

## IXONANTHACEAE (R. Kool, Leiden)

This small family of 2 or 3 Old World rain-forest genera was already recognized as a separate suprageneric taxon by PLANCHON (1847) and PLANCHON & KLOTZSCH (1856), who relegated it to the affinity of *Ochnaceae*, later correctly referred to *Linaceae* as a subfamily *Ixonanthoideae* by HUB. WINKLER (1931) and finally recognized as a family of its own by EXELL & MENDONÇA (1951).

As to the number of genera contained in the family, there is no unanimity of opinion. FORMAN (1965: 523) referred 8 genera to the family, but NOOTEBOOM (1967) argued that several belong to *Simaroubaceae*. After careful consideration 3 genera are admitted here in *Ixonanthaceae sensu stricto*: *Cyrillopsis* KUHLM. from South America, *Ochthocosmus* BENTH. (incl. *Phyllocosmus* KLOTZSCH) from tropical America and Africa, and *Ixonanthes* JACK from Indo-Malesia. The three genera form a close-knit group. They are all small and the wide distribution in the tropics points to a high age of the group.

We must mention that there is a, doubtful, fourth genus, *Allantospermum* FORMAN, which the author reckons to the *Ixonanthaceae*. It occurs with one species in Borneo and another one in Madagascar. NOOTEBOOM (1967, 1972) included this genus in *Simaroubaceae*. The morphology, chemotaxonomy, and palynology corroborate this affinity, but the anatomy of wood and leaf (VAN WELZEN & BAAS, 1984) is just in favour of affinity with *Ixonanthaceae*.

We refrain from a long discussion of the merits of HALLIER's attempt (1923) to have *Linaceae* as a huge complex centre of affinities and confine ourselves to what is usually accepted nowadays in recognizing a few families grouped around *Linaceae sensu stricto*.

In the treatment of the family *Linaceae* (page 607, see there) the families *Linaceae*, *Ixonanthaceae*, and *Ctenolophonaceae* are opposed by concise diagnoses.

Leaf anatomy has clarified many points but a fair number remains unsolved, which should be the subject of further multidisciplinary studies (VAN WELZEN & BAAS, *l.c.*).

*References*: EXELL & MENDONÇA, Bol. Soc. Brot. ser. 2a, 25 (1951) 105; FORMAN, Kew Bull. 19 (1965) 521–526; HALLIER *f. Beih. Bot. Centralbl.* 39, 2 (1923) 1–178; NOOTEBOOM, *Adansonia* II, 7 (1967) 161–168; *Fl. Males.* I, 6 (1972) 970, f. 1; PLANCHON in Hook. Lond. J. Bot. 6 (1847) 588–603; PLANCHON & KLOTZSCH, *Abh. Kön. Ak. Wiss. Berlin* 1856, Physik. Abh. (1857) 235; VAN WELZEN & BAAS, *Blumea* 29 (1984) 453–479; HUB. WINKLER in E. & P. Nat. Pfl. Fam. ed. 2, 19a (1931) 123, f. 55 & 56. — C.G.G.J. VAN STEENIS (1985).

*Vegetative anatomy*. The leaves of *Ixonanthes* have paracytic stomata, a simple vascular strand in petiole and midrib with sclerenchyma forming a complete cylinder enclosing parenchymatous ground tissue adaxially, and rhomboidal crystals and druses, as more or less constant characters. Variation has been recorded in presence or absence of anticlinal division walls of the epidermal cells, mucilage cells and extent of the vascular bundle sheaths of the minor veins. This diversity partly coincides with the boundaries between the sections *Brewstera* and *Ixonanthes*.

The wood of *Ixonanthes* is characterized by solitary vessels with simple perforations, fibres with numerous distinctly bordered pits, largely apotracheal axial parenchyma bands of 2–5 cells wide, and narrow 1–3(–4)-seriate, weakly heterogeneous rays. The vessel-ray pits are large and simple.

The above characters are in fairly good agreement with the treatment of *Ixonanthes*, together with *Allantospermum*, *Cyrillopsis*, *Ochthocosmus*, and *Phyllocosmus* in one family of the *Linaceae* alliance. *Allantospermum* would fit here better than in the *Iringiaceae*, although its wood stands out in the *Ixonanthaceae* on account of its minute, half-bordered vessel-ray pits.

*References*: BURGESS, *Sabah For. Rec.* 6 (1966) 247–248; DESCH, *Mal. For. Rec.* 15 (1957) 156–157; METCALFE & CHALK, *Anatomy of the Dicotyledons* 1 (1950) 268–273; METCALFE, LESCOT & LOBREAU, *Adansonia sér. II*, 8 (1968) 337–351; ROJO, *Adansonia sér. II*, 8 (1968) 73–83; VAN WELZEN & BAAS, *Blumea* 29 (1984) 453–479. — P. BAAS.

*Palynology*. Pollen of *Ixonanthaceae*, which is described by LOBREAU (1969: 526, *Cyrillopsis*) and OLTMANN (1971), is subprolate to prolate (*Cyrillopsis*, *Ochthospermum*) or subspherical (*Ixonanthes*), and measures from 27 to 52  $\mu\text{m}$ . The apertural system is always tricolporate. The colpi are long and the endoapertures have costae on their polar sides. Exine stratification can easily be observed. Tectum and nexine are thin, while the infratectal layer consists of long columellae.

The thickness of this columellate layer clearly exceeds that of tectum and nexine together. Sculpture is mostly somewhat scabrate. *Cyrtloopsis* has a rugulate or striate exine. Pollen of *Ixonanthes* is characterized by the presence of distinct supracteal spines. *Allantospermum*, which genus was at first included in *Ixonanthaceae*, has tricolporate pollen with endoapertural costae, long columellae, and a rugulate to striate sculpture. As for its pollen morphology, the genus *Allantospermum* is considered to be related to *Ixonanthaceae* by BORTENSCHLAGER c.s. (1966), METCALFE c.s. (1968) and OLTMANN (l.c.) and to *Simaroubaceae* (especially to *Irvingia*) by MULLER (1972), which latter opinion is accepted here. METCALFE c.s. (l.c.) consider pollen of *Ixonanthaceae*, *Allantospermum*, and *Irvingiaceae* together more similar to *Simaroubaceae* pollen than to that of *Linaceae*. However, OLTMANN (l.c.) concluded on pollen morphological evidence that *Ixonanthaceae* (*Allantospermum* excluded) are nearest to *Erythroxylaceae* and also, but to a lesser extent, related to *Linaceae*.

*References*: BORTENSCHLAGER, ERDTMAN & PRAGLOWSKI, Bot. Notis. 119 (1966) 160–168; LOBREAU, Pollen et Spores 11 (1969) 499–555; METCALFE, LESCOT & LOBREAU, Adansonia sér. II, 8 (1968) 337–351; MULLER, Fl. Males. I, 6 (1972) 972; OLTMANN, Pollenmorphologisch-systematische Untersuchungen innerhalb der Geraniales. Diss. Bot. 11 (1971). — R.W.J.M. VAN DER HAM.

### 1. IXONANTHES

JACK, Mal. Misc. 2, 7 (1822) 51; ENDL. Gen. Pl. (1840) 1055, '*Ixonanthes*'; HALL f. Beih. Bot. Centralbl. 39, 2 (1923) 6; HUB. WINKLER in E. & P. Nat. Pfl. Fam. ed. 2, 19a (1931) 124, f. 55, 56A–E; KOOL, Blumea 26 (1980) 195. — *Emmenanthes* HOOK. f. & ARN. Bot. Beech. Voy. (1836) 217. — *Brewstera* M.J. ROEMER, Syn. Monogr. 1 (1846) 141. — *Pierotia* BLUME, Mus. Bot. Lugd. Bat. 1 (1850) 179; *ibid.* 1 (1851) 396. — *Discogyne* SCHLTR, Bot. Jahrb. 52 (1915) 123. — Fig. 1–3.

Evergreen, buttressed trees or treelets growing monopodially with flushes, glabrous. Branches ascending. Bark brownish, finely fissured, rich in tannin; younger parts smooth. Stipules caducous, free, scale-like, about obliquely triangular, entire, acutish, glabrous. Leaves simple, spirally arranged, with slightly incrassate, entire or glandular-serrate margin, pinnately nerved, mostly obovate, tapering towards the base into a short petiole; midrib sulcate above, prominent beneath; venation obscure or slightly prominent on both surfaces; reticulations fine, irregular. Inflorescences axillary, dichasially corymbose. Peduncle smooth, glabrous; primary axes paired or sub-4-whorled, secondary axis paired, otherwise as the primary ones but usually much shorter; bracts scale-like, triangular, persistent, acutish, entire, smooth; bracteoles absent. Flowers bisexual, 5-merous, actinomorphic, perigynous. Young buds sticky. Calyx and corolla indurated and persistent in fruit, increasing in size. Sepals connate for up to 0.2 of their length, quincuncial, glabrous, fleshy to coriaceous in fruit. Petals quincuncial, almost free, glabrous, distinctly veined. Stamens 10 or (15–)20, in one whorl; filaments inserted outside and against the disk, irregularly coiled in bud, glabrous, subsistent; anthers (basi-)dorso-versatile with a large peltate connective, introrse with 2 longitudinal slits, finely verru-



Fig. 1. View on *Ixonanthes* forest, seen from the resthouse at Malili, Central Celebes (Photogr. J. VAN ZIJLL DE JONG, 1933).

cose. *Disk* well-developed, bowl-shaped, with free margin, erect, entire or slightly lobed. *Ovary* superior, 5-celled, glabrous. *Ovules* 2 per locule, axile, one on each margin of the carpel, collateral, pendulous, epitropous. *Style* 1, irregularly coiled in bud, either elongating to 25 mm or remaining very short (up to 2.5 mm in *I. petiolaris*), glabrous, subpersistent in fruit; stigma mushroom-shaped, margin slightly lobed, fleshy. *Capsule* septicidal and septifragal, 5-celled, 5-valvate, without a central column, ovoid-conical or ellipsoid, acute or obtuse, glabrous, smooth; valves sometimes ultimately apically bifid, in transverse section W-shaped; exocarp sometimes fibrous and subtended by a thin membrane (hypoderm) folding along the septa and apparently into the 5 epicarp clefts; mesocarp dark, spongy; endocarp glossy. *Seeds* 1 or 2 per cell, either with a basal wing or with a suprahilar arillode; testa tenacious, brown; endosperm spongy, white, containing oil; embryo straight,  $\pm$  half as long as the dorso-ventrally appressed,  $\pm$  asymmetrically elliptic cotyledons. Germination epigeal.

Distr. In continental Southeast Asia and *Malesia* 3 spp. (absent in Java, the Lesser Sunda Islands, and the Moluccas).

Ecol. Primary forest on various soils below 1000 m.

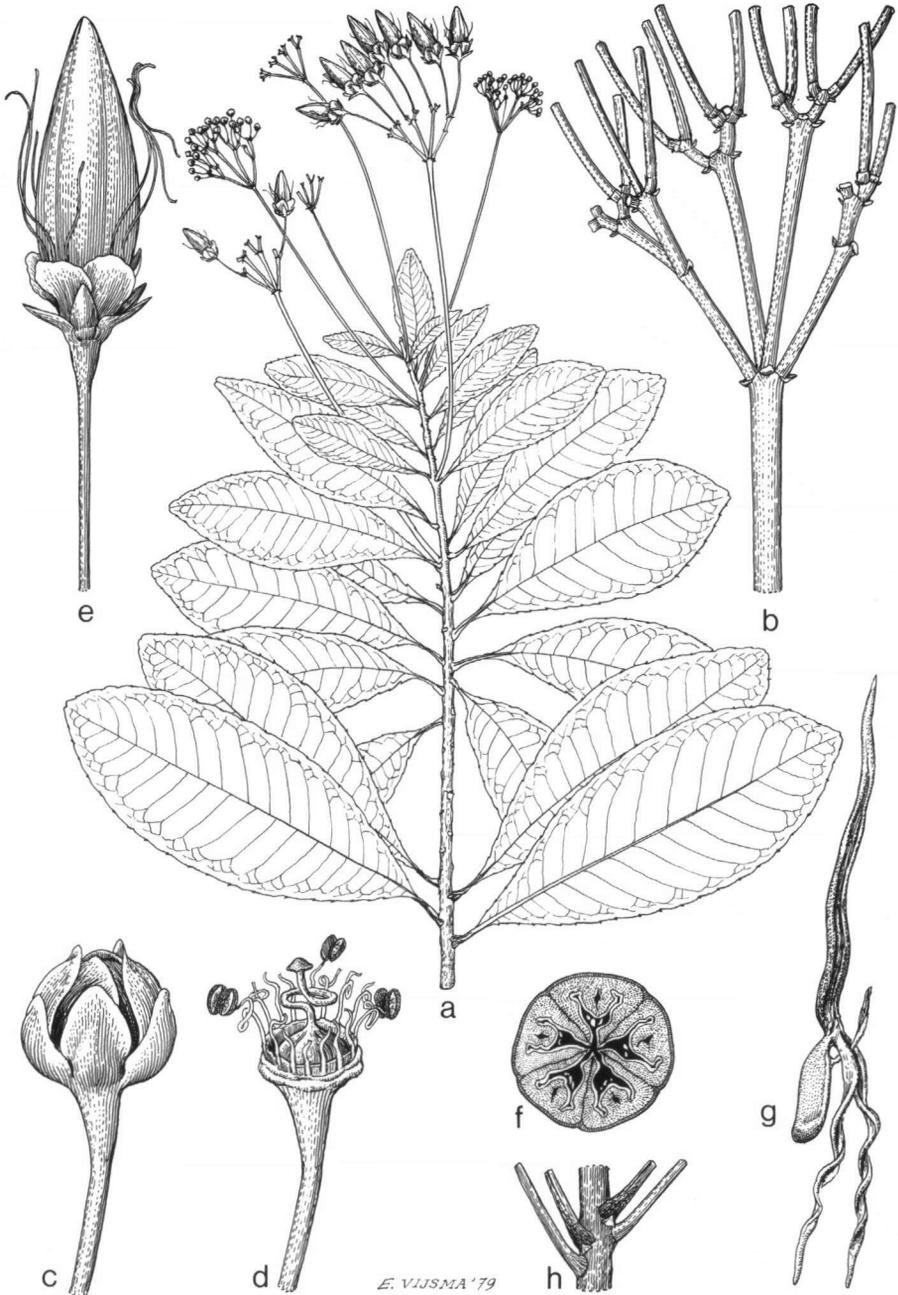


Fig. 2. *Ixonanthes icosandra* JACK. *a.* Habit,  $\times 0.5$ ; *b.* branching of inflorescence,  $\times 3$ ; *c.* flower bud; *d.* ditto, perianth removed, both  $\times 10$ ; *e.* fruit,  $\times 3$ ; *f.* ditto in CS,  $\times 4$ ; *g.* ovule, with 3-lobed arillode,  $\times 15$ ; *h.* stipules,  $\times 2$  (KEP FRI 3121).

Field notes. According to CORNER (Wayside Trees, 1940) the withering leaves are characteristic ochre-brown.

Uses. Though they may be sizeable trees, the timber is of little value and has no features for special purposes.

KEY TO THE SECTIONS AND THE SPECIES

1. Petiole 2–3 mm. Leaf margins slightly glandular-serrate. Primary branches of the inflorescence sub-4-whorled. Stamens (15–)20. Ovules and seeds with a suprahilar arillode, without a basal wing. — *Sect. Brewstera* ..... 1. *I. icosandra*
1. Petioles 10–25 mm. Leaf margins entire, eglandular. Primary branches of the inflorescence paired. Stamens 10. Seeds with a basal wing, suprahilar arillode absent. *Sect. Ixonanthes*.
2. Inflorescence dense. Flowers at anthesis 1.5–3 by 1–2.5 mm diam. Style 1.5–2.5 mm. Fruit at most 1.5(–2) cm long. Valves ultimately apically 1–2 mm deep bifid. Seeds 10–13 by 3–4 mm 2. *I. petiolaris*
2. Inflorescence lax. Flowers at anthesis 3–5 by 2–7 mm. Style 15–20 mm. Fruit (2–)3–4(–4.5) cm long. Valves not bifid. Seed 18–20 by 4–9 mm ..... 3. *I. reticulata*

1. Section *Brewstera*

(M.J.ROEMER) HALL.f. Beih. Bot. Centralbl. 39, 2 (1923) 7. — *Brewstera* M.J.ROEMER, Syn. Monogr. 1 (1846) 141.

Young inflorescence axes, petioles *etc.* not glaucous. Lenticels inconspicuous. Petiole pulvinate. *Leaf margin* slightly glandular-serrate. Peduncle slightly flattened and distally faintly grooved with four ridges; primary branches sub-4-whorled around the usually developed terminal flower of the peduncle. *Disk* entire. *Stamens* (15–)20. *Ovules* 2 per cell, usually only one fertile. *Capsule* ovoid-conical, acute. *Seeds* with a suprahilar arillode, without a basal wing; arillode as long as the seed, fleshy, cream-coloured.

1. *Ixonanthes icosandra* JACK, Mal. Misc. 2, 7 (1822) 53; MIQ. Fl. Ind. Bat. 1, 2 (1859) 494; Illust. (1870) 68, *incl. var. cuneata* MIQ.; HOOK.f. Fl. Br. India 1 (1874) 416; KING, J. As. Soc. Beng. 62, ii (1893) 191; HOCHR. Pl. Bogor. Exsic. (1912) 40; GUILLAUMIN, Fl. Gén. I.-C. 1 (1911) 584; RIDLEY, Fl. Mal. Pen. 1 (1922) 325, f. 31, *incl. var. obovata* RIDLEY; HALL.f. Beih. Bot. Centralbl. 39, 2 (1923) 7; CORNER, Wayside Trees (1940) 221, f. 60; GUILLAUMIN, Fl. Gén. I.-C. ed. 2, 2, 1 (1945) 501; MERR. J. Arn. Arb. 33 (1952) 227; COCKBURN, Tree Fl. Mal. 1 (1972) 307; KOOL, Blumea 26 (1980) 197, f. 2. — *Brewstera crenata* M.J.ROEMER, Syn. Monogr. 1 (1846) 141, *nom. illeg.* — *Pierotia lucida* BLUME, Mus. Bot. Lugd. Bat. 1 (1850) 180. — *I. lucida* BLUME, *ibid.* 1 (1851) 396. — *I. dodecandra* GRIFF. J. As. Soc. Beng. 23 (1854) 632, t. 1 ('*subdodecandra*'). — *Macharisia icosandra* PLANCH. [in Herb. Hook.] ex CHOISY, Mém. Soc. Phys. & Hist. Nat. 14 (1855) 168, *nom. inval.* — *I. cuneata* MIQ. Suppl. (1896) 484. — *I. obovata* HOOK.f. Fl. Br. India 1 (1874) 417. — Fig. 2.

Trees or treelets up to 30 m, bole up to 1.3 m diam. Leaf scars ± orbicular to triangular. Stipules up to 0.6 mm long. *Leaves* oblong to slightly obovate oblong, 6–19 by 3–6.5 cm, pergamentaceous, base tap-

ering; apex obtuse, often retuse, apiculate; petiole 2–3 mm, pulvinate. Peduncle 6–14 cm; pedicels 3–15 mm; bracts up to 5 mm long. *Flowers* at anthesis 2–3 by 1–2 mm diam. *Sepals* elliptic, 1–1.5 by 0.8–1 mm (in fruit enlarging to 1.5–2.5 by 1–1.5 mm), c. 0.3 mm thick at the base, margin ± hyaline, subcoriaceous in fruit. *Petals* orbicular, 2–2.5 by 2–2.5 mm (in fruit enlarging to 3–4 by 3–4 mm), subcoriaceous in fruit. *Filaments* ultimately up to 15 mm long; anthers basi-dorso-versatile. Style up to 10 mm. *Ovary* top-shaped, ± 5-angular, c. 0.5 by 0.7 mm. *Capsule* 15(–20) by 5–6 mm. *Seeds* ellipsoid, 10 by 2 mm; arillode adaxillary, tripartite.

Distr. Thailand; in *Malesia*: Sumatra and Malay Peninsula.

Ecol. Primary and secondary forests on slopes and ridges, 0–600(–900) m.

Field notes. Bole straight, sometimes with short stiltroots. Bark smooth or slightly shallowly fissured, red, fawn, brown, or grey, soft. Inner bark red, purplish red, reddish brown, or brown. Wood white, orange, yellow, brown, cream-brown, or brownish red, hard. Crown conical, dense. Flowers whitish, yellow, green, sticky. Fruits green to dark brown, sticky.

Uses. Sometimes used for house-building.  
Vern. *Kayu leja-leja*, Sum. E. Coast, *kassi*  
*branah*, *kayu ratuh*, *pempaaga*, Palembang, *kayu*

*beluks*, Banka, *buah tui*, *pagar anak*, *sankau merah*,  
Malaya, *injau belukar*, Pahang, *jenjulung*, *men-*  
*julong*, *punggong kijang*, Kedah.

## 2. Section *Ixonanthes*

*Emmenanthes* HOOK.f. & ARN. Bot. Beech. Voy. (1836) 217. — *Ixonanthes*  
*sect. Emmenanthes* HALL.f. Beih. Bot. Centralbl. 39, 2 (1923) 8.

Young inflorescence axes, petioles, etc. glaucous. Lenticels punctiform or slit-like. Petiole flattened, upper side more or less deeply sulcate, sometimes very narrowly winged. *Leaf margin* slightly incassate, entire, eglandular. Peduncle angular to flattened, not grooved; primary branches of inflorescence paired, terminal flower of the peduncle usually developed. *Disk* entire or sometimes slightly 10-lobed. *Stamens* 10. *Ovules* 2 per cell, usually both fertile. *Capsule* short- or long-ellipsoid, obtuse. *Seeds* with a basal wing, without a suprahilar arillode; wing oblong, fairly stiff, concolorous, with a distinct dark-coloured raphe.

**2. *Ixonanthes petiolaris* BLUME**, Mus. Bot. Lugd. Bat. 1 (1851) 396; MIQ. Fl. Ind. Bat. 1, 2 (1859) 494; Illust. (1870) 69; KOOL, Blumea 26 (1980) 199, f. 1d, 3b. — *Pierotia reticulata* BLUME, Mus. Bot. Lugd. Bat. 1 (1850) 180; *ibid.* 1 (1851) 396, *non I. reticulata* JACK. — *I. multiflora* STAPF ex RIDLEY, Kew Bull. (1930) 75. — *I. philippinensis* ELMER, Leafl. Philip. Bot. 10 (1939) 3758, *descr. angl.* — Fig. 3.

Trees or treelets up to 30 m, bole up to 50 cm diam. Young bark with punctiform lenticels, older parts striped with numerous lanceolate lenticels. Leaf scars orbicular with 3–5, sometimes distinct vascular scars. Stipules up to 0.5 mm. *Leaves* elliptic-oblong, 6–15 by 3–7.5 cm, pergamentaceous to subcoriaceous; base acute; apex slightly obtuse; petiole 1.5–2 cm. *Inflorescences* densely flowered. Peduncle 3.5–7(–9.5) cm; pedicels c. 5 mm; bracts up to 1 mm. *Flowers* at anthesis 1.5–3 by 1–2.5 mm. *Sepals* elliptic to orbicular, 1–1.5 by 1–1.5 mm (in fruit enlarging to 1.5–2 by 1.5–2 mm), thickened at base, laterally with a c. 1.5 mm wide hyaline band; fleshy in fruit. *Petals* orbicular to elliptic, 2–2.5 by 1–1.5 mm (in fruit enlarging to 2.5–3 by 1.5–2 mm), thickened at base, margin narrowly hyalinous, chartaceous in fruit. *Filaments* ultimately up to 15 mm; anthers dorso-versatile. *Style* up to 2.5 mm. *Ovary* flattened globose, c. 1.5 by 0.5 mm. *Capsule* short-ellipsoid, 1.5(–2) by 0.8(–1.2) cm, valves ultimately apically 1–2 mm deep bifid; septa after dehiscence (long-)persistent, adaxially connate with the adjacent ones. *Seeds* 1–1.3 by 0.3–0.4 cm.

Distr. Thailand; in *Malesia*: Sumatra, Malay Peninsula, Borneo, Philippines (Luzon, Sulu Is.), and Central Celebes. Perhaps also in New Guinea; see the note under *I. reticulata*.

Ecol. In primary and secondary forests on granitic sand and on slopes and ridges, 0–800 m.

Field notes. Bole deeply fluted, buttresses gradually merging into the bole. Outer bark smooth, green, red, pale brown, yellowish brown, or black, flaking in small pieces, minutely ridged. Inner bark orange-whitish, yellow, pink, red, or reddish brown, granular, sticky, soft. Wood white or reddish brown. Sapwood white, pinkish white, honey-coloured, yellow, or brown, with distinct lamination. Crown large, spreading, medium dense. Flowers cream to green; calyx green; stamens white. Fruits green to brown.

Vern. *Mara jening*, *meribikang*, Sumatra; *tinjau laut*, Sum. W. Coast; *kayurdori bunga*, Sum. E. Coast; *gerungang*, *jurung*, Malaya; *inyang burong*, N. Sembilan, Selangor; *inggi burong*, *pinang pinang*, Borneo.

**3. *Ixonanthes reticulata* JACK**, Mal. Misc. 2, 7 (1822) 51; MIQ. Fl. Ind. Bat. 1, 2 (1859) 494; Illust. (1870) 69; HANCE, J. Bot. 14 (1876) 243; KING, J. As. Soc. Beng. 62, ii (1893) 192; RIDLEY, Fl. Mal. Pen. 1 (1922) 326; HALL.f. Beih. Bot. Centralbl. 39, 2 (1923) 9; CORNER, Wayside Trees (1940) 222, f. 60; MERR. J. Arn. Arb. 33 (1952) 228; BROWNE, For. Trees Sarawak Brunei (1955) 175; COCKBURN, Tree Fl. Mal. 1 (1972) 307; KOOL, Blumea 26 (1980) 200, f. 3A. — *Hypericinea macrocarpa* WALL. Cat. (1831) 4833, *nomen.* — *Gordonia decandra* ROXB. Fl. Ind. ed. Carey 2 (1832) 573. — *Emmenanthes chinensis* HOOK.f. & ARN. Bot. Beech. Voy. (1836) 217. — *I. chinensis* (HOOK.f. & ARN.) CHAMP. in R.Br. Proc. Linn. Soc. 2 (1850) 100, and many later authors. — *I. khasiana* HOOK.f. Fl. Br. India 1 (1874) 416. — *I. hancei* PIERRE in Laness. Pl. Util. Col. Fr. (1886) 306. — *I. cochinchinensis* PIERRE, Fl. For. Cochin. 4 (1893) t. 284A; GUILLAUMIN, Fl. Gén. I.-C. 1 (1911) 584; ed. 2, 1 (1945) 501. — *I. grandiflora* HOCHR. Pl.

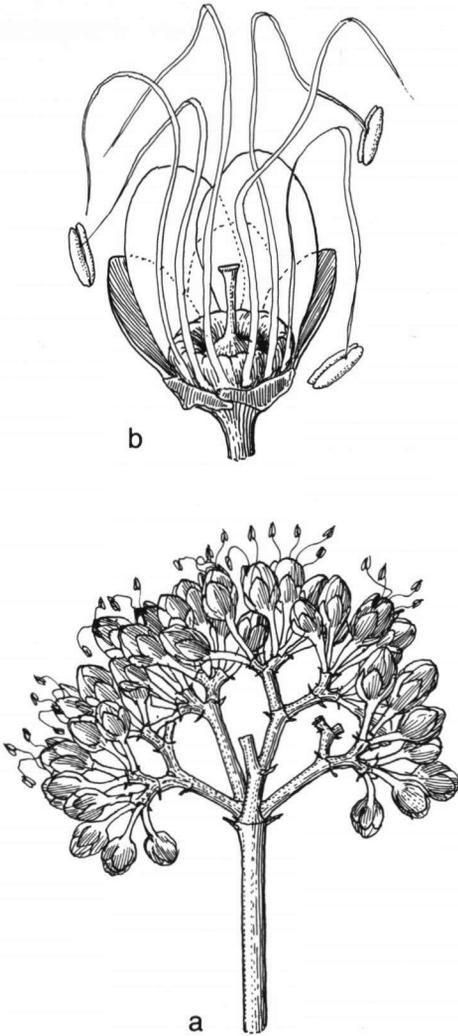


Fig. 3. *Ixonanthes petiolaris* BLUME. a. Inflorescence,  $\times 2$ ; b. flower,  $\times 6$  (SAN 40370).

Bog. Exsicc. (1904) 39; MERR. Enum. Born. (1921) 313; HEYNE, Nutt. Pl. Ned. Ind. (1927) 854. — *Discochyne papuana* SCHLTR, Bot. Jahrb. 52 (1915) 123. — *I. longipedunculata* MERR. Philip. J. Sc. 17 (1921) Bot. 264. — *I. crassifolia* HALL.f. Beih. Bot. Centralbl. 39, 2 (1923) 10. — *I. beccarii* HALL.f. l.c. — *I. petiolaris* (non BLUME) HALL.f. l.c. 8, pro syn. — *I. grandifolia* RIDLEY, Kew Bull. (1930) 74. — *I. pa-*

*pauana* (SCHLTR) HUB. WINKLER in E. & P. Nat. Pfl. Fam. ed. 2, 19a (1931) 126, t. 55, 56 A–E.

Treelet or tree up to 40 m, bole up to 1 m diam. Lenticels slit-like or punctiform. Leaf scars round to ovate. Stipules up to 1 mm. Leaves elliptic, elliptic oblong, or slightly ovate, entire, 5.5–14 by 3–10 cm, pergamentaceous to coriaceous; base acute, apex slightly obtuse to emarginate; petiole 1–2.5 cm. *Inflorescences* lax. Peduncle (3–)5–8(–14) cm; pedicels c. 5 mm, bracts up to 1 mm. *Flowers* at anthesis 3–5.5 by 2–7 mm. *Sepals* elliptic, 4–5 by 3–4 mm (in fruit enlarging to c. 8 by 4 mm), within from top to bottom with a slightly thickened and paler band, fleshy to coriaceous in fruit. *Petals* orbicular to elliptic, 4–5.5 by 3–4 mm (in fruit enlarging to c. 10 by 6 mm), within from the base upwards thickened by a bundle of nerves, margin broadly hyaline, subcoriaceous in fruit. *Filaments* ultimately up to 2 cm. Style up to 2 cm. *Ovary* globose, c. 3 by 2 mm. *Capsule* long-ellipsoid, (2–)3–4(–4.5) cm long, valves not apically bifid; septa after dehiscence (long-)persistent, connate with the adjacent ones. *Seeds* 1.8–2 by 0.4–0.9 cm.

*Distr.* From Assam through Indochina to S. China (Kwangsi, Kwantung, Yunnan, Kweichow, Hainan); throughout *Malesia* (but not in Java and Lesser Sunda Islands, and not yet collected in the Moluccas).

*Ecol.* Primary (rarely secondary) forests, frequently on hillsides and ridges, often on sand and granite, sandstone and kerangas, in swamp and heath forest, largely below 500 m, but occasionally found as high as 1000 m.

*Field notes.* Bole straight and fluted. Buttresses narrow, small. Bark smooth, lengthwise fissured, scaly or cracked, pink, yellowish, brown, fawn, or grey to blackish. Inner bark red, light brown, or dark orange brown, granular, soft. Wood white, dirty white, or dirty yellowish, hard, heavy. Sapwood ochre, with white or yellow lamination, medium hard. Flowers white or greenish. Stamens yellowish-brown. Ovary brown, style green.

*Vern.* *Obah*, Malaya, *jinjagong*, *sansak china*, Penang, *ingeran* or *inggi burong*, *nyiran burong*, *pagar anak*, *sakit hudang*, Selangor, *angaran buron*, Trengganu, *djurung*, Palembang, *sentulu*, N. Borneo, *langudai*, *perepat rimba*, Sabah, *kanju junong*, Brunei, *redin*, S. Sarawak, *lura*, Celebes, *kese ruok*, New Guinea, Tehid lang.

*Note.* This species is the only one with certainty found in New Guinea. As identification of sterile collections is not possible, such collections from New Guinea are tentatively included in *I. reticulata*, but might belong in part to *I. petiolaris*.