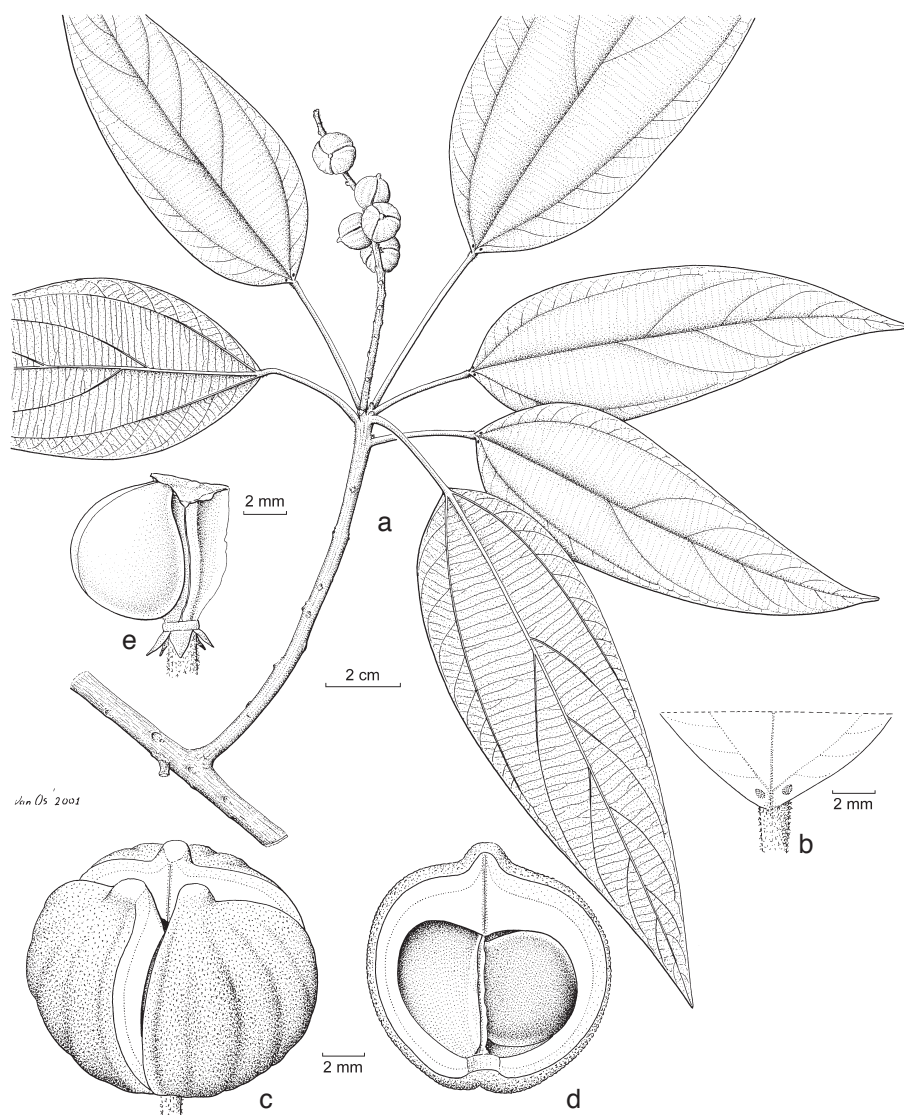


Fig. 1. *Mallotus kongkandae* Welzen & Phattar. a. Habit; b. base of leaf upper surface with extrafloral nectaries; c. fruit; d. section through fruit showing thick wall; e. column with one attached seed (all: Chayamarit et al. 1551, L).

0.5–0.7 mm, caducous to persistent. *Leaves*: petiole 15–53 by 1–1.5 mm, basally and apically pulvinate; blade ovate to narrowly ovate, 8–18 by 3.4–6.2 cm, length/width ratio 2.3–3.6, coriaceous, base obtuse, margin entire, sinuate, apex acute to caudate, upper surface dark green, basally with 2 extrafloral nectaries on the blade, orbicular to elliptic, 1–1.2 by 0.7–0.8 mm, lower surface greenish grey, not glabrescent, domatia absent, nerves 9 or 10 per side, looping. *Staminate inflorescences* and *flowers* unknown.

Pistillate inflorescences and *flowers* unknown. *Infructescences* racemes, up to 8 cm long; bracts c. 1 by 0.8 mm, persistent, hairy outside, glabrous to subglabrous inside. *Fruits* 10–14 by 10–14 mm, opening loculicidally-septicidally, orange (green when dry); wall 2–3 mm thick; column 6–7.5 by 3–3.7 mm; pedicels 2.5–3 mm long. *Seeds* ± globose, 4.5–5 by 4.2–4.8 by 3–4 mm, surface irregular, dull, dark brown; hilum 1.8–2 by 1.3–1.5 mm.

Distribution — Endemic to Thailand (Northern, Kamphaeng Phet). Only known from the type specimen.

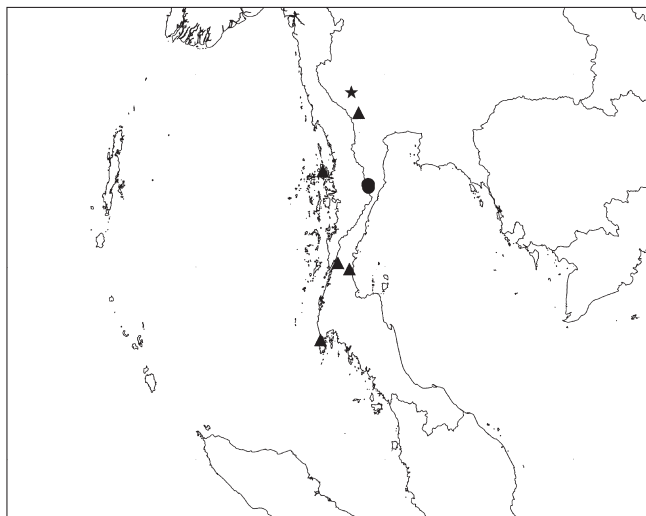
Habitat & Ecology — Altitude c. 1340 m. Fruiting in July.

Vernacular name — Pra kai saet (Thai), Smitinand (2001).

2. *Mallotus leptostachyus* Hook.f. — Fig. 2; Map 1

Mallotus leptostachyus Hook.f. (1887) 435; Pax & K. Hoffm. (1914) 183; Airy Shaw (1972) 300; Van Welzen, Slik & Bollendorff in Van Welzen et al. (2000) 101. — Type: *Helper* (*Kew Distrib.*) 4729 (holo K; iso A, K), Myanmar, Tenasserim, King's Island, Mergui Archipelago.

Small trees up to 10 m high, dbh up to 9 cm. *Outer bark* smooth. *Indumentum* sparse, composed of stellate and simple hairs, and sessile, globular to disc-shaped, light red glandular hairs. *Stipules* narrowly triangular, 1.3–1.7 by 0.3–0.4 mm, caducous to persistent. *Leaves*: petiole 20–55 by 1–1.5 mm, basally and apically pulvinate; blade elliptic to obovate, 16–26 by 6–11.5 cm, length/width ratio 2–3, chartaceous, base obtuse, margin with glandular teeth, sparsely hairy, apex caudate, upper surface dull green, basally with 2 extrafloral nectaries on the nerves near the petiole insertion, elliptic, 0.8–2 by 0.3–0.4 mm, lower surface brownish green, glabrescent, domatia absent, nerves 8–10 per side, looping. *Inflorescences* racemes, axes basally 1–1.5 mm thick; bracts persistent, hairy outside, glabrous to subglabrous inside. *Flowers*: sepals 3,



Map 1. Distribution of *Mallotus kongkandae* Welzen & Phattar. (★), *M. leptostachyus* Hook.f. (▲), and *M. pallidus* (Airy Shaw) Airy Shaw (●).

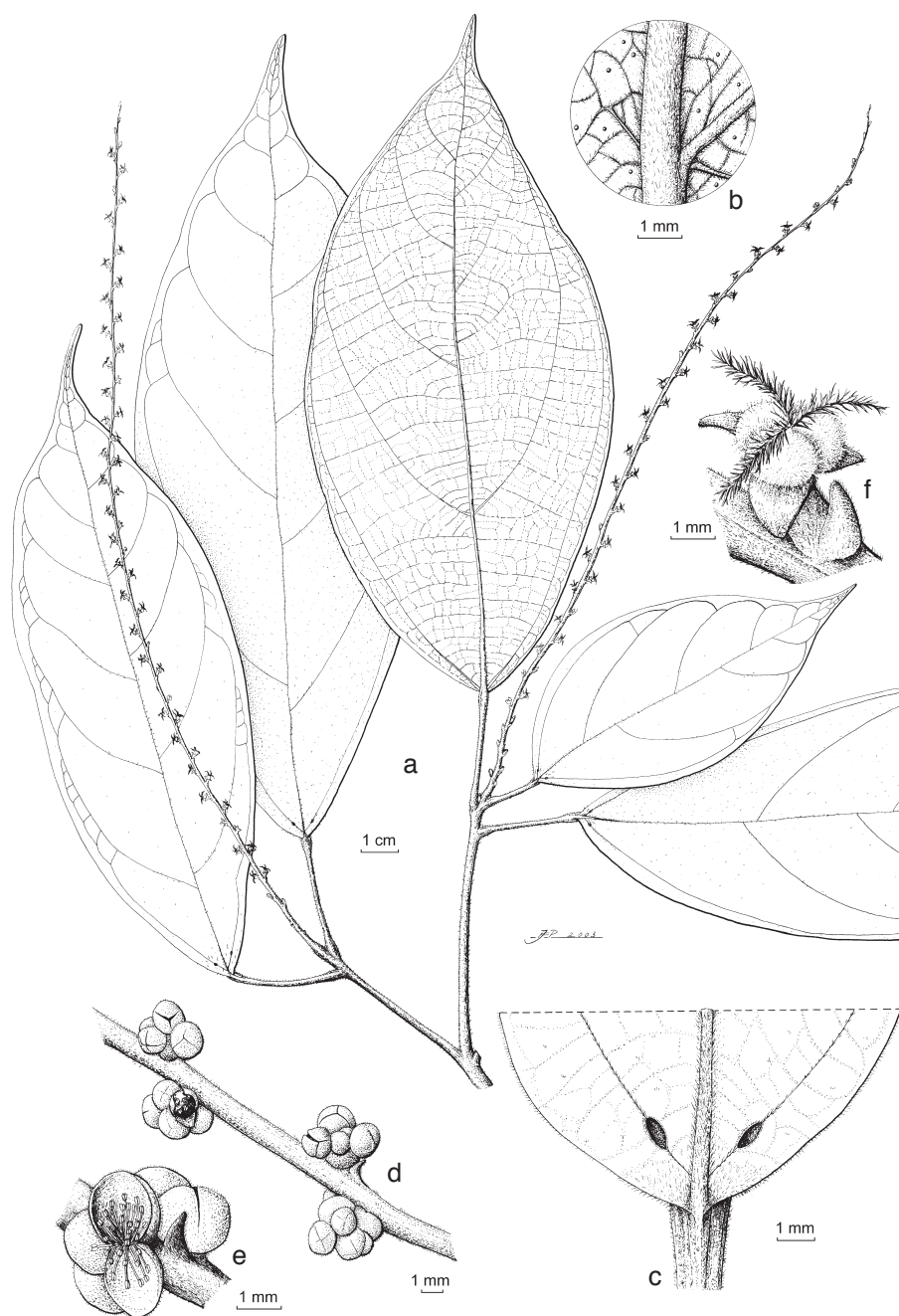


Fig. 2. *Mallotus leptostachyus* Hook.f. a. Habit with flowers; b. detail of leaf lower surface with glandular hairs and domatia; c. base of leaf upper surface with extrafloral nectaries; d. staminate inflorescence in bud; e. immature staminate flower; f. pistillate flower (a: Kerr 12097, BM, L; b, c: Kerr 16442, BM; d: Helfer (Kew Distrib.) 4729, K; e: Kerr 12097A, BM; f: Kerr 12097, L).

ovate. *Staminate inflorescences* up to 25 cm long, flowers 3–5 per node, nodes up to 65; bracts 0.5–1.5 by 0.2–0.4 mm. *Staminate flowers* 4–5 mm diam.; pedicels 1–1.5 mm long; sepals 1.7–2.5 by 1.2–1.8 mm, pale light green; stamens 40–60, filaments 0.7–2.5 mm long, glabrous, very pale light yellowish whitish, anthers ovoid, 0.1 by 0.2 mm, glabrous to sparsely hairy, light yellow, connective broad; pistillode pyramidal, c. 0.3 mm long, consisting of 1 or 2 adnate, glabrous to subglabrous appendices. *Pistillate inflorescences* up to 20 cm long, nodes up to 31; bracts 0.7–0.9 by 0.2–0.4 mm. *Pistillate flowers* 3.2–4 mm diam.; pedicels 0.5–0.8 mm long; sepals 1.8–2 by 0.8–1.2 mm, erect; ovary 3-locular, 1–1.2 by 1.5–2 mm; stigmas sessile, 2–2.5 mm long. *Fruits* 8–8.2 by 10–12 mm, opening septicidally-loculicidally, dull light green; wall 0.5 mm thick; column 2.8–3 by 3.1–3.3 mm. *Seeds* ± globose, 5–5.2 by 4–5 by 4–4.7 mm, surface smooth, glossy, brown; hilum 1.3–1.6 by 1.5–2 mm.

Distribution — Myanmar and Thailand.

Habitat & Ecology — Locally in understorey of evergreen forest, on hills and by streams, on shale soil. Altitude up to 400 m. Flowering: December to March.

3. *Mallotus pallidus* (Airy Shaw) Airy Shaw — Fig. 3; Map 1

Mallotus pallidus (Airy Shaw) Airy Shaw (1977) 78. — *Mallotus philippensis* (Lam.) Müll.Arg. var. *pallidus* Airy Shaw (1972) 300 ('*pallida*'). — Type: Put 2489 (holo K; iso BK, BM, C, L), Thailand, Prachuap Khiri Khan, Sam Roi Yot.

Shrubs up to 6 m high. *Indumentum* tomentose, composed of stellate hairs, and sessile, globular to disc-shaped, light yellow glandular hairs. *Stipules* linear-triangular, 3–6 by 0.4–0.7 mm, early caducous. *Leaves*: petiole 8–33 by 0.5–1 mm, basally and apically pulvinate; blade elliptic to narrowly elliptic, 7–14.5 by 2.2–5.2 cm, length/width ratio 2.4–4.1, subchartaceous, base rounded to obtuse, margin entire, apex acute to acuminate, upper surface dull green, basally with 2 (rarely 4) extrafloral nectaries on the nerves near the petiole insertion, elliptic, 0.6–1.2 by 0.3–0.6 mm, lower surface greenish grey, glabrescent, domatia absent, nerves 8–10 per side, looping. *Inflorescences* racemes, axes basally 0.5 mm thick; bracts caducous, hairy on both sides. *Staminate inflorescences* up to 12.5 cm long, flowers 1–4 per node, nodes up to 70; bracts 2.5–4.2 by 1.2–1.4 mm. *Staminate flowers* 4–5 mm diam.; pedicels 2.3–5.2 mm long; sepals 3 or 4, ovate to elliptic, 2.3–2.8 by 1–1.7 mm; stamens 50–70, filaments 0.6–3 mm long, glabrous, anthers ovoid, 0.2 by 0.3 mm, sparsely hairy, connective broad; pistillode flattened, c. 0.1 mm long, consisting of 3 connate, glabrous to subglabrous appendices. *Pistillate inflorescences* up to 12 cm long, nodes up to 9; bracts 2.5–4.3 by 1.2–1.4 mm. *Pistillate flowers* 2.5–4.2 mm diam.; pedicels 1–4 mm long; sepals 4 or 5, narrowly triangular, 2–4 by 0.9–1.2 mm, erect; ovary 3-locular, 2–3 by 1.8–2.2 mm; stigmas sessile, 2–3 mm long. *Fruits* 7.3–7.8 by 11.5–12 mm, opening septicidally-loculicidally, yellowish; wall 0.6–0.8 mm thick; column 3–4 by 3–3.5 mm. *Seeds* ± globose, 5–5.2 by 4–5 by 4–4.7 mm, surface smooth, glossy, ochre; hilum 1–1.5 by 2–2.5 mm.

Distribution — Endemic to Thailand (Prachuap Khiri Khan, Amphoe Pran Buri, Khao Sam Roi Yot Nat. Park). See note 2.

Habitat & Ecology — Locally in secondary, open, dry deciduous scrub forest, on rocky limestone soil. Altitude up to 300 m. Flowering and fruiting: May to November.

Vernacular name — Kra duk kai khao.

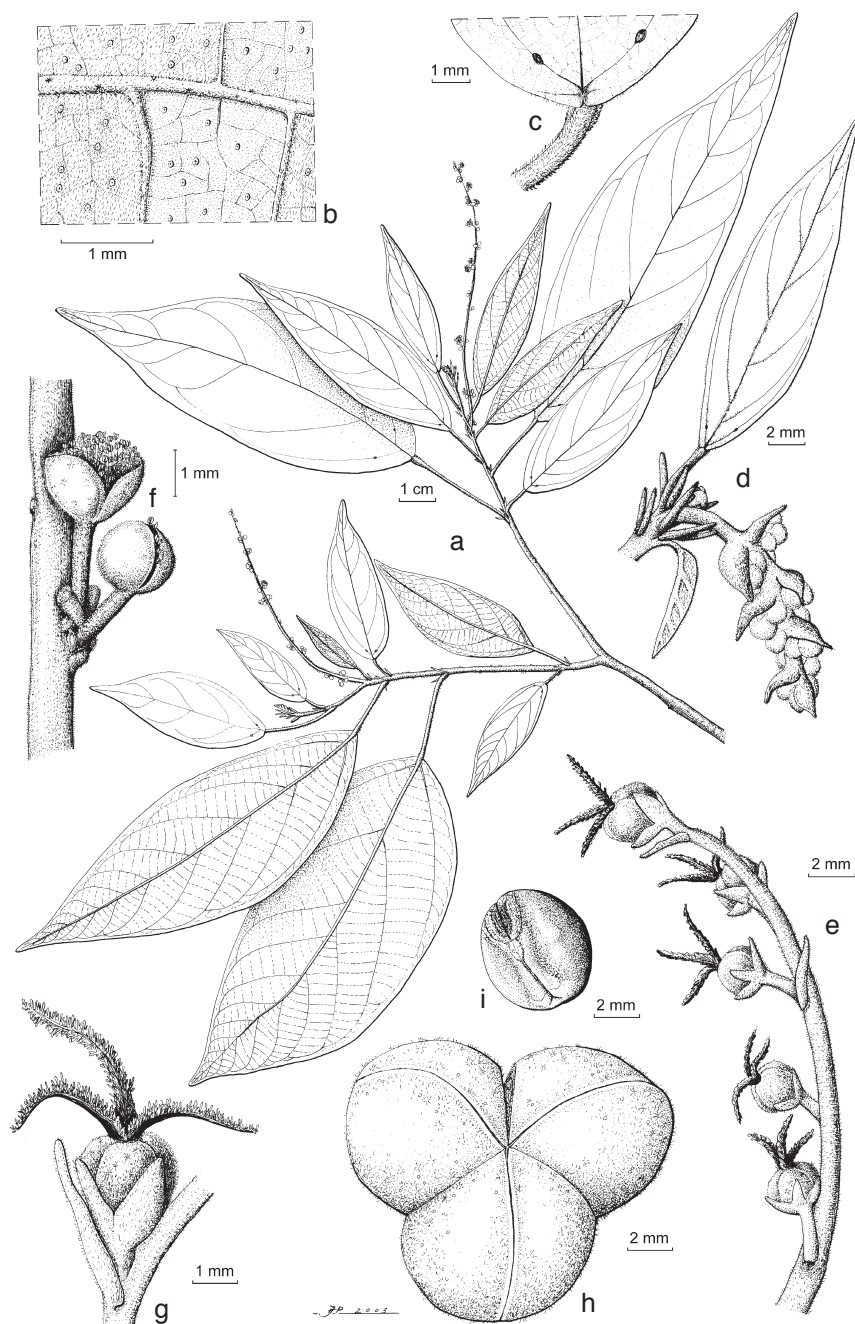


Fig. 3. *Mallotus pallidus* (Airy Shaw) Airy Shaw. a. Habit; b. detail of leaf lower surface with glandular hairs; c. base of leaf upper surface with extrafloral nectaries; d. immature staminate inflorescence; e. pistillate inflorescence; f. staminate flower; g. pistillate flower; h. fruit; i. seed (a, h, i: Middleton et al. 1136, L; b–d, f: Newman et al. 1140, A; e, g: Larsen et al. 1179, AAU).

Notes — 1. *Mallotus rhamnifolius* (Willd.) Müll.Arg. can easily be confused with *M. pallidus*, in particular because of the fruits. The main differences are found in the domatia and general measurements: domatia always present (absent in *M. pallidus*), stipules caducous and long (early caducous and shorter in *M. pallidus*), dried hairs on staminate inflorescences usually darker brown (usually not so brown in *M. pallidus*), staminate bracts short (long in *M. pallidus*), bracts caducous (early caducous in *M. pallidus*), male flowers: sepals and filaments short (long in *M. pallidus*), female flowers with short, narrow stigmas with long papillae (longer, broader stigmas with shorter papillae in *M. pallidus*), fruits small (bigger in *M. pallidus*). If the two species would be united a very strange disjunct distribution would result (Sri Lanka and Sam Roi Yot in Thailand). Seemingly, the two entities are good species, because, besides differences in morphology, they also differ in habitat preferences and in dispersal ability. *Mallotus rhamnifolius* is only found in Sri Lanka and seems indifferent to a certain habitat, while *M. pallidus* is restricted to a single locality in Thailand (Sam Roi Yot) and only occurs on limestone in an open shrubby habitat (so far, it did not disperse to other limestone areas).

2. Based on the presence of yellow glandular hairs, Kiu (1993) published a new synonym for *M. pallidus*: *M. philippensis* (Lam.) Müll.Arg. var. *mengliangensis* C.Y. Wu ex S.M. Hwang, from China. But Hwang (1996) recognised it again as a variety of *M. philippensis* and included *M. pallidus* under the list of doubtful taxa for the Flora of China. *Mallotus philippensis* var. *mengliangensis* also remains doubtful for us, because we have not seen the type material, but based on its distribution (Yunnan) and altitude (1300–1400 m above sea level) we agree with Hwang that it does not represent *M. pallidus*.

4. *Mallotus philippensis* (Lam.) Müll.Arg. — Fig. 4; Map 2

- Mallotus philippensis* (Lam.) Müll.Arg. (1865) 196 ('*philippinensis*'); Backer & Bakh.f. (1964) 483; Airy Shaw (1972) 300; Whitmore (1973) 115; Airy Shaw (1975) 168; (1980) 170; (1981) 328; (1982) 29; (1983) 37; Philcox (1997) 158; P.I. Forst. (1999) 480; Welzen et al. (2000) 105; Keßler (2002) 50; W.J. Kress et al. (2003) 232. — *Croton philippense* Lam. (1786) 206. — [*Croton coccineus* Vahl var. γ Geiseler (1807) 33]. — *Rottlera philippensis* (Lam.) A. Juss. ex Spreng. (1826) 877; Scheff. (1869) 124 ('*philippinensis*': isonym). — *Echinus philippensis* (Lam.) Baill. (1866) 314 ('*philippinensis*'). — Type: *Sonnerat s.n.* (holo P barcode P00279571), Philippines, see note 1.
- Croton punctatus* Retz. (1789) 30 ('*punctatum*'), non Jacq. (1787). — [*Croton coccineus* Vahl var. β Geiseler (1807) 33]. — Type: *J. König s.n.* (holo LD; iso C), Sri Lanka, see note 2.
- Croton coccineus* Vahl (1791) 97. — Lectotype (selected here): *J. König s.n.* (holo C; iso C, LD), Sri Lanka, see note 2.
- Rottlera tinctoria* Roxb. (1802) 36, t. 168. — Lectotype (selected here): *Wallich Numer. List* 7832A (holo K (photo in L); iso K (photo in L), Icon Ined. 106 (CAL, K)), India.
- Croton montanus* Willd. (1805) 547. — Type: *Klein s.n.* (holo *Herb. Willd.* 17874, (IDC microfiche no. 1261), B), India.
- Rottlera aurantiaca* Hook. & Arn. (1838) 270. — Type: *Unknown s.n.* (holo K barcode K000185510), China, Fujian, Loo Choo.
- Rottlera tinctoria* Roxb. var. *monstruosa* Ham. ex Dillwyn (1839) 22; Mabb. (1977) 532; Nicolson, Suresh & Manilal (1988) 112; Manilal (2003) 87. — Type: Van Rheede tot Draakestein & Municks, Hort. Malab. 5 (1685), t. 24 (holo), India.
- Rottlera affinis* Hassk. (1842) 41. — Type: *Unknown s.n.* (holo BO? n.v.), Indonesia, W Java.

- Mappa stricta* Rchb.f. & Zoll. (1856) 31; (1857) 310; Miq. (1859) 402. — *Macaranga stricta* (Rchb.f. & Zoll.) Müll.Arg. (1866) 1004. — Type: *Korthals s.n.* (holo BO? n.v.), Indonesia, Sumatra, Prov. Padang, Prope Lubu alang (= Lubukalung), Mantjiro inc. 24 April 1834.
- Aconceveibum trinerve* Miq. (1859) 389. — Type: *Zollinger 1101* (holo U), Myanmar.
- Mallotus reticulatus* Dunn (1908) 365. — *Mallotus philippensis* (Lam.) Müll.Arg. var. *reticulatus* (Dunn) F.P. Metcalf (1941) 207. — Type: *Hongkong Herb. 3429* (holo HK; iso K), China.
- Euonymus hypoleucus* H. Lévl. (1914) 260. — Type: *Cavalerie 2733* (holo E; iso E, K), China, Kweichow, Lo-fou, 4 April 1906.
- Mallotus philippensis* (Lam.) Müll.Arg. var. *tomentosa* Gamble (1925) 1322. — Lectotype (selected here): *Gamble 14368* (K), India, Connoo Ghat.
- Mallotus bicarpellatus* T. Kuros. (2004) 31. — Type: *Nicolson 2282* (holo TI; iso BM, KATH, L), Nepal, Bagmati Zone, Bhaktapur District.

Shrubs to small trees up to 25 m high, dbh up to 48 cm; bole up to 15 m high; crown up to 18 m long. *Outer bark* smooth to shallowly fissured, up to 8 mm thick, grey with patches of brown, on cross section reddish brown; sapwood cream, heartwood pink to brown-coloured. *Indumentum* tomentose, often villous, composed of stellate and/or simple hairs, and sessile, globular to disc-shaped, red (sometimes dull yellow to orange, rarely black) glandular hairs. *Stipules* triangular, 1–1.5 by 0.4–0.7 mm, caducous to persistent. *Leaves*: petiole 15–130 by 0.8–2 mm, basally and apically pulvinate; blade ovate to elliptic, sometimes obovate, 4–25 by 2–13 cm, length/width ratio 1.2–5.2, coriaceous, base truncate to cuneate, margin entire, rarely dentate to serrate (with glandular teeth), slightly sinuate, apex obtuse to acuminate, upper surface dull green, basally with 2 (or 4) extrafloral nectaries on the blade (0–3 mm from petiole insertion), orbicular to elliptic, (0.4–)1–3 by (0.3–)0.8–1.2 mm, lower surface greenish grey to brown, not glabrescent, domatia rarely present, nerves 6–11 per side, looping. *Inflorescences* racemes, axes brownish, basally 1–2 mm thick; bracts persistent, hairy outside, glabrous to subglabrous inside. *Staminate inflorescences* up to 17 cm long, flowers 1–3(–4) per node, nodes up to 45; bracts 0.5–0.8 by 0.6–1.2 mm. *Staminate flowers* 3–5 mm diam.; pedicels 1.8–3.5 mm long; sepals 3 or 4, ovate to elliptic, 2–3 by 0.7–2.5 mm; stamens 18–33, filaments 0.5–4 mm long, glabrous, anthers ellipsoid, 0.5–0.8 by 0.3–0.4 mm, glabrous to sparsely hairy, light yellow, connective not broad; pistillode absent. *Pistillate inflorescences* up to 21 cm long, nodes up to 40; bracts 0.7–1.5 by 0.6–1.2 mm. *Pistillate flowers* 4–7 mm diam., pedicels 0.5–2 mm long; sepals (3 or) 4 or 5, narrowly triangular, 1–2 by 0.7–1.8 mm, reflexed; ovary (2- or) 3-locular, 1–1.5 by 1–1.8 mm; style up to 1 mm long; stigmas 2–7 mm long. *Fruits* 4–12 by 4.5–11 mm, opening loculicidally-septicidally, red; wall 0.3–0.5 mm thick; column 3–7 by 2–4 mm. *Seeds* ± globose, 3–5.5 by 3–5.5 by 2.5–5.2 mm, surface smooth, glossy, black; hilum 1–2.5 by 1–2 mm.

Distribution — From Pakistan to South China and South Japan, throughout Southeast Asia and Malesia to East Australia and West Pacific (Solomon Islands).

Habitat & Ecology — Locally common in understorey of primary to secondary forests, scrub, mostly found on disturbed sites; on ridges, forest edges, road and river sides, steep slopes, marshy and savannah areas; in wet (riverine, swampy) to well-drained terrains; on a large variety of soil types, like granite, limestone, sandstone, sandy clay, sandy loam soil, volcanic rock, gravel, quartz, shale, and rock. Also cultivated (Hawaii and Miami, USA). Altitude: sea level up to 1600 m. Flowering and fruiting the whole year through.

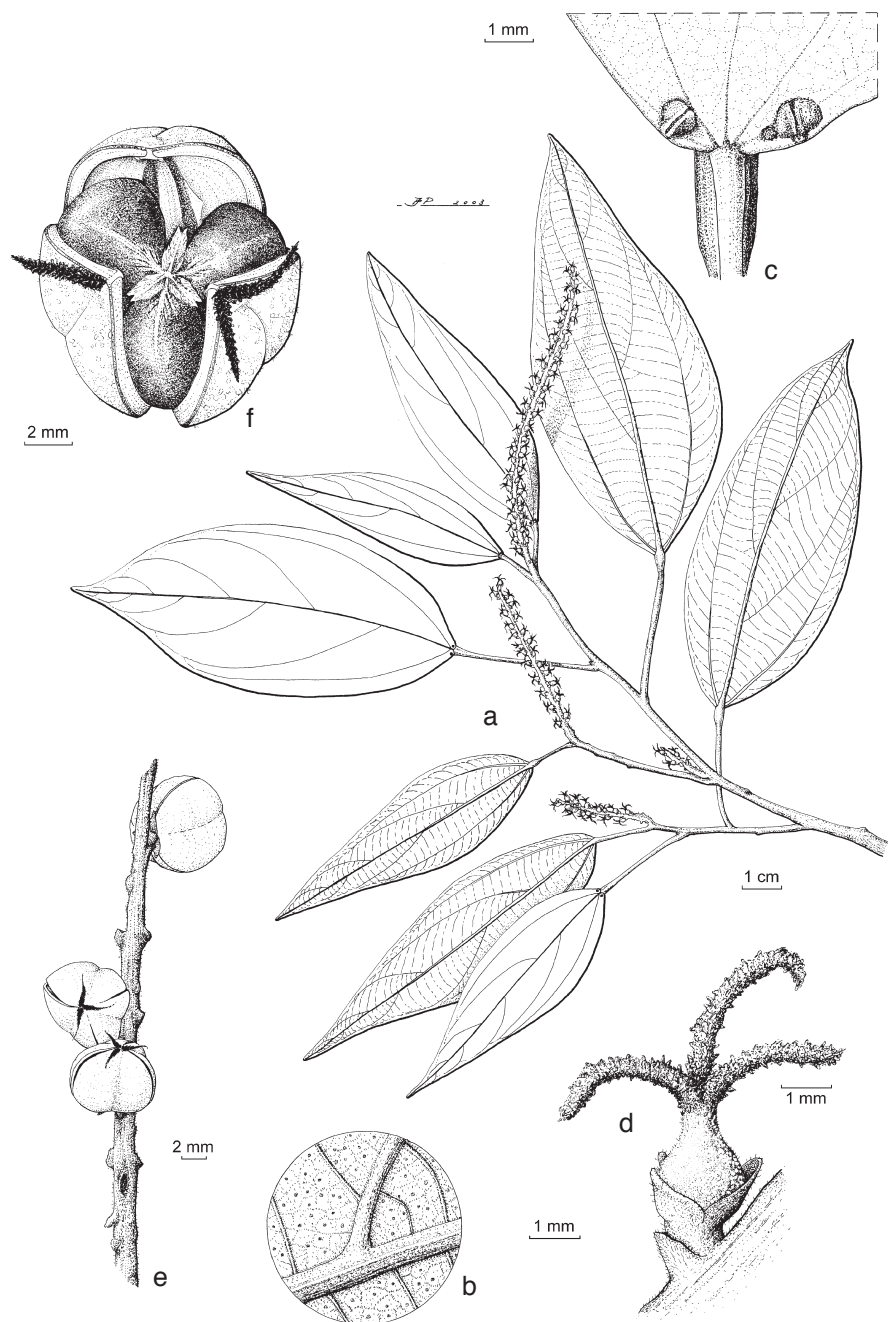
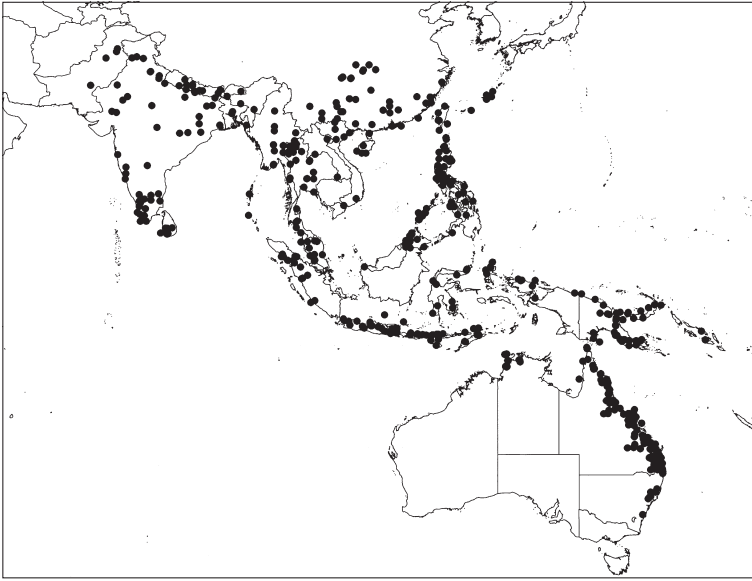


Fig. 4. *Mallotus philippensis* (Lam.) Müll. Arg. a. Habit; b. detail of leaf lower surface with glandular hairs; c. base of leaf upper surface with extrafloral nectaries; d. pistillate flower; e. fruits; f. dehiscent fruit showing the seeds and apex of the column (a–d: Maxwell 97-1483; e, f: Murata et al. T-16429; all L).



Map 2. Distribution of *Mallotus philippensis* (Lam.) Müll.Arg.

Uses — Ornamental (red fruits). The wood is used for rafters, tool handles, matchboxes, and house-posts. The fruits and bark are used as an antihelminthic, to relieve constipation, and against cutaneous affections. The fruits and leaves are used against colds and to cure stings and bites of snakes and other poisonous animals. The leaves are used as a fodder. The glands of the fruits are used as a red dye. The roots are used for dissolving coagulated blood and contusions. The oil of the seeds is used as a substitute for tung oil (*Vernicia* Lour., Euphorbiaceae) in the formulation of rapid-drying paints, varnishes, hair fixers and ointments. Partly after Ambasta (1986) and Manilal (2003).

Vernacular names — India: Jorat, losan (Assam); kamala, rohani, sindur (Hindi); kameela (Bengali); kapilo (Guj.); kunkumadamara (Canara); kuramadakku, manjana, ponnagam, ponnakam, pee-ponnagam, tsjerou-ponnagamchendiramu vusuntagundha, wasuntagundha; puroakung (Lepcha); shendri (Marhatta); kapilogundi, kunkumo (Oriya); sinduri (Oriya and Telunga); kapli, kungumam, kurangumanjanatti (Tamel); kunkuma (Telunga); kukum shull, thinkhei, thirisalukkai maram. Nepal: Rohni, ruinii, sidhure, sindure (Nepali). Bangladesh: Sindur. Myanmar: Hpadawng, hpawng-awn, indian kamala, mai-hpawng-tun, palannwe, po-thi-din, taw-thi-din. Thailand: Monkey-faced tree (English); mah gai, sa-bo-se (Karen); cha tri khao, kai khat hin, kham daeng, kham saet, khang poi, khi nuea, khi tao, lai tua phu, makai khat, ma khai, mna peu nah, phla kwang bai yai, plapphla khi tao, plapphla kitas, saet, sak kabuea lawa, sat pa, thaeng thuai, thong khao, thong thuai, ton kanam (Thai). Japan: Kusunoha-akamegasiwa, kusunoha-gashiwa. Malaya: Min-ya-ma-ya, mue-ra-kae-pu-te (Malay); balik angin, mingak madia, kasiran. Sumatra: Kajoe poetat, madang mansiro, masiho, moacho, toeba sira, tumbasira. Java: Kangke djuan (Mad.); kaju tike, kapasan, kemesoe, palan, papasan, tal

tidang, talaman, tapèn, tekeg-tekegan. Borneo: Sabah: Ayagkun (Bajau Tuaran); asin asin, mata kunau (Dusun), bai bai (Dusun Tampoluri); magundasing (Murut Tenom); balinasi (Kwijau). Philippines: Dalunis (Ibanág); banáto (Ibanág, Igorot, Tagalog); anangkuli, boas. Sulawesi: Paedje-paedje. Lesser Sunda Islands: Hotel ewi (Bunag); biofluke, bnafo (Dawan); hadju puser, kaika, kajoe tapis, poeser, pudjar, pure, puser. Moluccas: Galoega foeroe (Ternate), intiboro. New Guinea: Papua (former Irian Jaya): Kikindam (Kotte); maile (Kulumo); poiro (Matapaili), nakokupote (Minu); ugo (Musa, Safia); gamete (Naukwate, Onjob); matsiuna (Roro); iruda, mamada, nakunmenia. New Guinea: Damon (Andjai), rah (Gab Gab); dammoen, dammonnie, domoni (Kabar); sies (Manikiong); andeh, haha, sebijreraka, nokloe. Solomon Islands: Aingwasa (Kwara'ae), sokori. Australia: Op auaum. Partly after Salvosa (1963), Nicolson et al. (1988), Smitinand (2001), and Kress et al. (2003).

Notes — 1. Forster (1999) mentioned as the holotype of *M. philippensis* the sheet *P 16581*, but this number refers to a *Commerson s.n.* collection of *M. papillaris*.

2. *Croton punctatus* and *C. coccineus* were based on different specimens in different herbaria, both with the same annotations of J. König. The name *C. coccineus*, being based on a different specimen, is not superfluous.

3. Under the number *Wallich Numer. List 7772A* there are two very distinct species as can be seen on the IDC microfiche nr. 7394 of the Wallich herbarium in K. The specimen found on the left hand base corner is *M. philippensis*. The one found on the right hand base corner is *M. distans* as it is generally known based on Müller Argoviense's description of the fruits (densely hairy mixed with punctuate glandular hairs).

4. The collections *Ludwigs 247* and *465* (M) have on the label as locality 'Kamerun: Victoria', but it is likely that this is a mistake.

5. The sheets *Dickason 6641*, *Unknown s.n.* (L 0436439) and *Zollinger 3873*, have aberrant staminate and pistillate inflorescences, respectively; and *Kukkonen 6791* has aberrant stems; all of them are probably infected by a virus (these sheets look the same as *Rottlera tinctoria* Roxb. var. *monstruosa* Ham. ex Dillwyn).

5. *Mallotus repandus* (Rottler) Müll. Arg. — Fig. 5; Map 3

Mallotus repandus (Rottler) Müll. Arg. (1865) 197; Gagnep. (1925) 365; Backer & Bakh.f. (1964) 483; Airy Shaw (1972) 301; Whitmore (1973) 114; Airy Shaw (1980) 170; (1981) 328; (1982) 29; (1983) 37; McPherson & Trel (1987) 106, pl. 20; Philcox (1997) 165; P.I. Forst. (1999) 484; Welzen et al. (2000) 107; Keßler (2002) 50; W.J. Kress et al. (2003) 232. — *Croton repandus* Rottler (1803) 206 ('*repandum*'). — *Mallotus repandus* (Rottler) Müll. Arg. var. *genuinus* Müll. Arg. (1865) 197, nom. inval. — *Rottlera repanda* (Rottler) Scheff. (1869) 124. — Lectotype (selected here): *Rottler s.n.* = *Wall. Numer. List 7774*, fide specim. in Herb. Wall. (IDC microfiche no. 7394) (holo LIV; iso K-W, L s.n. barcode L0436491 ex. CAL), India, Marmelon.

Croton rhombifolius Willd. (1805) 555. — *Rottlera rhombifolia* (Willd.) Thwaites (1861) 272. — Type: *Roloff s.n.* (holo B, *Herb. Willd.* 17900, (IDC microfiche no. 1261)), Sri Lanka.

Helwingia populifolia Spreng. (1815) 89; Airy Shaw (1962) 419. — Type: *Unknown s.n.* (holo B†), India, Bengal.

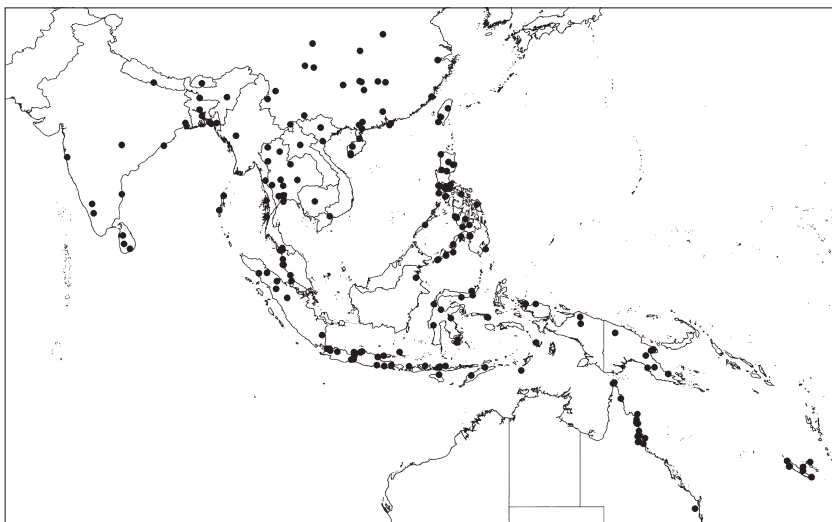
Rottlera scabrifolia A. Juss. (1824) 111, t. 9, f. 29B. — *Mallotus repandus* (Rottler) Müll. Arg. var. *scabrifolia* (A. Juss.) Müll. Arg. (1865) 197. — Type: *Unknown s.n.* (*Herb. A. Juss.* 16583, (IDC microfiche no. 6206), P), Indonesia, Timor.

Rottlera viscida Blume (1826) 608. — Lectotype (selected here): *Blume 1716* (holo L barcode L0436521; iso L barcodes L0436522, L0436536), Indonesia, Java, Nusa Kambangan.

Rottlera scandens Span. (1841) 348. — *Mallotus scandens* (Span.) Müll. Arg. (1866) 982. — Type: *Spanoghe s.n.* (holo L barcode L 0293546), Indonesia, Lesser Sunda Islands, Timor.

- Croton volubilis* Llanos (1856) 503. — Neotype (selected here): *Merrill Species blancoanae* 842 (holo US; iso L, P), Philippines, Luzon, Rizal.
- Rottlera? cordifolia* Benth. (1861) 307. — Type: *Wright s.n.* (holo K barcode K000185495; iso NY barcode NY00273207, US barcode 00096200), Hongkong.
- Mallotus contubernalis* Hance (1882) 293. — Lectotype (selected here): *Sampson & Hance 17694* (K), China, Guandong, West River, Ting-ü-shan.
- Mallotus chrysocarpus* Pamp. (1910) 413. — *Mallotus contubernalis* Hance var. *chrysocarpus* (Pamp.) Hand.-Mazz. (1931) 214. — *Mallotus repandus* (Rottler) Müll.Arg. var. *chrysocarpus* (Pamp.) S.M. Hwang (1985) 297. — Type: *Silvestri 1290* (holo FI), China, Hubei, 'Monte Triora'.
- Mallotus contubernalis* auct. non Hance: Pax & K. Hoffm. (1914) 180. — *Mallotus illudens* Croizat (1938) 146. — Lectotype (selected here): *Wang 239* (holo A; iso NY), China, Jiangxi.
- Mallotus repandus* (Rottler) Müll.Arg. var. *megaphyllus* Croizat (1938) 146. — Type: *Kingdon Ward 8922* (holo A; iso NY), Laos, Mong Hsing.
- Rottlera dicocca* auct non. Roxb.: Roxb. ((1814) 73, nom. nud.), (1832) 829, pro specim.; Baill. (1858) 423 ('*dioica*' Roxb.). — Vouchers: *Roxburgh s.n.* (BM barcode BM00813956; BR barcode 849411; Icon Ined. 480 (K, CAL)), India.
- Trewia nudiflora* auct non. Willd: Hance (1878) 14. — Voucher: *Sampson 9420* (K), China, Guandong.

Woody climber up to 10 m high. *Outer bark* dark brownish grey. *Indumentum* sparse, composed of stellate and/or simple hairs, and sessile, globular to disc-shaped, light yellow to orange glandular hairs. *Stipules* triangular, 0.5–0.6 by 0.3–0.6 mm, persistent to caducous. *Leaves*: petiole (10–)24–64 by 0.8–2 mm, basally and apically not pulvinate; blade broadly ovate to elliptic, 4–19 by 3–13.5 cm, length/width ratio 1.1–2.2, chartaceous, base cordate to cuneate, margin with glandular teeth, apex acute to caudate, upper surface dull dark green, glabrescent, rarely densely hairy, marginally with 2–4(–10) extrafloral nectaries per side, orbicular to elliptic, 0.3–1 by 0.2–0.4 mm, lower surface light green, glabrescent, domatia present or absent, nerves 4–6 per side, ending in the margin. *Inflorescences* racemes or panicles, axes basally 1–1.5 mm thick; bracts persistent, hairy outside, glabrous to subglabrous inside. *Staminate inflorescences*



Map 3. Distribution of *Mallotus repandus* (Rottler) Müll.Arg.

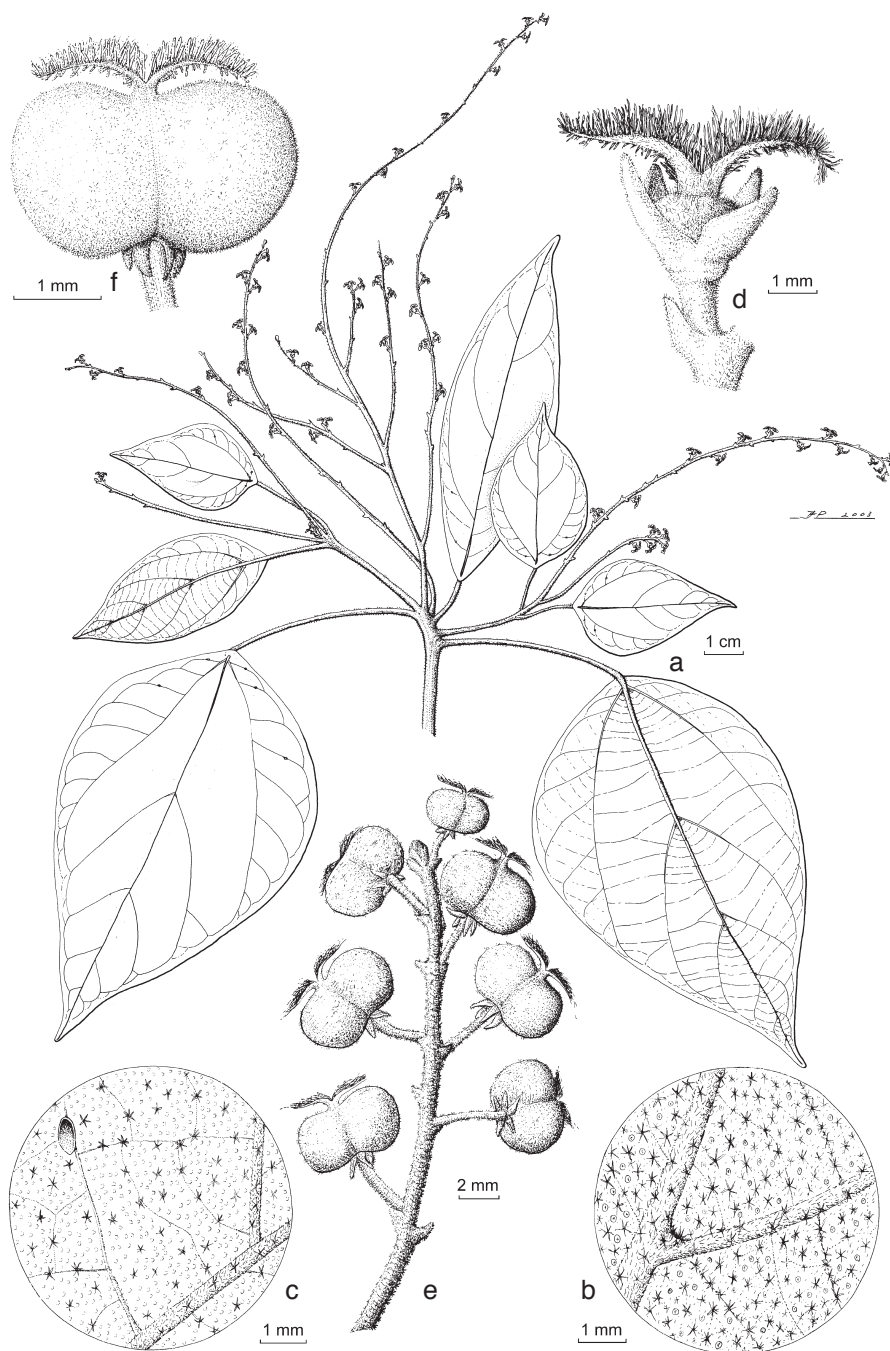


Fig. 5. *Mallotus repandus* (Rottler) Müll. Arg. a. Habit; b. detail of leaf lower surface with glandular hairs; c. detail of leaf upper surface with extrafloral nectaries; d. pistillate flower; e, f. fruit (a–d: Bunchuai 1325; e, f: Van Balgooy 2980; all L).

up to 15 cm long, flowers 1–3 per node, nodes up to 28; bracts 0.8–1.5 by 0.4–1 mm. *Staminate flowers* 4–5 mm diam.; pedicels 1.8–5.2 mm long; sepals 3 or 4, ovate to elliptic, 2.5–3.5 by 1.2–2.3 mm; stamens 30–75, glabrous to sparsely hairy, filaments 1–2 mm long, anthers ellipsoid, 0.5–0.8 by 0.3–0.4 mm, light yellow, connective not broad; pistillode absent. *Pistillate inflorescences* up to 13 cm long, nodes up to 20; bracts 1–2 by 0.5–0.8 mm. *Pistillate flowers* 2.5–3 mm diam., pedicels 1–4 mm long; sepals 4 or 5, narrowly triangular, 1.8–2.2 by 0.6–0.8 mm, reflexed; ovary (1- or) 2- or 3-locular, 1–1.2 by 1.2–1.3 mm; style up to 1.5 mm long; stigmas 1.5–2.5 mm long. *Fruits* 5–11 by 7–13 mm, opening loculicidally-septicidally, yellowish brown; wall 0.5–1 mm thick, outside grooved or not, shallowly depressed above the septa or not, hairs smooth to slightly rough; column 3–7.5 by 1–2.5 mm. *Seeds* ± globose, 4–6 by 4–6.2 by 3.5–4.5 mm, surface smooth, glossy, black; hilum 1.5–2 by 1–1.5 mm.

Distribution — From Nepal to South China and Taiwan, throughout Southeast Asia and Malesia to East Australia and New Caledonia.

Habitat & Ecology — Locally scattered in the understorey of primary to secondary forests, scrub and disturbed sites; on ridges, forest edges, mangrove swamp edges, road and river sides, steep slopes and dry ground; on various soil types: limestone, granite, sandy loam, and rock. Altitude: sea level up to 1500 m. Flowering and fruiting the whole year through.

Vernacular names — India: Akoos (Hindi), kanda-veltoo (Teling), watta-tali. Myanmar: Ngahlaing-bo, taw-thidin-nww. Laos: Ma-pawp-kua (Lao). Thailand: Kurapia, makai khrua, makai kûae, mapop khrua, naeo nam, pho khan, yiao maeo, yiao maeo thao (Thai). Cambodia: Champou prei, mtehs barang. Malai Peninsula: Ku-ko-mu-ya (Malay). Java: Katjoe-kilang, merangan, sindukan, toekal takal. Philippines: Panuá-lan (Tagalog); adgao, ambao, tagbanua, tapin. Lesser Sunda Islands: Nono nuifmetan (Dawan); keterakaba, ikur wase, rowe. New Guinea: Papua (former Irian Jaya): Toho (Wagu); wananugapok (Waskuk); Ngontoen. New Caledonia: Waithied (Lifou). Partly after Roxburgh (1832), Salvosa (1963), Nicolson et al. (1988), Smitinand (2001), and Kress et al. (2003).

Notes — 1. The vegetative and reproductive characters of *M. repandus* in Malesia are quite constant, but in the northern part of the distribution area of this species (Indochina and China) specimens are variable: elliptic to obovate leaves (broadly obovate in Malesia), fruits globose or heart shaped, 2- or 3-locular, grooved or not, hairs smooth to slightly rough (heart shaped, (1- or) 2-locular, grooved, hairs smooth in Malesia). It is difficult to distinguish clear groups based on morphology alone, because there are many intermediates. Therefore, we consider this to be a variable species, but without gaps in the morphology on which infraspecific entities could be based.

2. Furthermore, vegetatively, the Chinese material of *M. repandus* can be easily confused with *M. millieitii* H. Lév., also from China. Distinctive characters of *M. millieitii* are found on the fruits: 3-locular, globose, 12–15 by 12–15 mm, column 7–13 mm long, wall c. 2 mm thick, with a thick and rough layer of glandular hairs; seeds 6.5–7 by 6.5–7 by 3.8–4 mm. Specimens studied of *M. millieitii* (Yunnan: Henry 10669, 10700, 10700A, 13696. Guizhou: Cavalerie 3967, Esquirol 45, Teng 90329, Tsiang 4633, 4218. Guangxi: Ching 6396, Steward & Cheo 602, 387). Ecology of *M. millieitii*: In ravines, valleys, thickets, open hill sides; soil: rocky. Altitude 1150 m. Flowering: October to February, May; fruiting: June, July, October.

EXCLUDED SPECIES

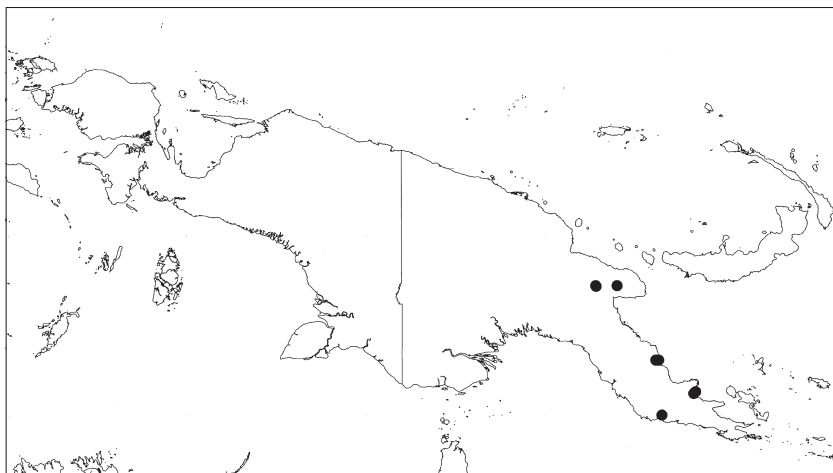
Mallotus chromocarpus Airy Shaw is excluded from section *Philippinenses*. It was placed there (sub. *Rottlera*) by Airy Shaw (1978a) because of the presence of alternate leaves and unarmed fruits, but it has more characters in common with the monospecific genus *Octospermum*, like the presence of indehiscent fruits, absence of stipules, marginal extrafloral nectaries on the upper side of the leaf blade, broad connectives (shaped umbrella-like), and its occurrence in New Guinea. It primarily differs in the number of locules (3–5 in *M. chromocarpus* and 7–9 in *O. pleigynum*).

The phylogenetic relationships of the sections of *Mallotus* with other genera of the subtribe Rottlerinae are not exactly known. Until phylogenetic analyses are performed it is not clear whether *Mallotus chromocarpus* and *Octospermum pleigynum* should be placed in a section of *Mallotus*, or in a genus of their own: *Octospermum*.

***Mallotus chromocarpus* Airy Shaw — Fig. 6; Map 4**

Mallotus chromocarpus Airy Shaw (1978a) 403; (1978b) 64; (1980) 164, 225. — Type: NGF (McDonald) 8204 (holo K; iso A, BRI, L), Papua New Guinea, Central Province, Mori River.
Mallotus discolor auct. non (F. Muell.) F. Muell. ex Benth.: Airy Shaw (1966) 44.

Trees up to 30.5 m high, dbh up to 40 cm; bole up to 18 m high; crown up to 9.5 m long; branchlets glabrescent. *Outer bark* rough, long and transversely fissured to smooth, up to 19 mm thick, greyish with patches of brown, on cross section reddish; sapwood cream; heartwood straw-coloured. *Indumentum* tomentose, composed of stellate hairs, and sessile, globular to disc-shaped, orange glandular hairs. *Stipules* absent. *Leaves* alternate, simple, symmetric; petiole 25–80 by 1–2 mm, glabrescent; blade ovate to elliptic, 6–18 by 5.3–14 cm, length/width ratio 1.3–1.8, coriaceous, base rounded to cuneate, peltate for 3 mm, margin entire, apex caudate, upper surface dull green, glabrous, basally with 2 (or 4) extrafloral nectaries on the nerves near the petiole insertion,



Map 4. Distribution of *Mallotus chromocarpus* Airy Shaw.

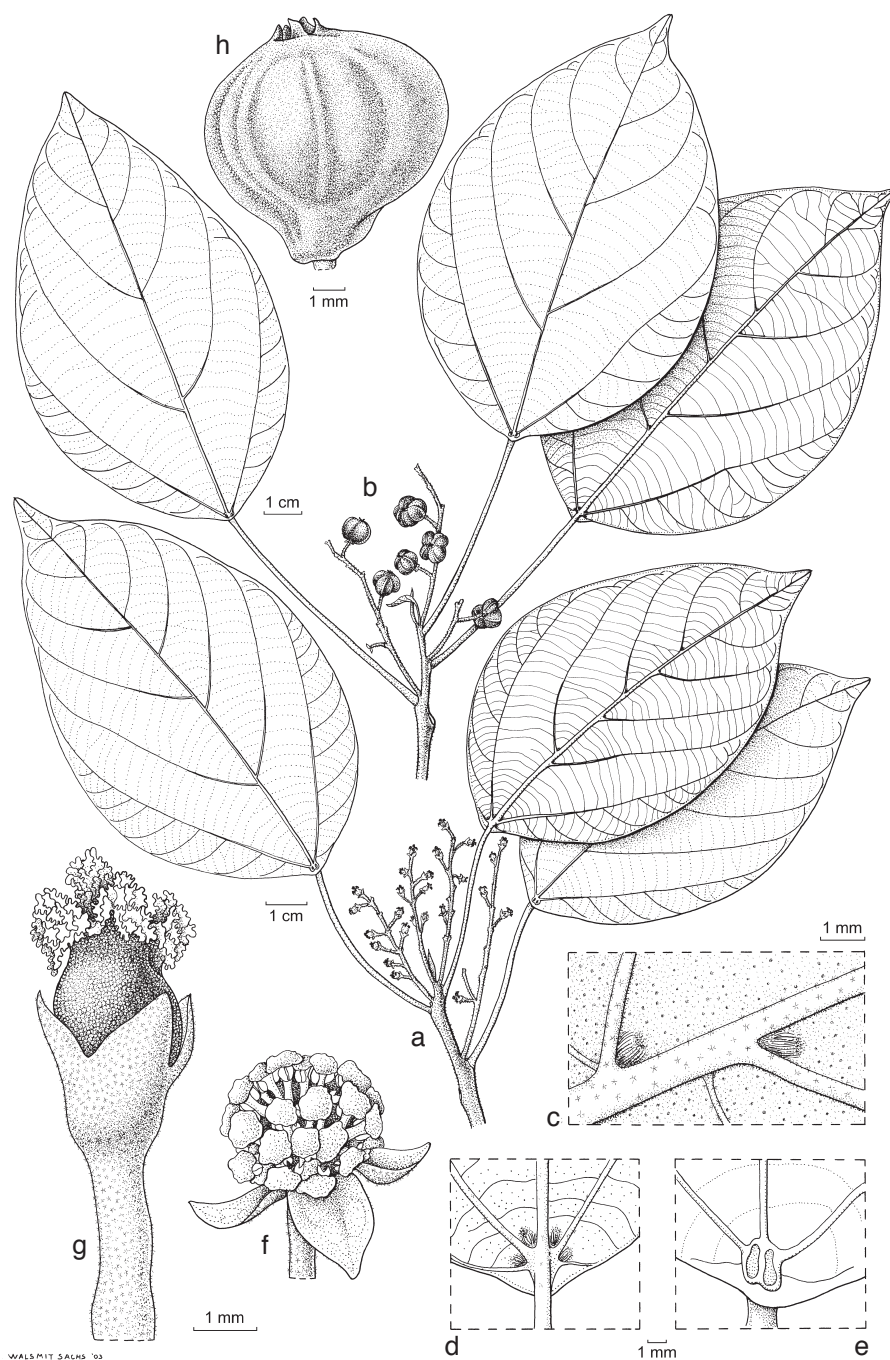


Fig. 6. *Mallotus chromocarpus* Airy Shaw. a. Habit with flowers; b. habit with fruits; c, d. detail of leaf lower surface with glandular hairs and domatia; e. base of leaf upper surface with extrafloral nectaries; f. staminate flower; g. pistillate flower; h. fruit (a–e, g, h: Brass 24245; f: NGF 27832; all L).

elliptic, 2–3 by 0.7–1 mm, marginal nectaries 0–6 per side, elliptic, 0.5–1 by 0.3–0.5 mm, lower surface greenish grey to brownish grey, not glabrescent, domatia present, woolly, venation prominent, 3-nerved, nerves 4–6 per side, looping, veinlets reticulate. *Inflorescences* racemes, axillary (1–3 together) or terminally grouped, erect, unisexual, axes basally 1 mm thick; bracts triangular, persistent, margin entire, hairy on both sides; buds light green. *Flowers* actinomorphic, not exceeding 1 cm diam.; pedicels hairy; sepals persistent, valvate, densely hairy outside, subglabrous to sparsely hairy inside, with glandular hairs on both sides, ovate, margin entire, apex acute; petals and disc absent. *Staminate inflorescences* up to 15.5 cm long, flowers 3–5 per node, nodes up to 40; bracts 0.6–0.7 by 0.3–0.5 mm, apex acuminate. *Staminate flowers* 2.8–3.5 mm diam.; pedicels 1.5–2 mm long; sepals (2 or) 3, 1.8–2.2 by 1.7–2 mm, free; stamens 30–36, glabrous, filaments 0.6–1 mm long, free (to basally connate), anthers ovoid, basifixed, 0.5–0.6 by 0.5–0.6 mm, often at the apex with glandular hairs, light yellow, connective broad (umbrella-like); pistillode absent. *Pistillate inflorescences* up to 10.5 cm long, flowers 1 per node, nodes up to 13; bracts 0.6–0.8 by 0.4–0.6 mm, apex acute. *Pistillate flowers* 2–2.5 mm diam., pedicels 2–4 mm long, hairy, gland dotted; sepals (3 or) 4 (or 5), 1.5–2 by 1–1.2 mm, slightly connate at base; ovary (3- or) 4- or (5-)locular, 1.5–1.8 by 1.8–2 mm, with glandular hairs; stigmas sessile, plumose, 1–1.2 mm long, densely covered with papillae above, outer surface hairy and with glandular hairs. *Fruits* indehiscent drupes, 5–8 by 8–10 mm, with (3 or) 4 (or 5) distinctly long ridges, orange, sparsely warted and hairy, densely gland-dotted; wall c. 0.5 mm thick, glabrous to sparsely hairy inside; column 4–4.2 by 1.2–1.3 mm. *Seeds* ± globose, 4–4.2 by 3.7–4 by 3.6–3.8 mm, glossy, brown; hilum 3.5–3.8 by c. 1 mm.

Distribution — Endemic to New Guinea.

Habitat & Ecology — Locally common in the canopy of young to old secondary forest, or on the grassland-edge of swamp-forest. Altitude: sea level up to 150 m. Flowering and fruiting: March to October.

Vernacular name — New Guinea: Osari (Orokaiva-Mumuni).

DOUBTFUL NAMES

Mallotus philippensis (Lam.) Müll.Arg. var. *mengliangensis* C. Y. Wu ex S. M. Hwang (1985) 294. — Type: *Li 3543* (holo SCBI n.v.), China, Yunnan, Xishuangbanna. = cf. ***Mallotus philippensis*** (Lam.) Müll.Arg.

ACKNOWLEDGEMENTS

The directors of the following institutes are thanked for lending their material: A, AAU, B, BM, BP, BR, BRI, C, CAL, CANB, CGE, DBN, DD, DPU, DS, E, F, FH, FI, G, GJO, H, HAL, HK, IBSC, JE, K, KEP, KIEL, L, LD, LE, LIV, M, MA, MANCH, MEL, MICH, MO, NSW, NY, OXF, P, PDA, PH, S, SAN, SBT, SING, SYS, TCD, TI, TU, U, UC, US, W, WRSL. Special thanks are due to J. F. Veldkamp for his valuable help concerning nomenclatural problems; J. Porck, A. Walsmit Sachs, and J. van Os for the drawings; B. Vrijbloed and G. Thijssen for the administration of the collections, L. Frankova and D. N. F. Kiehl for help with the literature; Ding Hou for help with the Chinese translations; J. M. de Wolf, B. J. van Heuven for technical support; J. B. Mols and K. Kulju for their comments on the manuscript. This study was financially supported by the Alberta Mennega Stichting, Stichting Hugo de Vries, Stichting Leids Universiteits Fonds (LUF), and the Society for the Advancement of Research in the Tropics (TREUB).

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IDENTIFICATION LIST

The numbers behind the collector numbers refer to the following taxa:

- 1 = *Mallotus chromocarpus* Airy Shaw
- 2 = *Mallotus kongkandae* Welzen & Phattar.
- 3 = *Mallotus leptostachyus* Hook.f.
- 4 = *Mallotus pallidus* (Airy Shaw) Airy Shaw
- 5 = *Mallotus philippensis* (Lam.) Müll.Arg.
- 6 = *Mallotus repandus* (Willd.) Müll.Arg.

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