

FLORAE MALESIANAE PRAECURSORES LIX  
APOCYNACEAE V. OCHROSIA, NEISOSPERMA

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SUMMARY

A revision with keys to and descriptions of the 5 Malesian species of *Ochrosia* Juss. (2 n. sp.) and 6 of *Neisosperma* Raf. Several species names are reduced. All types are mentioned. A selected number of specimens is cited; a full list of collectors will appear in the series Identification Lists of Malesian Specimens.

*Bleekeria* Hassk. and *Excavatia* Markgr. are reduced to *Ochrosia*.

In the note under *Ochrosia* there is a full discussion of the differences between this genus and *Neisosperma*, especially of the fruit for which some old types were microscopically examined. In *Ochrosia* the fruits are apocarpous, but in one species they are connate for one third, while in a new species from Flores they are united into a syncarpous, 2-celled drupe.

In spite of the diversity of the fruit-structure in the two genera, they are very similar in flowers and vegetatively. For this reason, the key to the species in *Ochrosia* is preceded by a general (tentative) key to the species of both genera for practical purpose of identification of flowering material.

11. OCHROSIA JUSS.

*Ochrosia* Juss., Gen. Pl. (1789) 144; DC., Prodr. 8 (1844) 356–357, p.p.; B. & H. f., Gen. Pl. 2 (1876) 700, p.p.; K. Schum. in E. & P., Pfl. Fam. 4, 2 (1895) 155, p.p.; Merr., En. Philip. 3 (1923) 329, p.p.; Ingle & Dadswell, Austr. J. Bot. 1 (1953) 8–9, p.p.; Backer & Bakh. f., Fl. Java 2 (1965) 231, p.p.; Boiteau, Adansonia 2. sér. 14 (1974) 493; Fosb. & Sach., Adansonia 2. sér. 17 (1977) 23.

*Ochrosia* sect. *Lactaria* F. v. M., Fragm. 7 (1871) 130; Boerl., Handl. 1, 2 (1899) 362, 395; Pich., Bull. Mus. Hist. Nat. Paris 2. sér. 19 (1947) 206. — *Ochrosia* subg. *Lactaria* (F. v. M.) Val., Ann. Jard. Bot. Btzg 12 (1895) 225.

*Bleekeria* Hassk., Nat. Tijd. N.I. 10 (1856) 38; Miq., Ann. Mus. Bot. Lugd.-Bat. 4 (1869) 138, tab. 5, B, C; Koidz., Bot. Mag. Tokyo 37 (1923) 52; Merr. & Perry, J. Arn. Arb. 24 (1943) 214; v. Royen, in Man. Forest Trees Papua 9 (1966) 19.

*Excavatia* Markgr., Bot. Jahrb. 61 (1928) 194; v. Royen, in Man. Forest Trees Papua 9 (1966) 19.

Small laticiferous trees. *Leaves* 2- to 5-whorled, of elliptic or obovate general shape, subcoriaceous, rarely chartaceous, with numerous straight, nearly horizontal lateral veins and rather straight interstitial veins. *Inflorescences* axillary, cymose, glabrous, with small bracts. *Flowers* small. *Calyx* lobes broadly ovate, obtuse, keeled, without glands inside. *Corolla* salver-shaped, white or whitish, glabrous outside; tube cylindric, constricted in the mouth, slightly widened below it; lobes oblong, overlapping to the right, glabrous. *Anthers* below the mouth of the corolla, included, oblong, acute, filaments short. *Stigma* head short-cylindric, with a collar of conglutinate hairs at the base, biapiculate at the top. *Ovary* glabrous, ovate-oblong, superior, gradually tapering into the style, bicarpellate; each carpel with 2–4 ovules in 2 rows. *Fruit* apocarpous, rarely hemisyncarpous or syncarpous, drupaceous; *endocarp* hard, consisting of compact fibers, comprising 2 lateral

cavities with spongy tissue within; placentas penetrating deeply into the narrow carpel hole. *Seeds* 1–3 on each placenta, flat, elliptic or circular, with a narrow wing, peltately affixed. *Embryo* central, straight, with ovate cotyledons as long as the hypocotyl and radicle. *Alcaloid* base: ellipticine.

*Distribution*: About 23 species, of which only 5 in Malesia, 2 in northern Australia, the bulk in the Pacific Islands as far east as the Marquesas and Hawaii, 1 in the Mascarenes (Réunion).

*Type species*: *Ochrosia borbonica* Gmelin in Linné, Syst. Naturae ed. 13, vol. 2 (1791) 439.

*Note*. Some words may be needed about the typification of *Ochrosia* and *Neisosperma*. Jussieu founded the genus *Ochrosia* in 1789, without naming or describing a species, on the 'bois jaune' collected by Commerson in Bourbon (= Réunion). This plant is preserved in P (*Herb. Jussieu nr. 7170*) (Boiteau in *Adansonia* 2. sér. 14, 1974: 486–488, 493). It has been given a specific name in 1791 by Gmelin in Linné, Syst. Naturae ed. 13, vol. 2 (1791) 439: *Ochrosia borbonica* Gmelin, without description. This epithet is antedated by *O. maculata* Jacq. (*Collectanea* 4, 1790: 218), also from Bourbon, probably a form of *O. borbonica*. In former times, this, as the first described species, has been chosen to characterize the genus.

By the time when more species became known, botanists got aware of fruit differences within the genus. It was F. v. Müller (*Fragm.* 7, 1871: 130) who first used this character for discerning two named sections. These have been well defined and figured by Valetton (*Ann. Jard. Bot. Btzg* 12, 1895: 223–236, tab. 22–25) as subgenera: section *Lactaria* F. v. Müller with a solid endocarp containing two lateral cavities filled with spongy tissue, and section *Echinocaryon* F. v. Müller with an endocarp splitting into diverging fibers. On generic level, the cavity-fruited species have been named *Bleekeria* Hassk. *emend.* by Koidzumi (*Bot. Mag. Tokyo* 37, 1923: 51) and *Excavatia* by Markgraf (*Bot. Jahrb.* 61, 1928: 194).

All authors followed Valetton's definitions, till in 1947 Pichon (*Bull. Mus. Hist. Nat. Paris* 2. sér. 19, 1947: 206) kept the cavity-fruited species as the true *Ochrosia* Juss. In opposition to all previous authors he ascribed cavity fruits to the above-cited *O. maculata* Jacq., though Jacquín's description and illustration (*Icon. Pl. Rar.* 2, 1792: tab. 321) do not show that. Nevertheless Pichon was right: adult fruits of *O. borbonica* contain these holes, though only in the lower half or third. For the fibrous-fruited genus Fosberg & Sachet (*Adansonia* 2. sér. 17, 1977: 20 & 28) introduced the name *Neisosperma* Raf. (*Sylva Tellur.*, 1838: 162).

Microscopical investigation reveals that in both genera sclerenchymatous strands of the same structure are the form-giving elements. Both sides of the narrow seed chamber are sheltered by a compact hard layer of endocarp, consisting of interwoven sclerenchyma strands. From these layers spring laterally either similar compact tissues enclosing two larger or narrower cavities with a loose parenchymatous content that easily vanishes when dry, or there are numerous coarse fibers penetrating outwards through an extensive mass of a similar loose parenchyma. In some species their ends incrassate into warts when reaching the exocarp.

The peculiar shape of the mericarp in either genus has been well compared by Rumphius to a shell (*Herb. Amboin.*, 1750: 184, tab. 60): 'De mossel-formige vrucht' (*cf.* Markgraf, *Bot. Jahrb.* 61, 1928: 192). It represents a hard follicle, splitting in the middle line, but kept closed at its dorsal base ('laat zig med geen geweld van malkander trekken', p. 256) by a protrusion of the endocarp vaulting into the carpel

hole. This inner protrusion may be compared to the hinge of a shell. The seed chamber (carpel hole) is compressed laterally, its 2 placentas running through from its ventral to its dorsal end ('twee dikachtige gedroogte bladjes als lippen', p. 184). Either placenta bears 1–3 very flat peltate seeds, the lowermost remaining small because it is checked by the hinge. On a one-seeded placenta the seed has an outcut (as the placenta) corresponding to the hinge.

In *Ochrosia ackeringae* the mericarps are connate for about 1/3, forming a hemisyncarpous fruit. In the recently discovered *Ochrosia syncarpa* they are really united into a syncarpous two-celled drupe. Here the dorsal part of the endocarp is equably thickened, without a hinge. How this fruit may open is unknown.

Despite the diversity of the fruits the two genera are very similar in flower structure. Mrs. Allorge (*Adansonia* 2. sér. 14, 1974: 488–490, 496) has worked out thoroughly several smaller flower differences on New-Caledonian material, and Potier & Janot (*Comptes Rendus Acad. Sc. Paris* vol. 276, 1973: 1727) found corresponding chemical differences in their alkaloids (*cf.* Boiteau, *Adansonia* 2. sér. 14, 1974: 492). As far as these morphological characters could be constantly found in the Malesian species, they may be summarized as follows:

*Ochrosia*: Carpels not immersed in a tissue, though glandular at the base, gradually tapering into the style; no disk. Fruit apocarpous, rarely  $\pm$  syncarpous. Mericarps with a solid thin or thick endocarp surrounding two lateral spongy cavities. Alkaloids on ellipticine basis.

*Neisosperma*: Carpels immersed into a special tissue, or in a cross with 2 minute disk scales, abruptly rounded below the style. Fruit always apocarpous. Endocarp splitted into coarse fibers penetrating the mesocarp, often ending in warts in touch with the exocarp. Alkaloids on corynane basis.

Unfortunately some other good characters as fruit colour, splitting of the style base, and shape of pollen grains (Allorge *in litteris*), though present in Malesian species too, do not keep there to the limits of the genera but seem distributed at random among species.

As it may offer difficulty to refer flowering material to one of the two genera, I have tried to frame a single key for the Malesian species.

#### TENTATIVE KEY TO THE MALESIAN SPECIES OF OCHROSIA AND NEISOSPERMA

based on flowering material

- 1a. Leaves chartaceous to subcoriaceous, small, lanceolate, 6–8 × 1–1.5 cm, lateral veins springing under 30° from the midrib. . . . . **1. *Ochrosia syncarpa***
- b. Leaves subcoriaceous to coriaceous, not lanceolate, larger, lateral veins springing under 80–90° from the midrib . . . . . 2
- 2a. Lateral veins 15–20 mm remote, strongly arcuate. Flowers 23–28 mm long. **3. *Neisosperma ficifolium***
- b. Lateral veins close, straight. Flowers smaller. . . . . 3
- 3a. Lateral veins horizontal, interstitial ones as strong as main ones . . . . . 4
- b. Lateral veins springing under 80° from the midrib, the interstitial ones less strong than the main ones . . . . . 5
- 4a. Leaves elliptic, abruptly acuminate. Inflorescence many-flowered. Anthers near the mouth of the flower tube . . . . . **4. *Ochrosia coccinea***

- b. Leaves oblong-elliptic, gradually acuminate. Inflorescence few-flowered. Anthers in the middle of the tube . . . . . **3. Ochrosia tenimberensis**
- 5a. Leaves broadest above the middle . . . . . 5
- b. Leaves broadest in the middle. . . . . 9
- 6a. Leaves large, 10–36 × 6–13 cm. Inflorescence many-flowered.
- 1. Neisosperma oppositifolium**
- b. Leaves smaller, 6–15 × 3–5.5 cm. Inflorescence few-flowered . . . . . 7
- 7a. Leaves oblanceolate, main lateral veins 7–10 mm distant.
- 2b. Neisosperma acuminatum var. apoense**
- b. Leaves obovate, main lateral veins 3–8 mm distant . . . . . 8
- 8a. Leaves large, 6–15 × 3.5–5 cm, main lateral veins 5–8 mm distant. Corolla 15 mm, lobes equalling the tube.
- 2 a. Neisosperma acuminatum var. acuminatum**
- b. Leaves smaller, 9 × 3.5 cm, lateral veins 3–4 mm distant. Corolla 8 mm, lobes longer than the tube. . . . . **5. Ochrosia minima**
- 9a. Inflorescence loose. Leaves ± ovate or obovate. . . . . 10
- b. Inflorescence crowded. Leaves elliptic-oblong . . . . . 11
- 10a. Leaves elliptic-ovate, yellowish-green, with subacute top and base; main lateral veins 5–8 mm distant. Corolla 16 mm. **4. Neisosperma citrodorum**
- b. Leaves oblong-obovate, not yellowish-green; main lateral veins 2–3 mm distant. Corolla 12 mm. . . . . **2. Ochrosia ackeringae**
- 11a. Leaf base cuneate, lateral veins arcuate, 8–10 mm distant. Corolla 7–8 mm long. . . . . **6. Neisosperma sciadophyllum**
- b. Leaf base sinuately narrowed, lateral veins straight, 3–5 mm distant. Corolla 8–14 mm long. . . . . **5. Neisosperma glomeratum**

#### KEY TO THE MALESIAN SPECIES OF OCHROSIA

- 1a. Leaves chartaceous to subcoriaceous, small, lanceolate, 8–10 × 1–1.5 cm, acute at both ends; lateral veins springing under 30° from the midrib. Corolla lobes longer than the tube. Fruit syncarpous, ovate-acute, 2 × 1 cm.
- 1. O. syncarpa**
- b. Leaves subcoriaceous, larger than 10 × 1.5 cm, oblong-elliptic or obovate, shortly acuminate; lateral veins subhorizontal. Corolla lobes shorter or as long as the tube. Fruit apocarpous or hemisyncarpous, larger than 2 × 1 cm. . . . . 2
- 2a. Leaves ± oblong-elliptic, broadly and shortly acuminate (or obtuse), lateral veins all subequal, 2 mm distant. Fruits red or yellow, apocarpous or hemisyncarpous; endocarp a thick solid mass, filling the whole lateral space except the 2 cavities near the lateral borders. . . . . 3
- b. Leaves broad-elliptic to broad-obovate, more abruptly acuminate; main and interstitial lateral nerves well discernible, 3–4 mm distant. Fruits red, apocarpous; endocarp thin, the 2 lateral cavities occupying the whole space at either side of the seed chamber. . . . . 4
- 3a. Leaves oblong-elliptic, petiole 1–2 cm. Inflorescence repeatedly dichasial. Flowers crowded; corolla tube 7 mm, lobes 4.5 mm. Fruit yellow, hemisyncarpous, V-shaped, mericarps cylindrical . . . . . **2. O. ackeringae**
- b. Leaves ± elliptic-oblong, petiole 0.5–1 cm. Inflorescence forming only 1 dichasium with monochasial branches. Flowers few, loose; corolla tube 4 mm,

lobes 4 mm. Fruit red, apocarpous; mericarps obovate, spreading horizontally.

**3. *O. tenimberensis***

4a. Leaves elliptic-acuminate, with sinuately narrowed base, 3–13 × 3–4.5 cm. Inflorescence repeatedly dichasial, peduncle 0.8–3 cm. Flowers numerous; corolla tube 4 mm, lobes 4 mm. Mericarps applanate, 25–45 × 20–25 × 8 mm.

**4. *O. coccinea***

b. Leaves obovate, with cuneately narrowed base, 5–9 × 3–4 cm. Inflorescences only once dichasial, peduncle 5–6 cm. Flowers few; corolla tube 8 mm, lobes 6 mm. Mericarps 15 × 10 × 8 mm.. . . . **5. *O. minima***

**1. *Ochrosia syncarpa* Markgr., n. sp. – Fig. 1D.**

Arbuscula 6–7 m alta. *Ramuli* graciles teretes, iuveniles aurantiaci. *Folia* ternatim verticillata, petiolus gracilis, 0.5–1 cm, lamina chartacea vel subcoriacea, lanceolata, utrimque longiuscule angustata, 6–8 × 1–1.5 cm, nervi laterales in sicco distincti, oblique recti, sub angulo 30° e costa oriundi, principales 3 mm inter se distantes, sed interstitialibus aucti. *Inflorescentiae* in ramificationibus terminales,

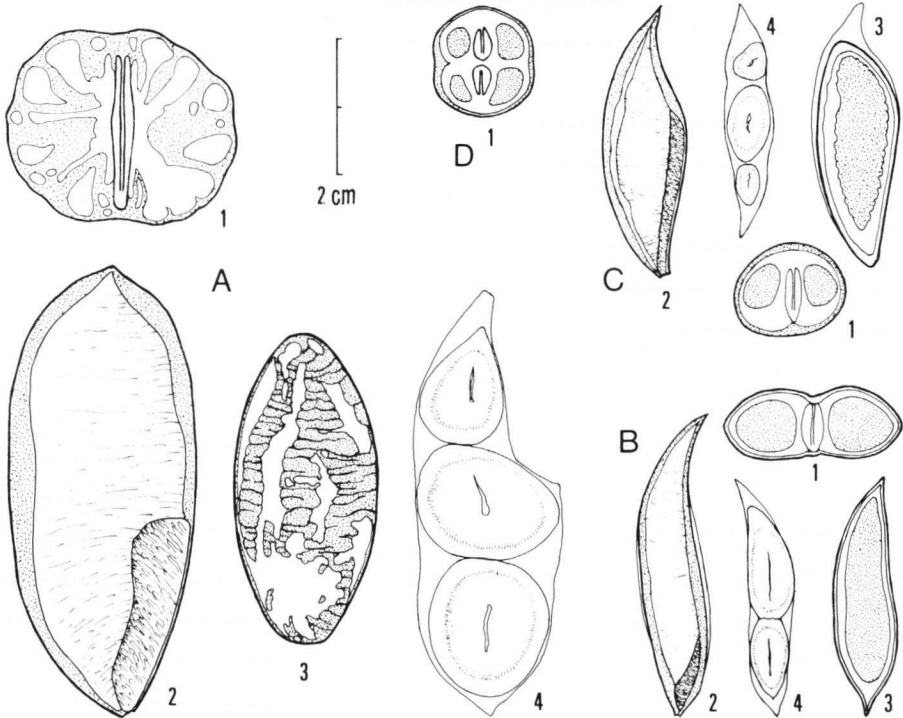


Fig. 1. Fruits of some Malesian *Ochrosiinae*. – A. *Neisosperma citrodorum* (Laut. & K. Sch.) Fosb. & Sach. – B. *Ochrosia coccinea* (T. & B.) Miq. – C. *O. tenimberensis* Markgr. – D. *O. syncarpa* Markgr. – 1. cross section, 2. median longitudinal section, showing the open carpel hole and the 'hinge', 3. tangential longitudinal section parallel to the carpel hole, 4. placenta with seeds. – white: the hard endocarp; punctulate: the parenchymatous tissue; hatched: the 'hinge'.

semel dichasiales, mox in monochasia exeuntes, pauciflorae glabrae, pedunculus 1–1.5 cm, pedicelli brevissimi, bracteis minutis squamiformibus suffulti. *Calycis* lobi ovati, 1.8 × 1 mm, minute ciliati, intus eglandulosi. *Corollae* albae tubus 6 × 1 mm, infra faucem ampliatus, glaber, lobi oblongi obtusi glabri, 9 × 2 mm. *Stamina* infra faucem filamentis distinctis inserta, antherae oblongo-ovatae acutae, 1.2 mm longae. *Caput stigmatis* breviter cylindricum, breviter apiculatum, basi in collum pilosum ampliatus. *Stylus* indivisus. *Ovarium* in stylum sat sensim attenuatum, 0.7 mm altum, glabrum, biloculare, in utroque loculo 4-ovulatum. *Fructus* drupaceus, syncarpus, ovatus, basi rotundatus, apice acutus, 1.8–2.4 × 1.0–1.3 × 0.8 cm. Exocarpium et mesocarpium in sicco 1 mm crassum, endocarpium durum, filis densissimis compositum, 4 foramina lateralia longitudinalia, textura spongiosa repleta continens; loculamenta carpellorum 2, angusta, placentis binis duriusculis lanceolatis percursa. *Semina* in quaque placenta 2, late elliptica, peltata, anguste alata, ca. 7 × 5 mm, albuminosa. *Embryo* centralis, rectus, cotyledones obovati obtusi, 2 × 1.5 mm, in hypocotylum et radiculam aequilongam sensim angustati.

**H o l o t y p e:** W. Flores, 11.4.1965, *Kostermans 22012* (L).

**D i s t r i b u t i o n:** Hitherto known only from the Lesser Sunda Islands.

LESSER SUNDA Is. F l o r e s ( W ): southern coastal part, dry places, fl. & fr. 11.4.65, *Kostermans 22012*; near Wae Wot, 150 m, fl. fr., 10.4.65, *Kostermans & Wirawan 64*; Pantai Borong, *Verheijen 3394, 3479*; Ende-Mataloko, coastal, up to 700 m, *Schmutz 2425*. — L o m b l e n I.: East, *Loeters 1662*.

**E c o l o g y:** dry places at low altitude.

## 2. *Ochrosia ackeringae* (T. & B.) Miq.

*O. ackeringae* (T. & B.) Miq., Ann. Mus. Lugd.-Bat. 4 (1869) 138, tab. 5 B; Val., Ann. Jard. Bot. Botz 12 (1895) 229; K. Schum. in E. & P., Pfl. Fam. 4, 2 (1895) 156; Boerl., Handl. 2 (1899) 395; Koord., Atlas 4 (1916) t. 631–632; Pich., Bull. Mus. Hist. Nat. Paris 2. sér. 19 (1947) 208; Bakh. f., Blumea 6 (1950) 386; Backer & Bakh. f., Fl. Java-2 (1965) 232; Fosb. & Sach., Adansonia 2. sér. 17 (1977) 23. — *Lactaria ackeringae* T. & B., Nat. Tijd. N.I. 29 (1867) 249. — *Bleekeria ackeringae* Koidz., Bot. Mag. Tokyo 37 (1923) 52. — *O. ackeringae* var. *angustifolia* Bak. f. in Andrews, Monogr. Christmas Island (Ind. Ocean) (1900) 182. — *O. littoralis* Merr., Philip. J. Sc. 4 (1909) 315; Merr., En. Philip. 3 (1923) 330; Pich., Bull. Mus. Hist. Nat. Paris 2. sér. 19 (1947) 208. — *Bleekeria littoralis* (Merr.) Koidz., l.c. — *Excavatia littoralis* (Merr.) Markgr., Bot. Jahrb. 61 (1928) 194; v. Royen, in Man. Forest Trees Papua 9 (1966) 19. — *Lactaria calocarpa* auct. non Hassk.: Miq., Sum. (1860) 553.

*Branches* subangular, sparsely lenticellate. *Leaves* oblong-obovate, shortly acuminate or obtuse, with narrowed base (6–)10–15 × (2–)3–5 cm, petiole 1–2 cm, lateral veins springing under 80° from the midrib, the main laterals 2–3 mm distant, marginal vein 1 mm inside. *Inflorescences* repeatedly dichasial. Peduncle 0.5–2(–6) cm. *Calyx* lobes oblong-ovate, 1.5–2 × 1 mm. *Corolla* tube 7 × 1 mm, lobes 4.5 × 1.3 mm. *Anthers* 1.2–1.5 mm below the mouth of the corolla. *Ovary* 1 mm high; style slender, simple. *Fruit* half-syncarpous, V-shaped, yellow, mericarps sub-cylindric, indistinctly flattened from back to bulge, obtuse when ripe, up to 4 × 2 × 1.5 cm, their 'hinge' 25 × 3.5 mm. *Endocarp* solid, with 2 lateral cavities of 4–5 mm diam., placentas obtuse. *Seeds* usually 2 on each placenta, the larger one elliptic, about 12 × 7 mm, the smaller one subcircular, 7 × 7 mm. *Cotyledons* 4 × 2 mm, radicle 3 × 1 mm.

**T y p e:** Bangka *Akkeringa* (L).

BANGKA. *Akkeringa s.n.*

SUMATRA. Lampong, Pulu Sibuku, *Teysmann s.n.*

JAVA. Prinsen Eiland (= P. Panaitan), van Borssum Waalkes 205 & 726; Besuki, afd. Djember, 100 m. *Koorders* 129, 130, 131, 11115, 11116, 20360, 29918; Nusa Barung, beach vegetation, *Jacobs* 4753; Puger, primary forest on limestone rocks, *Buwalda* 7295.

BORNEO. Semporna, Bad Gaya Islands, *For. Dept.* 3797; Pulau Gaya Forest Res., *SAN* 18406; Pulau Timbun Mata, *SAN* 49136; Kunak, Maupat Timbun Mata, *SAN* 68109; Mt. Sidungol, *Forest Dept.* 9362.

CELEBES. Menado, Banggai, Pankowa, *BB* 31894; onderafd. Bonthain, *Boschproefstation Cel* 164; Kabaena Island, Eempuhu, Landschaft Balo, *Elbert* 3405; Saleijer Eilanden, on rocks near the sea, *Docters van Leeuwen s.n.*

PHILIPPINES. M i n d a n a o: Cotabato prov., Lun Masla, *PNH* 34087; Samar, *BS*. 1703. — L u z o n: prov. Ilocos Norte, Mount Quebrada, *PNH* 17819; Batangas prov., Bantigui promontory, *PNH* 13833; Sulu Archipelago (ex Merrill); Babuyan Islands, Dalupiri, *BS*. 10627. — P a l a w a n: Aborlan, Victoria Mts., *PNH* 12460.

MOLUCCAS. Buru, *Cult. Hort. Bog. IV.A.99 & I.V.A.109*; Tjikuketjil, *BB* 22791; Seran, Pulo Sugio, *Beccari s.n.* — K e i I s l a n d s. Kei ketjil, Tual, *Beccari s.n.*

NEW GUINEA. NW.: Amberbakin, *Beccari s.n.*

NEW IRELAND. Namatanai, *Peekel* 752; Cape Entrance 2°22'S 150°12'E, *LAE* 65300, 65380.

E c o l o g y: Coastal rain forest and strand vegetation.

### 3. *Ochrosia tenimberensis* Markgraf, *n. sp.* — Fig. 1C.

Arbuscula, *ramuli* novelli subangulares, adulti teretes. *Folia* 3- ad 4-verticillata, petiolus 0.5–1 cm longus, lamina elliptica, utrimque angustata, subcoriacea, glabra, 8–13 × 3.5–4 cm, venae laterales rectae, principales 2 mm distantes, sub 80°e costa oriundae. *Inflorescentiae* in foliis superioribus axillares, tantum semel divel trichasiales, pedunculus 0.8 cm longus. *Lobi calycis* ovati, carinati, acutiusculi, 1.5 × 1.2 mm. *Corollae* albae tubus 4 × 1 mm, lobi ovato-oblongi, obtusi, 4 × 1.5 mm. *Stamina* in medio tubo inserta, antherae 1.3 mm longae. *Caput stigmati* conicum, breviter apiculatum. *Stylus* basi breviter fissus. *Ovarium* 0.8 mm altum, in stylum sensim attenuatum. *Fructus* apocarpus, mericarpia rubra, horizontaliter divergentia, obovata, breviter acuminata, 4 × 1.8 × 1.2 cm. Endocarpium solidum, 'claustrum' 2 cm longum, 3 mm latum, excavationes laterales in media parte 5 mm diam. *Semina* in utraque placenta 3 inaequalia, maiora 1 × 0.6 mm. *Cotyledones* embryonis obovatae, 1.5 × 1.2 mm, radícula 1.5 × 0.3 mm.

Affinis *Ochrosiae mariannensi* DC. ex insulis Mariannensibus (depictae in Kanehira, *Flora Micronesica*, 1930: 330 et in Stone, *Flora of Guam*, in *Micronesica* 6, 1970: 653); sed mericarpia minus lata, folia latiora, flores minores.

T y p u s: *Pleyte* 72 (L), cum floribus et fructibus juvenilibus.

D i s t r i b u t i o n: Tanimbar Islands.

TANIMBAR IS. Pulau Jamdena, Saumlaki, *Pleyte* 72; Pulau Selaru, Namtabung, fruits, *Pleyte* 128; van Borssum Waalkes 3191; Ilgnei Otimmer, *BB*. 4283.

### 4. *Ochrosia coccinea* (T. & B.) Miq. — Fig. 1B.

*O. coccinea* (T. & B.) Miq., *Ann. Mus. Bot. Lugd.-Bat.* 4 (1869) 138, tab. 5, C; Val., *Ann. Jard. Bot. Btjg* 12 (1895) 230; Boerl., *Handl.* 2 (1899) 395; Pich., *Bull. Mus. Hist. Nat. Paris* 2. sér. 19 (1947) 208; Fosb. & Sach., *Adansonia* 2. sér. 17 (1977) 25. — *Lactaria coccinea* T. & B., *Nat. Tijd. N.I.* 29 (1867) 249. — *Bleekeria coccinea* Koidz., *Bot. Mag. Tokyo* 37 (1923) 52. — *Excavatia coccinea* Markgr., *Bot. Jahrb.* 61 (1928) 195; v. Royen, in Man. *For. Trees Papua* 9 (1966) 19. — *Excavatia coccinea* var. *peekelii* Markgr., *Notizbl. Berl.-Dahl.* 10 (1928) 282.

*Branchlets* subangular, smooth. *Leaves* 2- to 3-whorled, elliptic with abruptly acuminate top and sinuately narrowed base, 7–13(–20) × 3–5 cm; lateral veins horizontal, the main ones 2–3 mm distant, the marginal vein 1 mm inside. *Inflorescences* many-flowered, repeatedly dichasial, ending in monochasia; peduncle 0.8–3 cm, pedicels 2–4 mm. *Calyx* lobes 1.5 × 1 mm. *Corolla* tube 4 × 1 mm, lobes 4 × 1.2 mm. *Anthers* 1 mm below the mouth of the corolla tube. *Ovary* oblong, 0.7 mm high; style splitted at base. *Fruit* apocarpous, mericarps spreading horizontally, bright red, elliptic in outline, with contracted base and rounded top, flattened dorsal-ventrally, 2.5–5 × 2–2.5 × 0.8 cm; endocarp thin-walled, the lateral cavities occupying the whole lateral space, 'hinge' 9 × 2 mm; placentas lanceolate. *Seeds* 2 on each placenta, the apical one 15 × 7 mm, the basal one 8 × 4 mm. *Cotyledons* oblong, 6 × 2.5 mm, radicle 3 × 0.8 mm.

**T y p e:** Ceram, *Teysmann* (FI).

**D i s t r i b u t i o n:** Celebes, Moluccas, New Guinea, Solomon Islands.

CELEBES. Bantung, Komé, *bb* 3577.

MOLUCCAS. C e r a m: Wahaai, *Teysmann s.n.*; *Treub* 518. – K e i I s l a n d s: Tual, Ohoidir, *Jensen* 372.

NEW GUINEA. NW.: monte Arfak a Putat, *Beccari p. pap.* 837; Maripi, near Andai, *BW* 12100; Manokwari, Dessa, clayey flat country, *BB* 33470; *Kostermans* 284 & 399; Hollandia, Sentani Lake, inundated in wet season. *BW* 4737. – E a s t: Sepik Dist., Wewak-Angoram area, *Pullen* 1352; Morobe Dist., Markham Valley, Umi River, 480 m, *Brass* 32704; Bulolo, 7 10'S 146 40'E, *NGF* 9537, 16488, 46713; *Hartley* 9973.

**E c o l o g y:** Lowland rain forest along rivers, even if temporarily flooded.

## 5. *Ochrosia minima* (Markgr.) Fosb. & Boiteau

*O. minima* (Markgr.) Fosb. & Boiteau, *Adansonia* 2. sér. 17 (1977) 27. – *Excavatia minima* Markgr., *J. Arn. Arb.* 21 (1940) 199. – *Bleekeria minima* Merr. & Perry, *J. Arn. Arb.* 24 (1943) 214.

Slender treelet 3–4 m; *branches* terete. *Leaves* 2- to 3-whorled, obovate-cuneate, 9 × 3.5 cm, petiole 1 cm; lateral veins springing under 80° from the midrib, the main ones 3–4(–5) mm distant, marginal vein 1 mm inside. *Inflorescences* few-flowered, dichasial with monochasial endings, peduncle 5–6 cm, pedicels 1 mm long. *Calyx* lobes 2 × 1 mm. *Corolla* tube 8 × 1 mm, lobes 6 × 2 mm. *Anthers* 1 mm long, inserted below the mouth of the corolla tube. *Style* splitted at base. *Ovary* 1 mm high, consisting of 2 separate carpels, with 2 ovules each. *Fruit* bright red, apocarpous; mericarps spreading horizontally, 15 × 10 × 8 mm, elliptic-rounded in outline. Endocarp thin-walled, 'hinge' 3 × 1 mm, lateral cavities taking the whole inferior part. *Seed* 1 on either placenta, elliptic, 8 × 5 mm. *Embryo* 1.5 mm.

**T y p e:** New Guinea, Wassikussa River, *Brass* 8512 (A).

**D i s t r i b u t i o n:** Known only by the type collection.

**E c o l o g y:** Rain forest.

### NAMES OF OCHROSIA EXCLUDED FOR MALESIA

*Ochrosia calocarpa* (Hassk.) Miq., *Ann. Mus. Bot. Lugd.-Bat.* 4 (1869) 139 (*Bleekeria kalokarpa* Hassk., *Nat. Tijds. N.I.* 1, 1856: 40). Introduced into the



Buitenzorg Bot. Garden from Australia by Mr. White, then director of Sidney Bot. Garden. It was only a presumption of Hasskarl's (p. 41) that it could be native in India or Indonesia. Valetton (Ann. Jard. Bot. Btzg 12, 1895: tab. 5) figured the type specimen which then was still alive at Bogor: it is a true *Ochrosia* with 2 lateral fruit cavities. The fruit (mericarp), however, has a mesocarp mantle 1 cm thick all around. This is conform with Hasskarl's description, but not with any species known in the Flora Malesiana area, rather with some Pacific taxa. Indeed, Bentham (Fl. Austral. 4, 1869: 310) and Bailey (Queensl. Fl. 3, 1900: 982, tab. 91/92, fig. 4) include it under *Ochrosia elliptica* Labill. This species is cited by Bailey as 'common among the mangroves all along the coast' (of Queensland).

*Ochrosia borbonica* auct. non Gmel.: Hook. f., Fl. Br. Ind. 3 (1882) 638; K. & G., Mat. Fl. Mal. Pen. 19 (1907) 428; Ridl., Fl. Mal. Pen. 2 (1923) 340 = *Neisosperma oppositifolium* (Lam.) Fosb. & Sach.

*Ochrosia elliptica* auct. non Labill.: K. Schum. & Hollr., Fl. Kaiser Wilh. Land (1889) 112; K. Schum. & Laut., Fl. Schutzgeb. (1901) 504 = *Neisosperma oppositifolium* (Lam.) Fosb. & Sach.

## 12. NEISOSPERMA RAF.

*Neisosperma* Raf., Sylva Tellur. (1838) 162; Fosb. & Sach., Micronesica 8 (1972) 48; 10 (1974) 254–255 (as *Neiosperma*); Adansonia 2. sér. 17 (1977) 19–22, 28–33.

*Cerbera* Lam., Encycl. 1 (1783) 62, p.p.; Forst. f., Fl. Ins. Austr. Prodr. (1786) 19, p.p.; Gaertn., De Fruct. 2 (1791) 192–193, p.p., sed recte tab. 124, fig. o–s; DC., Prodr. 8 (1844) 354.

*Ochrosia* DC., Prodr. 8 (1844) 356–357, p.p.; B. & H. f., Gen. Pl. 2 (1876) 700, p.p.; K. Schum. in E. & P., Pfl. Fam. 4, 2 (1895) 155, p.p.; K. Schum. & Laut., Fl. Schutzgeb. (1901) 504, p.p.; Merr., Int. Rumph. (1917) 431; En. Philip. 3 (1923) 329–330, p.p.; Markgr., Nova Guinea 14 (1926) 283; Heyne, Nutt. Pl. 2. ed. (1927) 1287; Markgr., Bot. Jahrb. 61 (1928) 189–194; Kerr in Craib, Fl. Siam. En. 2 (1939) 436; Corner, Wayside Trees (1940) 147; Kan. & Hat., Bot. Mag. Tokyo 55 (1941) 496; Merr. & Perry, J. Arn. Arb. 24 (1943) 214/v. Royen, in Man. For. Trees Papua 9 (1966) 37–38; Huber, Rev. Handb. Fl. Ceylon 1 (1973) 17.

*Ochrosia* sect. *Echinocaryon* F. v. M., Fragm. 7 (1871) 130; Boerl., Handl. 2 (1899) 362, 394; Pich., Bull. Mus. Hist. Nat. Paris 2. sér. 19 (1947) 209. — *Ochrosia* subg. *Echinocaryon* Val., Ann. Jard. Bot. Btzg 12 (1895) 225–226.

*Ochrosia* sect. *Phragmochrosia* Pich., Bull. Mus. Hist. Nat. Paris 2. sér. 19 (1947) 211.

*Pseudochrosia* Bl., Mus. Bot. Lugd.-Bat. 1 (1849) 158.

*Lactaria* [Rumph., Herb. Amboin. 2 (1742) 255, tab. 84; cf. Merr., Int. Rumph. (1917) 431] Hassk., Nat. Tijd. N.I. 10 (1856) 38–43, p.p.; Miq., Fl. Ind. Bat. 2 (1856) 415, p.p.; Hassk. & De Vriese, Ned. Kruidk. Arch. 4 (1859) 7–10, p.p.; O. Ktze, Rev. Gen. (1891) 415; Koidz., Bot. Mag. Tokyo 37 (1923) 48–51.

*Calpicarpum* Boiteau, Adansonia 2. sér. 14 (1974) 495, non G. Don.

[*De mosseliformige vrucht (Fructus musculiformis*, translation by Burmann) Rumph., Herb. Amboin. 2 (1742) 184, tab. 60, *quoad fructum*; cf. Markgr., Bot. Jahrb. 61 (1928) 192].

Laticiferous trees up to 25 m. *Leaves* (2–)3–5-whorled, elliptic or obovate, usually subcoriaceous, often with dense, straight lateral veins. *Inflorescences* axillary, cymose. *Flowers* small; *calyx* lobes ovate-orbicular, obtuse, keeled, glabrous, without glands inside. *Corolla* salver-shaped, white or whitish; tube cylindrical, constricted in the mouth, slightly widened below it; lobes oblong, obtuse, overlapping to the right. *Anthers* below the mouth of the corolla tube or deeper, oblong, acute, with short filaments. *Stigma* head ellipsoidal, short with a hair ring at the base and with 2 apical appendages. *Style* usually broad, consisting of 2 easily separable strands. *Ovary* oblong, half-immersed, abruptly truncate below the style; carpels 2,

separate, each with 2–6 ovules in 2 rows. *Fruit* quite apocarpous; mericarps horizontally spreading, rarely drooping (in *N. oppositifolia*), drupaceous; exocarp thin, mesocarp thick,  $\pm$  loose, endocarp hard, dissolving into fibres which run through the mesocarp towards the surface; placentas deeply penetrating. *Seeds* 1–3 at either placenta, flat, suborbicular, with a narrow marginal zone. *Embryo* median, straight, with oblong cotyledons longer than hypocotyl and radicle. *Alcaloid* basis: corynane.

*Distribution*: About 20 species, of which 6 in Malesia, in part extending to Queensland and to the Solomon Islands, the bulk in New Caledonia, 2 species in the Bonin and Riu Kiu Islands, one (*N. oppositifolia*) from the New Hebrides through Micronesia and Malesia to Thailand, Vietnam, Sri Lanka (Ceylon), Andaman and Maldivive Islands and Seychelles.

*Type species*: *Neisosperma muricata* Raf., Sylva Tellur. (1838) 162 (= *N. oppositifolium* Fosb. & Sach.).

#### KEY TO THE MALESIAN SPECIES OF NEISOSPERMA

- 1a. Branchlets thick. Leaves coriaceous, broadly obovate, obtuse, rarely short-acuminate. Mericarps developing excentrically to the pedicel. Seed one at either placenta, erose at the 'hinge' . . . . . **1. *N. oppositifolium***
- b. Branchlets slender or thickish. Leaves chartaceous to subcoriaceous, if obovate then not broadly, always acuminate. Mericarp developing centrally to the pedicel. Seeds 2–3, if one then not erose . . . . . 2
- 2a. Peduncle 2–5(–8) cm. Mericarp shortly acuminate or obtuse, oblong or ellipsoidal, verrucose when dry, with coarse fibers. Seeds 3 or 2 at either placenta . . . . . 4
- b. Peduncle 1–2(–3) cm. Mericarp acuminate, not verrucose when dry, with slender fibers inside. Seed one at either placenta . . . . . 3
- 3a. Leaves obovate, shortly or not acuminate, 3–5.5 cm wide, main lateral veins 5–8 mm distant, rather straight. Mericarp 5 × 2.5 × 2–2.5 cm, long-acuminate; beak (5–)8–15 mm. . . . . **2a. *N. acuminatum* var. *acuminatum***
- b. Leaves oblanceolate, long-acuminate, 2.5–3 cm wide, main lateral veins 7–10 mm distant, slightly curved. Mericarp 4.5 × 2.5 × 2 cm, short-acuminate; beak 3–5 mm. . . . . **2b. *N. acuminatum* var. *apoense***
- 4a. Leaves obovate, (9–)12–25 × 6–8 cm, with remote, strongly curved lateral veins. Corolla at anthesis 23–28 mm long (as a whole) . . . . . **3. *N. ficifolium***
- b. Leaves elliptic or oblong, 10–18(–36) × 6–8(–10) cm, with rather straight lateral veins. Corolla at anthesis 7–16 mm long . . . . . 5
- 5a. Leaves yellowish-green, elliptic with shortly tapering base, 12–18 × 4.5–5 cm; petiole 1–2 cm. Ends of inflorescence loose. Corolla 16 mm long. . . . . **4. *N. citrodorum***
- b. Leaves dark green, oblong-elliptic to oblong, 12–25 × 3.5–6 cm; petiole 2–4 cm. Ends of inflorescence contracted. Corolla 7–14 mm long . . . . . 6
- 6a. Leaf base sinuately narrowed; lateral veins straight, 3–5 mm distant. Corolla tube 3–6 mm. Mericarps 5–10 × 4 × 3 cm, short-acuminate, usually with 2–3 seeds at either placenta . . . . . **5. *N. glomeratum***
- b. Leaf base cuneate; lateral veins arcuate, 8–10 mm distant. Corolla tube 2–3 mm long. Mericarps 5 × 3 × 3 cm, usually rostrate and one-seeded at either placenta. . . . . **6. *N. sciadophyllum***

1. *Neisosperma oppositifolium* (Lam.) Fosb. & Sach.

- N. oppositifolium* (Lam.) Fosb. & Sach., *Adansonia* 2. sér. 17 (1977) 30. — *Cerbera oppositifolia* Lam., *Encycl.* 1 (1783) 62. — *Lactaria oppositifolia* O. Ktze, *Rev. Gen.* (1891) 415. — *Ochrosia oppositifolia* K. Schum. in E. & P., *Pfl. Fam.* 4, 2 (1895) 156; Merr., *Int. Rumph.* (1917) 431; *En. Philip.* 3 (1923) 330; Heyne, *Nutt. Pl.* (1927) 1287; Kerr in Craib, *Fl. Siam. En.* 2 (1939) 436; Corner, *Wayside Trees* (1940) 147; Backer & Bakh. f., *Fl. Java* 2 (1965) 232; Burkill, *Dict. Econ. Prod.* 2 ed. (1966) 1597. — *Calpicarpum oppositifolium* Boiteau, *Adansonia* 2. sér. 14 (1974) 495.
- Cerbera parviflora* Forst. f., *Prod.* (1786) 19. — *Lactaria parviflora* O. Ktze, *Rev. Gen.* (1891) 415. — *Ochrosia parviflora* Henslow, *Ann. Nat. Hist.* 1 (1838) 345; Markgr., *Nova Guinea* 14 (1926) 283; *Bot. Jahrb.* 61 (1928) 191; Kan. & Hat., *Bot. Mag. Tokyo* 55 (1941) 496.
- Cerbera platyspermos* Gaertn., *De Fruct.* 2 (1791) 193, tab. 124, fig. o-s. — *Ochrosia platyspermos* DC., *Prod.* 8 (1844) 356.
- N. muricata* Raf., *Sylva Tellur.* (1838) 162.
- Lactaria sulubris* Raf., *Sylva Tellur.* (1838) 162; Hassk. & de Vriese, *Ned. Kruidk. Arch.* 4 (1859) 7, 9 [based on pre-Linnean Rumph., *Herb. Amboin.* 2 (1742) 255, tab. 84]; Miq., *Sum.* (1860) 228; Koidz., *Bot. Mag. Tokyo* 37 (1923) 51. — *Ochrosia salubris* Bl., *Mus. Bot. Lugd.-Bat.* 1 (1850) 158; Miq., *Ann. Mus. Bot. Lugd.-Bat.* 4 (1869) 137; Boerl., *Handl.* 2 (1899) 394; Koord., *Atlas* 4 (1916) t. 630. — *Bleekeria salubris* Hassk., *Nat. Tijds. N.I.* 10 (1856) 41.
- Ochrosia commutata* K. Schum. in E. & P., *Pfl. Fam.* 4, 2 (1895) 156.
- Ochrosia cowlei* Bailey, *Queensl. Agr. J.* 1 (1897) 299; *Queensl. Fl.* 3 (1900) 982, tab. 91/92, fig. 5.
- Paralstonia platyphylla* Merr. ex Schneid., *Bull. Bur. For. Philip.* 14 (1916) 204, *nom. nud.* (sec. Fosb. & Sach.).
- Ochrosia borbonica auct. non* Gmel.: Hook. f., *Fl. Brit. Ind.* 3 (1882) 638; K. & G., *Mat. Fl. Mal. Pen.* 19 (1907) 428; Ridl., *Fl. Mal. Pen.* 2 (1923) 340.
- Pseudochrosia glomerata auct. non* Bl.: K. Schum., *Bot. Jahrb.* 9 (1888) 214.
- Ochrosia elliptica auct. non* Labill.: K. Schum. & Holtr., *Fl. Kaiser Wilh. Land* (1889) 112; K. Schum. & Laut., *Fl. Schutzgeb.* (1901) 504.

Tree 6–18 m. *Branchlets* angular, glabrous, smooth, hollow. *Leaves* (2–)3–4-whorled, coriaceous, glabrous, obovate, obtuse or scarcely acuminate, base broadly cuneate, not decurrent, 10–25(–36) × 5–12(–13) cm; petiole 2–4 cm; main lateral veins slightly curved, under 80° with the midrib, 10–15 mm distant, interstitial ones usually indistinct; marginal vein indistinct, in the very margin. *Inflorescence* glabrous, repeatedly dichasial; peduncle 2–7 cm, pedicels 2–3 mm long, flowers not crowded. *Calyx* lobes 2 mm. *Corolla* tube 4–5 × 1 mm, lobes 7–8 × 1.8 mm. *Anthers* 1.6 mm long, below the mouth of the corolla tube. *Style* simple. *Ovary* 0.8 mm high. *Mericarps* ellipsoidal, abruptly short-acuminate, obliquely inserted, drooping, 6–8 × 3.5–4 × 3–3.7 cm, 'hinge' 15 × 8 mm. Endocarp excurrent into coarse fibers and warts. *Seed* one at either placenta (rarely a small second one), suborbicular, erose at the hinge, 3 × 2.5 cm, with a border of 0.3 cm. *Cotyledons* 11 × 7 mm, radicle 5 × 1 mm.

**Note on the type:** *Cerbera oppositifolia* Lam. is founded on the illustration by Rumphius, *Herb. Amboin.* 2 (1742) tab. 84. A neotype is to be chosen.

**Distribution:** Ceylon, Andaman Islands, southern Thailand, through Malesia till Solomon Islands, Marianne Islands, New Hebrides, Fiji, Samoa, Tonga Islands. Numerous records.

MALAY PENINS. Perak, Johore, Singapore: several records.

SUMATRA. Several records.

JAVA. Several records, incl. Noordwachter I., Verlaten I., and Nusa Kambangan

BORNEO. Sarawak: Several records: Pulau Talang Talang (*S.* 20899).

CELEBES. Mahili, Kawatta. *Bpr. Cel.* II.408; Usu, *Bpr. Cel.* II.333.

MOLUCCAS. Ceram, Amboina, Banda, Babar, Talaud Is.

PHILIPPINES. Polillo, Mindanao, Basilan.

NEW GUINEA (incl. Aru Is., Schouten I., and New Britain). Numerous records.

## 2. *Neisosperma acuminatum* (Val.) Fosb. & Sach.

*N. acuminatum* (Val.) Fosb. & Sach., *Adansonia* 2. sér. 17 (1977) 28. — *Ochrosia acuminata* Trim. ex Val., *Ann. Jard. Bot. Botz* 12 (1895) 231, tab. 22 (Trim., *List Pl. Bot. Gard. Peradeniya*, 1885: 51, *nom. nud.*); *Koord.*, Minahassa (1898) 530; Boerl., *Handl.* 2 (1899) 394; Heyne, *Nutt. Pl.* (reprint 1927) 1287.

Tree 15 m. *Branchlets* slender, smooth, slightly angular. *Leaves* (2–)3–5-whorled, subcoriaceous, obovate to obovate-elliptic, 6–15 × 2.5–5.5 cm; petiole 1–2 cm; main lateral veins rather straight, originating under 70–80° from the midrib, with irregular interstitial veins. *Inflorescences* repeatedly dichasial, corymbose, glabrous, few-flowered; peduncle usually 2 cm, pedicels bracteolate, 2–4 mm. *Calyx* lobes 1.2–1.5 mm. *Corolla* yellowish, tube 7–8 × 1 mm, lobes 5–7 × 2 mm, oblong-acuminate though with obtuse apex, 1.2 × 0.4 mm, scarcely twisted in bud. *Anthers* below the mouth of the corolla tube, 1.5 mm long. *Style* simple. *Ovary* 0.7–1 mm high. *Mericarps* black, spreading horizontally, ovate, acuminate, 4.5–5 × 2.5 × 2–2.5 cm. Endocarp fibers slender, 'hinge' 14–15 × 3–4 mm. *Seed* one at either placenta, elliptic, 3 × 1.5 × 0.2 cm. *Cotyledons* 10 × 2.2 mm, radicle 6 × 1 mm.

### a. var. *acuminatum*

*Leaves* obovate, short-acuminate or obtuse, 6–15 × 3–5.5 cm; main lateral veins rather straight, 5–8 mm distant. *Mericarps* long-acuminate, beak (5–)8–15 mm.

**T y p e:** Menado, *Teysmann s.n.* (L).

**D i s t r i b u t i o n:** Celebes.

CELEBES. **M a l i l i:** Usu, *Boschproefst. Cel. II 351, Cel. III 29*. — **M i n a h a s s a:** Menado, *Teysmann s.n.*; *Botz IV A 37; Botz IV A 41; Botz C 74*; Amurang, 900 m, *BB 17152*; 100 m, *BB 17679*; Tetepangan, Mt. Lokon, near Tomchon, 600 m, *Forman 349 A*.

### b. var. *apoense* (Elm.) Markgr., *n. stat.*

*Ochrosia apoensis* Elm., *Leafl. Philip. Bot.* 4 (1912) 1461; Merr., *Enum. Philip.* 3 (1923) 329; Tsiang, *Sunyatsenia* 2 (1934) 110; Pich., *Bull. Mus. Hist. Nat. Paris* 2. sér. 19 (1947) 211. — *Neisosperma apoense* Fosb. & Sach., *Adansonia* 2. sér. 17 (1977) 28.

*Leaves* oblanceolate, long-acuminate, 7–15 × 2.5–3 cm; main lateral veins slightly curved, 7–10 mm distant. *Mericarps* short-acuminate, beak 3–5 mm.

**T y p e:** Mindanao, *Elmer 10478*.

**D i s t r i b u t i o n:** Philippines.

PHILIPPINES. **M i n d a n a o:** Mt. Apo, 1200 m, *Elmer 10478, 14967*; Sorsogon, Lake Polog, *BS. 23605*. **L u z o n:** Mayon volcano, *PNH 18397*; Isabela Prov., Mt. Moises, *BS. 47264*.

**E c o l o g y:** Primary rain forest.

## 3. *Neisosperma ficifolium* (Sp. Moore) Fosb. & Sach.

*N. ficifolium* (Sp. Moore) Fosb. & Sach., *Adansonia* 2. sér. 17 (1977) 29. — *Alstonia ficifolia* Sp. Moore, *J. Bot.* 61 (1923) Suppl. p. 32. — *Ochrosia ficifolia* Markgr., *Bot. Jahrb.* 61 (1928) 190; Kan. & Hat., *Bot. Mag. Tokyo* 55 (1941) 496.

*Ochrosia rudis* Markgr., *Bot. Jahrb.* 61 (1928) 189. — *N. rudis* Fosb. & Sach., *l.c.*, 31.

Tree 5–25 m. *Branchlets* thick, subangular. *Leaves* 3- to 4-whorled, subcoriaceous, (9–)12–25 × (4–)6–8 cm, obovate, shortly acuminate, base cuneate or sinuously rounded; petiole 1.5–4 cm; lateral veins strongly arcuate, 8–12 pairs, 1.5–2 cm distant; no marginal vein, tertiary reticulation indistinct. *Inflorescences* repeatedly dichasial, ending in monochasia, flowers glomerate; peduncle 1.5–2(–7) cm, rather thick, pedicels bracteolate, 2–4 mm long. *Calyx* lobes 2–2.4 × 1.8 mm. *Corolla* yellowish-white, tube 10–13 × 1.2–1.5 mm, lobes 13–15 × 4 mm. *Anthers* 1.5 × 0.6 mm, below the mouth of the corolla tube. *Ovary* 0.8 mm high, style simple. *Mericarps* red, horizontally spreading, oblong, 7–9 × 3–3.8 × 2.5–3.5 cm, remotely verrucose when dry, endocarp 3 mm thick around the seed chamber; 'hinge' 22 × 8–10 mm, in the fruit body consisting of crude fibers and warts, at last becoming 'flamed' outside by thickening of the fiber ends. *Seeds* 3 on either placenta, orbicular, 1.5 × 1.5 cm, the lowest one 1.2 × 1.0 cm. *Cotyledons* oblong, subauriculate, 7–9.5 × 3–4 mm, radicle 3–4.5 × 1.6 mm.

**Type:** New Guinea, Sogere, *Forbes 74* (BM).

**Distribution:** New Guinea and Japen I.

**NEW GUINEA.** From West to East through the whole island, numerous records. — **Japen I.:** Serui, *BB 30273, 30288*; Woda, *BW 11217*.

**Ecology:** Lowland and lower montane rain forest, often on clay; up to about 800 m.

**Note:** Despite the numerous collections now available even from the Arfak region, plants similar to the type of *Ochrosia rudis* have not been found. This type consists of young flower branchlets and an old mericarp withered to the endocarp. The 'flamed' structure of this evidently represents a maximal stage of thickening of the usually crude fibers and warts of *N. ficifolia*.

#### 4. *Neisosperma citrodorum* (Laut. & K. Schum.) Fosb. & Sach. — **Fig. 1 A.**

*N. citrodorum* (Laut. & K. Schum.) Fosb. & Sach., *Adansonia* 2. sér. 17 (1977) 29. — *Ochrosia citrodora* Laut. & K. Schum. in K. Schum. & Laut., *Fl. Schutzgeb.* (1901) 504; Markgr., *Bot. Jahrb.* 61 (1928) 190.

*Paralstonia clusiacea* auct. non Baill.: Markgr., *Nova Guinea* 14 (1926) 283.

Tree 10–20 m. *Branchlets* horizontal, angular, smooth. *Leaves* 2- to 3-whorled, chartaceous, bright green, elliptic-ovate, shortly acuminate, base long-cuneate, 12–18 × 4.5–5.5 cm; petiole 1–2 cm; main lateral veins under 80° from midrib, 5–8 mm distant, interstitial veins less distinct, marginal vein 2–3 mm inside. *Inflorescence* repeatedly dichasial; peduncle 2–5 cm, pedicels bracteolate, 4–5 mm. *Calyx* lobes 2 × 1.8 mm. *Corolla* tube 8 × 1.5 mm, lobes 8–10 × 2 mm. *Anthers* somewhat above the middle of the corolla tube, 1.5 × 0.7 mm. *Ovary* 0.8 mm high, style splitted at the base. *Mericarps* red, 7 × 3 × 2.7 cm, ellipsoidal, remotely verrucose when dry, spreading horizontally; endocarp 3 mm thick around the seed chamber, consisting of crude fibers and warts in the fruit body; 'hinge' 21 × 6–8 mm. *Seeds* 3 on either placenta, circular, the 2 upper ones 2 cm in diam., the lowest one 1.2 cm. *Cotyledons* 7 × 2.5 mm, radicle 2.5 × 1 mm.

**Type:** New Guinea, Gogol-Oberlauf, *Lauterbach 1073* (WRSL).

**Distribution:** New Guinea (incl. Japen I.).

**NEW GUINEA.** Numerous records through the whole island from West to East. — **Japen I.:** Woda, *BW 11185*.

### 5. *Neisosperma glomeratum* (Bl.) Fosb. & Sach.

*N. glomeratum* (Bl.) Fosb. & Sach., *Adansonia* 2. sér. 17 (1977) 29. — *Pseudochrosia glomerata* Bl., Mus. Bot. Lugd.-Bat. 1 (1850) 158; Miq., Fl. Ind. Bat. 2 (1856) 415. — *Ochrosia glomerata* Val., Ann. Jard. Bot. Btzig 12 (1895) 233, tab. 23 & 24; Boerl., Handl. 2 (1899) 394; Markgr., Bot. Jahrb. 61 (1928) 191; Pich., Bull. Mus. Hist. Nat. Paris 2. sér. 19 (1947) 209. — *Lactaria glomerata* Koidz., Bot. Mag. Tokyo 37 (1923) 51.

*Paralstonia clusiacea* auct. non Baill.: Merr., Philip. J. Sc. 1 (1906) Suppl. p. 117; Merr., En. Philip. 3 (1923) 323.

[*De mosselvormige vrucht (Fructus musculiformis*, trad. Burman), Rumph., Herb. Amboin. 2 (1742) 184, tab. 60, *quoad fructum*; cf. Markgr., Bot. Jahrb. 61 (1928) 192].

Tree 5–25 m. *Branchlets* subangular, smooth. *Leaves* (3- or 4- or 5-whorled, subcoriaceous, oblong-elliptic, short-acuminate, base longly narrowed, (8–)15–18(–25) × 3.5–6 cm; petiole 2–4 cm; lateral veins under 80° from the midrib, straight, with as distinct interstitial ones, usually 3–5 mm distant, marginal vein 0.5 mm inside the border. *Inflorescence* repeatedly dichasial or trichasial, the flowers crowded above the first ramification; peduncle (2–)5–8 cm, pedicels bracteolate, 1–3 mm. *Calyx* lobes 1.8–2 × 1.4–1.7 mm. *Corolla* cream-coloured, fragrant, tube 3–6 × 1 mm, lobes 5–8 × 2 mm. *Anthers* 1.7 mm long, below the mouth of the corolla tube. *Style* splitted at base. *Ovary* oblong, 0.8 mm. *Mericarps* spreading horizontally, ellipsoidal to ovoid, ± acuminate, remotely verrucose when dry, 5–10 × 4 × 3 cm, red; endocarp ‘hinge’ 16 × 7 mm, fibers rather slender, several ending in warts. *Seeds* 1–3 at either placenta, nearly circular, two seeds of 2.5 × 2 cm, one of 1.2 × 1 cm, or in one-seeded fruits 2 × 1.5 cm. *Cotyledons* 5–9 × 2–4 mm, radicle 3–5 × 1 mm.

**T y p e:** New Guinea, *Zippelius s.n.* (L).

**D i s t r i b u t i o n:** Borneo (Sabah), Philippines, Moluccas, New Guinea.

**BORNEO.** S a b a h: Sandakan Dist., Semporna, Selangan Is., *SAN A 2442*; Lahad Datu Dist., Pulau Sakar, *SAN 21666, 26017*; Silam, *SAN 36023, 47675, 55154, 57436*.

**PHILIPPINES.** P a l a w a n: Puerto Princesa, Mt. Pulgar, *Elmer 12783*; Panacan, Aborlan, Victoria Mts., *Elmer 12303*. — L u z o n: Several records. — M i n d o r o: Mt. Yagar, *PNH 17709*. — S i b u y a n: Mt. Giting, *Elmer 12149*. — N e g r o s: *F.B. 20687*.

**MOLUCCAS.** T a l a u d I.: Karakelong, Gunong Piapi, 350 m, *H. J. Lam 3265*. — K e i I.: Groot Kei, *Cult. Hort. Bog. IV A 137*.

**NEW GUINEA.** West: Manokwari, *BW 3543*; Sorong, v. *Royen 3508*. — East: Maprik Dist., Ulupu, *Stopp. s.n.* — S c h o u t e n I.: Biak, *BW 2392, 9622*.

### 6. *Neisosperma sciadophyllum* (Markgr.) Fosb. & Sach.

*N. sciadophyllum* (Markgr.) Fosb. & Sach., *Adansonia* 2. sér. 17 (1977) 31. — *Ochrosia sciadophylla* Markgr., Gard. Bull. Sing. 22 (1967) 26.

Tree 9–12 m. *Branchlets* angular. *Leaves* 3- to 4-whorled, petiole 2–4 cm, blade subcoriaceous, glabrous, elliptic-oblong, obtusely short-acuminate, base cuneate, 12–25 × 3.5–6 cm; lateral veins arcuate, the main ones 8–10 mm distant. *Inflorescence* glabrous, bracteolate, few-flowered; peduncle 2–3 cm, repeatedly dichasial; flowers sessile, crowded. *Calyx* lobes ovate, 1.5 × 1 mm. *Corolla* white, glabrous, tube 2–3 mm long, lobes oblong, obtuse, 5 × 1 mm. *Anthers* 1 mm long, below the mouth of the corolla tube. *Style* simple. *Ovary* 0.6 mm high, carpels separate, biovulate. *Mericarps* spreading, short-ovate, ± rostrate, verrucose when dry, usually 5 × 3 × 3 cm, ‘hinge’ 20 × 6 mm; endocarp fibrous, some fibers ending in

warts. *Seed* usually one at either placenta, rarely 2, 2–3 × 1.5–2 cm, erose at the base. *Cotyledons* oblong, 8 × 3 mm, radicle 4 mm long.

*Type*: Solomon Is., New Georgia, *BSIP 3700* (BSIP).

*Distribution*: New Britain and Solomon Is.

NEW BRITAIN. Near Urin: *NGF 10026*.

*Ecology*: Well-drained primary rain forest, *Camposperma* forest; at low altitudes.

*Use*: The wood is used for boat paddles.