

## NEW AND NOTEWORTHY MALESIAN SPECIES OF LORANTHACEAE

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### SUMMARY

Ten new or noteworthy Malesian species of Loranthaceae are discussed. The known area of the relictual *Cecarria obtusifolia* (Merrill) Barlow is increased to include Flores and Timor. *Dendrophthoe curvata* (Blume) Miquel is accepted as a distinct species. The status of *Dendrophthoe falcata* (L. f.) Ettingsh. is discussed, and the species is excluded from the Malesian flora. *Dendrophthoe gangliiformis* Barlow is described as a new species from Celebes, Alor and Tanimbar. A new combination, *Dendrophthoe kerrii* (Craib) Barlow, is made for the mainland Asian taxon *Loranthus kerrii* Craib. *Dendrophthoe* × *rimituba* Barlow is described as a new nothospecies endemic to Sumatra. A new combination, *Dendrophthoe timorana* (Danser) Barlow, is made for a species previously placed in the genus *Amyema*. *Loranthus odoratus* Wallich is recorded from Sumatra as a new genus and species for Malesia. *Macrosolen brevityubus* Barlow is described as a new species endemic to Borneo. The identity of *Macrosolen melintangensis* (Korthals) Miquel, a widespread species in western Malesia, is established. *Trithecanthera sparsa* Barlow is described as a new species endemic to Borneo.

### INTRODUCTION

This paper is presented as a precursor to a treatment of the family Loranthaceae for Flora Malesiana. In the Malesian region the family comprises 23 genera and more than 200 species. As an alternative to publication of a comprehensive revision in close conjunction with a flora treatment, conspectuses of several genera have already been completed (Barlow, 1991b, 1992, 1993). These have dealt with some of the genera most in need of revision.

For some other genera of Loranthaceae in the region, the existing taxonomy requires less change at species level, and a conspectus with the same detail as those cited above is hardly warranted. The work of a previous student of the family, B.H. Danser, provides a generally sound basis for delineation of these genera, and most of the species currently accepted in them are satisfactorily circumscribed. In this paper some miscellaneous accounts are therefore presented, providing descriptions of four new species and notes on significant new records or species circumscriptions.

Critical studies of the Loranthaceae relevant to the Malesian region were made by Danser, the major works being revisions for the Netherlands Indies (Danser, 1931) and the Philippines (Danser, 1935) in widely circulated journals. Revisions and flora treatments by the present author (Barlow, 1974, 1984) are also accessible. In this paper the synonymy provided in these earlier revisions has not been repeated where it remains unchanged, and wherever possible reference has been made to previous species descriptions.

Specimen label data have been accumulated in computer files, and lists of specimens examined will only be published where they represent significant new findings or newly recognized taxa. Extracts from these files can be provided on request, and reference copies relevant to this paper have been lodged at the Australian National Herbarium.

A provisional key to the genera dealt with here has been presented recently (Barlow, 1991a). For convenience, the genera and species discussed below are arranged in alphabetical order. For additional introductory notes, dealing with generic relationships, species circumscription, biogeographic history and the rationale for the taxonomic decisions made, see the conspectuses cited above.

## TAXONOMY

### 1. *Cecarria obtusifolia* (Merrill) Barlow

*Phrygilanthus obtusifolius* Merrill, Philipp. J. Sci. 1 Suppl. (1906) 189. — *Cecarria obtusifolia* (Merrill) Barlow in Barlow & Wiens, Brittonia 25 (1973) 34. — Type: *Borden FB 1813* (lecto PNH, not extant, see below; iso BO, NY, S, not seen), Philippines, Bataan, Mt Mariveles, Lamao R., 650 m, ix.1904.

For description and additional synonymy see Barlow, Austral. J. Bot. 22 (1974) 556; Flora of Australia 22 (1984) 90. *Cecarria obtusifolia* can be identified by its opposite obovate leaves 3–5.5 cm long, inflorescence a 2- to 4-flowered raceme or spike, small 6-merous choripetalous corolla, and dorsifixed versatile anthers. The flower colour is white to pale creamy green.

*Cecarria obtusifolia* is distributed from the Philippines (Luzon, Mindanao) southwards to the Lesser Sunda Islands (Flores, Timor) and eastwards to New Guinea, the Solomon Islands and northeastern Australia (Fig. 1; 15 collections seen) in closed and open mesic forests. Recorded hosts include *Calophyllum*, *Casuarina*, *Syzygium* and *Xanthostemon*. The specimens from the Lesser Sunda Islands cited below are new records for the species, and represent a significant extension to the known range.

*Cecarria* is a monotypic genus. It shows several character states which appear to be plesiomorphic for Loranthaceae, and it is probably a relictual Gondwanan entity (Barlow & Wiens, 1973; Barlow, 1983, 1990). Its small white choripetalous open flowers, presumably insect pollinated, are probably close to the primitive state for the family. Its genome ( $x = 9$ ) suggests that it is near the stem of the amyemoid genera which differentiated on the Australian tectonic plate (Barlow, 1990).

Perhaps in keeping with its apparently relictual nature, the species has a fragmented distribution, and is apparently nowhere common. It has attained a wide distribution on both sides of Charles's Line, and presumably reached the Lesser Sunda Islands and the Philippines as an early migrant from the Papuan side of the contact zone.

Barlow (1974, 1984) treated the Philippine *Phrygilanthus* (*Cecarria*) *obtusifolia* and the New Guinean *P. novoguineensis* Krause as conspecific, although there are some differences in leaf and inflorescence characters. The additional specimens from the Lesser Sunda Islands are more or less intermediate in these characters, suggesting that the differences are clinal ones. This is consistent with the suggestion that the specimens represent a single morphological species with a fragmented distribution.

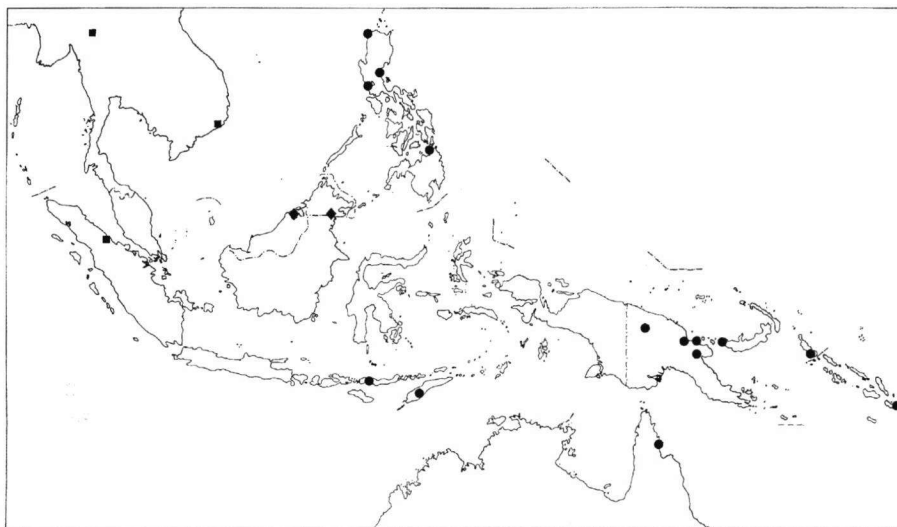


Fig. 1. Distribution of Loranthaceae species. Symbols show recorded occurrence in 1° grid cells. ● = *Cecarria obtusifolia* (Merrill) Barlow; ■ = *Loranthus odoratus* Wallich; ◆ = *Macrosolen brevitubus* Barlow.

In the original description Merrill cited three collections, which are therefore syntypes. Danser (1935) listed all three collections, but cited only *Borden FB 1813* (PNH) as type, and this is accepted as lectotypification. This specimen is no longer extant, but isotypes not seen in the present study are cited from BO, NY and S, and provide the basis for further lectotypification. Other collections cited by Danser have been seen, including a syntype, *Whitford 134*.

*Selected specimens examined:* *Verheijen 3189* (L), Lesser Sunda Islands, Flores, Pong Dode, G. Putih, 22. xii.1972 (vern. 'Tai-ntala'); *Schmutz 3085* (L), Lesser Sunda Islands, Flores, Kae Valley, Puangteko Creek, 550 m, 9. ii.1973; *Bloembergen 3417* (L), Lesser Sunda Islands, Timor, Bioba to Oi Pula, 680–1200 m, 6. iii.1939.

## 2. *Dendrophthoe curvata* (Blume) Miquel

*Loranthus curvatus* Blume, *Bijdr.* 13 (1825) 665. — *Dendrophthoe curvata* (Blume) Miquel, *Fl. Ind. Bat.* 1, 1 (1856) 820. — Type: *Blume s.n.* (not seen), Java, G. Salak.

*Loranthus leptopetalus* Blume, *Fl. Jav. tab. post. ed.* (1898) 32. — *Dendrophthoe leptopetala* (Blume) Danser, *Bull. Jard. Bot. Buitenzorg III*, 10 (1929) 309. — Type: not located.

*Loranthus lauterbachii* Schumann in Schum. & Lauterb., *Fl. Deutsch. Schutzgeb. Südsee* (1901) 299. — Type: *Lauterbach 666* (holo B, not seen; iso WRSL), New Guinea, Huon Gulf. Cape Ancona, 2. viii.1890.

*Loranthus dolichocladus* Schumann in Schum. & Lauterb., *Fl. Deutsch. Schutzgeb. Südsee, Nachtr.* 1 (1905) 258. — Type: *Nyman 1068* (holo B, not seen; iso WRSL), New Guinea, Friedrich Wilhelmshafen, x.1899.

Glabrous except for the young parts, inflorescence, ovary and usually the corolla white- to red-brown-tomentose, the leaves usually soon glabrescent; very rarely completely glabrous. *Leaves* scattered or subopposite; lamina narrowly to broadly ovate or obovate, (4–)10–15 cm long, (1.5–)3–5(–8) cm wide, attenuate to cuneate at the base to a petiole usually 10–20 mm long, mostly obtuse or rounded (sometimes acute) at the apex, bifacial (often weakly), darker and glossy above or dull on both sides; venation pennate with the midrib and the main laterals visible above and often more distinct below. *Inflorescences* at the nodes, a (2–)5- to 10(–16)-flowered raceme; axis 10–25(–30) mm long; pedicels (1–)2–4(–5) mm long; bracts 1–1.5 mm long, acute to rounded. *Ovary* cylindrical to slightly funnel-shaped, 2–3 mm long; calyx limb erect, c. 1 mm long, usually truncate but sometimes irregularly split or finely serrate or rarely 5-toothed. *Corolla* in mature bud 5-merous, (28–)30–48 mm long, uniformly widened upwards, slightly narrowed to a neck and usually weakly clavate and acute at the apex; tube in the open flower 18–30 mm long and the lobes reflexed 4–6 mm higher, curved, more deeply split on one side. *Anther* 3–5 mm long, obtuse; free part of the filament 1–2 times as long, rarely with a few scattered stellate hairs. *Style* slender; stigma capitate, 1.5–2 times as wide as the style. *Fruit* widest near the base, 8–14 mm long.

*Dendrophthoe curvata* can be identified among its regional congeners by its combination of scattered, petiolate, bifacial, medium-sized, early glabrescent leaves; racemes inserted singly or few in leaf axils, with relatively few flowers (mostly 5–10) often secund; corolla in mature bud mostly 30–48 mm long, at anthesis with a gradually widened curved tube more deeply split on one side; and stamens lacking a tuft of hairs at the base of the blunt or obtuse anther. Within the genus the species is virtually lacking in unique specialized characters, and thus presents a rather generalized facies. The flower colour is variously described as greenish yellow to orange or (most commonly) red, usually grading from the paler to the darker hues from the base towards the apex; in some areas (especially the Bismarck Archipelago) the direction of this colour gradient is reversed.

The species is distributed widely in Malesia, from Sumatra to New Guinea, the Solomon Islands and North Queensland, but is striking by its apparent absence from the Philippines, the northern Moluccas and the Lesser Sunda Islands (Fig. 2; more than 200 collections seen). It is recorded mostly in lowlands below 500 m but less frequently up to 2300 m in New Guinea, 1700 m in Java and (in forms transitional to *D. × rimituba*) 3000 m in Sumatra. The species is common in rain forests, but also occurs in seasonal forests and in plantations; among its numerous hosts the following have been recorded for Malesia: *Acacia*, *Antidesma*, *Casuarina*, *Citrus*, *Codiaeum*, *Dillenia*, *Elaeocarpus*, *Eugenia*, *Ficus*, *Hibiscus*, *Kjellbergiodendron*, *Kleinhovia*, *Lonchocarpus*, *Lophopetalum*, *Melaleuca*, *Melia*, *Myristica*, *Nauclea*, *Pangium*, *Ploiarium*, *Pongamia*, *Protium*, *Rhizophora*, *Rhododendron*, *Sonneratia*, *Stenocarpus*, *Syzygium*, *Terminalia*, *Timonius*, *Trema*, *Vaccinium*, *Weinmannia*.

*Dendrophthoe curvata* has been previously included by numerous authors in an extremely polymorphic and widespread taxon, first called *Loranthus longiflorus* and subsequently *Dendrophthoe falcata*, distributed from India to Australia. Some of the

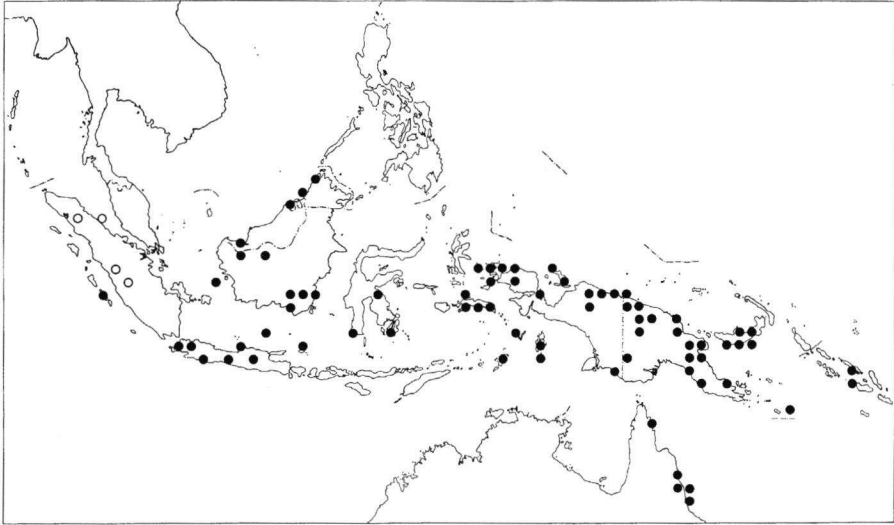


Fig. 2. Distribution of *Dendrophthoe curvata* (Blume) Miquel. Symbols (●) show recorded occurrence in 1° grid cells. Occurrences of specimens transitional to *D. x rimituba* Barlow are shown as open circles.

elements included within this complex appear to have a capacity to hybridize, both within the complex and with related species of *Dendrophthoe*. Together with the apparent lack of unique specialized characters, this has presented difficulty in circumscribing component taxa which are sharply defined morphologically, and the preferred solution has been to treat the whole as a single polymorphic species. Study of the comprehensive material in L, comprising more than 250 collections filed under *D. falcata*, and covering the entire geographic range, indicates that included within this complex there are several natural entities which each have morphological and geographical integrity. The nature and robustness of the characters diagnostic of these entities indicates that they have equivalent status to other species recognized in this genus, and it is proposed that they be treated accordingly.

The geographical distribution of the *D. falcata* complex is not as continuous as generally assumed. There appears to be a geographic disjunction between the elements of the complex in mainland Southeast Asia and those in the Malasian region. No specimens attributable to the complex have been seen from peninsular Burma, Thailand or Malaya, and the morphological discontinuities observed are in conformity with this geographic discontinuity.

A more critical revision of the Asian elements of the complex is necessary. Preliminary examination of the materials in L indicates that the most common entity, probably referable to *D. longiflora* (Desr.) Ettingsh., occurs widely in India and Ceylon, and is distinguished by being glabrous (except for the ovary often white tomentose), smooth-stemmed, large leaved, with a long robust inflorescence axis

(30–60 mm) with many flowers (20 or more) with long pedicels (4–5 mm) inserted in false verticels and not secund, long flowers (40–60 mm) constricted just below the apex and obtuse in bud, mostly red or yellow below and green above, and anthers mostly longer than the free part of the filament and with a tuft of hairs at the base. A less common Indian entity, probably referable to *D. falcata* (L. f.) Ettingsh., is more or less glabrous and glaucous, with fine longitudinal lenticels on the stems, pendulous linear leaves less than 1 cm wide, and a slender inflorescence axis 35–40 mm long bearing c. 15 flowers on long pedicels (c. 5 mm). Another entity, occurring in India and Ceylon, is glabrous or sparsely white-tomentose, has apparently isofacial leaves, inflorescence axis 25–40 mm long bearing 10–12 pedicels 1–4 mm long, corolla 30–40 mm long, and lacks a tuft of hairs below the anther, which is usually shorter than the free part of the filament. An entity in India (Himalayan foothills), Burma, Thailand and Indochina, referable to *Dendrophthoe kerrii* (Craib) Barlow<sup>1</sup>, is distinctive in its dense creamy white tomentum on the inflorescence, flowers and leaf undersides, slender inflorescence axis c. 30 mm long bearing c. 20 flowers on long pedicels (3–5 mm), relatively short corolla (23–40 mm), curved anthers, and fruits widest above the middle. Critical study may therefore lead to recognition of several species in mainland Asia, none of which is present in Malesia.

*Dendrophthoe curvata*, as accepted here, is relatively homogeneous throughout its area, with the exception of Sumatra. It can be distinguished from one or more of the Asian taxa mentioned above by its combination of stems with round lenticels, early glabrescent bifacial leaves, relatively short inflorescence axis (mostly 10–25 mm) with relatively few flowers (mostly 5–10) often secund, corolla in mature bud mostly 30–48 mm long, and stamens lacking a tuft of hairs at the base of the anther.

In Sumatra the species appears to be largely subsumed by introgression into *D. × rimituba* (see there). In Borneo the species is sympatric with *D. pentandra*, and many specimens appear to be hybrids. In the drier parts of eastern Java and the Lesser Sunda Islands *D. curvata* is replaced by *D. glabrescens* and *D. odontocalyx*, which are widespread in seasonally arid tropical Australia.

### 3. *Dendrophthoe falcata* (L. f.) Ettingsh.

*Loranthus falcatus* L. f., Suppl. Pl. (1781) 211. — *Dendrophthoe falcata* (L. f.) Ettingsh., Denkschr. K. Akad. Wiss. M.-N. Cl. Wien 32 (1872) 52. — Type: Not seen.

This name has been applied by numerous authors to a complex taxon thought to be widespread, from India to eastern Australia, and very polymorphic. Based on examination of the extensive holdings in L, it is concluded that a number of closely related but morphologically and geographically discrete species are represented by the collections referred to this complex. The exceptional biological and geographical situation supposedly represented by *Dendrophthoe falcata* sens. lat. is therefore not valid.

*Dendrophthoe falcata* sens. str. does not occur in Malesia, and is probably of restricted occurrence in India. For further discussion see under *D. curvata*, which is the most widespread member of the species group occurring in Malesia.

<sup>1</sup>) *Dendrophthoe kerrii* (Craib) Barlow, *comb. nov.* — *Loranthus kerrii* Craib, Kew Bull. (1911) 453.

#### 4. *Dendrophthoe gangliiformis* Barlow, *spec. nov.*

Species nova *D. locellatae* Danser similis, sed foliis tenuioribus undulatis, petiolo tenuiore, corolla brevior, anthera brevior thecis non locellatis differt. — Holotypus: *Jaag 1304* (L), Lesser Sunda Islands, Alor, Central highlands, Pido-Woisika, 800 m, 20.v.1938.

Glabrous except for young shoots, inflorescences and flowers shortly ochre to red-brown tomentose, the leaves and corollas soon glabrescent. *Leaves* scattered; lamina narrowly to broadly ovate, 6–16 cm long, 3.5–7 cm wide, thin, cuneate at the base to a petiole 3–8 mm long, undulate at the margin, rounded or sometimes broadly obtuse at the apex, weakly bifacial, dull on both sides; venation pennate with the midrib and the semicurvinerved main laterals prominent on both sides. *Inflorescences* many at the nodes, inserted on cushion-like swellings, a short 4- to 10-flowered raceme; axis very slender, 12–20 mm long; pedicels 0.5–4 mm long; bracts narrowly triangular, spreading, acute and usually acuminate, c. 1 mm long. *Ovary* cylindrical, c. 1.5 mm long; calyx limb erect, c. 0.7 mm long, toothed. *Corolla* in mature bud 5-merous, 21–30 mm long, very slender, slightly widened upwards, narrowed to a neck, clavate and acute at the apex; tube in the open flower 14–20 mm long and the lobes reflexed 3–5 mm higher, curved. *Anther* 2–2.5 mm long, obtuse, slightly shorter than the free part of the filament. *Style* slender; stigma knob-like, twice as wide as the style.

*Dendrophthoe gangliiformis* is recorded from Celebes, the Lesser Sunda Islands and the Moluccas (Fig. 3; 4 collections seen), from sea level to 800 m. Habit details are poorly known; the only recorded host is *Ficus*.

The species shares with *D. locellata* the gall-like swelling of the older nodes, from which the inflorescences arise. The flowers and fruits of the two species, borne on several short inflorescences at each node, are therefore cauliflorous with respect to their presentation to pollinators and dispersal agents. *Dendrophthoe gangliiformis* differs from *D. locellata* in having thinner leaves, undulate at the margins, with more slender petioles; shorter corollas; and anthers which are shorter than the free filaments and not transversely septate. The corolla colour has not been recorded.

The specific epithet (Latin *gangliiformis* 'knotted') alludes to the gall-like swelling of the older nodes, from which the inflorescences arise.

*Additional specimens examined:* *Kjellberg 376* (BO), Celebes, Kendari, 0 m, 23.ii.1929; *Kjellberg 1210* (BO), Celebes, Kendari, 0 m, 8.iv.1929; *Buwalda 4372* (L), Moluccas, Tanimbar, Jamdena, Otimmer, low altitude, 22.iii.1938.

#### 5. *Dendrophthoe* × *rimituba* Barlow, *nothospec. nov.*

Nothospecies nova *D. flosculosae* Danser similis, sed foliis tenuioribus non bullatis, basi truncatis vel leviter attenuatis, apice acuminatis acutis, axibus inflorescentiis tenuioribus, flores minus numerosis praeditis, bracteis rotundatioribus, corolla in alabastro clavatiore rotundatiore differt. — Holotypus: *Meijer 3343* (L), Sumatra, Central, near Bukittinggi, Mt Merapi, 1500–1600 m, 12.vi.1955.

Glabrous except for the inflorescence densely and the flowers sparsely to densely red brown tomentose or sometimes the corolla glabrous. *Leaves* opposite or scattered; lamina narrowly ovate to ovate, (6–)8–15(–18) cm long, (3–)6–9 cm wide, truncate to attenuate at the base to a petiole 7–20 mm long, thin, finely undulate at the

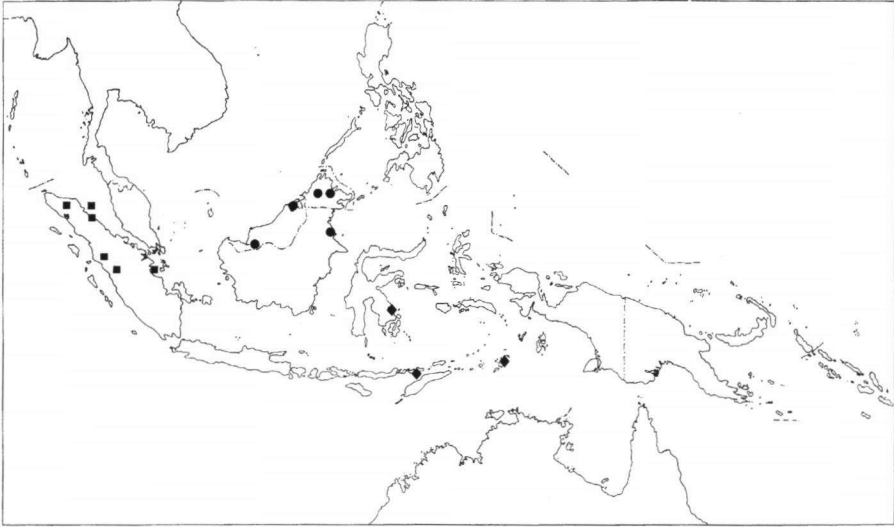


Fig. 3. Distribution of Loranthaceae species. Symbols show recorded occurrence in 1° grid cells. ◆ *Dendrophthoe gangliiformis* Barlow; ■ = *Dendrophthoe x rimituba* Barlow; ● = *Trithecanthera sparsa* Barlow.

margin, acuminate and acute at the apex, bifacial, dull on both sides or slightly lustrous above; venation pennate with the midrib distinct above and raised below and the main laterals somewhat curvined and usually visible. *Inflorescences* at the nodes, a 15- to 30-flowered raceme; axis 40–65 mm long; pedicels 1–3.5(–6) mm long; bracts c. 1 mm long, spreading, rounded or obtuse, red brown ciliate. *Ovary* cylindric, c. 2 mm long; calyx limb erect, ragged, c. 1 mm long. *Corolla* in mature bud 5-merous, 20–26(–32) mm long, slender, gradually widened upwards, narrowed to a weak neck, abruptly widened and clavate below the rounded or obtuse apex, red; tube in the open flower 15–24 mm long and the lobes reflexed 2–3 mm higher, hardly curved but split almost to the base on one side. *Anther* 1.5–2 mm long, obtuse, slightly shorter than the free part of the filament. *Style* slender; stigma capitate, twice as wide as the style. *Fruit* ovoid to ellipsoid, c. 9 mm long, often finely tuberculate.

*Dendrophthoe x rimituba* is endemic to Sumatra (Fig. 3; 15 collections seen), at elevations from sea level to 1600 m. Habit details are poorly known; the only recorded host is coffee.

Some of the specimens here referred to *D. x rimituba* were treated by Danser (1931) as a form of *D. falcata* “delicate in all parts, but (with) long and many-flowered inflorescences (and) leaves ... rather acute.” Others he referred to *D. flosculosa*, where they are syntypes. *Dendrophthoe x rimituba* is close to both *D. flosculosa* and *D. curvata*, and is probably a relatively stabilized taxon derived from them through hybridization. It shares with *D. flosculosa* the long many-flowered inflorescences and acuminate acute leaves, and differs in its generally smaller, thinner leaves, more cu-



neate at the base and not bullate between the main veins; the more slender inflorescence axis bearing fewer flowers; and the slightly more clavate and rounded corolla bud. It differs from typical *D. curvata* in its generally larger ovate leaves, truncate at the base; and longer inflorescence axis bearing more flowers with shorter and more clavate acute corolla buds. The corolla colour is described as red.

Many Sumatran specimens are difficult to classify because *Dendrophthoe* × *rimituba* appears to display a morphological gradation towards *D. curvata* over a wide area in Sumatra, especially at higher elevations. Apart from a specimen from the Mentawi Islands, no pure *D. curvata* material has been seen from Sumatra, and its presence can only be inferred from the specimens which show intermediacy. Sumatran specimens filed under *D. curvata* in L have been annotated accordingly.

As noted above, *Dendrophthoe* × *rimituba* displays only characters which are a combination of those of *D. curvata* and *D. flosculosa*, and it is concluded that the taxon is of hybrid origin. However, it is widespread, obviously fertile, and represents a relatively distinct morphotype which persists in the presence of *D. flosculosa*. It is therefore accorded specific rank. It appears to have effectively replaced pure *D. curvata* in Sumatra, presumably through establishment of highly competitive hybrid genotypes which have been conserved by selection.

The specific epithet is derived from the Latin *rima* ('cleft') and *tubus* ('tube'), and alludes to the deep split on one side of the corolla tube.

## 6. *Dendrophthoe timorana* (Danser) Barlow, *comb. nov.*

*Amyema timorana* Danser, Bull. Jard. Bot. Buitenzorg III, 11 (1931) 350; Barlow, Blumea 36 (1991) 370. — Type: *Teijsmann s.n.* (holo BO, not seen).

For description see Danser, Bull. Jard. Bot. Buitenzorg III, 11 (1931) 350. The description is amended as follows: *Inflorescences* at the nodes, a 2- or 3-flowered umbellate raceme with flowers developing successively but maturing almost together; axis 5–12 mm long; pedicels c. 3 mm long. *Corolla* in mature bud 4-merous, 12–18 mm long, robust, clavate and obtuse at the apex; tube in the open flower not seen but probably short, regular, with the lobes reflexed near the middle. *Dendrophthoe timorana* can be identified locally by these characters, together with the narrow thin pendulous leaves and dense white indumentum of the inflorescence and flowers. The flower colour is green beneath the indumentum.

The species is endemic to Timor in the Lesser Sunda Islands (Fig. 4; 7 collections seen), at elevations from lowlands up to 1400 m. Habitat details are poorly known, but *D. timorana* apparently occurs in seasonal open forests and woodlands; recorded hosts include *Casuarina* (commonly) and *Albizia*.

This species was described as an *Amyema* by Danser (1931). Barlow (1991b) also referred the species to *Amyema*. Additional specimens now available clearly show that it is a species of *Dendrophthoe*. The inflorescence is not a true umbel, as the flowers develop successively and racemosely. None of the specimens seen has fully open flowers, but the corolla appears to be regular, apparently with a short tube. Danser's illustrations (1931: 343) indeed show the unequal age of the flowers in the inflorescence, but probably exaggerate the depth of separation of the corolla lobes.

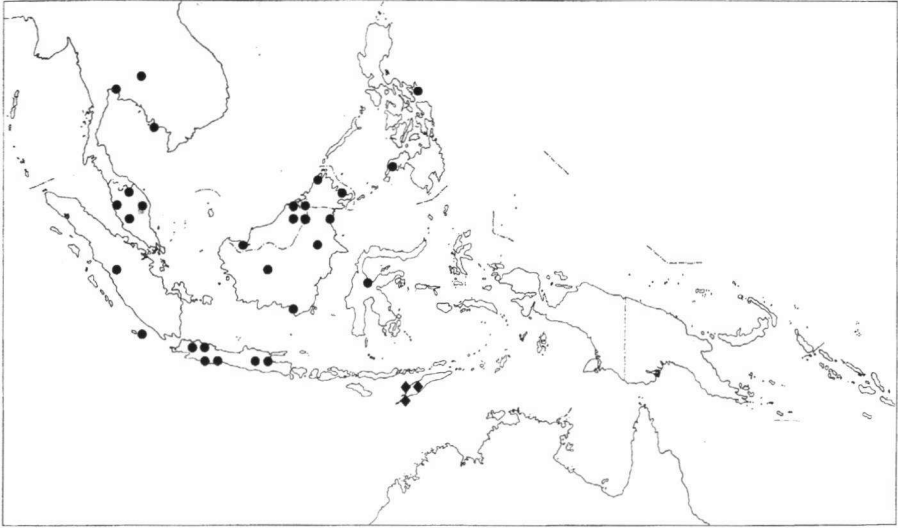


Fig. 4. Distribution of Lorantheae species. Symbols show recorded occurrence in 1° grid cells. ◆ = *Dendrophthoe timorana* (Danser) Barlow; ● = *Macrosolen melintangensis* (Korthals) Miquel.

*Dendrophthoe acacioides* (Cunn. ex Benth.) Tieghem, of northwestern Australia, has a similar few-flowered umbellate raceme and a similar habit. It differs from *D. timorana* in its entirely glabrous habit, much longer flowers and warty fruits.

*Specimens examined:* Lesser Sunda Islands, Timor: *Bloembergen* 3421 (L), Hue Kenutu, near cliff of Kapan, 1000 m, 10.iii.1939; *Bloembergen* s.n. (L), Noilmina, 100 m, 1939; *Schmutz* 2289 (L), Lalian, 300 m, 25.vi.1968; *Schmutz* 2307 (L), Oeolo, 700 m, 30.vi.1968; *Teijsmann* 16399 (L), Tanini; *Wiradinata* 400 (L), Fatumnasi, Soe, 1400 m, 13.i.1975.

## 7. *Loranthus odoratus* Wallich

*Loranthus odoratus* Wallich, in Roxburgh, Fl. Ind. ed. 1, 2 (1824) 215. — Type: *Wallich* s.n. (K, not seen), India, 'Mountains of Chandagiri and Sheopore, in flower in February and March' (presumed syntypes).

For description see Danser, Bull. Jard. Bot. Buitenzorg, III, 14 (1938) 26 under *Hyphear delavayi*. *Loranthus odoratus* can be identified by its combination of opposite, petiolate, ovate-lanceolate, nearly isofacial leaves 5–10 cm long, axillary spicate inflorescence up to 8 cm long, and small 6-merous flowers c. 4 mm long which are functionally unisexual but often with vestigial organs of the other sex. The flower colour is described as white, brownish yellow or orange.

*Loranthus odoratus* (s.l.) is distributed from Nepal, India (Assam), Burma and southern China, throughout Indochina to Taiwan and to Sumatra (Fig. 1; 15 collections seen), recorded mostly in highlands at elevations from 1050 to 3000 m. *Quercus* is frequently recorded as host. Other habitat details are unknown. The specimen cited below is the first record for the species and the genus in the Flora Malesiana region.

*Loranthus* is a genus of perhaps only 2 species (see below), distributed from southern Europe eastwards through southern Asia to Sumatra, China, Japan and Taiwan. It shows several character states which appear to be apomorphic, especially in its inflorescence and flower characters and reproductive system. It is distinguished by its spicate inflorescence and small flowers which have choripetalous corollas and are predominantly functionally unisexual. These characters, together with its genome ( $x = 9$ ) suggest that it is a specialized derivative of the Afro-Indian evolutionary line which was ultimately of Gondwanan origin (Barlow, 1990). Occurring as it does at the northern margin of the family area, it is presumably a relatively young genus which has occupied new territory as a consequence of its reproduction and dispersal syndrome.

*Status of the genus:* *Loranthus* is very closely related to the relatively large genus *Helixanthera*, which extends from tropical and subtropical Africa eastwards through southern Asia to northwestern Malesia. *Helixanthera* is relatively polymorphic, with a few species groups which differ strikingly from each other in flower size, relative style length and presence or absence of an articulation in the style. It is accordingly difficult to discriminate *Loranthus* and *Helixanthera* with respect to these characters. The presence of unisexual flowers has sometimes been used to distinguish *Loranthus*, but the character appears to be variable even within the species of the genus. A parallel situation occurs in *Struthanthus* and satellite groups in the New World, where structural and functional dioecy appears to be a derived state younger than the differentiation of the genera, and therefore of little systematic significance at that level. Danser (1938) expressed the view that *Loranthus* (*Hyphear*) and *Helixanthera* are probably congeneric. Further study is needed to resolve this issue, as the taxonomic consequence of uniting the genera would be the submergence of the larger and equally well-known genus *Helixanthera* into the very small genus *Loranthus*.

Danser (1936) gave a detailed account of the probable taxonomic status of the 9 described species of *Hyphear* (= *Loranthus*). Most of these are distinguished on differences in expression of functional unisexuality in the flowers, and on petal number. These generally have little taxonomic value, even at specific level. Danser concluded that the genus may comprise only two species, and the present study supports his view that *L. delavayi* Tieghem, *L. hemsleyanus* King and *L. pseudo-odoratus* Lingelsheim are conspecific with *L. odoratus*. Even when circumscribed broadly, *Loranthus odoratus* is vegetatively homogeneous over its large area. Many of the specimens are apparently functionally male or female, with variation in the extent to which organs of the other sex are developed. In relatively few cases do organs of both sexes appear to be fully developed in one flower.

*Selected specimen examined:* Rahmat Si Boeea 10661 (L), Sumatra, East Coast, Asahan, SE of Dolok Si Manoek-manoek, Aek Si Tamboerak, 28. x.1936. — See also page 31.

## 8. *Macrosolen brevitylus* Barlow, *spec. nov.*

Species nova *M. macrophylo* (Korthals) Miquel affinis, sed habitu gracili, foliis parvioribus anguste ovatis vel ellipticis petiolo brevi, nervatura obscura, foliis juvenalibus linearibus differt. — Typus: Chew Wee Lek 980 (holo L 105767), Sarawak, Baram, Marudi Forest Reserve, 4° 12' N 114° 19' E, below 500 feet (150 m), 5. ii.1966.

Glabrous. *Stem* internodes terete below, slightly angular and dilated upwards but soon terete. *Leaves* opposite; narrowly ovate to elliptic, 8–13 cm long, 2.5–5 cm wide, shortly cuneate to truncate at the base to a petiole 1–4 mm long, usually acuminate and acute, bifacial, lustrous or dull above, dull and paler below; venation pennate with the midrib visible on the upper surface and raised below and the main laterals faintly visible on both sides; lamina in the juvenile state linear, to 15 cm long, 0.5–1 cm wide, otherwise similar to adult leaves. *Inflorescence* a raceme of 4–5 pairs of flowers; axis 8–15 mm long; pedicels 1–3 mm long; bracts 3, spreading, the central one triangular, acute, 1–1.5 mm long, the lateral ones slightly narrower, c. 1 mm long, free. *Ovary* cylindrical, c. 3.5 mm long; calyx limb entire, somewhat spreading, 0.6–0.8 mm long. *Corolla* in mature bud 6-merous, 15–25 mm long, abruptly inflated in the lower part, 6-angular, 6-winged below the middle, narrowed to a long neck above, weakly clavate, angular and acute at the apex; tube in the open flower 4–6 mm long, the narrowly spatulate lobes reflexed 3–5 mm higher. *Anther* 2–3.5 mm long, about half to three fourths as long as the free part of the filament.

*Macrosolen brevitubus* is endemic to Borneo (Fig. 1; 4 collections seen), recorded at low elevations. Habitat details are poorly known; the only recorded host is *Strombosia rotundifolia* and the habitat is once recorded as dipterocarp forest.

The new species appears to be most closely related to *M. macrophyllus*, with which it is geographically sympatric in the lowlands of Borneo. The inflorescences of the two species are similar, being racemes of a few pairs of well-spaced flowers in which the corolla lobes separate deeply, leaving a very short bell-like tube. This is probably a synapomorphy reflecting pollinator specialization. *Macrosolen brevitubus* differs from *M. macrophyllus* in its more slender habit, smaller narrowly ovate to elliptic leaves with venation obscure except the midrib, and which are very shortly petiolate and long and linear in the juvenile state, and shorter anther filaments.

The specific epithet is derived from the Latin *brevis* ('short') and *tubus* ('tube'), and alludes to the short bell-like corolla tube.

*Additional specimens examined:* Borneo: Au & Ashton S 16758 (L), Sarawak, Miri, NE Lambir Hills, Takau formation, 400 ft (120 m), 29.xi.1962; Richards 2680 (L), Sarawak, 4th Division, Marudi, below 300 m, ii.1932; Meijer 1912 (L), Eastern, N of Tarakan, Nunukan, low altitude, xi.1953.

## 9. *Macrosolen melintangensis* (Korthals) Miquel

*Loranthus melintangensis* Korthals, Verh. Bat. Genootsch. 17 (1839) 281. — *Macrosolen melintangensis* (Korthals) Miquel, Fl. Ind. Bat. 1, 1 (1856) 830. — Type: *Korthals s.n.* (holo L 908.127-969; iso L), Sumatra, G. Malintang.

*Loranthus lowii* King, J. As. Soc. Bengal 56, 2 (1887) 98. — *Macrosolen lowii* (King) Tieghem, Bull. Soc. Bot. France 42 (1895) 442. — Type: *Scortechini 861* (holo K, not seen; iso L), Malaya, Perak, G. Arang Para.

*Macrosolen javanus* Danser, Bull. Jard. Bot. Buitenzorg III, 11 (1931) 289. — Type: *Docters van Leeuwen 3024* (lecto BO, not seen, see below; iso L), Java, Preangan, G. Goentoer, Pateung-teung, c. 1500 m, 9.xi.1918.

*Macrosolen sumatranus* Danser, Bull. Jard. Bot. Buitenzorg III, 11 (1931) 299. — Type: *Bünne-meijer 3335* (holo L; iso BO, not seen), Sumatra, Agam, Brani, c. 950 m, 26.vi.1938.

*Macrosolen floridus* Danser, Rec. Trav. Bot. Néerl. 31 (1934) 232. — Type: *Clemens 31411* (holo ?BO, not seen, see below; iso L), British North Borneo, Mt Kinabalu, Penibukan, spur south of Kina Taki R., 4000–5000 ft (1200–1525 m), 7.ii.1933.

*Macrosolen bellus* Danser, Philipp. J. Sci. 58 (1935) 48. — Type: *Ramos & Chan BS 30447* (lecto BM, see below), Philippines, Catanduanes, Calolbong, summit, 300 m, 14.xi.–11.xii.1917.

*Macrosolen urceolatus* Danser, Blumea 4 (1941) 259. — Type: *van Wijk 65a* (holo BO, not seen; iso L), Borneo, eastern, Kahajan, Bahaoen, 25.ix.1938.

Doubtful species provisionally included:

*Loranthus demesae* Merrill, Philipp. J. Sci. C 9 (1914) 280. — *Macrosolen demesae* (Merrill) Danser, Verh. Kon. Akad. Wetensch. Amst. afd. Natuurk. Sect. 2, 29 (1933) 93. — Type: *Foxworthy, Demesa & Villamil FB 13788* (holo PNH, not seen), Philippines, Mindanao, Zamboanga, Talisay, 40–50 m.

*Macrosolen tenuiflorus* Danser, Bull. Jard. Bot. Buitenzorg III, 11 (1931) 300. — Type: *Endert 3999* (holo BO, not seen), Borneo, eastern, Kong Kemoel, 1800 m.

For descriptions and further synonymy see Danser, Bull. Jard. Bot. Buitenzorg, III, 11 (1931) 289, 292, 293, 299, 300; Rec. Trav. Bot. Néerl. 31 (1934) 232; Philipp. J. Sci. 58 (1935) 47, 48; Blumea 4 (1941) 259, under *Macrosolen javanus*, *M. lowii*, *M. melintangensis*, *M. sumatranus*, *M. tenuiflorus*, *M. floridus*, *M. demesae*, *M. bellus*, and *M. urceolatus* respectively. The essential characters for an integrated description are as follows: Glabrous except for the inflorescence very rarely papillose hairy. *Stem* internodes terete below, slightly flattened and dilated upwards. *Leaves* opposite; lamina more or less ovate, (5–)8–12(–18) cm long, 1.5–6 cm wide, shortly cuneate to truncate or very rarely cordate at the base to a petiole (3–)6–15(–18) mm long, usually slightly to strongly acuminate and acute at the apex but sometimes finally rounded, bifacial, shining or glossy above, dull and paler below, usually recurved at the margin; venation pennate, visible on the upper surface, with only the midrib raised, dark coloured and visible below. *Inflorescences* axillary, a short sometimes subumbellate raceme of 2–4 pairs of flowers; axis usually slender, 3–10(–16) mm long (or slightly longer in fruit), often subtended at the base by an involucre of a few acuminate prophylls; pedicels slender, (1–)2–4 mm long (to 5 mm in fruit); bracts 3, the central one acuminate, 1–2 mm long, the lateral ones acute to slightly obtuse, 0.5–1 mm long, connate at the margin in the lower part, appressed to the ovary. *Ovary* ovoid or ellipsoid, 1.75–2.5 mm long; calyx limb entire, somewhat spreading, 0.3–0.7 mm long. *Corolla* in mature bud 6-merous, (15–)20–30 (–35) mm long, usually slender and slightly inflated towards the middle, weakly 6-ribbed or 6-winged near the middle, clavate, angular and usually acute at the apex. *Anther* 1.5–3 mm long, about two thirds as long as the free part of the filament.

*Macrosolen melintangensis* can be identified among its regional congeners by its combination of opposite, petiolate, ovate, bifacial, medium-sized leaves recurved at the margins, few-flowered raceme with slender parts, bracts which are nearly free, and slender corolla mostly 20–30 mm long with weakly developed wings. Within the genus the species is virtually lacking in specialized characters, and thus presents a very generalized facies. The flower colour is mostly described as pink, red or orange, with a dark band at the neck and grading to yellow or green above.

The species is distributed in Thailand and Indochina, and widely in western Malesia, recorded from Malaya, Sumatra, Java, Borneo, Celebes and the Philippines (Fig. 4; 72 collections seen), recorded mostly at elevations from 1000 to 2350 m and less frequently down to sea level. Habitat details are very poorly known; there is a solitary record of *Ficus* as host.

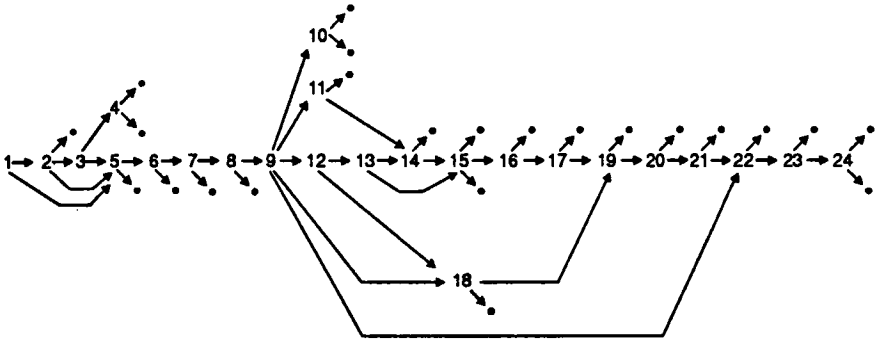


Fig. 5. Schematic representation of the key to *Macrosolen* species presented by Danser (1931).

In Malesia the genus *Macrosolen* is very complex taxonomically, with species limits difficult to circumscribe. The genus appears to have broad ecological tolerances, and is probably still in an active phase of differentiation in the region in response to Quaternary climatic cycles. The difficulty Danser (1931) encountered is illustrated by his key, the steps of which are illustrated schematically in Figure 5. The strong skewing, re-entry of paths to the main line of the key and dependence on quantitative characters such as corolla dimensions all attest to the taxonomic difficulty. The path to some of the 23 species treated could involve as many as 20 key steps.

Danser's solution, in part, was to recognize local races, and to circumscribe species narrowly. In what is treated here as a single species, Danser (1931, 1934, 1935, 1941) recognized several species, each confined to a single Malesian botanical province (*M. lowii* in Malaya, *M. sumatranus* in Sumatra, *M. javanus* in Java, *M. tenuiflorus*, *M. floridus* and *M. urceolatus* in Borneo, *M. demesae* and *M. bellus* in the Philippines). He was clearly aware of the doubtful nature of these distinctions, sometimes expressing doubts about their validity. For example his description of *M. floridus* (Danser, 1934) was qualified with statements that its differences from *M. sumatranus* and *M. tenuiflorus* were 'rather unimportant', and that several 'provisory species' may have to be united. In his description of *M. urceolatus*, Danser (1941) indicated that it was probably conspecific with *M. tenuiflorus*.

Re-examination of all of the assembled material referred by Danser to the species cited above indicates that it belongs to one widespread but not unusually polymorphic species. There appear to be no sharp morphological discontinuities which define biotypes having geographic integrity. Whilst the species may be relatively old (by virtue of its large area and apparent lack of apomorphies), it appears not to have differentiated strongly in the Malesian archipelago in response to Quaternary events despite its apparent rarity at very low elevations.

The earliest available name for the species is *M. melintangensis*. The type material in L does not bear flowers, but the leaves and inflorescences clearly conform with the materials assembled here. Danser (1931) noted a close similarity of the Sumatran *M. melintangensis* to his *M. javanus*, but because of lack of flowers and his commitment to a provincial species concept, treated the former as doubtful.

Danser (1931) did not indicate a type among the 11 collections he cited under *M. javanus*, and these are hence all syntypes. One collection, *Docters van Leeuwen 3024*, was used for illustration, and it is selected as lectotype of the name. In designating the type of *M. floridus*, Danser (1934) cited the location as 'B', without explanation, but in his earlier works he used this symbol for Buitenzorg (Bogor). The holotype of *Macrosolen bellus* (PNH) is no longer extant. An isotype in BM bearing inflorescences and flowers has been seen and identified as lectotype of the species name.

*Status of the genus: Macrosolen* is very closely related to the small genus *Elytranthe*, with which it is sympatric in southern Asia and western Malesia. The two genera have similar genomes ( $x = 12$ ), vegetative morphology, inflorescence architecture and floral characters, and probably have common derivation from the Indian-Indosinian evolutionary line which was ultimately of Gondwanan origin (Barlow, 1990). Danser (1933, 1936) altered his circumscription of the two genera during the course of his work on the family in Malesia. The differences are matters of degree, in the extent of development of involucre bracts at the base of the inflorescence and subtending the flowers, and in the insertion of the flowers on the inflorescence axis. It is difficult to discriminate *Macrosolen* and *Elytranthe* with respect to these characters, which may be of little systematic significance at generic level. Further study is needed to resolve this issue, as the taxonomic consequence of uniting the genera would be the submergence of the larger and well-known genus *Macrosolen* into the very small genus *Elytranthe*.

#### 10. *Trithecanthera sparsa* Barlow, *spec. nov.*

Species nova *T. superbae* Danser similis, sed foliis alternis petiolatis isofacialibus, inflorescentiis brevioribus, floribus paucioribus, corolla magis robusta differt. — Typus: *Chai S 34045* (holo L 381183; iso L 366933), Borneo, Sarawak, 2nd Division, Lubok Antu, Lanjak-Entimau, near Bukit Senkajang, Sg Jelok, 2100 ft (640 m), 19.iii.1974.

*Shrub* glabrous, robust. *Stem* internodes terete. *Leaves* alternate or sometimes a few of them opposite; lamina ovate, 10–16(–30) cm long, 6–12 cm wide, thick, isofacial and dull on both sides, attenuate at the base to a winged petiole 10–14 mm long and 3–4 mm thick with 2 fine ridges extending to the base, obtuse or rounded at the apex; venation obscure except for the midrib raised below and visible but not raised above. *Inflorescence* a raceme (or spike), arising at older nodes; axis deflexed vertically downwards, up to 55(–80) mm long with a non-flowerbearing basal part 5–10 mm long, 4–6 mm thick, tapered towards the apex but lacking a non-flowerbearing prolongation, bearing 20–30 flowers usually sparsely distributed; pedicels 0–1 mm long, c. 2 mm thick, reflexed so that the flowers are oriented upwards; bract deflexed, cup-shaped, c. 2 mm long, c. 1.5 mm deep, broadly acute. *Ovary* funnel-shaped, 4–6 mm long; calyx limb 1–1.5 mm long, irregularly and shallowly lobed. *Corolla* in the mature bud 65–75 mm long, c. 3 mm wide at the base and inflated to 10–13 mm wide above, thick in the lower part, thinner in the inflated part, with 2 rows of small wings near the point of reflexion of the lobes 18–25 mm below the apex, at anthesis gamopetalous almost to the point of reflexion; tube with a single variable slit sometimes to within 15 mm of the base; lobes thick and woody. *Stamens* erect; anther 8–10 mm long, about twice as long as the free part of the filament. *Style*

straight; stigma capitate, flat at the apex, c. 1.5 times as wide as the style. *Fruit* obovoid, 12–15 mm long, borne on a pedicel enlarged up to 4 mm thick.

*Trithecanthera sparsa* is endemic to Borneo (Fig. 3; 5 collections seen), recorded at elevations from 400 to 1000 m. Habitat details are poorly known; the only recorded host is *Shorea*, and the species is once recorded from mixed dipterocarp forest.

*Trithecanthera* comprises 5 species distributed in Malaya and Borneo, and shows several character states which appear to be apomorphic. These include its robust inflorescence, which is a raceme or spike in which the axis hangs downwards and the large, 6-merous gamopetalous flowers are reflexed upwards. It is probably a specialized derivative of the dendrophthoid generic group, which is part of the Afro-Indian evolutionary line which was ultimately of Gondwanan origin (Barlow, 1990), and is probably a young genus which has differentiated in situ in northern Malesia.

The new species appears to be most closely related to *T. superba*, with which it is geographically sympatric in Sarawak and Sabah, but which appears to occur at higher elevations. These two species differ from the other three congeners in not having verticillate phyllotaxy. *Trithecanthera sparsa* differs from *T. superba* in its alternate phyllotaxy, its shorter inflorescence axis with fewer flowers more sparsely distributed, and its thicker differently coloured corollas. It can be further distinguished from other congeners by its combination of the above-mentioned characters, leaves rounded at the apex, lack of a sterile prolongation of the inflorescence axis, and usually pedicellate flowers. The flower colour is described as bright yellow, sometimes with green in the throat.

In a genus in which specific differences are always sharply defined, the new entity is as sharply distinct as the other species are from each other, and its specific status is clearly evident. The few known collections of *Trithecanthera sparsa* show it to occur over a relatively large area in Borneo (Fig. 3), and it is therefore not a highly local young endemic. The geography of the genus nevertheless suggests that the species has differentiated in situ in Borneo. In general, its distinguishing morphological characters (short inflorescence axis lacking a sterile tip; pedicellate flowers; non-verticillate phyllotaxy) appear to be plesiomorphic for the genus. Sharing its territory with congeners which apparently have more specialized pollination systems, the species may be somewhat relictual.

The specific epithet is derived from the Latin *sparsus* ('scattered'), and alludes to the number and insertion of flowers along the axis of the raceme.

*Additional specimens examined:* de Vogel 8202 (L), Borneo, Sabah, Interior, Crocker Ra, 1000 m, 11.x.1986; Wood SAN A3436 (L), Borneo, N, Sandakan, Sepilok, 24.iii.1954; Kostermans 13896 (L), Borneo, E, Berouw, Mt Ilas Bungaan, 400 m, 16.ix.1957.

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[Note added in proof: *Loranthus odoratus*: A second Malesian collection of this species has been located among undetermined materials in L, as follows: *de Vogel* 5486 (L), Celebes, Central, Mt Roroka Timbu, W slope, 1° 16' S, 120° 18' E, 1300 m, on *Lithocarpus*, 20.v.1979. This significant range extension suggests that the species may occur more widely in western Malesia.]