

A REVISION OF THE MALESIAN SPECIES OF PALMERIA (MONIMIACEAE – MONIMIEAE)

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SUMMARY

Twelve species are recognized of which five (*P. womersleyi*, *P. brassii*, *P. hooglandii*, *P. schoddei*, and *P. clemensae*) are described as new. Nine species are reduced to synonymy (*P. warburgii*, *P. puberula*, *P. myriantha*, *P. paniculata*, *P. parvifolia*, *P. acuminata*, *P. habbamensis*, *P. pulchra* and *P. dallmannensis*). All twelve species occur in New Guinea, only one (*P. arfakiana*) extending westwards into Sulawesi. *P. incana*, *P. gracilis* and *P. hypargyrea* may also occur in Queensland in addition to the three species already described from Australia.

INTRODUCTION

Palmeria is the only genus of the Monimieae occurring in the Malesian-Australian region. It is virtually confined to northeastern Australia and the island of New Guinea, one species extending further westwards into northern Sulawesi. The genus was first described from Queensland, but the greatest development of species is in New Guinea. No study of the genus has been made since Smith's account of Brass's collections made during the Archbold Expeditions between 1933–1939 and the report by Kanehira and Hatusima on their collections made in 1940. Consequently, the great mass of material collected in the central mountains of New Guinea since the Second World War has never been critically examined, and the only key to the species remains that published by Perkins in 1915.

The extensive material of the older species now available has made it clear that several of these must now be regarded as synonyms. On the other hand it has been necessary to describe five new species.

The species are not difficult to distinguish once their characteristics have become familiar, but these characteristics are difficult to define. The nature of the indumentum, especially of the lower leaf surface, is the most useful character (Fig. 1).

None of the species described from Australian material appear to occur in New Guinea. However, three specimens collected in Queensland may be referable to three New Guinea species, although each is represented by a single gathering and identification cannot be conclusive (see under *P. gracilis*, *P. incana*, and *P. hypargyrea*).

PALMERIA

Palmeria F. v. Muell., Fragm. 4 (1864) 151; A. DC., Prodr. 16 (2) (1864) 657; Perkins and Gilg, Pflanzenreich 4 (1904) 64; Perkins, Bot. Jahrb. 52 (1915) 214; Perkins, Übersicht über die Gattungen der Monimiaceae. Leipzig (1925) 42.

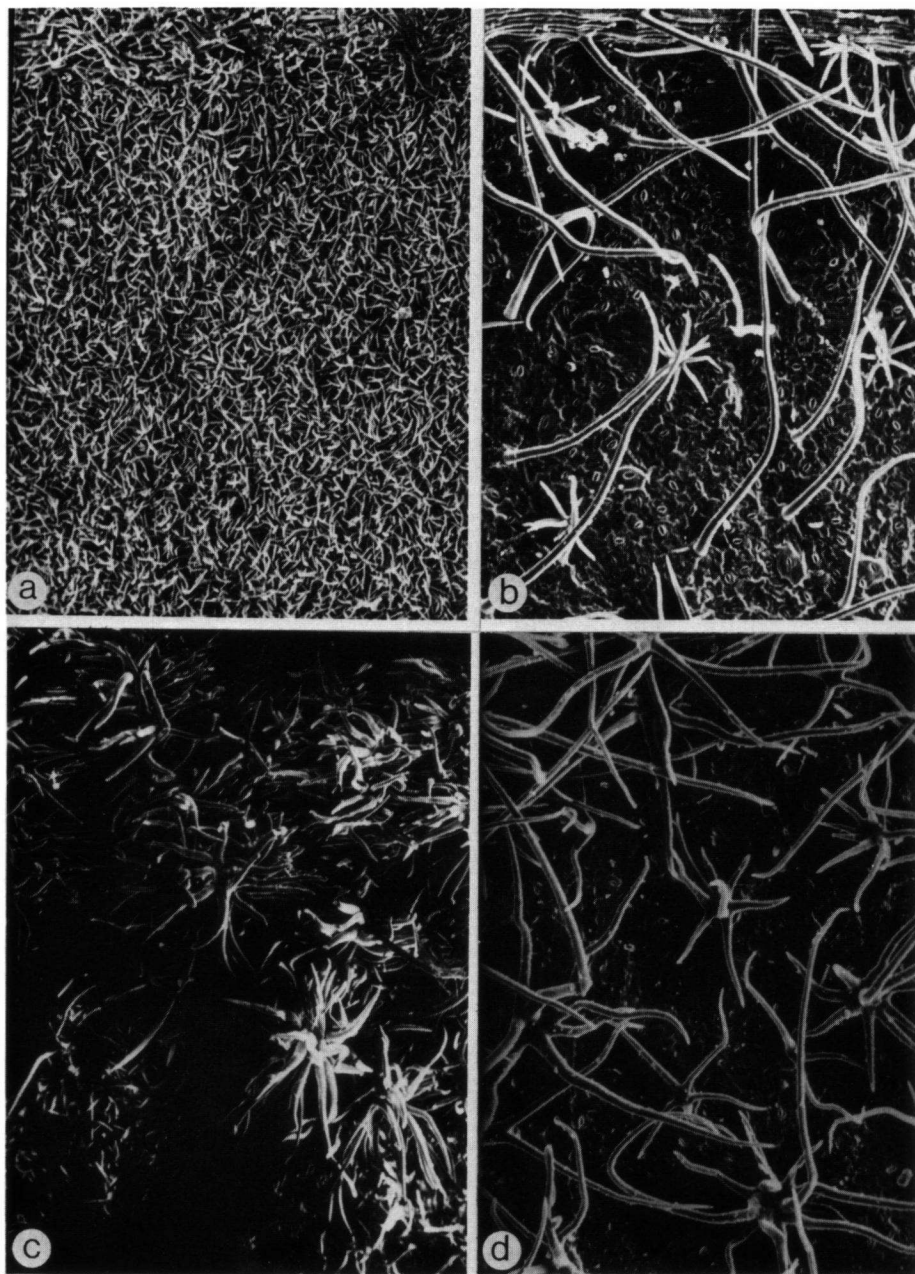


Fig. 1. Scanning electron micrographs of hair types in *Palmeria*. — a. *P. hypargyrea*, with a dense, even felt of shorter hairs (Hoogland & Craven 11, 101). — b. *P. gracilis*, with simple bristles and small stellate hairs (Hartley 12313). — c. *P. schoddei*, with large tufted hairs rising above a felt of shorter hairs (Schodde 2038). — d. *P. brassii*, with large stellate hairs (Umbano & Streimann NGF 30874). All $\times 50$.

Woody lianes with opposite, entire leaves, usually bearing stellate hairs. Dioecious, with lateral or terminal cymose panicles or pleiochasia. *Male flowers* bowl-shaped or saucers shaped, with 4–7 tepals either incurved or spreading at anthesis to reveal the numerous stamens \pm sessile on the surface of the receptacle; anthers opening by longitudinal slits. *Female flowers* globose or flask-shaped with c.5 small obtuse tepals surrounding a minute ostiole; carpels sessile on the inner surface of the receptacle, interspersed with numerous bristles. The receptacle enlarging to become a \pm globose fruit, which splits open irregularly at maturity to reveal the achenes.

Distribution: Twelve species in New Guinea, of which three may also occur in Queensland and one extends to East Sulawesi. Three further species have been described from Australia.

KEY TO THE MALESIAN SPECIES

- 1a. Outer surface of receptacle glabrous **1. *P. hooglandii***
- b. Outer surface of receptacle bearing hairs. 2
- 2a. Undersurface of leaf \pm glabrous **3. *P. arfakiana***
- b. Undersurface of leaf with indumentum. 3
- 3a. Undersurface of leaf bearing numerous simple hairs (and usually also some stellate hairs) **2. *P. gracilis***
- b. Undersurface of leaf bearing stellate hairs (occasionally also with a few simple hairs) 4
- 4a. Mature fruits c. 7–8 mm diam. (before dehiscing). Achenes about 5 mm long when dry (known only from the Angi Lakes area) **4. *P. angica***
- b. Mature fruits c. 15–20 mm diam. (before dehiscing). Achenes about 7 mm long or longer when dry 5
- 5a. Stellate hairs of underside of leaf laxly or densely distributed but not matted to form a close felt 6
- b. Stellate hairs densely distributed over the underside of the leaf and matted together to form a close felt 8
- 6a. Stellate hairs of the underside of leaf large (0.6–0.9 mm), generally distributed over the leaf surface, usually rather dense (but the leaf-surface clearly visible through them) **5. *P. brassii***
- b. Stellate hairs of the underside of the leaf small (0.2–0.25 mm) occasionally generally distributed and dense, but often confined to leaf base and petiole . . 7
- 7a. Radiating arms of stellate hairs numerous, delicate and whitish (common throughout New Guinea) **3. *P. arfakiana***
- b. Radiating arms of stellate hairs few, rather stout and yellowish (known only from East Sepik Province) **6. *P. fengeriana***
- 8a. Felt on the underside of the leaf with a smooth even surface 9
- b. Felt on the underside of the leaf with some larger hairs protruding above the general surface 11
- 9a. Leaves large (mostly over 12 cm long) (known from Morobe and Central Provinces) **7. *P. incana***
- b. Leaves smaller 10

- 10a. Leaves small (less than 5 cm long) (known from the Murray Pass area). 8. *P. montana*
 b. Leaves larger (Tari District westwards) 9. *P. hypargyrea*
 11a. Veins on the underside of the leaf fringed with long hairs 10. *P. clemensae*
 b. Veins on the underside of the leaf bearing tufted stellate hairs above the petiole 12
 12a. Leaves large (9 cm or longer) 11. *P. womersleyi*
 b. Leaves smaller (6 cm or shorter) 12. *P. schoddei*

1. *Palmeria hooglandii* Philipson, *sp. nov.*

Frutex alte scandens, ramis folisque glabris. Folia oblongo-elliptica ad lanceolata. Inflorescentiae axillares vel terminales, ad 10 cm longae. Flos mas cupulatus, c. 5,5 mm diam.; tepala c. 5–7; stamina sub-sessilia, c. 0,75 mm longa. Flos femineus globulatus, 2,5 mm diam.; carpella c. 8, stylis filiformibus. — *T y p u s*: *Hoogland & Pullen 6142* (L) Papua New Guinea. W. Highlands Prov.: Hagen distr.

Woody liane to 22 m high, branches and foliage glabrous. *Leaves* opposite; petiole 0.75–1.0 cm long; blade oblong-elliptic, occasionally lanceolate-elliptic, 7.5–15.5 x 1.76–6 cm, chartaceous, apex with an apiculum (often long and narrow), base cuneate, margin entire, mid-rib slightly channelled above, prominent below, lateral veins about 6, well-defined, meeting within the margin. *Inflorescence* axillary and terminal, either simple unbranched pleiochasia (often grouped at the ends of branches to resemble panicles) or with long lateral branches forming a panicle-like inflorescence, the rachis 4.5–10 cm long, with lateral branches up to 4.0 cm; male inflorescences often larger and more openly branched at anthesis than females. *Male receptacles* bowl-shaped becoming almost disc-shaped at anthesis, c. 5.5 mm diam. (without the tepals), margin produced into about 5–7 irregular tepals, outer surface of tepals minutely pubescent; stamens c. 18, sub-sessile; anthers c. 0.75 mm, opening by longitudinal slits. *Female receptacle* globular, 2.5 mm diam., with a terminal ostiole surrounded by 5 minute obtuse tepals, a few microscopic hairs present on the tepals, the inner surface of the receptacle bearing long simple hairs between the carpels; carpels c. 8, tapering to filiform styles which project through the ostiole. Immature *fruit* globose or irregularly bulged, with an asymmetric beak, mature fruit not seen.

Distribution: Papua New Guinea. Southern Highlands Province: Lufa Distr.; Ialibu Distr.; Mendi Distr. — Enga Province: Lagaip Distr.; Wabag Distr.; — Western Highlands Province: Hagen Distr. — Chimbu Province: Gembogl Distr. — Eastern Highlands Province: Goroka Distr.; Lufa Distr.; Okapa Distr. — Morobe Province: Finschhafen Distr.

Ecology: A liane reaching 22 m in primary and secondary lower montane rain forest. Between 1950–2800 m.

Vernacular names: *Korinda*, *Kende*, *Kent* (All Enga); *Boma* (Chimbu). *Abiya* (Okapa).

Notes: One of the most distinctive species, with both the vegetative parts and inflorescence glabrous (only the tepals are minutely pubescent). Its distribution covers most of the central Highlands from Lagaip to Okapa, with a single disjunct occurrence in the Cromwell Mountains (Huon Peninsula). This eastern specimen matches the High-

lands material very well. It seems likely that this species eventually will be found in the Finisterre Range.

The flowers are described as creamy and scented. The achenes are purple-black on a bright red torus.

The specific epithet refers to Dr R. D. Hoogland who, in company with Mr R. Pullen, first collected this species in the Hagen District of the Western Highlands.

2. *Palmeria gracilis* Perkins — Fig. 1b

P. gracilis Perkins, Bot. Jahrb. 31 (1902) 745.

P. paniculata Ridley, Trans. Linn. Soc. (Bot.) ser. 2, 9 (1916) 144.

Woody liane, reaching 20 m, young parts covered with a lax indumentum of simple hairs, together with small stellate hairs especially on the flowers. *Leaves* opposite; petiole 2.5–10 mm long, hairy; blade usually ovate with broad rounded, cordate, or cuneate base, and a long narrow apiculum, more rarely elliptic with a short apiculum, 4–14.5 × 1.8–11.5 cm, membranaceous, margin entire, midrib and lateral veins well-defined, the upper surface with the remnants of simple hairs and small stellate hairs, or becoming glabrous except for simple hairs along the mid-rib and sometimes the principal veins and the margin, the undersurface with a dense or sparser covering of curved simple hairs mixed with a varying number of small stellate hairs. *Inflorescence* axillary and terminal, either simple pleiochasia, few flowered and with a delicate rhachis, or branching to the second degree with rather stouter rhachis, 5–20 cm long, often produced profusely on lateral branches of limited growth; rhachis, branches and pedicels with lax hairs and a varying amount of short dense stellate hairs; bracts linear, caducous. *Male receptacle* saucer-shaped, 6–8 mm diam., with 5 recurved deltoid tepals, outer surface with long simple hairs and dense stellate indumentum; stamens c. 20–24, sessile, c. 1.25 mm long, lobes dehiscent by longitudinal slits. *Female receptacle* globose, c. 2.25 mm diam., outer surface with indumentum as in male, inner surface with long bristles between the carpels; carpels c. 8–10, tapering to a long filiform reflexed style. Immature *fruit* subspherical with an asymmetric beak; mature fruit splitting into irregular lobes c. 2–2.5 cm long, densely bristly on both surfaces; achenes spherical, sessile, drupaceous, c. 7 mm long when dry.

Distribution: Irian Jaya. Vogelkop Peninsula (Ije River); Japen Islands; Lake Habbema; Idenburg River. Papua New Guinea. West Sepik Province: Telefomin Distr.; Amanah Distr. — Southern Highlands Province: Koroba Distr.; Mendi Distr., Ialibu Distr. — West Highlands Province: Hagen Distr.; Jimi Distr. — Eastern Highlands Province: Goroka Distr.; Okapa Distr.; Kainantu Distr. — Morobe Province: Lae Distr.; Finschhafen Distr.; Mumeng Distr.; Menyama Distr.; Wau Distr. — Central Province: Goilala Distr.; Moresby Distr.

Ecology: Woody liane reaching 20 m or more, in rain forest, second growth or open scrubby areas with a wide altitudinal range (500–3000 m) but most frequent in lower montane rain forest (*Castanopsis*, *Lithocarpus*, *Nothofagus*, *Podocarpus* or *Elaeocarpus* dominated).

Vernacular names: *Gapunga* (Koroba); *Hompanofi* (Okapa); *Kepundom* (Maring); *Obirambiram* (Mendi); *Towndun* (Maring).

U s e s: For wrapping tobacco before being smoked in pipes or as cigarettes. When burnt to a fine ash, used as salt.

N o t e s: One of the most widespread and frequent species, recognized by the simple curved bristles on the undersurface of the leaf. The size of the leaf is varied, as is the density of the indumentum, but the variability has no geographical or apparent ecological basis.

The flowers are cream, in males with whitish stamens. The red or dark achenes are borne on a light red receptacle.

The range of this species may extend to Queensland, but the single gathering (*Schodde* 3270) is not conclusive.

3. *Palmeria arfakiana* Beccari

P. arfakiana Becc., Malesia (1877) 186.

P. warburgii Perkins in Engler, Pflanzenreich IV. 101. Nachtr. (1911) 37.

P. pulchra Perkins, l.c. 38.

P. myriantha Perkins in Lauterbach, Bot. Jahrb. 52 (1915) 214.

P. puberula A. C. Smith, J. Arnold Arb. 22 (1941) 249.

P. acuminate Kanehira and Hatusima, Bot. Mag. Tokyo 5 (1942) 251.

P. parvifolia Kanehira and Hatusima, l.c. 255.

Woody liane, young branches hirsute or puberulous. *Leaves* opposite or sub-opposite; petiole 3–15 mm long, either densely covered with minute stellate hairs or these may be sparse (almost absent) at maturity, longer simple hairs sometimes also present and abundant; blade usually oblong-elliptic or obovate, sometimes narrower or sub-rotund, (2.5–12–20) × 1–9.5 cm, chartaceous to coriaceous, apex attenuated to a short or long apiculum, base rounded, truncate, or cuneate, margin entire, the upper surface of mature leaves with remnants of minute stellate hairs, especially at the base of the mid-rib, or glabrous, the undersurface with minute stellate hairs forming a dense or open indumentum or virtually absent from the mature blade, persisting, if at all, on the mid-rib or near the base of the leaf, longer simple hairs may be present along the mid-rib. *Inflorescence* axillary and terminal, paniculate, 7–20 cm long (rarely shorter), lower branches 1.5–3–5 cm long with few flowers or with tertiary branches, the rhachis and branches usually with a greyish or cream tomentum or with sparse stellate hairs, rarely more or less glabrous at anthesis. *Male receptacle* bowl-shaped becoming a flat disc at anthesis c. 6–8 mm diam., with c. 5 irregular tepals, outer surface with a short dense indumentum or with fewer minute stellate hairs, inner surface with short simple hairs; stamens c. 25, sessile, c. 0.75–1.25 mm long, dehiscing by longitudinal slits. *Female receptacle* urceolate, c. 2.0–2.5 mm high, outer surface with indumentum as in male, inner surface with long simple hairs; carpels c. 5–8 (16), with filiform styles. Immature *fruit* sub-spherical, beaked, splitting irregularly at maturity to reveal the red inner surface and black achenes.

D i s t r i b u t i o n: S u l a w e s i (Eastern Peninsula: Luwuk). N e w G u i n e a. In uplands throughout the island from Vogelkop Peninsula to Milne Bay; also on Manus and New Britain.

E c o l o g y: Liane, often strongly growing in primary rain forest, mostly in the lower and upper montane zones, ascending to 3200 m, but occasionally as low as 100 m. Also in second growth and climbing over shrubs near the forest margin.

Vernacular names: *Angore* (Mendi); *Bengop* (Hattam); *Gawa Kepundom* (Maring); *Iaso* (Mendi); *ibiwudediji* (Tari); *Kainagent* (Enga); *Kangom* (Iaro River); *Linore* (Telefomin); *Mulkrima* (Telefomin); *Njeng* (Hagen, Wankl); *Pêngop* (Hattam); *Puquabou* (Tari); *Repalip* (Enga); *Tomenguntong* (Saider); *Tsik* (Enga); *Xatapi* (Guale, Movoi).

Uses: The leaves are burnt to make salt.

Notes: The most frequent and widespread species of the genus. It is the only species known to occur on islands to the north of the New Guinea mainland and in Sulawesi.

The variety of forms included within the limits of this species as treated here is greater than is generally acceptable in one species. It is possible that future studies will recognize entities within this complex, and perhaps reinstate species here regarded as conspecific. However, it has proved impossible to subdivide on the basis of indumentum and leaf-size. Broadly speaking four groups may be recognized, though frequent intermediates link all of these: (i) a large leaved form with adult leaves more or less glabrous except for small stellate hairs on the petiole and base of the leaf (*P. arfakiana sensu stricto*), (ii) a large leaved form with the lower surface more or less densely and evenly covered with small stellate hairs, (iii) a smaller leaved form (often with narrower more oblong blades) usually with the indumentum persisting only near the leaf base (*P. pulchra*), (iv) a small leaved form with few stellate hairs (*P. accuminata*, *P. parvifolia*). The first three forms are all frequent and widespread. The fourth appears to be confined to mountains to the west of the island (e.g. Arfak Mts, Wissel Lakes). The species described by Kanehira and Hatusima here regarded as reduced sub-alpine states and reduced to synonymy, may prove to be distinctive enough for specific status when better material becomes available, but the evidence available is that they are the end of a reduction series.

The type of *P. myriantha* Perkins represents the most glabrous state, with even the branches of the inflorescence more or less glabrous and the receptacles bearing a rather sparse coating of stellate hairs. However, similar collections occur throughout the range (e.g. *Jacobs 8825*; *Womersley NGF 14136*; *Carr 13110*) and must be regarded as one extreme of a continuous range of variation. I have not seen type material of *P. warburgii* Perkins from Sulawesi (the only occurrence of the genus west of New Guinea), but plants collected in Sulawesi by Eyma fit the original description. The younger leaves are rather heavily coated below with small stellate hairs, but older leaves can approach the glabrous condition.

Although undoubtedly a liane, like all other species of *Palmeria*, it must vary in habit because a number of collectors describe it as a tree or sprawling shrub. The young foliage is tinged with red. The flowers are cream or yellowish. The black achenes are borne on a red or pink receptacle.

The unpublished name *Palmeria myrtifolia* Perkins, *Übersicht über die Gattungen der Monimiaceae* (1925) p. 43, refers to this species.

4. *Palmeria angica* Kanehira & Hatusima

P. angica Kanehira and Hatusima, Bot. Mag. Tokyo, 56 (1942) 252.

Woody liane to 3 m high, young branches with a greyish indumentum. *Leaves* opposite; petiole 7–8 mm long, closely pubescent; blade oblong-elliptic, $4-8 \times 2-4$ cm, chartaceous or coriaceous, base rounded, apex shortly acuminate, the upper surface \pm densely or sparsely stellate hairy, becoming glabrous, the undersurface densely stellate-pilose. *Inflorescence* axillary, to 10 cm long, the rhachis and branches with greyish stellate indumentum. *Male flowers* not seen. *Female receptacle* urceolate, 2.5 mm long (after flowering), with short dense indumentum on the outer surface, tepals 5, minute; carpels 7–8. *Fruits* subspherical, c. 8 mm diam., splitting irregularly. Achenes c. 5 mm long when dry.

Distribution: Irian Jaya. Angi Lakes.

Ecology: Scandent in low spinneys on the burnt and open summit of Mt Koebre at 2300 m.

Notes: The small fruits appear to enclose a single achene, which is considerably smaller than those of the other species.

5. *Palmeria brassii* Philipson, *sp. nov.* — Fig. 1d

'*Palmeria fengeriana* Perkins' A. C. Smith, in part. J. Arnold Arb. 22 (1941) 248.

Frutex alte scandens, ramis dense tomentosis. Folia lato-elliptica, obovata vel rotundata, $8-22 \times 4,8-12$ cm, apiculata, subtus pilis stellatis magnis nitidisque tecta. Inflorescentiae axillares vel terminales, ad 40 cm longae. Flos mas cupulatus, c. 5 mm diam.; tepala c. 5; stamina sessilia $0,75-1,0$ mm longa. Flos femineus urceolatus, 2–3 mm altus; carpella c. 15, stilis filiformibus. Achenia lobis irregularibus receptaculi insidentia. — **T y p u s:** *Philipson and Kairo 3649* (L) Papua New Guinea. Morobe Prov., Wau Distr. above Kaisenik.

Woody liane, to 20 m high, young branches with a thick indumentum. *Leaves* opposite, petiole 10–17 mm long, densely clothed in brown indumentum; blade usually broadly elliptic or slightly obovate or rotund, with a small blunt apiculum or occasionally with an attenuated apex, $8-22 \times 4,8-12$ cm, chartaceous, margin entire, mid-rib prominent below, lateral veins about 6, arched and meeting within the margin, the upper surface of mature leaves covered with the scattered remnants of stellate hairs, which may form a dense pile above the mid-rib and principal veins and on the margin, the lower surface covered with large stellate hairs with lax, shining, bristle-like arms, sometimes rather densely disposed but not obscuring the surface of the blade; a few simple hairs may occur among the stellate indumentum. *Inflorescences* axillary and terminal, covered with a short dense creamy or fulvous tomentum, elongate (to about 40 cm) with relatively short opposite or subopposite lateral branches (5–8 cm long) or the inflorescence more paniculate with lateral branches 15–20 cm long (the male inflorescences frequently more lax than the female at anthesis); the lateral branches bearing several opposite tertiary branches and caducous subulate bracts. *Male receptacle* bowl-shaped, becoming almost a flat disc at anthesis, with about 5 irregular tepals, c. 5 mm diam., outer surface with a dense covering of small stellate hairs, inner surface with short simple hairs between the

stamens; stamens c. 20 sessile on the inner surface of the receptacle, c. 0.75–1.0 mm long, apex of the connective with a tuft of minute hairs, lobes dehiscing by longitudinal slits. *Female receptacle* urceolate, often asymmetric, 2–3 mm high at anthesis, outer surface with indumentum as in the male, inner surface with long simple hairs between the carpels; carpels c. 15 distributed over the inner surface of the receptacle, tapering to filiform styles which project through the ostiole, becoming reflexed. Immature *fruit* subspherical, or irregularly bulged, usually markedly asymmetric with a prominent beak to one side; at maturity the enlarged receptacle splits to form about 5 coriaceous, very irregular lobes c. 2 cm long to which the ripe achenes are attached; achenes spherical, sessile, with a shining black surface, mesocarp succulent, endocarp stony, c. 7 mm long when dry.

Distribution: Papua New Guinea. Eastern Highlands Province: Kainantu Distr. — Morobe Province: Kaiapit Distr.; Menyamya Distr.; Mumeng Distr.; Wau Distr. — Central Province: Gailala Distr.; Moresby Distr.

Ecology: Woody liane on shrubs and trees in primary and secondary lower montane rain forest (dominated by *Castanopsis*, *Lithocarpus*, *Nothofagus* or *Podocarpus*) occurring in ridge forest and also in swampy places with dark brown loam. Between 1200–2450 m.

Vernacular names: *Nani* (Kassam); *Arawe* (Finisterre Mts); *Boma* (Gumini); *Arokot* (Ueli, Movoi).

Uses: Employed as lashing material.

Notes: Characterized by its large leaves bearing a loose indumentum of large stellate hairs with shining, bristle-like, spreading arms. The flowers are described as white. The immature green, white-spotted fruits later split open to reveal black achenes on a red torus.

P. brassii may be distinguished from *P. gracilis* by the predominance of stellate hairs, by the shape of the blade and by the longer inflorescence. Some specimens with more numerous simple hairs may also approach *P. gracilis* in leaf shape. They are possibly of hybrid origin.

Of all the New Guinea species, *P. brassii* probably is most closely related to the Australian *P. scandens* from which it differs principally in the length of the inflorescence and the shape of the leaf.

6. *Palmeria fengeriana* Perkins

P. fengeriana Perkins in Engler, Pflanzenreich Nachtr. Heft 49 (1911), 39.

Woody liane reaching 12 m high, young branches pubescent. *Leaves* opposite; petiole 4–10 mm long, with a brown pubescence; blade oblong-elliptic, 6–15 × 3.5–8 cm, coriaceous, apex acute or apiculate, base rounded, margin entire, mid-rib and lateral veins prominent below, the upper surface of mature leaves with the scattered remnants of minute stellate hairs and with a dense tomentum along the mid-rib and principal veins, the lower surface with widely spaced hairs varying from simple curved bristles to few – or many – armed stellate hairs with yellowish translucent arms sometimes with a denser tomentum along the mid-rib. *Inflorescence* axillary, narrowly panicate; rhachis,

branches and flowers tomentose, c. 8–12 cm long, lateral branches few-flowered, small caducous bracts below the branches and pedicels. *Male receptacle* shallowly cup-shaped, 3 mm diam., tepals 5, ovate 1.5 mm long, outer surface with a dense covering of minute stellate hairs, inner surface with simple hairs; stamens c. 25 subsessile, dehiscing by longitudinal slits. *Female flowers* not seen.

Distribution: Papua New Guinea. East Sepik Province, Ambunti Distr.

Ecology: A liane of montane rain forest, between 800–2070 m.

Note: The type specimen of this species was destroyed during the second world war but specimens collected by Ledermann and cited by Perkins (Bot. Jahrb. 52, 1915) still exist. Some details of the above description, especially of the male flowers, are taken from the original description of Perkins.

The species has not been collected since the time of Schlechter and Ledermann and is evidently local. The shape of the leaf is similar to that of *P. gracilis* as also are the occasional simple curved hairs on the underside of the leaf. However, most of the indumentum of the underside of the leaf is made up of stellate hairs of which the majority have rather few radiating arms which have a translucent yellow colouring.

7. *Palmeria incana* A. C. Smith

P. incana A. C. Smith, Journ. Arnold Arb. 22 (1941) 245.

Woody liane, with young branches covered in greyish tomentum. *Leaves* opposite; petiole 6–10 mm, puberulous; blade elliptic-oblong, 9–18 × 3.5–8 cm, chartaceous, base rounded or broadly cuneate, apex shortly acuminate, margin entire, upper surface becoming glabrous (except for puberulence above the mid-rib), the lower surface evenly covered with a close, fine, greyish-white indumentum, the mid-rib and arched lateral veins prominent below, impressed above. *Inflorescence* densely greyish pubescent, axillary and terminal, narrowly paniculate, up to 12 cm long, with branches c. 2–3 cm long. *Male flowers* globose, c. 2 mm diam. (in bud), apex depressed with 5 tepals, outer surface densely covered with a close indumentum of stellate hairs; stamens c. 20–24, broadly deltoid, c. 0.75 mm long, sessile, anthers opening by longitudinal slits. *Female flowers* not known. Immature *fruits* sub-spherical with an asymmetric beak; at maturity the enlarged receptacle ruptures irregularly to form coriaceous lobes c. 2 cm long; achenes sub-spherical, c. 7 × 5 mm, sessile.

Distribution: Papua New Guinea. Morobe Province: Wau Distr. — Central Province: Goilala Distr.

Ecology: Liane scrambling over trees in primary forest at 1200 m.

Note: Evidently a rare and local species, only twice collected. Lower surface of leaves covered with a smooth, even, greyish felt of close-set stellate hairs. This indumentum is similar to that of *P. hypargyrea*, but that western species has smaller leaves.

The original collection lacked flowers, but immature male flowers are provided by the only other gathering (Womersley and Thorne NGF 12763). The flowers are described as cream, with a rather unpleasant scent, and the achenes as black on a red torus.

The range of this species may extend to Queensland, but the single gathering (Mueller, Hancy's Creek) is not conclusive.

8. *Palmeria montana* A. C. Smith

P. montana A. C. Smith, Journ. Arnold Arb. 22 (1941) 247.

Woody liane to 3 m high, with slender branches covered with a greyish indumentum of minute stellate hairs. *Leaves* opposite; petiole to 5 mm long, puberulous; blade ovate to oblong-ovate or broadly ovate, 1.8–4.7 × 0.6–2.5 cm chartaceous, base cuneate or rounded, apex curving in to an acute apiculum, margin entire mid-rib slightly channeled above, prominent below, lateral veins rather obscure, the upper surface of mature leaves glabrous or with sparse remnants of small stellate hairs, the lower surface covered with a dense fine greyish white felt of stellate hairs. *Inflorescence*: axillary few-flowered pleiochasia, about 2 cm long, covered with a short dense indumentum, and bearing subulate bracts; pedicels 3–7 mm long. *Male receptacle* bowl-shaped, 4–5 mm diam. at anthesis (without the tepals) with 5 or 6 deltoid, acute tepals, outer surface densely covered with minute stellate hairs, the inner surface with short simple hairs; stamens 15–20, filament c. 0.4 mm, anthers c. 0.8 mm long, opening by longitudinal slits. *Female receptacle* subglobose, 2–2.5 mm diam., with a terminal ostiole surrounded by 5 minute obtuse tepals, indumentum of outer surface similar to that of male, inner surface covered with long simple hairs between the carpels; carpels 10–15, tapering to filiform styles which project through the ostiole. Immature *fruit* subglobose, splitting at maturity to reveal 1–5 drupaceous achenes.

Distribution: Papua New Guinea. Central Province: Goilala Distr.

Ecology: Sprawling over undergrowth in montane forest of climbing to 3 m. Also in disturbed forest and tree-fern savanna. Between 2700–2850 m.

Notes: Known only from the vicinity of Murray Pass. Features which distinguish this small leaved montane species from *P. schoddei* are given under that species.

The flowers are described as cream, and the achenes brown on a red receptacle.

9. *Palmeria hypargyrea* Perkins. — Fig. 1a

P. hypargyrea Perkins, Bot. Jahrb. 52 (1915) 215.

P. habbamensis A. C. Smith, Journ. Arnold Arb. 22 (1941) 246.

P. dallmannensis Kanehira and Hatusima, Bot. Mag. Tokyo 56 (1942) 254.

Woody liane, the young branches with minute stellate hairs and often four angled. *Leaves* opposite; petiole 5–9 mm long, puberulous; blade elliptic or narrowly elliptic 5–11.5 × 2.5–4.5 cm, thinly coriaceous, base cuneate or rounded, apex shortly acuminate, obtuse or acute, margin entire, upper surface becoming glabrous or retaining widely spaced remnants of stellate hairs, lower surface evenly covered with a close, fine indumentum (which may become thinner on the mid-rib and principal veins or rarely over the surface of the blade). *Inflorescence* axillary and terminal, pleiochasial, 4–8(–13) cm long, lateral branches few flowered, densely covered in greyish pubescence, except that the peduncle and rhachis may become glabrous or bear only sparse minute stellate

hairs, small caducous bracts below the branches and some pedicels. *Male receptacle* saucer-shaped, c. 5 mm diam., with 5–6 detoid tepals, outer surface with a short dense indumentum; stamens c. 40, sessile, c. 0.75 mm long, lobes dehiscing by longitudinal slits. *Female receptacle* ovoid, c. 1.75 mm long, outer surface with indumentum as in male, inner surface with long simple bristles; carpels usually 3; style subulate. *Fruit* not seen.

Distribution: Irian Jaya. Nabire; Lake Habbema; Hellwig Mts. Papua New Guinea. West Sepik Province: (no precise locality or date). — East Sepik Province: Ambunti Distr. — Southern Highlands Province: Tari Distr.

Ecology: Scrambling in primary rain forest or over shrubs in young regrowth. Between 400–2800 m.

Vernacular name: *Oberonk* (Mendi).

Notes: Although there is considerable variation in the size of leaves, correlated with the unusual altitudinal range, the shape of the leaves is rather uniform and the smooth, close, but fine indumentum of the lower leaf surface and of the inflorescence is characteristic. In the original material collected by Ledermann the fine felt of stellate hairs has partially or completely disappeared from the lower surface of some leaves, only a few scattered, slightly larger, stellate hairs remaining. However, the typical covering of hairs has persisted in some areas. The leaves are described as greyish or whitish beneath, though some specimens from higher altitudes appear light fawn, at least when dried. The flowers are cream.

The unpublished name *P. pulleana* (Perkins, J., Übersicht über die Gattungen der Monimiaceae, 1925, p. 43) refers to this species.

The range of this species may extend to Queensland, but the single gathering (*Brass* 18298) is not conclusive.

10. *Palmeria clemensae* Philipson, *sp. nov.* — Fig. 2

Frutex alte scandens, ramis tomentosis. Folia elliptica, 7–15 × 3,5–7,5 cm, apiculata, basi truncata vel rotundata, subtus indumento pilis stellatis densissime coacto atque secus nervos pilis mollibus longissimis tecta. Inflorescentiae axillares vel terminales, ad 20 cm longae. Flos mas cupulatus, ca. 8–10 mm diam., tepala 5–7; stamina sessilia, 0,75–1,5 mm longa. Flos femineus urceolatus, c. 2 mm altus; carpella ca. 8–12, stylis filiformibus. Achenia lobis irregularibus receptaculi insidentia. — **T y p u s:** *Clemens* 7859 (B) Papua New Guinea. Morobe Prov.: Sattelberg.

Woody liane, with young branches covered with a fulvous or creamy indumentum. *Leaves* opposite; petiole 5–10 mm long, hairy; blade elliptic to broadly elliptic, with an apiculum (either long and attenuate or short), 7–15 × 3.5–7.3 cm, chartaceous or slightly coriaceous base truncate or rounded, margin entire, mid-rib and principal veins prominent below, sometimes deeply impressed above, the upper surface of mature leaves with scattered remnants of stellate hairs or glabrous, the lower surface densely covered with a close felt of small stellate hairs and with longer soft hairs along the veins (usually forming a prominent fringe, rarely almost absent). *Inflorescence* axillary and terminal, about 7–20 cm long, covered with a dense fulvous or creamy indumentum, narrowly panicle, the side branches few-flowered. *Male receptacle* bowl-shaped becoming almost a flat disc at anthesis, with 5–7 irregular tepals, c. 8–10 mm diam., outer surface with a dense covering of short stellate hairs, inner surface with short simple hairs between the stamens; stamens

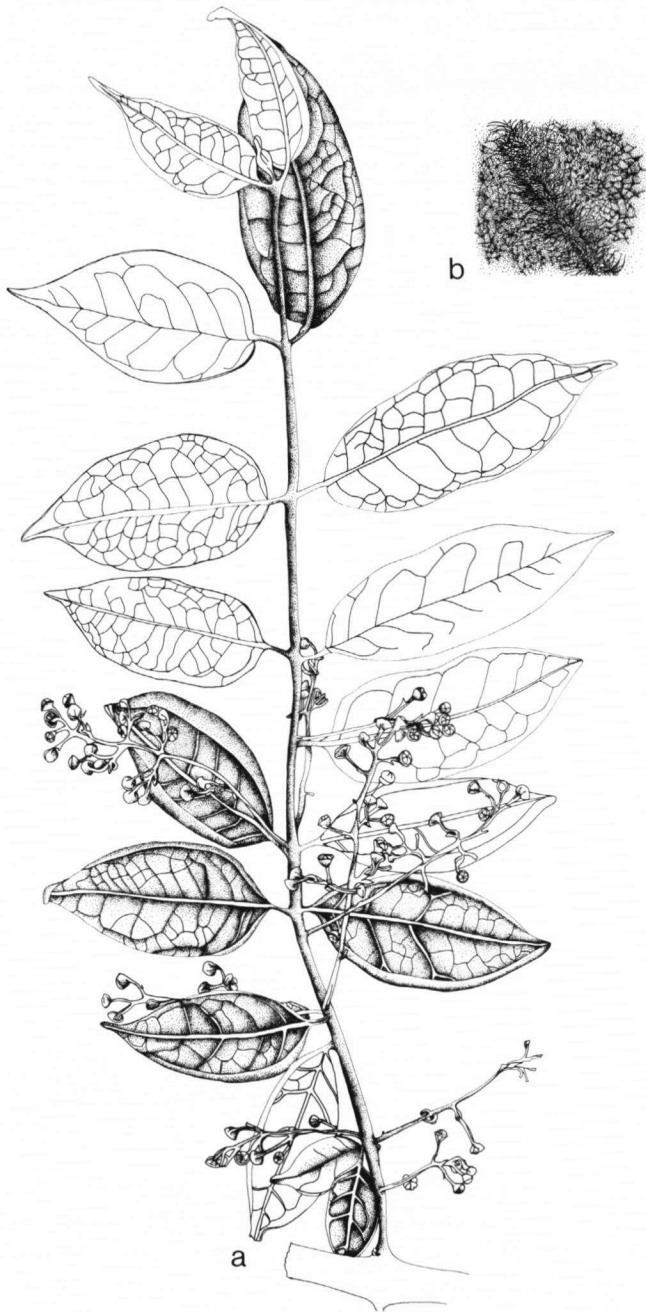


Fig. 2. *Palmeria clemensae*. — a. Twig of male plant, $\times \frac{1}{2}$; b. portion of lower surface of leaf, $\times 5$ (van Balgooy 957).

c. 30–45, with broad filaments up to 0.5 mm long, anthers 0.75–1.5 mm long, dehiscing by longitudinal slits, filaments and connectives hairy. *Female receptacle* urceolate, c. 2 mm high at anthesis, outer surface with indumentum as in the male, inner surface with long simple hairs between the carpels; carpels c. 8–12, tapering to filiform styles. Immature fruit globose with a beak (often asymmetrical); at maturity the enlarged receptacle splits open to form about 5 coriaceous very irregular lobes c. 2 cm long; achenes sub-spherical, sessile; mesocarp succulent, endocarp stony, c. 7 mm long when dry.

Distribution: Papua New Guinea. Southern Highlands Province: Tari Distr.; Mendi Distr. — Chimbu Province: Gembogl Distr. — Eastern Highlands Province: Kainantu Distr. — Morobe Province: Finschhafen Distr.; Mumeng Distr. — Central Province: Goilala Distr.

Ecology: Lower montane and mossy forest (*Castanopsis*, *Lithocarpus*, *Nothofagus*, *Podocarpus*, *Libocedrus* dominated), between 1200–2750 m.

Vernacular name: *Kari* (Chimbu).

Note: A widespread but rather rarely collected species, distinguished by the close felt of minute stellate hairs on the undersurface of the leaves, combined with longer soft bristly hairs along the veins. The species occurs in two forms. One has rather thin leaves with a close buff felt on the lower leaf surface, and with rather few and short bristles, whereas in the other form the leaf blade is more coriaceous with the veins deeply impressed above, the felt is paler (creamy white or fawn) and the bristles form conspicuous fringes along the veins. The second form may also have larger flowers, though the specimens available are inadequate to establish this conclusively. The first form is more frequent in the east (Morobe and Central Provinces) and the second in the west (Eastern and Southern Highlands Provinces), but in both regions specimens of both forms have been collected.

The black achenes are sessile on a red torus.

The specific epithet commemorates Mrs M. S. Clemens who first collected this species in Morobe Province. Her specimens all belong to the eastern form.

11. *Palmeria womersleyi* Philipson, *sp. nov.* — Fig. 3

Frutex alte scandens, ramis junioribus, fulvo-tomentosis. Folia elliptica ad lato-elliptica, 9–18 × 3.5–10 cm, longe vel breve apiculata, subtus indumento pilis stellatis densissime coacto pilis etiam stellatis longioribus dispersisque tecta. Inflorescentiae axillares vel terminales, 7–15 cm longae. Flos mas cupulatus, 7–9 mm diam.; tepala 5–7; stamina sessilia, 0.75–1.25 mm longa. Flos femineus urceolatus, 2–3 mm diam., carpella ca. 10–12, stylis subulatis. Achenia lobis irregularibus receptaculi insidentia. — **T y p u s:** *Philipson and Karenga 3690* (L) Papua New Guinea. Eastern Highlands Prov., Okapa Distr., 30 km along Okapa road.

Woody liane, repeatedly branched, often reaching the top of medium-sized trees, young branches covered with a fulvous indumentum. *Leaves* opposite; petiole 8–17 mm long, densely covered with stellate hairs; blade elliptic to broadly elliptic, 9–18 × 3.5–10 cm, chartaceous to coriaceous, margin entire, base cuneate or rounded, apex broad with a short obtuse apiculum or more gradually narrowed to an acute apex, mid-rib slightly channelled above, prominent below, lateral veins about 5, arched and meeting within the margin; the upper surface of mature leaves with widely-spaced remnants of stellate hairs,

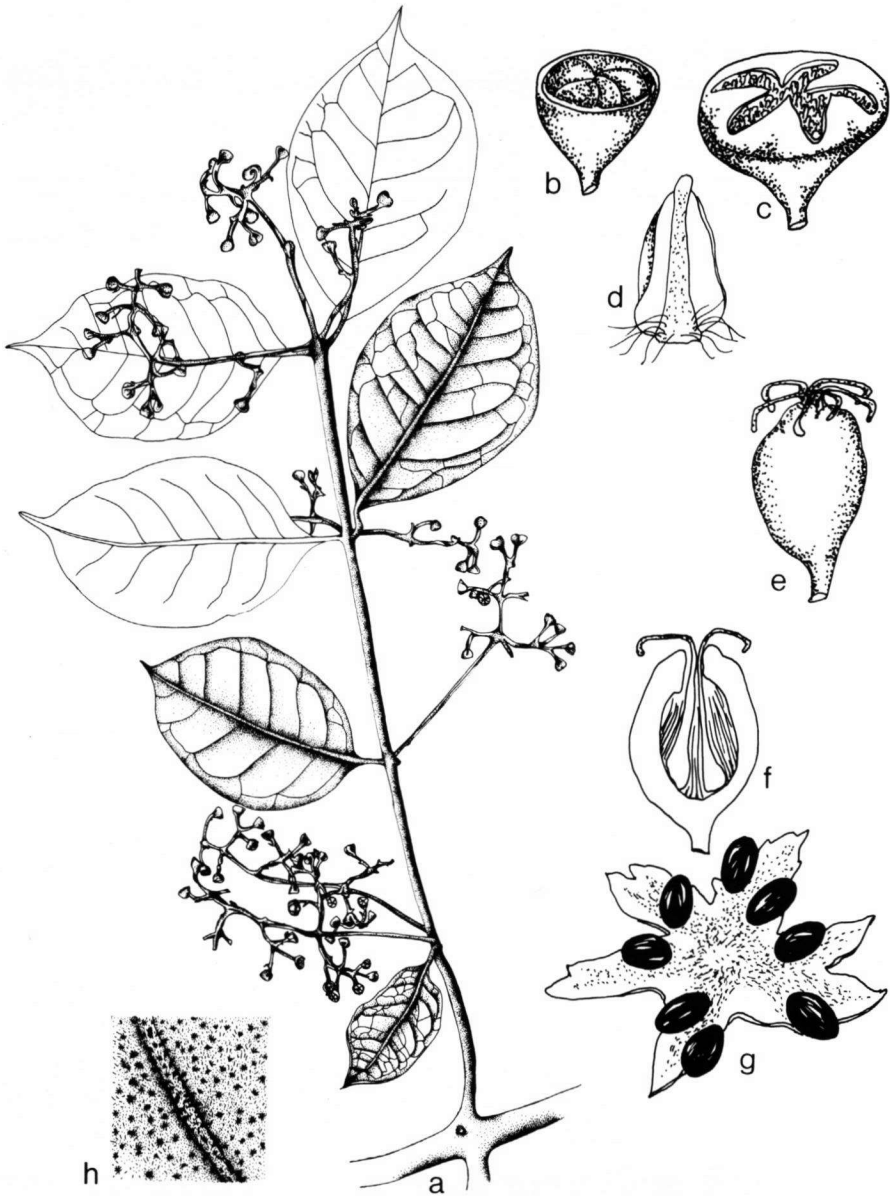


Fig. 3. *Palmeria womersleyi*. — a. Twig of male plant, $\times \frac{1}{4}$; b. bud of male flower at anthesis, $\times 6$ (all Hoogland & Schodde 6787); d. anther, $\times 15$ (Womersley NGF 14005); e. female; c. male flower, and f. in longitudinal section, $\times 6$ (Philipson 3721); g. receptacle bearing achenes, $\times 1$ (Hoogland & Pullen 5429); h. portion of lower surface of leaf, $\times 5$ (Philipson 3690).

the lower surface with a loose or close felt of stellate hairs together with a variable number of larger, more tufted, stellate hairs especially on the veins. *Inflorescences* axillary and terminal, pleiochasial, often produced profusely on short leafy lateral branches, coming to resemble panicles when the foliage abscises, covered with a short dense indumentum; pleiochasia 7–15 cm long, bearing opposite or verticillate short branches (c. 1.5–2.0 cm long) each with a small number of flowers and minute subulate bracts mostly caducous before anthesis. *Male receptacle* bowlshaped, 7–9 mm diam. at anthesis (without the tepals), with 5–7 irregular tepals eventually opening to disclose the numerous (30–40) stamens, outer surface with a dense covering of small stellate hairs, the inner surface with very short simple hairs; anthers sessile, c. 0.75–1.25 mm long; the connective sometimes with short hairs at the base and apex, lobes dehiscing by longitudinal slits. *Female receptacle* cup-shaped, 2–3 mm diam. at anthesis, upper surface concave with a small central ostiole, outer surface with indumentum as in male, inner surface covered with long simple hairs between the carpels; carpels about 10–12, distributed over the inner surface of the receptacle, tapering to filiform styles (c. 2 mm long) which project through the ostiole, becoming reflexed. The immature *fruit* remains sub-spherical with an usually asymmetric beak developed from the tepals; at maturity the enlarged receptacle ruptures irregularly to form about 4–6 coriaceous arms 2.0–2.5 cm long to which the ripe achenes are attached; achenes spherical, sessile, with a shining black surface, drupaceous, mesocarp succulent, endocarp stony, 7 mm long when dry.

Distribution: Papua New Guinea. Enga Prov. Lagaip Distr.; Wabag Distr. — Southern Highlands Prov. Ialibu Distr. — Western Highlands Prov., Hagen Distr. — Eastern Highlands Prov., Goroka Distr.; Lufa Distr.; Okapa Distr.

Ecology: A liane copiously branched over low shrubs or climbing high on forest trees in primary or secondary forest or open scrub, between 1800–2600 m.

Vernacular names: *Kombendegambeka* (Hagen, Towopa); *Noldunkan* (Whaji, Minj); *Hakappa* (Mairi, Watabung); *Kibekelakkan* (Chimbu, Masul).

Uses: Leaves used for smoking (Wabag).

Notes: A moderately large-leaved species which may be recognized by the close covering of stellate hairs on the lower leaf surface which are fulvous or rufous at least in dried specimens. The hairs are of two sizes: the smaller more numerous and forming a general felted tomentum; the larger more widely spaced and giving the leaf surface and especially the principal veins a tufted appearance. In fresh material the pubescence on the lower leaf surface appears either olive green, fulvous or rufous. Flowers fragrant, stamens white. Fruit with mature torus green outside and pink to bright red within; achenes black.

The species is named in honour of Mr John Womersley who first collected it at Nondugl, Western Highlands Province, in 1953.

12. *Palmeria schoddei* Philipson, *sp. nov.* — Fig. 1c

Frutex scandens gracilis, ramis dense tomentosis. Folia ovata, 3,3–6,0 × 1,5–2,5 cm, apice acuta, basi rotundata, subtus pilis stellatis densissime coacto pilis etiam stellatis longioribus dispersisque tecta. Inflorescentiae axillares. Flos mas cupulatus, ca. 7,0 mm diam.; tepala 5–6; stamina 20–25, filamentis brevibus. Flos femineus ignotus. Achenia lobis irregularibus receptaculi insidentia. — **Type:** *Wheeler ANU 6271* (L) Papua New Guinea. Western Highland Prov.: Mt Hagen.

Woody liane to 25 m high, with slender branches covered with a rough fulvous indumentum of stellate hairs. *Leaves* opposite; petiole 7–10 mm long, covered in stellate hairs; blade ovate, 3.3–6.0 × 1.5–2.5 cm, chartaceous, base rounded, narrowed to an acute apex, margin entire, mid-rib slightly channelled above, prominent below, lateral veins conspicuous, the upper surface of mature leaves with widely spaced remnants of small stellate hairs, the lower surface covered with dense indumentum of small fulvous stellate hairs, with scattered slightly larger stellate hairs along the principal veins. *Inflorescence*: axillary, few-flowered pleiochasia, up to 5.5 cm long, covered with a dense fulvous tomentum, and bearing subulate caducous bracts; pedicels opposite or sub-opposite, c. 5–7 mm long. *Male receptacle* bowl-shaped, c. 7 mm diam. at anthesis (without the tepals) with 5 or 6 deoltoid tepals, outer surface densely covered with an uneven stellate indumentum, the inner surface with short simple hairs; stamens 20–25, with short filaments, anthers c. 0.8–1.0 mm long, opening by longitudinal slits. *Female flowers* not seen. Mature *fruits* with irregular coriaceous receptacular lobes 2 cm long, bearing sessile drupaceous achenes 0.8 cm diam. when dry.

Distribution: Papua New Guinea. Southern Highland Province: Tari Distr.; Mendi Distr. — Western Highlands Province: Wabag Distr.; Hagen Distr.

Ecology: In forest climbing to 8 m or scrambling over low scrub at the margin of grassland. Between 2700–2900 m.

Vernacular names: *Obe*, *Yaso* (Mendi); *Kena'ugl* (Enga); *Dekaruek* (Melpa).

Notes: Similar to *P. montana* A. C. Smith, a montane species from the Wharton Range, but distinguished by leaf shape and size (larger and lacking an apiculum); coarser indumentum on the mid-rib; and by the larger flowers.

The specific epithet refers to Dr R. Schodde who, with Dr Hoogland, first collected this species in the Wabag District in 1960.

INSUFFICIENTLY KNOWN SPECIES

***Palmeria hypochrysea* Perkins, Bot. Jahrb. 52 (1915) 215.**

The species is known only from the type specimen (*Ledermann 12404*) which was destroyed during the last war. The description does not appear to fit any known species.

ACKNOWLEDGEMENTS

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ADDENDUM TO LEVIERIA

***Levieria montana* Becc.** was found in a recent collection made in Celebes, Minahassa, at c. 1000 m: *de Vogel 2439*, in fruit, a solitary tree of c. 10 m height.