

OPILIACEAE (P. Hiepko, Berlin)

Small evergreen trees, shrubs or lianas; two genera (*Cansjera* and *Opilia*) are known to be root-parasites. *Leaves* distichous, simple, usually extremely variable in form and size, entire, exstipulate, pinnately veined; dried leaves mostly finely tubercled by cystoliths located in the mesophyll. *Inflorescences* axillary or cauliflorous, panicle-like, racemose, umbellate (in Africa) or spicate; bracts narrowly ovate or scale-like, in *Opilia* peltate, often early caducous. *Flowers* small, (3–) 4–5 (–6)-merous, mainly bisexual, sometimes unisexual and plants then dioecious (*Gjellerupia*, *Melientha*, and *Agonandra*) or gynodioecious (*Champereia*). Perianth with valvate, free or sometimes partly united tepals (in ♀ flowers of *Gjellerupia* wanting). *Stamens* as many as and opposite to the tepals (in ♀ flowers only small staminodes); anthers introrse, 2-celled, longitudinally dehiscent. *Disk* intrastaminal, lobed (lobes alternating with the stamens), annular, or cupular. *Ovary* superior, 1-celled; style short or none, stigma entire or shallowly lobed. *Ovule* 1, pendulous from the apex of a central placenta, anatropous, unitegmic and tenuinucellar. *Fruit* drupaceous, pericarp rather thin, mesocarp ± fleshy-juicy, endocarp woody or crustaceous. *Seed* large, conform to the drupe, without testa; hilum basal, often in a funnel-shaped cavity. *Embryo* terete, embedded in rich, oily endosperm, nearly as long as the seed or shorter, with 3–4 linear cotyledons, radicle often very short.

Distribution. There are 9 genera with about 30 *spp.*, widespread in the tropics. *Rhopalopilia* is restricted to Africa and Madagascar, *Agonandra* to South and Central America. In Malasia: 7 genera, 5 of these only known from the eastern Old World (1 endemic: *Gjellerupia* in New Guinea); *Opilia* and *Urobotrya* occur also in tropical Africa.

Ecology. Some species of *Opiliaceae* occur as undergrowth in evergreen forest, primary and secondary, e.g. *Lepionurus sylvestris* is in Java an indicator of everwet climate [cf. VAN STEENIS in Back. & Bakh. f. Fl. Java 2, 1965, (70)]. Other species tolerate or prefer a more seasonal climate and are constituents of deciduous forest. *Cansjera* and *Opilia* often occur in beach forest.

As to the altitude the species of *Opiliaceae* are usually found at low and medium altitude below 1000 m, only some species ascend with several collections up to 1600 or even 2000 m (*Lepionurus* in Sumatra).

Some species are mainly growing on sandy soil, others are more often found on limestone.

Habit. Most species are small trees of about 3–8 m, sometimes gregariously growing (*Urobotrya spp.*) or tiny shrubs (*Lepionurus* often less than 1 m high); only *Champereia* and *Melientha* can attain sizes of more than 10 m. The lianas (*Cansjera* and *Opilia*) are climbing up to 30 m, but they are often recorded as erect shrubs, too. The stem of a young *Cansjera rheedii* is growing in an inclined position and the branches are spreading (cf. HIEPKO & WEBER, Willdenowia 8, 1978, 354, f. 1); if there is no tree for climbing up it becomes an erect shrub.

Pollination. The flowers of all species of this family possess nectar-secreting disks; some flowers are fragrant. They are evidently entomophilous. The inflorescences of *Champereia manillana* are often visited by ants.

Dispersal. The fruits of *Opiliaceae* are drupaceous and vary in size from less than 1 cm long (*Champereia*) to 4 cm (*Melientha*). For *Champereia* it is reported that the fruits are eaten by birds.

Galls. Galled fruits (or flowers?), in form and size like peas, have been observed in some specimens of *Opilia amentacea* (in N. Borneo, Philippines, and New Guinea).

Parasitism. Root-parasitism has been proved to occur in *Cansjera leptostachya*, *C. rheedii* and *Opilia amentacea* (see under these species). According to HIEPKO & WEBER (*l.c.*), *Cansjera rheedii*

forms 4 morphologically different types of haustoria. The largest type of haustoria is formed in the root hair zone and may grow up to 1 cm or more in diameter. Selfparasitism is common in this species, and it was shown that it is also mycotrophic (*cf.* WEBER, *Naturwissenschaften* 64, 1977, 640 f.).

Morphology. The panicle-like inflorescences of *Champereia* and *Melientha* are irregularly branched (fig. 2, 5), the flowers are pedicelled or sessile. In the racemose inflorescences of some genera the pedicelled flowers are arranged in ternate groups (in the axil of each bract) along the rachis, showing that these inflorescences are not genuine racemes but more complex types of inflorescences. Occurrence of bracteoles in some species of *Urobotrya* stresses this opinion.

The perianth of *Opiliaceae* was often described as composed of a 'minute and inconspicuous' calyx and \pm free petals. Other authors use these terms only for the description of *Opilia*, whereas the flowers of the other genera are called monochlamydeous (*e.g.* BACK & BAKH, *f. Fl. Java* 2, 1965, 66). Since the flowers of *Opilia* show solely a slightly cupuliform torus which hardly can be called calyx, I use the terms perianth and tepals for the entire family.

Anatomy. Wood. Most *Opiliaceae* are wood anatomically rather homogeneous. The light coloured wood shows often faint to distinct growth rings. The vessels are predominantly solitary, but up to 40–80% in radial multiples and tangential groups in *Lepionurus* and *Urobotrya latissuama*. The shrubby species show small vessels, the lianas have vessel diameters up to 200 μ m. Fibres are often thick-walled, with minutely bordered pits in *Gjellerupia* and *Lepionurus*, and bordered pits up to 4–6 μ m in the other genera. The rays are 2–6-seriate mingled with few uniseriates; ray cells are weakly procumbent and square/upright, except in *Agonandra*, *Opilia*, *Champereia*, and *Melientha*, where the rays are composed of clearly procumbent cells. With the exception of *Agonandra*, all genera show cystoliths of calcium carbonate in enlarged ray cells. The presence or absence of stalks and the size and shape of the cystoliths seem to have diagnostic value. Parenchyma strands are apotracheal, diffuse or diffuse-inagregate.

Leaves. Cystoliths occur in all representatives, commonly in pairs of clusters in enlarged mesophyll cells or ray cells of the vascular tissue. Size, shape and refractive properties seem to be taxonomically relevant. Within the family, uniseriate and branched hairs (the last mentioned in species of *Opilia*, *Rhopalopilina* and *Cansjera*) are found. They may cover leaf surfaces, or may be restricted to midrib and veins, or are lacking. Stomata are paracytic with two to several subsidiary cells. Some variation in differentiation of the mesophyll is found: either a homogeneous tissue of cubic cells, or two layers of palisade parenchyma and spongy parenchyma, with or without a hypodermis.

Both wood and leaf characters point to a very close relationship between *Champereia* and *Melientha*. Of the other Malesian taxa, *Gjellerupia*, *Lepionurus*, and *Urobotrya* are very similar. *Opilia* and *Cansjera*, as well as the African *Rhopalopilina* and the neotropical *Agonandra*, seem to have a slightly isolated position.

Literature: DESCH, *Mal. For. Rec.* 15² (1954) 431; EDELHOFF, *Bot. Jahrb.* 8 (1887) 100–153; KOEK-NOORMAN & VAN RIJCKEVORSEL, *Willdenowia* 13 (1983) 147–174; METCALFE & CHALK, *Anat. Dicot. Oxford* (1950) 379–381; REED, *Mem. Soc. Brot.* 10 (1955) 29–79; SOLEREDER, *Syst. Anat. Dicot. Stuttgart* (1899) 227–237, 829–830; *ibid.* (1908) 81–83. — J. KOEK-NOORMAN.

Embryology. Detailed embryological investigations on members of this family are very rare. Only in *Cansjera rheedii* (SWAMY, 1960) and *Opilia amentacea* (SHAMANNA, 1955; SWAMY & RAO, 1963) the male and female gametophyte have been studied. In the tetrasporangiate anther a glandular tapetum with 2–4-nucleate cells is developed. The pollen grains are 2-celled when shed.

The anatropous ovule is unitegmatic and has a much reduced nucellus. The nucellar tissue and the integument collapse in later stages of ovular development (therefore the ovules often have been described as ategmic). The chalazal megaspore of the linear tetrad develops into a *Polygonum* type embryo sac. A chalazal caecum grows down into the solid part of the gynoecium and so the embryo sac becomes U-shaped at maturity. The endosperm is cellular. Its chalazal chamber grows towards the base of the ovary forming a 1-nucleate haustorium which in *Opilia amentacea*

reaches the pedicel of the flower. In *Cansjera rheedii* the haustorium is branched and secondary haustoria are developed. The embryogeny has not yet been studied.

Literature: DAVIS, Embryol. Angiosp. (1966) 193 f.; FAGERLIND, Svensk Bot. Tidskr. 42 (1948) 195–229; SHAMANNA, Curr. Sci. 24 (1955) 165–167; SWAMY, Phytomorphology 10 (1960) 397–409; SWAMY & RAO, *ibid.* 13 (1963) 423–428.

Palynology. The first detailed palynological survey of *Opiliaceae* (together with the other families of *Olacales*) was given by REED (1955). The results of my own studies during the last years have not yet been published.

The pollen grains of *Opiliaceae* (in Mal.) are always simple, spherical or suboblate (*Gjellerupia*, *Lepionurus*), and mostly distinctly tricolporate. The ectoaperture is a furrow bordered by a smooth margin (*Urobotrya* and *Opilia*). In *Lepionurus* the ectoapertures are very short and distinct. If the pollen is reticulate, the meshes are interrupted by the colpi (*Champereia*, *Gjellerupia*, *Melientha*, and *Urobotrya*) or closed by a murus (*Lepionurus*).

The apertural membrane is granulate only on the endoaperture in *Cansjera*, *Champereia*, and *Gjellerupia*, but on the whole surface of the furrow in *Opilia* and *Urobotrya*.

The ectexine consists of tectum, infratectal layer and foot-layer. The tectum varies in thickness and may be smooth, perforate, echinulate (*Agonandra*) or reticulate, sometimes with crested muri (*Champereia*, *Lepionurus* and *Melientha*), while in some genera the meshes are not closed (e.g. *Gjellerupia*). The infratectal layer is columellate, except in *Cansjera* in which it is granular. The foot-layer is often sculptured on the inner side of the apertural margin. Endexine is generally present.

The pollen of *Opiliaceae* is similar to the pollen of *Olacaceae* (LOBREAU-CALLEN, 1980) where we also find many suboblate grains. It also resembles pollen of *Icacinaceae*. The pollen grains of *Cansjera* are similar to those of certain genera of *Santalaceae* (*Scleropyrum*, *Pyrularia*, etc.) and to those of *Octoknemaceae*. These families have an endosculptate foot-layer and an ornamented apertural membrane (except many *Icacinaceae*).

Literature: ERDTMAN, Pollen morphology and plant taxonomy, Angiosperms (1952) 298–299; LOBREAU-CALLEN, Adansonia sér. 2, 20 (1980) 29–89; REED, Mem. Soc. Brot. 10 (1955) 29–79. — D. LOBREAU-CALLEN.

Chromosomes. Chromosome numbers of 3 spp. have been recorded, two of these species occur in Malesia: *Lepionurus sylvestris* ($n = 10$) and *Opilia amentacea* (= *O. celtidifolia*, $2n = 20$, African material counted). The neotropical *Agonandra racemosa* has the same chromosome number ($n = 10$).

Literature: KHOSLA, Nucleus 21 (1978) 211–218; MANGENOT & MANGENOT, Bull. Jard. Bot. Brux. 28 (1958) 323; SEAVEY, Taxon 24 (1975) 671.

Phytochemistry. HEGNAUER (1969) stressed the paucity of phytochemical information on *Opiliaceae*. The most interesting feature then known was the presence of acetylenic fatty acids in the lipids of roots, stem and leaves of *Cansjera leptostachya* BTH. This connects *Opiliaceae* biochemically with *Olacaceae* and *Santalaceae*. In the meantime phytochemical screenings of some medicinally used African *Opiliaceae* plants demonstrated the presence of saponins in two Madagascan species of *Rhopalopilia* (DEBRAY c.s., 1971), in *Rhopalopilia pallens* PIERRE (BOUQUET, 1970) and in *Opilia celtidifolia* (GUILL. & PERR.) ENDL. (HAERDL, 1964, *l.c. sub* 'Uses'; BOUQUET & DEBRAY, 1974; SHIHATA c.s., 1977). Alkaloid-like substances were also detected in the Madagascan *Rhopalopilia* spp., in *Rhopalopilia pallens* and in *Opilia celtidifolia*, but confirmation of the presence of true alkaloids by isolation and characterization is still lacking. Saponins of the bark of *Opilia celtidifolia* have triterpenic saponins, i.e. oleanolic acid and hederagenin, according to SHIHATA c.s. (1977). This is in line with the saponins of African *Olacaceae* which have recently been shown to have mainly oleanolic acid and hederagenin as saponins.

Literature: BOUQUET, Plantes méd. Congo-Brazzaville, Thèse (Pharm.), Univ. Paris (1970) 37; BOUQUET & DEBRAY, Plantes méd. Côte d'Ivoire, Trav. Doc. O.R.S.T.O.M. no. 32, Paris (1974) 133; DEBRAY c.s. Contr. inventaire plantes méd. Madagascar, Trav. Doc. O.R.S.T.O.M. no. 8,

Paris (1971) 31; HEGNAUER, *Chemotaxonomie der Pflanzen* 5 (1969) 248–249; SHIHATA c.s. *Planta Medica* 31 (1977) 60–67. — R. HEGNAUER.

Taxonomy. Before VALETON (1886) established the *Opiliaceae* as a distinct family the genera of this group have been placed by different authors in several other families. BENTHAM & HOOKER (1862) e.g. treated the tribe *Opilieae* (*Lepionurus*, *Cansjera*, *Opilia*, and *Agonandra*) as a part of their *Olacineae*, whereas *Champereia* was a member of their *Santalaceae* (B. & H., 1883). In the treatment of BAILLON (1892) the *Opilieae* (including *Opilia*, *Lepionurus*, *Champereia*, *Melientha*, *Agonandra*, and *Cansjera*) made part of the family *Loranthaceae*, which included also the *Olaceae*, *Santaleae* and several other groups today mostly considered to form distinct families. ENGLER (1889) treated *Champereia* also as a genus of *Santalaceae*; the other genera of our *Opiliaceae* were placed in two different tribes of the family *Olacaceae*, namely the *Opilieae* (*Opilia*, *Cansjera*, and *Lepionurus*) and *Agonandreae* (*Agonandra*).

In 1897 ENGLER accepted the family *Opiliaceae* as established by VALETON (*l.c.*) and transferred *Champereia* according to the treatment of VALETON from *Santalaceae* to the tribe *Opilieae* of this family. In the classification of SLEUMER (1935) the same two tribes are set down: *Opilieae* and *Agonandreae*. The second tribe is composed of the genera *Gjellerupia* and *Agonandra*. Since *Gjellerupia* is, with respect to morphological, anatomical, and palynological characters, obviously more closely allied to *Urobotrya* and *Lepionurus* it has also to be included in the *Opilieae*.

Most present-day authors consider *Opiliaceae* in our circumscription as a distinct family placed along with *Olaceae* and *Santalaceae* in the order *Santalales* (or *Olacales*). THORNE (1981) very recently included this family in the rank of a subfamily in his *Olaceae*.

Literature: BAILLON, *Hist. Pl.* 11 (1892) 456–458; BENTHAM & HOOKER, *Gen. Pl.* 1 (1862) 349; *ibid.* 3 (1883) 231; ENGLER in *E. & P. Nat. Pfl. Fam.* 3, 1 (1889) 214, 240–241; *ibid.* Nachtr. 1 (1897) 143; SLEUMER in *E. & P. Nat. Pfl. Fam.* ed. 2, 16b (1935) 33–41, 339; THORNE in Young & Seigler, *Phytochemistry and angiosperm phylogeny* (1981); VALETON, *Crit. Overz. Olacin.* (1886) 136–161.

Uses. Young leaves and inflorescences (incl. young fruits) of *Champereia manillana* and *Melientha suavis* are frequently used as a vegetable. The fruits (juicy mesocarp) of some species are also eaten locally and occasionally: *Cansjera leptostachya* (Northern Australia), *Champereia manillana* (in many parts of the range), *Melientha suavis* (in Thailand), and *Opilia spp.* (in Northern Australia and different parts of Africa).

Some species are used in local folk medicine (pounded or as a decoction): *Champereia manillana* (leaves and roots applied for ulcers, rheumatism, headache, and stomachache); *Lepionurus sylvestris* (roots or whole plant applied for fever or headache); *Opilia amentacea* (roots and/or leaves are in Africa applied for fever, headache, or intestinal parasites; in W. Africa the plant is said to have a purgative, diuretic, and abortive action); *Urobotrya siamensis* (in Thailand used for a medicine against intestinal parasites, in large amount a deadly poison).

The wood of *Melientha suavis* is often used for charcoal in Thailand.

Literature: BURKILL, *Dict. Econ. Prod. Mal. Pen.* (1935) 526, 1353; DRUET & COMEAU, *Ann. Univ. Abidjan, sér. C*, 14 (1978) 57–67; DUNLOP c.s. *N. Territ. Bot. Bull.* 1 (1976) 59; HAERDI, *Acta Tropica, Suppl.* 8 (1964) 109; HIEPKO, *Willdenowia* 9 (1979) 13–56; IRVINE, *Woody plants of Ghana* (1961) 474; WORSLEY, *Acta Ethnographica* 10 (1961) 153–190.

KEY TO THE GENERA

1. Inflorescence a panicle or panicle-like, in axils of leaves, often also on older branches and on the main trunk.
2. Shrub or small tree, polygamous (gynodioecious). Flowers distinctly pedicelled. Drupe ellipsoid, 8–16 mm long. 1. *Champereia*
2. Small tree. Flowers unisexual, sessile, the female flowers often with a very short pedicel, elongated in fruiting state. Drupe ellipsoid, 2.3–4 cm long 2. *Melientha*

1. Inflorescence a raceme or spike, in axils of leaves, rarely on older branches or on the trunk.
 3. Flowers in racemes, mostly 3 per bract. Bracts broadly ovate to ovate or cordate, caducous before anthesis. Tepals free or united at the base only (rarely female flowers without perianth).
 4. Shrub or small tree. Rachis of raceme glabrous or puberulous, pedicels glabrous. Bracts basally attached, not peltate. Drupe usually less than 1.5 cm long.
 5. Flowers bisexual. Raceme at least 2.5 cm, mostly longer. Drupe ellipsoid.
 6. Tepals free, recurved. Stamens exceeding the perianth. Disk annular. Drupe 8–16 mm
- 3. Urobotrya**
6. Tepals united at base, tube cupular, lobes spreading. Stamens not exceeding the perianth. Disk cupular with irregularly lobed margin. Drupe 9–16 mm long, resting on the thickened disk
 4. **Lepionurus**
 5. Plant dioecious. Raceme 1–2 cm long. Female flowers without perianth, male flowers with free tepals. Drupe ± orbicular. **5. Gjellerupia**
 4. Liana, sometimes an erect shrub. Rachis of raceme and pedicels densely covered with brownish hairs. Bracts peltate. Drupe ellipsoid, 1.5–3 cm long **6. Opilia**
 3. Flowers in spikes, each flower in the axil of a small (c. 1 mm long) persistent bract. Tepals united, tube urceolate, lobes shorter than the tube **7. Cansjera**

1. CHAMPEREIA

GRIFF. Calc. J. Nat. Hist. 4 (1843) 237; Flora 27, 2 (1844) 436; Not. Pl. As. 4 (1854) 362; Ic. Pl. As. 4 (1854) t. 537 ('*Champereya*'); B. & H. Gen. Pl. 3 (1883) 231; VALET. Crit. Overz. Olacin. (1886) 150; ENGL. in E. & P. Nat. Pfl. Fam. 3, 1 (1889) 214 (*sub Santalaceae*); BOERL. Handl. 1 (1890) 210; BAILL. Hist. Pl. 11 (1892) 457 (*sub Loranthaceae*); ENGL. in E. & P. Nat. Pfl. Fam. Nachtr. 1 (1897) 143 (*sub Opiliaceae*); SLEUM. in E. & P. Nat. Pfl. Fam. ed. 2, 16b (1935) 37; HIEPKO, Willdenowia 9 (1979) 14. — *Malulucban* BLCO, Fl. Filip. (1837) 188, *nom. illeg.* — *Opilia sect. Opiliastrum* BAILL. Adansonia 3 (1862) 123. — *Govantesia* LLANOS, Rev. Progr. Cienc. 15 (1865) 191. — *Nallogia* BAILL. Bull. Soc. Linn. Paris 2 (1892) 985; Hist. Pl. 11 (1892) 478. — **Fig. 1, 2, 5b.**

Shrubs or small trees; branchlets glabrous. *Leaves* coriaceous-fleshy. Plants polygamous with ♀ or ♂ flowers in panicles. Panicles axillary, often also on older branches or on the main trunk. *Inflorescences* with ♀ flowers widely branched; ♂ inflorescences more dense with stout branches, rachises sometimes finely puberulous. *Flowers* 5- (sometimes 4- or 6-)merous, with pedicels, solitary or fascicled along the branches of the inflorescence; bracts minute, fugacious. — ♀ *Flowers*: tepals reflexed; filaments filiform; ovary small, conical, half immersed in the fleshy, annular disk; stigma sessile. — ♂ *Flowers*: tepals adjacent to the ovary; stamens rudimentary; disk lobed. *Drupe* shortly pedicelled, ellipsoid; pericarp thin, 0.8–1.2 mm thick, mesocarp fleshy, endocarp woody. *Embryo* nearly as long as the seed, radicle small, with 3 long cotyledons.

Distr. One variable species: Andamans, Burma, Thailand, Vietnam, Taiwan, and *Malesia*. **Fig. 3.**

Ecol. Open evergreen forest and dry monsoon forest, from lowland up to c. 1600 m, mostly below 900 m.

- 1. *Champereia manillana*** (BL.) MERR. Philip. J. Sc. 7 (1912) Bot. 233; Fl. Manila (1912) 185; Philip. J. Sc. 11 (1916) Bot. 268; Sp. Blanc. (1918) 133; En. Philip. 2 (1923) 116; KOORD. Exk. Fl. Java 4 (1925) 580, f. 862 ('*Cansjera leptostachya*'); KANEHIRA, Form. Trees, ed. 2 (1936) 176, f. 128; MERR. J. Arn. Arb. 19 (1938) 25; CORNER, Ways. Trees (1940) 514, f. 173; DESCH, Mal. For. Rec. 15² (1954) 431; LIU,

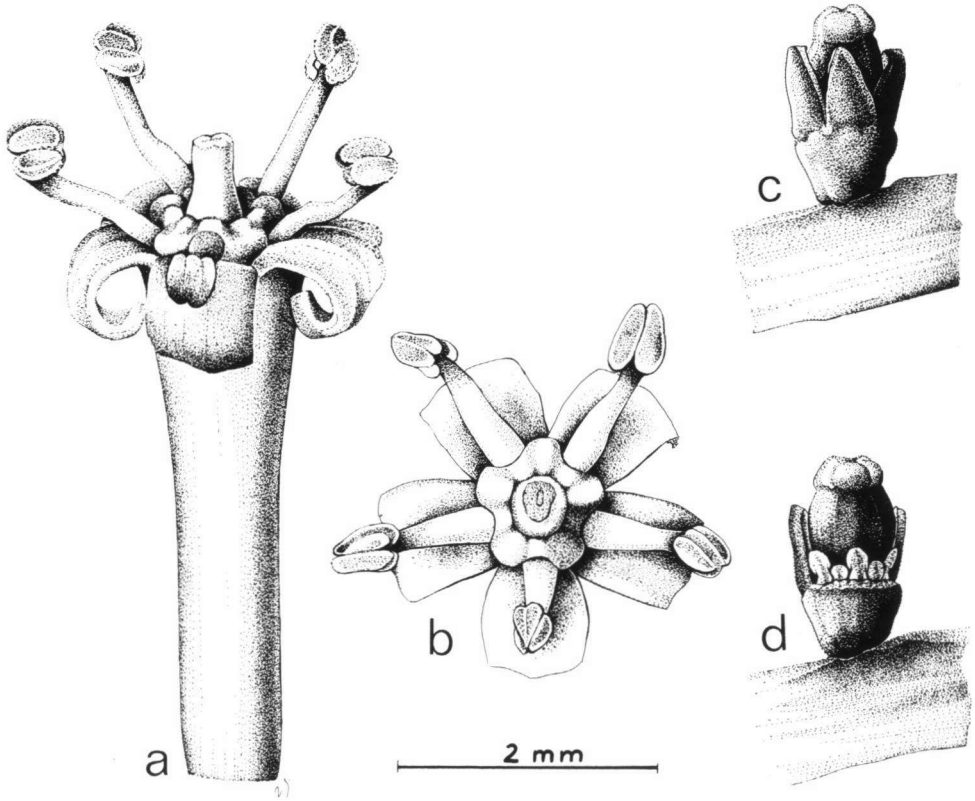


Fig. 1. *Champerea manillana* (BL.) MERR. a–b. ♀ Flower, c. ♀ flower, d. ♀ flower, two tepals removed (a–b GEESINK & HIEPKO 7823, c–d HIEPKO 364). After HIEPKO, 1979.

Illust. Lign. Pl. Taiwan 2 (1962) 808; LI, Woody Fl. Taiwan (1963) 142, f. 50 (*sub Santalaceae*); BACK. & BAKH. f. Fl. Java 2 (1965) 67; HATUS. Mem. Fac. Agric. Kagoshima Univ. 5, 3 (1966) 27; HUANG, Taiwania 14 (1968) 229 (fig. of pollen); LI, Fl. Taiwan 2 (1976) 233, f. 279; HIEPKO, Willdenowia 9 (1979) 16. — *Cansjera manillana* BL. Mus. Bot. Lugd. Bat. 1 (1851) 246. — *Opilia manillana* BAILL. Adansonia 3 (1862) 124. — *Opilia cumingiana* BAILL. l.c. — *Govantesia malulucban* LLANOS, Rev. Progr. Cienc. 15 (1865) 191. — *Champereya gnetocarpa* KURZ, J. Bot. 13 (1875) 325; J. As. Soc. Beng. 45, ii (1876) 123. — *Champereya griffithiana* PLANCH. ex KURZ, J. As. Soc. Beng. 44, ii (1875) 154; Hook. f. Fl. Br. India 5 (1886) 236 (*'Champerea' sub Santalaceae*); GAMBLE, J. As. Soc. Beng. 75, ii (1912) 277; PARKINS. For. Fl. Andam. (1923) 231. — *C. griffithii* PLANCH. ex KURZ, For. Fl. Burma 2 (1877) 330 (*nom. illeg.*); VIDAL, Sin. Atlas

(1883) t. 81, f. D; Phan. Cuming. (1885) 141; Rev. Pl. Vasc. Filip. (1886) 232; RIDL. Fl. Mal. Pen. 3 (1924) 172; BURK. Dict. (1935) 520. — *Nallogia gaudichaudiana* BAILL. Bull. Soc. Linn. Paris 2 (1892) 985. — *C. gaudichaudiana* (BAILL.) TIEGH. Bull. Soc. Bot. Fr. 41 (1894) 65. — *C. cumingiana* (BAILL.) MERR. Philip. J. Sc. 1 (1906) Suppl. 50; Ito, Illust. Form. Pl. (1927) t. 523. — *C. platyphylla* MERR. Philip. J. Sc. 11 (1916) Bot. 177; En. Philip. 2 (1923) 116. — *C. oblongifolia* MERR. Philip. J. Sc. 11 (1916) Bot. 177; En. Philip. 2 (1923) 116. — *C. lanceolata* MERR. Un. Cal. Publ. Bot. 15 (1929) 57. — Fig. 1, 2, 5b.

Small tree, mostly 4–8 m, sometimes up to 20 m, or shrub; stem 5–12 (–35) cm ø; bark smooth, pale. Slash wood white to cream. *Leaves* glabrous, ovate, oblong, or lanceolate, (4.5–) 6–18 (–25) by (1.5–) 2–8 (–11) cm; apex slightly acuminate or acute; base shortly attenuate to attenuate, rarely rounded; mid-

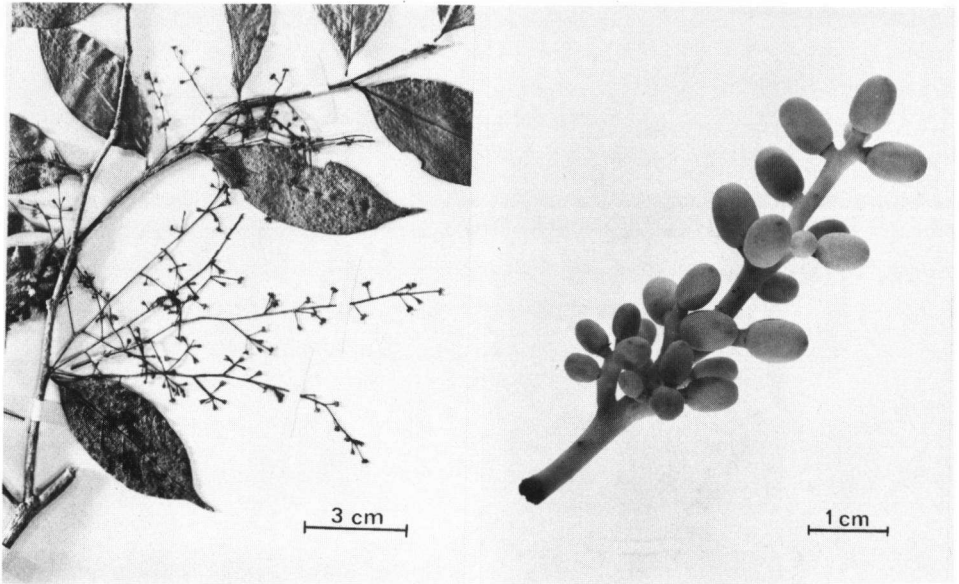


Fig. 2. *Champerea manillana* (BL.) MERR. Left: twig with inflorescences with ♀ flowers (RAHMAT SI TOROES 3297); right: young infructescence developed from a ♀ inflorescence (HIEPKO 364). After HIEPKO, 1979.

rib above prominulous; nerves 5–7 (–8) pairs; mid-rib and nerves prominent beneath; petiole 3–5 (–8) mm. *Panicles* solitary or in groups of 2–4; main rachis up to 20 cm long; bracts ovate, acute, 0.5–1 mm long. — ♀ *Flowers*: pedicels 2–5 mm, thickened upwards; tepals yellowish green, 1–1.5 mm, oblong, acute; stamens as long as the tepals, anthers yellow, oval, 0.3 mm long; disk green, annual, crenulate; ovary green, 0.5 mm long. — ♀ *Flowers* green; pedicels c. 0.5 mm long; tepals c. 0.5 mm, acute; staminodes minute, 0.2 mm long, scaly; disk lobes smaller than staminodes; ovary cylindric to ovoid, c. 0.5 mm long; stigma sessile, cushion-shaped. *Drupe* orange-red, (8–) 10–12 (–15) by 7–9 mm; pedicels c. 1.5–2 (–4) mm.

Distr. Andamans and SE. Asia to Taiwan, throughout *Malesia* to NW. New Guinea. Fig. 3.

Ecol. In open evergreen forest, primary and secondary, and in dry monsoon forest. Mostly at low and medium altitudes, from sea level up to 700 m, sometimes to 900 m (Malay Peninsula) or even 1600 m (N. Borneo). *Fl. fr.* Jan.–Dec., only in the northern part of the area of distribution (e.g. Luzon) more concentrated: *fl.* Dec.–April, *fr.* Jan.–May.

Inflorescences are frequently visited by ants. Fruits eaten by birds.

Uses. Young leaves and young fruits are eaten as

vegetables; according to BURKILL (Dict. 1935, 520) and many labels; BURKILL (*l.c.*) and many collectors recorded the fruits to be eaten in Thailand, Malaya, the Kangean Is., Flores, N. Borneo, and the Philippines (Luzon, Palawan). Leaves and roots are pounded to make a poultice for ulcers, and the boiled root is used for rheumatism in Malaya (BURKILL, *l.c.*). Mindanao: leaves pounded and applied for headache and stomachache (*vide* FRAKE in sched.).

Vern. Malay Peninsula: *belkan (sakai), chempe-rai, chimpri, chipreh, poko kuching-kuching*, sharing some of these names with *Lepionurus sylvestris*; Sumatra (Simalur): *tutup-mateh*; Flores: *sasang, sui*; Philippines (MERR. En. Philip. 2, 1923, 116): *garimo, liongliong, luingluing, malakabuan, malalukban, malaráyap, marispáris*, Tag., *ichikamanok*, Tagb., *panalayápin*, Ilk., *panalayápon*, Sbl., *sulan-manok*, Sub., *talaminuk*, Iv.; the main name in Luzon: *malulukban*; Palawan: *duro-manok, laniti*; Mindanao: *gelenjup, getipun*; Celebes: *borongbenisi, kajuwatu*; Talaud Is.: *amaloana, aramalu*; Amboina: *sayor garing*.

Notes. The species is extremely variable in vegetative characters, especially in form and size of leaves. The greatest variation is found in N. Borneo and the Philippines. Specimens from Luzon (and Taiwan) often have relatively small leaves; the largest

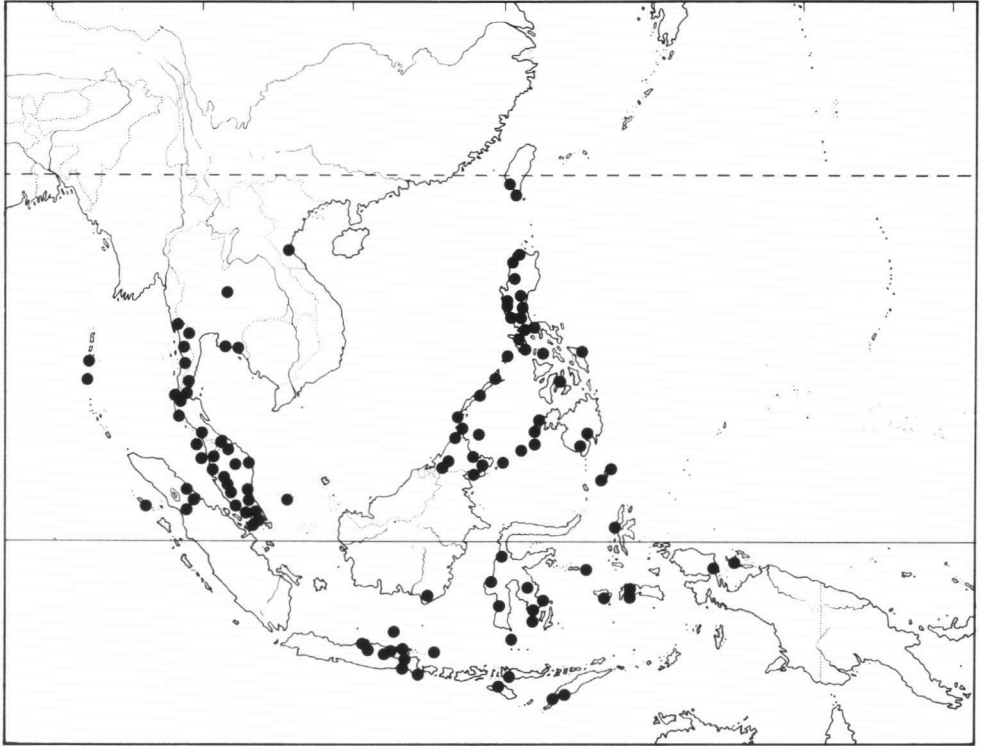


Fig. 3. Range of *Champerea manillana* (Bl.) MERR. After HIEPKO, 1979.

leaves are found in Samar and N. Borneo. But leaves of similar extreme sizes occur in other localities, too, and the number of main side-nerves is rather constant. Therefore it is impossible to accept the species described and named by MERRILL.

The flowers are rather uniform. The ovary of the

♀ flowers obviously develops rarely into a fruit. The variation of the size of the fruits is considerable, but the extreme forms are irregularly scattered over the whole area of distribution, e.g. relatively large fruits occur at the western (Andamans) and at the north-eastern border (Samar) of this area.

2. MELIENTHA

PIERRE, Bull. Soc. Linn. Paris 1 (1888) 762; BAILL. Hist. Pl. 11 (1892) 457; ENGL. in E. & P. Nat. Pfl. Fam. Nachtr. 1 (1897) 143; SLEUM. in E. & P. Nat. Pfl. Fam. ed. 2, 16b (1935) 36; HIEPKO, Willdenowia 9 (1979) 23. — Fig. 4, 5a.

Small trees; branchlets glabrous. *Leaves* glabrous, coriaceous-fleshy, in dry state hard and brittle. Plants dioecious. *Flowers* in panicle-like branched inflorescences; rachises minutely papillate to puberulous. *Inflorescences* mostly on the main trunk but also on branches and even in the axils of the uppermost leaves. Flowers 4- or 5-merous. — ♂ *Flowers* sessile, solitary or in groups of 3–5 (mainly at the end of the rachises) in the axil of a minute bract. Tepals reflexed. Filaments very short, attached to the base of the tepals; anthers relatively

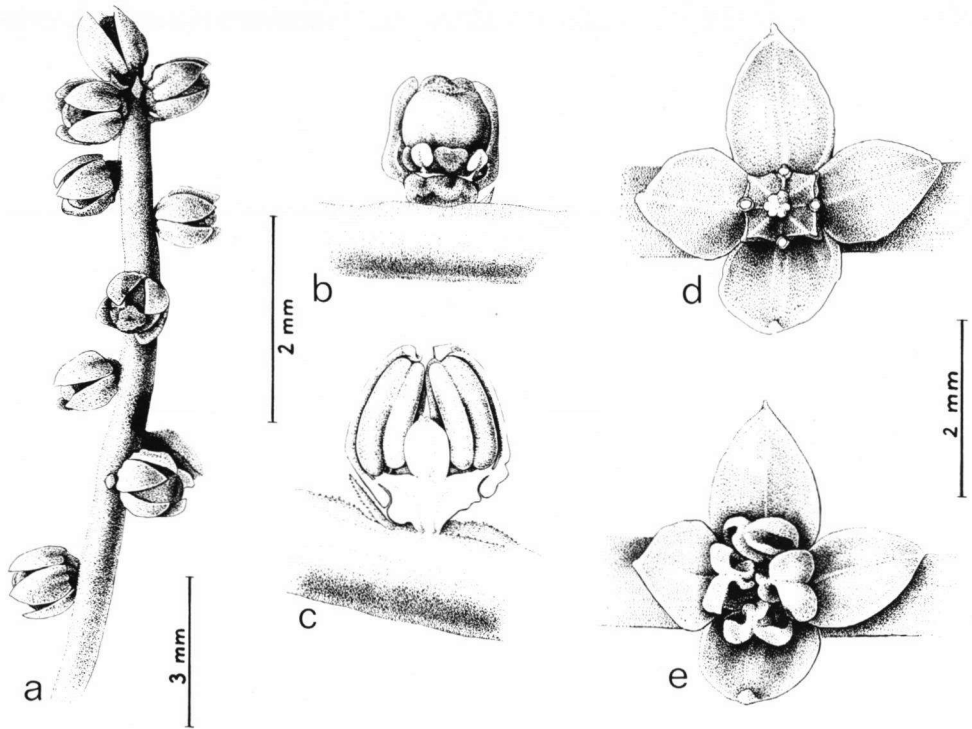


Fig. 4. *Melientha suavis* PIERRE *spp. suavis*. a. Part of a ♀ inflorescence, b. ♀ flower, two tepals removed c. LS of a ♂ flower-bud, d. ♂ flower, the stamens removed, e. ♂ flower (a-c PUT 666, d-e MAXWELL 75-70) After HIEPKO, 1979.

large. Disk lobes fleshy, as large as the rudimentary ovary. — ♀ *Flowers* solitary per bract, sometimes in groups of 3–4, with very short pedicels. Tepals adjacent to the ovary; the small staminodes alternating with broad disk lobes. *Drupe* pedicelled, ellipsoid to slightly ovoid or obovoid; pericarp thin, 1.5–2 mm thick, mesocarp fleshy-juicy, endocarp woody. *Embryo* nearly as long as the seed, with small radicle (2 mm) and 3–4 long, narrow cotyledons.

Distr. Monotypic, SE. Asia (Indochina, Thailand) and *West Malesia*: Malaya, Borneo, and the Philippines. Fig. 6.

Ecol. Primary, mostly deciduous forest, from the lowland up to 1500 m.

1. *Melientha suavis* PIERRE, Bull. Soc. Linn. Paris 1 (1888) 763; Fl. Coch. fasc. 17 (1892) t. 264B; GAGNEP. Fl. Gén. I.-C. 1 (1911) 802, f. 89; *ibid.* Suppl. 1 (1948) 731; HIEPKO, Willdenowia 9 (1979) 23. — *M. acuminata* MERR. Philip. J. Sc. 29 (1926) 477. — Fig. 4, 5a.

Small tree up to 13 m. *Leaves* lanceolate, elliptic to ovate (or rarely obovate), (4–) 6–12 (–16) by 2.5–5 (–7) cm; apex obtuse- or retuse-mucronulate, some-

times acute to acuminate; base cuneate-attenuate; nerves 5–6 (–8) pairs; hardly prominulous on both sides; petiole 1–5 mm. *Inflorescences* often in groups on swellings at the trunk or solitary on branches and in axils of leaves; main rachis up to 15 cm, in fruiting state up to 20 cm; bracts ovate, acute, c. 0.5 mm long. *Flowers*: see under the subspecies. *Drupe* yellow, 2.3–4 by 1.5–2 cm; pedicels 3–7 mm.

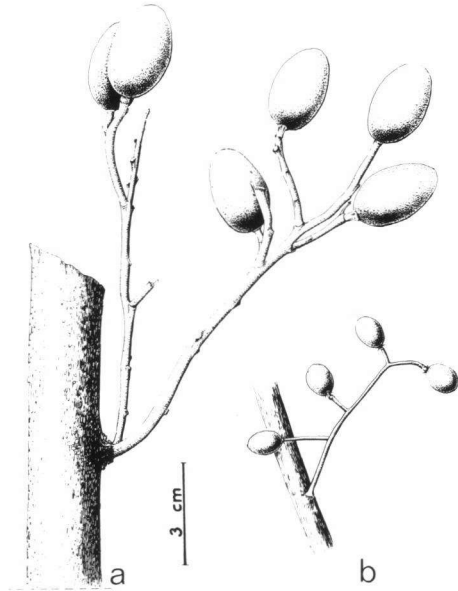


Fig. 5. *Melientha suavis* PIERRE *ssp. suavis*. a. Infructescences. — *Champereia manillana* (BL.) MERR. b. Infructescence developed from an inflorescence with ♀ flowers (a MAXWELL 75-452, b HARDIAL & SAMSURI 226). After HIEPKO, 1979.

KEY TO THE SUBSPECIES

1. Drupe ellipsoid or slightly ovoid, 2.3–3 cm long
a. *ssp. suavis*
1. Drupe slightly obovoid, 3.5–4 cm long
b. *ssp. macrocarpa*

a. *ssp. suavis*.

Small tree up to 11 m; bark grey, smooth or fissured; wood white. *Leaves*: see under the species; petiole 1–2 mm. Main rachis of the infructescence up to 5 mm ϕ . — ♂ *Flowers*: tepals greenish, c. 1.5 mm, oblong, acute; anthers yellow, almost sessile, oval, 1–1.5 mm long. Disk lobes and rudiment of ovary thick, irregularly angular, c. 0.5 mm long. — ♀ *Flowers* green; pedicels less than 0.5 mm; tepals c. 1 mm, acute; staminodes shorter than 0.5 mm; disk lobes as long as the staminodes, but much broader. Ovary globose, c. 1 mm, stigma sessile. *Drupe* ellipsoid or \pm ovoid, 2.3–3 by 1.5–1.7 cm; in herb. usually yellowish brown; pedicels 3–5 mm.

Distr. Thailand, Laos, Vietnam, Cambodia; in *Malesia*: Malay Peninsula and Philippines (Mindanao). Fig. 6.

Ecol. In deciduous forest, locally common, rarely in dry evergreen forest. From sea level (in beach forest) up to 600 m. *Fl.* Dec.–March; *fr.* April–July. Flowers strongly fragrant.

Uses. Young shoots and inflorescences are eaten after boiling as a vegetable (notes of many collectors). Fruits edible.

Vern. Philippines: *malatado*, Mindanao.

Note. *Melientha suavis ssp. suavis* varies considerably in leaf characters. The apex of the leaves is often obtuse-mucronulate but more or less acuminate leaves are to be found at several points of the range of the subspecies.

b. *ssp. macrocarpa* HIEPKO, Willdenowia 9 (1979) 28.

Small tree up to 13 m, girth of the stem up to 45 cm; bark smooth, grey; wood white. *Leaves* lanceolate, elliptic or slightly obovate, 8–15 by 2.3–4.5 cm; apex shortly acuminate; base cuneate-attenuate; petiole 2–5 mm long. *Flowers* not seen (according to KEP 80403 the inflorescences are attached to the stem and the flowers are 'apetalous, 4 green sepals, 4 stamens'). Main rachis of the infructescence up to 7 mm ϕ . *Drupe* ellipsoid to \pm obovoid, 3.5–4 by 2 cm, in herb. dark brown; pedicels 7 mm long.

Distr. Malesia: N. Borneo (Mt Kinabalu: Kota Belud). Fig. 6.

Ecol. In primary forest up to 1500 m, on black rocky soil. *Fr.* July and Aug.

Vern. *Tangal*.

Note. The fruits of this subspecies differ considerably in form and size, the structure of the pericarp and of the seed corresponds to that of *M. suavis ssp. suavis*.

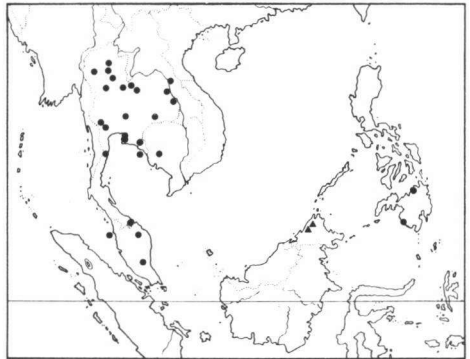


Fig. 6. Range of the genus *Melientha* PIERRE: *M. suavis* PIERRE *ssp. suavis* (dots), *M. suavis* PIERRE *ssp. macrocarpa* HIEPKO (triangles). After HIEPKO, 1979.

3. UROBOTRYA

STAPF, J. Linn. Soc. London 37 (1905) 89; HIEPKO, Ber. Deut. Bot. Ges. 84 (1972) 662; Willdenowia 9 (1979) 29. — *Opilia* subg. *Urobotrya* (STAPF) ENGL. Bot. Jahrb. 43 (1909) 171; SLEUM. in E. & P. Nat. Pfl. Fam. ed. 2, 16b (1935) 38. — Fig. 7.

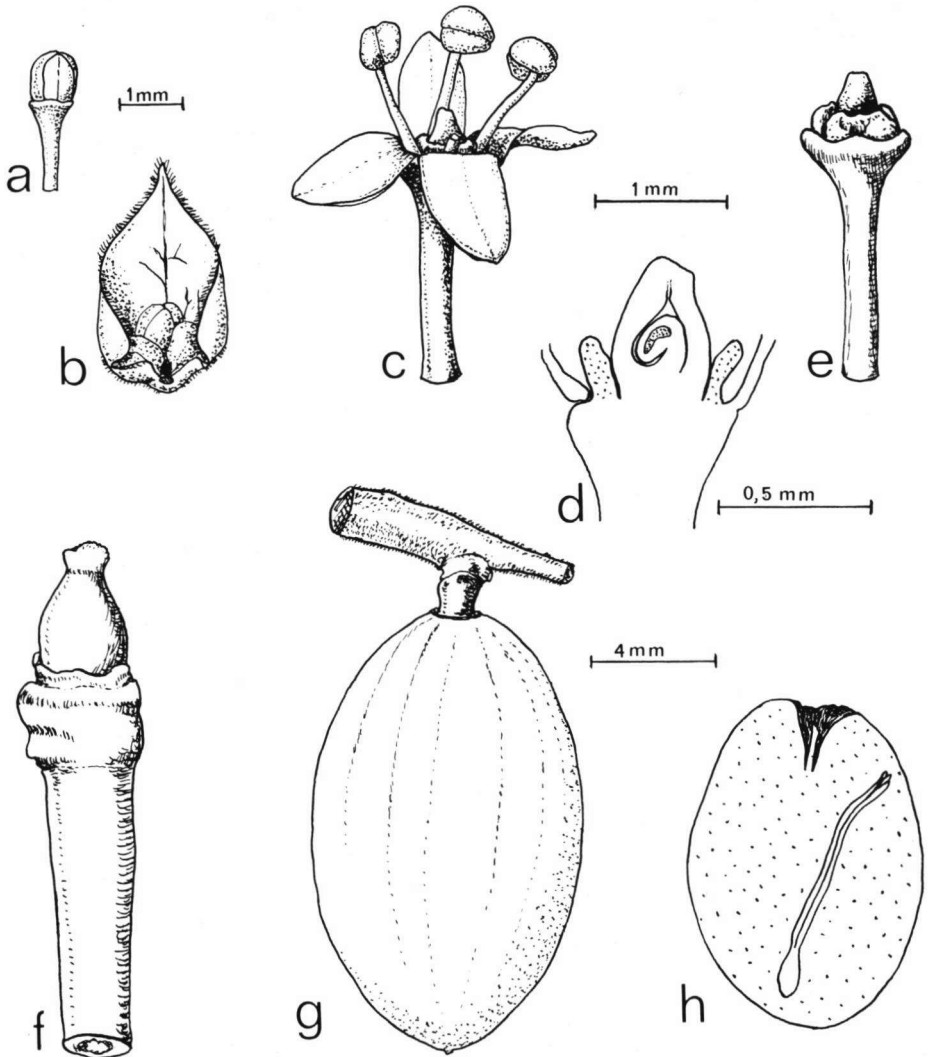


Fig. 7. *Urobotrya parviflora* HIEPKO. *a.* Flower-bud, *b.* bract (with 3 buds), *c.* flower, one stamen cut off, *d.* LS of pistil and disk, *e.* flower, tepals and stamens removed, *f.* pistil with disk, after flowering, *g.* fruit, *h.* LS of seed (*a, c, e* NED1738, holotype, *b* SAN 35987, *d* KOSTERMANS21116, *f* KOSTERMANS21069, *g* AMDJAH 370, *h* WOOD 1273). After HIEPKO, 1979.

Section Lepionuroides

HIEPKO, Willdenowia 6 (1972) 471; Nat. Hist. Bull. Siam Soc. 27 (1978) 121; Willdenowia 9 (1979) 29.

Shrubs or small trees, twigs glabrous or puberulous. *Leaves* glabrous or midrib hairy, thinly-coriaceous. *Flowers* bisexual, in racemes, usually three pedicelled flowers per bract; rachis of inflorescence slender, glabrous or puberulous. Bracts broad, green, with hyaline ciliate margin, densely imbricate, caducous before anthesis, only some basal (smaller) bracts persistent. Flowers 3- or 4 (-5)-merous. Tepals free, oblong, acute. *Stamens* exceeding the perianth. Disk annular, fleshy. Ovary conical to cylindrical; stigma sessile. *Drupe* ellipsoid, mesocarp thinly-fleshy; embryo with 3 long cotyledons.

Distr. The range of this section: 5 spp. in Thailand, S. Burma, Laos, S. China, Vietnam; in *Malesia*: 2 spp. in Borneo and Flores. Fig. 8.

Ecol. Evergreen (in Thailand rarely deciduous) forest, from the lowland up to c. 550 (-1000) m.

Uses. Leaves and/or fruits of *U. siamensis* HIEPKO in Thailand locally used as a medicine against intestinal parasites, in large amounts a deadly poison.

Taxon. The genus was originally restricted to western tropical Africa (*Urobotrya* sect. *Urobotrya* with 2 spp.). This section is characterized by much longer racemes with small, narrowly triangular bracts.

Two species from Indochina were originally described under *Lepionurus*. The young inflorescences are indeed very similar to those of that genus, but the structure of the flowers differs considerably (cf. HIEPKO, Ber. Deut. Bot. Ges. 84, 1972, 661-663). Anatomical and palynological data support the opinion that *Urobotrya* and *Lepionurus* are closely allied mutually and to *Gjellerupia*.

KEY TO THE SPECIES

1. Racemes 4.5-5.5 cm long, rachis glabrous. Tepals mostly 3. Drupe 14-16 by 7 mm 1. *U. floresensis*
 1. Racemes 8-12 cm long, rachis densely puberulous. Tepals mostly 4. Drupe 13 by 8.5 mm 2. *U. parviflora*

1. *Urobotrya floresensis* HIEPKO, Willdenowia 9 (1979) 32.

Small treelet, up to 3 m. Twigs puberulous. *Leaves* glabrous, only the midrib underneath with short hairs; ovate to elliptic, (5-) 8-12 (-16) by (2-) 3-4.5 (-6.5) cm; apex shortly acuminate, base rounded to cuneate; nerves 7-8 on each side of the midrib; petiole 1-2 mm. *Inflorescences* axillary, solitary; rachis (3-) 4.5-5.5 cm, glabrous. Bracts broadly ovate, apiculate, 2.5-3 by 2.5-3 mm. *Flowers* 3 per bract, without bracteoles; pedicels 1.5 mm. *Tepals* 3, rarely 4, c. 1 mm. *Stamens* white, filament c. 1 mm. Disk cup-shaped, up to nearly half the length of the ovary. *Ovary* cylindrical to conical, 0.7 mm long; stigma tripartite. *Drupe* 14-16 by 7 mm; pedicel 3 mm.

Distr. *Malesia*: Lesser Sunda Is. (W. Flores: Manggarai), 5 collections. Fig. 8.

Ecol. From the lowland up to 800 m, according to SCHMUTZ (*in sched.*) gregarious (like in *U. siamensis*).

Vern. *Sasang manuk* (cf. *Opilia amentacea*).

Note. This species is distinguished by several

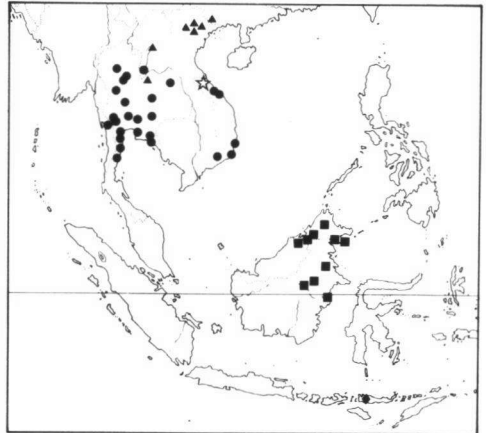


Fig. 8. Range of *Urobotrya* STAFF sect. *Lepionuroides* HIEPKO: *U. floresensis* HIEPKO (rhomb), *U. latisquama* (GAGNEP.) HIEPKO (triangles), *U. longipes* (GAGNEP.) HIEPKO (star), *U. parviflora* HIEPKO (squares), *U. siamensis* HIEPKO (dots). After HIEPKO, 1979.

characters partly typical for some other species of the genus: puberulous twigs, relatively small flowers, and large fruits (like *U. parviflora*), glabrous and comparatively short rachis (like *U. siamensis*). A unique character of *U. floresensis* is the trimerous flower, not only with three tepals and stamens, but also showing a tripartite stigma.

2. *Urobotrya parviflora* HIEPKO, Willdenowia 6 (1972) 474; *ibid.* 9 (1979) 34. — *Cansjera* sp.? MERR. Un. Cal. Publ. Bot. 15 (1929) 57. — Fig. 7.

Shrub, 1–5 m, twigs puberulous. *Leaves* glabrous, but midrib pilose on both sides, elliptic to broadly ovate or lanceolate, (6–) 8–13 (–17) by (1–) 2.5–5 (–7) cm; apex shortly acuminate, base rounded or cuneate; midrib prominent and rounded, nerves less prominent beneath, 6–8 pairs; petiole 1–3 (–5) mm long. *Inflorescences* axillary, usually solitary, rarely

in twos; rachis 8–12 cm long, densely puberulous. Bracts broadly ovate, acuminate, 3–4 by 4 mm, finely hairy on both sides. *Flowers* 3 per bract, without bracteoles; pedicels 1–1.5 mm. *Tepals* (3–) 4 (–5), whitish, c. 1 mm. *Stamens* white, filaments c. 1 mm, anthers elliptic, c. 0.5 mm long. Disk annular, low. *Ovary* conical, c. 0.5 mm long. *Drupe* slightly apiculate, red, mesocarp juicy, 13 by 8.5 mm; pedicels up to 2.5 mm.

Distr. *Malesia*: Borneo (Brunei, Sabah, N. & NE. Kalimantan). Fig. 8.

Ecol. In primary and secondary evergreen forest, from sea level up to 540 m. *Fl. fr.* Jan.–Dec.

Note. Form and size of the leaves are extremely variable; besides rather broadly ovate leaves narrowly lanceolate leaves are found (KOSTERMANS 21116: 12 by 1 cm). Inflorescences, flowers and fruits are fairly uniform.

4. LEPIONURUS

BL. Bijdr. (1826) 1148; ENDL. Gen. Pl. 2 (1840) 1041; B. & H. Gen. Pl. 1 (1862) 349; VALET. Crit. Overz. Olacin. (1886) 151; ENGL. in E. & P. Nat. Pfl. Fam. 3, 1 (1889) 241 (*sub Olacaceae*); BAILL. Hist. Pl. 11 (1892) 456 (*sub Loranthaceae*); SLEUM. in E. & P. Nat. Pfl. Fam. ed. 2, 16b (1935) 35; HIEPKO, Willdenowia 9 (1979) 38. — *Leptonium* GRIFF. Calc. J. Nat. Hist. 4 (1843) 236; Flora 27, 2 (1844) 435. — *Opilia* sect. *Lepionurus* (BL.) BAILL. Adansonia 3 (1862) 124. — Fig. 9, 10.

Shrubs, erect or straggling, usually glabrous, sometimes young twigs with short hairs. *Leaves* glabrous, thinly coriaceous. *Flowers* bisexual, in axillary racemes, three flowers per bract; rachis of inflorescence slender, glabrous. Bracts broad scaly, pale green, with hyaline, shortly ciliate margin, densely imbricate, caducous before anthesis (lowermost bracts smaller, sterile and persisting). *Flowers* (3–) 4 (–5)-merous. *Perianth* united, deeply lobed. *Stamens* not exceeding the perianth, filaments flattened. Disk cupular, with irregularly lobed margin. *Ovary* ovoid-conical; stigma ± sessile, entire or shallowly 4-lobed. *Drupe* ellipsoid to somewhat ovoid or obovoid; pericarp thin, mesocarp juicy, endocarp crustaceous. *Embryo* nearly as long as the seed, radicle small, with 3–4 long, linear cotyledons.

Distr. Monotypic. SE. Asia (Nepal to Vietnam) and *W. Malesia*: Sumatra, Malaya, Java, Borneo. Fig. 11. Ecol. Undergrowth in evergreen forest, from the lowland up to 1250 (–2000) m.

1. *Lepionurus sylvestris* BL. Bijdr. (1826) 1148; MIQ. Fl. Ind. Bat. 1, 1 (1856) 784; KURZ, For. Fl. Burma 2 (1877) 330 (*sub Santalaceae*); VALET. Crit. Overz. Olacin. (1886) 153, *incl. var. lanceolata* VALET.; BOERL. Handl. 1 (1890) 210; KING, J. As. Soc. Beng. 64, ii (1895) 593; BRANDIS, Indian Trees (1906) 150; GAGNEP. Fl. Gén. I.-C. 1 (1911) 806; KOORD. Exk.

Fl. Java 2 (1912) 170; *ibid.* 4 (1925) 581, f. 863; RIDL. Fl. Mal. Pen. 3 (1924) 172; BURK. Dict. (1935) 1353; KANJILAL c.s. Fl. Assam 1 (1936) 250; CORNER, Ways. Trees (1940) 515; BACK. & BAKH. f. Fl. Java 2 (1965) 67; HIEPKO, Willdenowia 9 (1979) 29. — *L. javanicus* G. DON, Gen. Syst. 2 (1832) 16, *nom. illeg.* — *Leptonium oblongifolium* GRIFF. Calc. J. Nat.

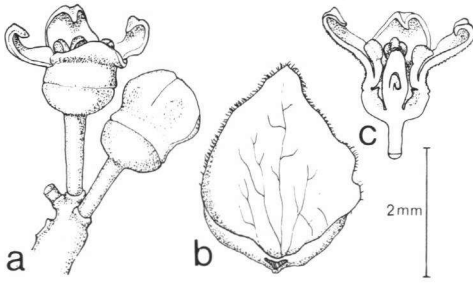


Fig. 9. *Lepionurus sylvestris* BL. *a.* Two flowers of a triad, one just opened, *b.* bract, *c.* LS of flower (NICOLSON 3072). After HIEPKO, 1979.

Hist. 4 (1843) 237; Flora 27, 2 (1844) 435; Not. Pl. As. 4 (1854) 368; Ic. Pl. As. 4 (1854) pl. 536. — *Oplia acuminata* WALL. [Cat. (1829) 243, n. 7206, nom. nud.] ex BAILL. Adansonia 3 (1862) 124. — *L. oblongifolius* (GRIFF.) MAST. Fl. Br. India 1 (1875) 583; KOORD. Exk. Fl. Java 2 (1912) 170; RIDL. Fl. Mal. Pen. 3 (1924) 173, incl. var. *angustifolius* RIDL. — Fig. 9, 10.

Shrub, usually less than 2 m, rarely up to 6 m. Leaves extremely variable in shape, (5.5–) 10–16 (–25) by (1.5–) 3–7 (–9) cm, ratio 2–4 (–10), widest

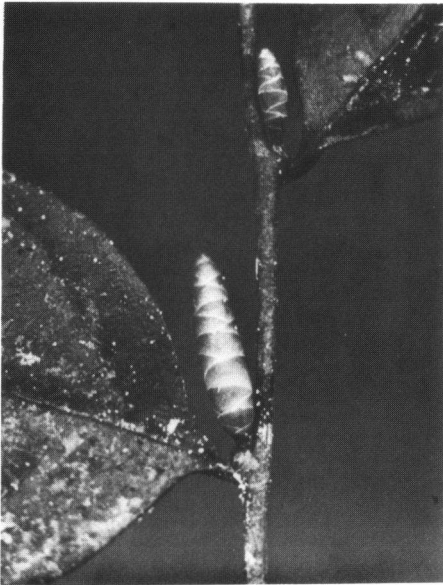


Fig. 10. *Lepionurus sylvestris* BL. Young inflorescences (GEESINK, HIEPKO & PHENGLAI 7567). Photogr. HIEPKO, Nov. 1974.

above, at, or below the middle: obovate, oblong, lanceolate or ovate; apex acutely acuminate, base shortly attenuate or attenuate; (5–) 8–10 (–13) pairs of nerves, midrib and side-nerves often prominent beneath; petiole 1–5 (–8) mm. Racemes 1–8 (–17) per axil; rachis erect, drooping or pendulous, 2–5 cm (in fruit up to 6 cm). Bracts broadly ovate, acuminate or apiculate, 4–5 (–7.5) by 3–5 (–8) mm. Flowers 3 per bract, on a tubercle, without bracteoles; pedicels 1–2 mm. Tepals united, tube 0.5 mm long, resting on the cupular hypanthium. Perianth yellowish, 2–4.5 mm across; segments patent, ovate, acute. Stamens inserted below the margin of the disk, as long as the perianth tube; anthers oval, 0.5 mm long. Pistil c. 1 mm long. Drupe resting on the thickened disk, orange-red, 9–16 by 6–10 mm; pedicel 2–2.5 mm, thick, seemingly longer through the enlarged tubercle on the thickened rachis. Embryo nearly as long as the seed, radicle about half as long as the cotyledons.

Distr. Nepal, Sikkim, Assam, Burma, S. China, Thailand, and S. Vietnam; in Malesia: Sumatra, Malay Peninsula (common), W. Java (common), rarely in Central Java, Borneo (Sarawak, Sabah, Kalimantan). Fig. 11.

Ecol. Usually in evergreen forest, locally common undergrowth, from sea level up to 1250 m, rarely up to 2000 m (Sumatra). Fl. fr. Jan–Dec.

RAZI (Lloydia 20, 1958, 238) mentioned *Lepionurus* in his list of phanerogamic parasites, but he does not give any evidence as proof of this statement.

Uses. In Peninsular Thailand the roots are locally used for a medicine against fever. In Pahang (Malaya) a poultice of the plant or of the root is applied for headache (BURKILL, 1935).

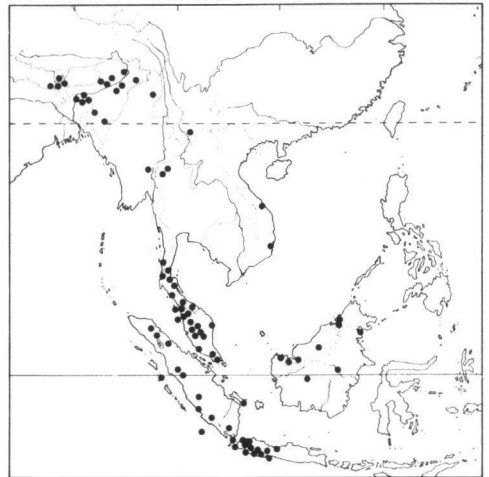


Fig. 11. Range of *Lepionurus sylvestris* BL. After HIEPKO, 1979.

Notes. As already pointed out by VALETON (Crit. Verz. Olacin. 1886, 152) the leaves of *L. sylvestris* are extraordinarily variable in shape and size. Extremely narrow leaves (ratio about 10) are especially striking, but such forms occur sporadically in all parts of the range of the species next to plants with a more common leaf shape (Burma, Thailand, Malaya, Sumatra).

The number of inflorescences per axil is also very

variable. Whereas in the greater part of the range 1–8 racemes are found, one third of the specimens from Assam show in part more than 10 racemes per axil.

The size of the flowers and the differentiation of the rim of the disk are variable as well. Since this variability is quite irregular it is impossible to distinguish varieties.

5. GJELLERUPIA

LAUT. Nova Guinea 8 (1912) 817, t. 149; SLEUM. in E. & P. Nat. Pfl. Fam. ed. 2, 16b (1935) 40; STEEN. Nova Guinea, Bot. 12 (1963) 192; HIEPKO, Willdenowia 9 (1979) 36. — Fig. 12.

Shrubs or small trees, twigs puberulous. *Leaves* glabrous, but midrib hairy above, coriaceous. Plants dioecious. *Flowers* in racemes, 1–3 pedicelled flowers per bract; rachis of inflorescence slender, glabrous, rarely with some scattered hairs. Bracts broadly cordate, green, with hyaline ciliate margin, densely imbricate, caducous before anthesis, only some basal (smaller) bracts persistent. — ♂ *Flowers* (3–) 4 (–5)-merous. Tepals free, oblong, acute, reflexed. Stamens

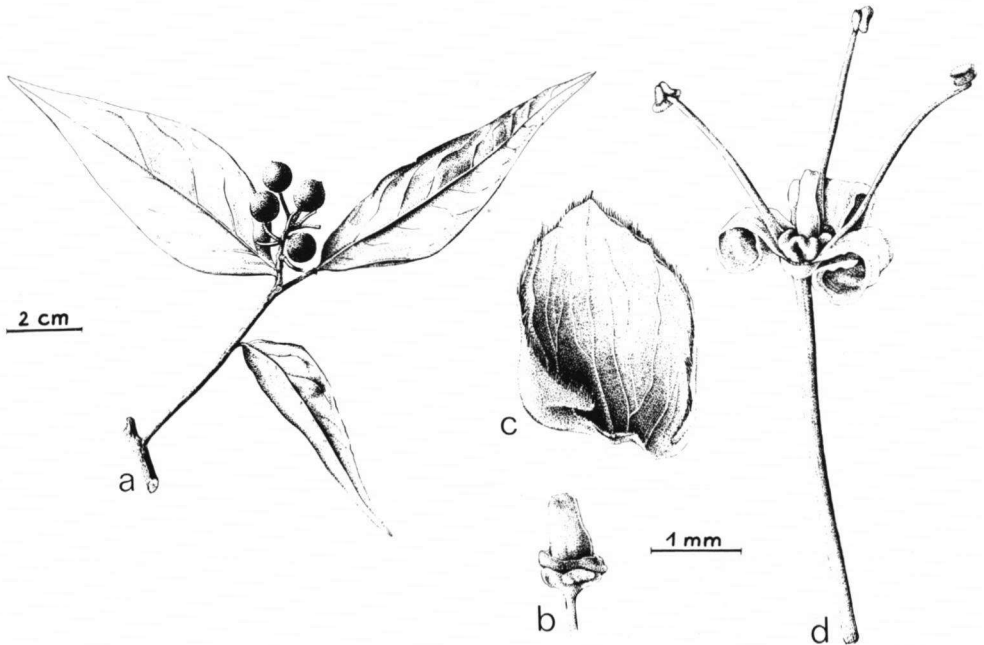


Fig. 12. *Gjellerupia papuana* LAUT. a. Twig with infructescence, b. ♀ flower, c. bract from a ♂ inflorescence, d. ♂ flower, one tepal and one stamen removed (a DARBYSHIRE & HOOGLAND 8232, b GJELLERUP 170, syntype, c KOSTERMANS & SOEGENG 266, d KOSTERMANS & SOEGENG 390). After HIEPKO, 1979.

exceeding the perianth. Disk annular, fleshy. Pistil rudimentary. — ♀ *Flowers* without perianth and stamens. Disk annular, thinly-fleshy. Ovary ± conical; stigma sessile. *Drupe* almost globular, mesocarp juicy, endocarp thinly crustaceous; embryo nearly as long as the seed, with 3–4 long, linear cotyledons.

Distr. Monotypic. *Malesia*: New Guinea.

Ecol. Undergrowth in high evergreen forest, often on limestone ridges, from the lowland up to 200 m.

Note. *Gjellerupia* was reduced by HATUSIMA (Bot. Mag. Tokyo 65, 1952, 110) to *Lepionurus sylvestris* BL., but VAN STEENIS (*l.c.*) pointed out that the observations and conclusions of HATUSIMA are erroneous and that *Gjellerupia* is a distinct genus. It is closely allied to *Urobotrya*. The male flowers of *Gjellerupia* show a striking similarity with those of *e.g.* *Urobotrya siamensis*. Furthermore the pollen type (LOBREAU-CALLEN, pers. comm.) and the placentation are the same in both genera.

1. *Gjellerupia papuana* LAUT. Nova Guinea 8 (1912) 817, t. 149; SCHELLENB. Bot. Jahrb. 58 (1923) 157; НИЕПКО, Willdenowia 9 (1979) 37. — Fig. 12.

Shrub or small tree up to 6 m, with few horizontal branches. Bark light grey, smooth. Wood hard, straw coloured. *Leaves* ovate to narrowly lanceolate, 5–15 (–17) by 1.5–4 (–5.5) cm; apex acute to acuminate, base attenuate to rounded; lateral nerves 8–15 pairs, midrib prominent beneath; petiole 1–4 mm. *Inflorescences* axillary, usually solitary, rarely 2 or 3 together; rachis 1–2 cm long (in fruiting state up to 2.5 cm). Bracts 2–3 by 2–3.5 mm. — ♂ *Flowers* 1–3 per bract; pedicels 1.5–4 mm long. Tepals 1.5–2 mm long. Stamens 1.5–2.5 mm; anthers subcordate, 0.3

mm long. Disk undulate. Rudimentary pistil cylindrical, up to c. 1 mm long, spindly. — ♀ *Flowers* 1–3 per bract. Tepals and stamens 0. Disk 0.5 mm. Ovary conical, 1 mm long. *Drupe* red, 10–12 mm ø; pedicel 5–7 mm long, often bent.

Distr. *Malesia*: New Guinea (Geelvink Bay, Jayapura, West Sepik & Sepik Distr.).

Ecol. Locally common as undergrowth in high evergreen forest, often on limestone ridges; from sea level up to 200 m. *Fl. fr.* Jan.–Dec.

Vern. *Marao*, Orne lang.

Note. The species is rather variable in form and size of the leaves; flowers and fruits are fairly uniform.

6. OPILIA

ROXB. Pl. Corom. 2 (1802) 31, t. 158; R. & S. Syst. Veg. 5 (1819) 275; ENDL. Gen. Pl. 2 (1840) 1041; B. & H. Gen. Pl. 1 (1862) 350; BAILL. Adansonia 3 (1862) 123; BTH. Fl. Austr. 1 (1863) 394; OLIV. Fl. Trop. Afr. 1 (1868) 352; VALET. Crit. Overz. Olacin. (1886) 153; ENGL. in E. & P. Nat. Pfl. Fam. 3, 1 (1889) 240 (*sub Olacaceae*); BAILL. Hist. Pl. 11 (1892) 456; ENGL. in E. & P. Nat. Pfl. Fam. Nachtr. 1 (1897) 143; SLEUM. in E. & P. Nat. Pfl. Fam. ed. 2, 16b (1935) 38 (*incl. Urobotrya*); LUCAS, Fl. Trop. E. Afr., Opil. (1968) 1; НИЕПКО, Willdenowia 12 (1982) 161. — *Groutia* GUILL. & PERR. Fl. Seneg. Tent. (1831) 100, t. 22. — *Tetanostia* RICH. ex M. ROEMER, Syn. Hesper. 1 (1846) 23. — *Pentitdis* ZIPP. ex BL. Mus. Bot. Lugd. Bat. 1 (1851) 246, *pro syn.*

Lianas, sometimes erect shrubs, root parasites; young branchlets glabrous or tomentose to puberulous. *Leaves* coriaceous. *Flowers* bisexual, in axillary racemes, three per bract. Rachis of racemes and pedicels densely covered with brownish or yellowish hairs. Bracts peltate, broadly ovate, densely imbricate, caducous before anthesis. *Tepals* free, 5–4, recurved. *Stamens* exceeding the perianth. Disk lobed, with 5–4 thick and fleshy, irregularly toothed lobes alternating with the stamens. *Ovary* cylindrical to ellipsoid, stigma sessile. *Drupe* ellipsoid, puberulous, mesocarp fleshy, endocarp thin, woody. *Embryo* nearly as long as the seed, radicle extremely small (*c.* 0.5 mm), with 3 cotyledons.

Distr. In tropical Africa 2 spp., *O. amentacea* also from India through Burma, Thailand, Indochina, and Malasia to the Solomon Is. and N. Australia. Fig. 13.

Ecol. In dry deciduous forest, often in beach forest, from the lowland up to 600 (-1200) m.

I. *Opilia amentacea* ROXB. Pl. Corom. 2 (1802) 31, t. 158; Fl. Ind. ed. Carey 2 (1832) 87; MIQ. Fl. Ind. Bat. 1, 1 (1856) 784; BTH. Fl. Austr. 1 (1863) 394; OLIV. Fl. Trop. Afr. 1 (1868) 352; MAST. Fl. Br. India 1 (1875) 583; KURZ, For. Fl. Burma 1 (1877) 238; VIDAL, Sin. Atlas (1883) t. 30, f. B; Rev. Pl. Vasc. Filip. (1886) 86; VALET. Crit. Overz. Olacin. (1886) 154; BOERL. Handl. 1 (1890) 212; WARB. Bot. Jahrb. 13 (1891) 300; TRIM. Fl. Ceyl. 1 (1893) 258; K. SCH. & LAUT. Fl. Schutzgeb. (1900) 301; BRANDIS, Indian Trees (1906) 150; MERR. Philip. J. Sc. 1 (1906) Suppl. 50; THONNER, Blütenpfl. Afr. (1908) t. 36; GAGNEP. Fl. Gén. I.-C. 1 (1911) 804; KOORD. Exk. Fl. Java 2 (1912) 170; MERR. Fl. Manila (1912) 184; GAMBLE, Fl. Pres. Madras 1 (1915) 192; EWART & DAVIES, Fl. N. Territ. (1917) 90; MERR. En. Philip. 2 (1923) 115; HAINES, Bot. Bihar Orissa 1 (1925) 190; KOORD. Exk. Fl. Java 4 (1925) 579, f. 861; BACK. & BAKH. f. Fl. Java 2 (1965) 66; HIEPKO, Willdenowia 12 (1982) 162, f. 1-4. — *Groutia celtidifolia* GUILL. & PERR. Fl. Seneg. Tent. (1831) 100, t. 22. — *Ximenia* (?) *olacioides* W. & A. Prod. (1834) 89. — *O. celtidifolia* (GUILL. & PERR.) ENDL. ex WALP. Rep. Bot.

Syst. 1 (1842) 377; KEAY, Fl. W. Trop. Afr. ed. 2, 1, 2 (1958) 651; GARCIA, Fl. Zambes. 2 (1963) 336; LUCAS, Fl. Trop. E. Afr., Opil. (1968) 2. — *Tetanosia olacioides* (W. & A.) M. ROEMER, Syn. Hesper. 1 (1846) 23. — *O. penttidis* BL. Mus. Bot. Lugd. Bat. 1 (1851) 246; MIQ. Fl. Ind. Bat. 1, 1 (1856) 784; VALET. Crit. Overz. Olacin. (1886) 155. — *O. javanica* MIQ. Fl. Ind. Bat. 1, 1 (1856) 784. — *O. tomentella* (OLIV.) ENGL. Pflanzenw. Ost-Afr. C (1895) 168; GARCIA, Fl. Zambes. 2 (1963) 338. — *O. thorelii* GAGNEP. Not. Syst. 1 (1910) 206; Fl. Gén. I.-C. 1 (1911) 804, f. 90. — *O. fragrans* ELMER, Leaf. Philip. Bot. 5 (1912) 1824.

Liana up to 30 m or erect shrub; bark smooth or fissured, pale to dark grey, branches glabrous or glabrescent. *Leaves* mostly glabrous; ovate, oblong, or lanceolate, 5-14 (-16) by 2-5 cm; apex acuminate, acute, or obtuse; base attenuate, sometimes rounded; midrib prominent beneath; nerves (6-) 7-9 (-11) pairs; petiole 3-7 (-10) mm. *Racemes* 1-5 in the axil of one leaf, 1.5-3.5 cm long when flowering; bracts 2-3 mm ø, with ciliate margin. *Pedicels* of 1.5-2 mm. *Tepals* yellowish green, oblong with a short inflexed top, shortly pubescent out-

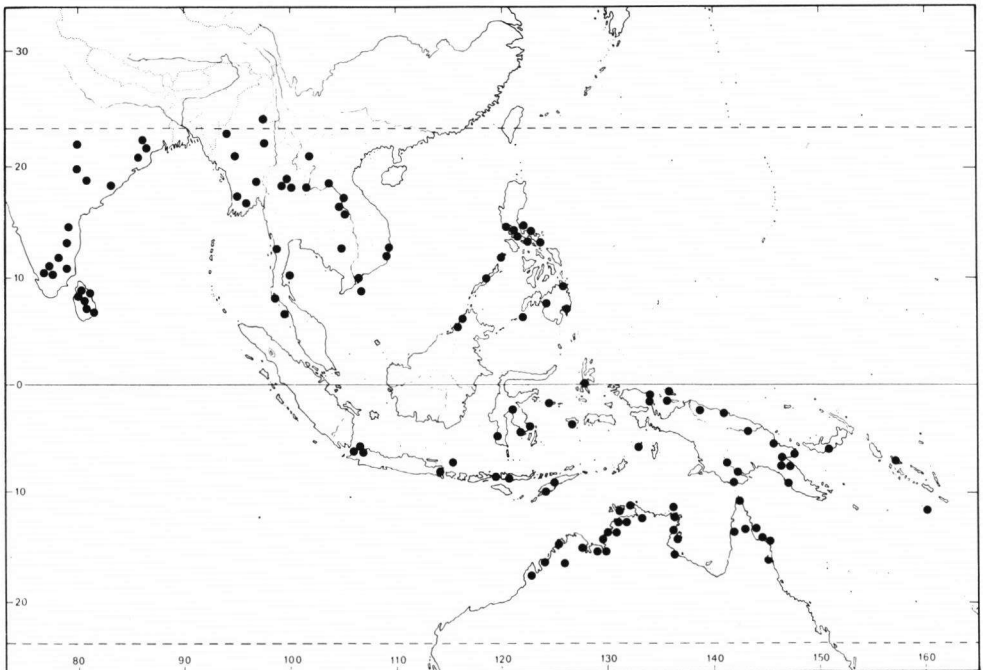


Fig. 13. Range of *Opilia amentacea* Roxb. in the eastern Old World.

side, c. 1.5 mm long. *Filaments* filiform, 1.5 mm; anthers oval, 0.3 mm long. Disk lobes subclavate, green, c. 0.5 mm long. *Ovary* c. 1 mm long. *Drupe* orange-yellow, 1.5–3 by 1.25–1.75 cm; pedicels thickened upwards, 5–7 mm.

Distr. Tropical Africa, and from India and Sri Lanka through Burma, Thailand, Indochina, and *Malesia* to the Solomon Is. and Australia. Fig. 13.

Ecol. In dry deciduous forests or thickets (in New Guinea in light rain-forest), often on seashore or along streams; on limestone, sandstone, or volcanic tuff; from sea level up to 600 m (in New Guinea up to 1000 m). *Fl. fr.* Jan.–Dec. Flowers sweet scented.

The root-parasitism was studied by BARBER (Proc. Cambridge Phil. Soc. 14, 1907, 246–256).

Pea-shaped galled flowers have been observed in

some specimens from the Philippines, N. Borneo, and from New Guinea.

Uses. The fleshy mesocarp of the fruit is edible, but it is only reported from different parts of Africa and N. Australia that the fruits are eaten.

Vern. Philippines: *agaroiroi*, P. Bis., *aratig*, *campenaya*, *toolongan*, Tagb.; Komodo: *landa*; Flores: *sasang manuk* (cf. *Urobotrya floresensis*).

Note. Like the other members of *Opiliaceae* this species is extremely variable in vegetative characters. Form, size, and texture of the leaves vary considerably as well as the measurements of the fruits, but the geographical distribution of these differences is irregular. The differences in the indumentum of the young twigs are also irregularly distributed. Inflorescences and flowers are uniform.

7. CANSJERA

JUSS. Gen. (1789) 448, *nom. cons.*; ENDL. Gen. Pl. 1 (1837) 331; MEISN. in DC. Prod. 14 (1857) 519; B. & H. Gen. Pl. 1 (1862) 349; BAILL. *Adansonia* 3 (1862)

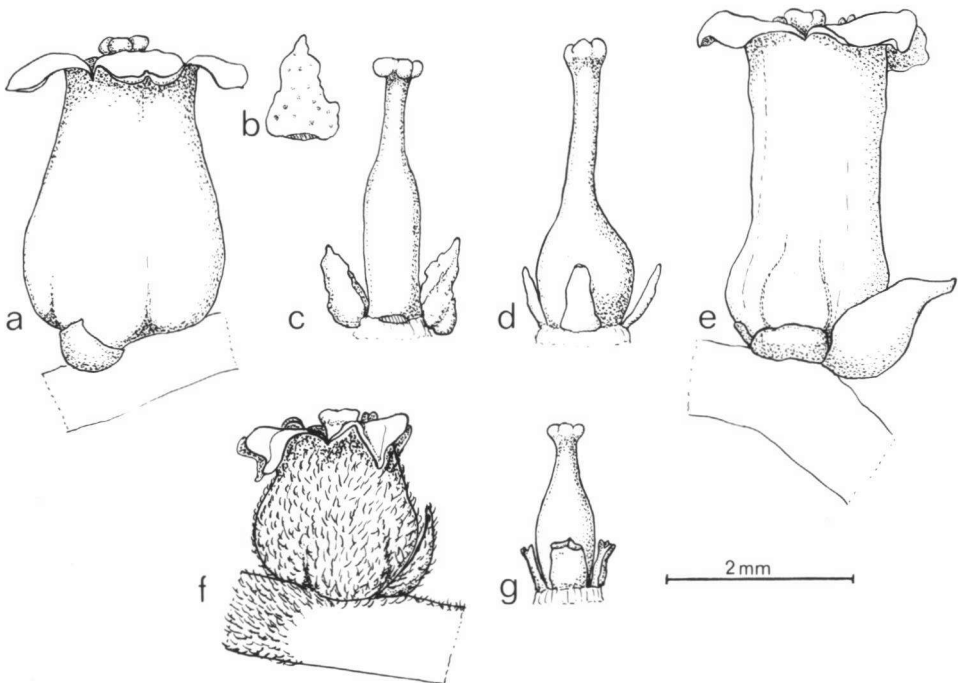


Fig. 14. *Cansjera rheedii* J.F. GMELIN. a. Flower with bract, without indumentum, b. disk scale, adaxial view, c. pistil and disk, one scale removed. — *C. parvifolia* KURZ. d. Pistil with disk scales, e. flower with bract, without indumentum. — *C. leptostachya* BTH. f. Flower with bract, g. pistil with disk scales (a–c GEESINK & HIEPKO 7831, d–e HELFER s.n., f–g NGF 30718). After HIEPKO, 1979.

124; BTH. Fl. Austr. 1 (1863) 191; VALET. Crit. Overz. Olacin. (1886) 156; ENGL. in E. & P. Nat. Pfl. Fam. 3, 1 (1889) 241; SÆUM. in E. & P. Nat. Pfl. Fam. ed. 2, 16b (1935) 36; HIEPKO, Willdenowia 9 (1979) 43. — *Tsjeru-caniram* RHEEDE [Hort. Mal. 7 (1688) 3, t. 2] ex ADANS. Fam. Pl. 2 (1763) 80; PFEIFFER, Nom. 2 (1874) 1501 (*'Tsjerucanirum'*); O.K. Rev. Gen. Pl. 1 (1891) 112 (*'Tsjerucaniram'*); BAILL. Hist. Pl. 11 (1892) 458 (*sub Loranthaceae*). — Fig. 14, 16, 17.

Lianas or erect shrubs, root parasites; branches often conspicuously zigzag; twigs densely covered with mostly upcurved hairs. *Leaves* herbaceous to thinly-fleshy or coriaceous, glabrous or hairy. *Flowers* bisexual, in axillary spikes, each flower in the axil of a small persisting bract. Rachis of spike and bracts densely hairy, perianth pilose. *Tepals* united; the urceolate or campanulate perianth with 4, small, recurved lobes, exceptionally 5-lobed. *Stamens* not exceeding the perianth tube; filaments filiform. Disk scales alternating with the stamens. *Ovary* ovoid to cylindric; style short, not or hardly exceeding the perianth tube; stigma capitate, \pm 4-lobed. *Drupe* \pm ellipsoid, sessile on the lacerated perianth; 1 or 2 drupes per infructescence; mesocarp fleshy-juicy, endocarp thin, brittle. *Embryo* much shorter than the seed, with 3–4 cotyledons.

Distr. 3 spp., from India and Sri Lanka to S. China, Malesia, and N. Australia. Fig. 15.

Ecol. In evergreen and deciduous forest, from the lowland up to 1000 m, in S. China up to 1400 m.

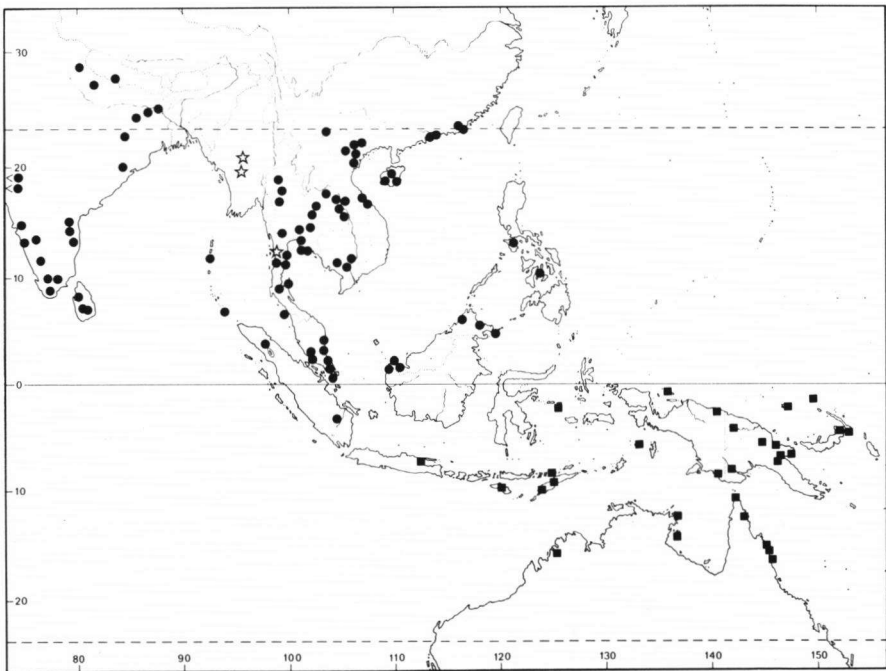


Fig. 15. Range of the genus *Cansjera* Juss.: *C. leptostachya* BTH. (squares), *C. parvifolia* KURZ (stars), *C. rheedii* J.F. GMELIN (dots). After HIEPKO, 1979.

KEY TO THE SPECIES

1. Leaves ovate to broadly lanceolate (or elliptic), \pm acuminate. Perianth tube (2-) 2.5-3.5 mm long
 1. *C. rheedii*
1. Leaves lanceolate, long-narrowed. Perianth tube c. 1.5 mm long 2. *C. leptostachya*

1. *Cansjera rheedii* J.F. GMELIN, Syst. Nat. 2 (1791) 280 (*'Cansiera'*); MEISN. Denkschr. Kön.-Bayer. Bot. Ges. Regensburg 3 (1841) 290; WIGHT, Ic. 5 (1852) t. 1861; BTH. Fl. Hongk. (1861) 296; BRANDIS, For. Fl. India (1874) 75; MAST. Fl. Br. India 1 (1875) 582; KURZ, J. As. Soc. Beng. 45, ii (1876) 123; For. Fl. Burma 1 (1877) 237; VALET. Crit. Overz. Olacin. (1886) 158; TRIM. Fl. Ceyl. 1 (1893) 259; KING, J. As. Soc. Beng. 64, ii (1895) 592; BRANDIS, Indian Trees (1906) 149, f. 69; GAGNEP. Fl. Gén. I.-C. 1 (1911) 809; MERR. Philip. J. Sc. 7 (1912) Bot. 265; GAMBLE, Fl. Pres. Madras (1915) 193; MERR. En. Born. (1921) 242; En. Philip. 2 (1923) 115; PARKINS. For. Fl. Andam. (1923) 125; HAINES, Bot. Bihar Orissa 1 (2) (1925) 191; MERR. Lingn. Sc. J. 5 (1927) 70; CHUN & CHANG, Fl. Hainan. 2 (1965) 458, f. 522; PATEL, For. Fl. Melghat (1968) 70; HIEPKO, Willdenowia 9 (1979) 45. — *C. malabarica* LAMK. (incl. var. β) Encycl. 3 (1792) 433, *nom. illeg.*; Tabl. Encycl. 2 (1792) 429, pl. 289. — *C. scandens* ROXB. Pl. Corom. 2 (1799) 2, t. 103 (*'Cansiera'*); Fl. Ind. ed. Carey 1 (1832) 441. — *Daphne polystachya* WILLD. Sp. Pl. 2 (1799) 420, *nom. illeg.* — *Daphne monostachya* WILLD. l.c. — *C. lanceolata* BTH. London J. Bot. 1 (1842) 491; M. ROEMER, Syn. Hesper. 1 (1846) 16. — *C. zizyphifolia* GRIFF. Calc. J. Nat. Hist. 4 (1843) 236 (*'Cansiera zizyphifolia'*); Flora 27 (1844) 435; Not. Pl. As. 4 (1854) 360; Ic. Pl. As. 4 (1854) pl. 537; KURZ, For. Fl. Burma 1 (1877) 237; RIDL. Fl. Mal. Pen. 3 (1924) 172; SINCLAIR, Gard. Bull. Sing. 14 (1953) 35. — *C. polystachya* (WILLD.) M. ROEMER, Syn. Hesper. 1 (1846) 144. — *C. monostachya* (WILLD.) M. ROEMER, l.c. 16. — *Oxalis sumatrana* MIQ. Fl. Ind. Bat. Suppl. (1861) 342. — Fig. 14a-c, 16.

Liana, climbing up to 8 (-11) m, with hanging branches, or erect shrub with spiny stem. *Leaves* coriaceous and brittle in dry state, glabrous, ovate to lanceolate or elliptic, (3-) 5-9 (-13) by 1.5-4 (-5) cm; apex \pm acuminate; base shortly attenuate to attenuate, rarely rounded; midrib and nerves sometimes prominent beneath, nerves 5-7 pairs; petiole 3-5 mm, densely hairy. *Spikes* 1-3 (-5) in the axil of one leaf, 1.3-2.5 (-4) cm long when flowering; bracts ovate to triangular, acute, 1 mm long. *Perianth* urceolate, greenish yellow, tube (2-) 2.5-3 mm long, lobes recurved, 0.5 mm. *Filaments* c. 2 mm; anthers broadly oval, reaching as far as the throat of the perianth tube. Disk scales slightly fleshy, ovate, acute, irregularly toothed, c. 0.75 mm long. *Ovary* \pm cylindrical, c. 1 mm long; style c. 1 mm,



Fig. 16. *Cansjera rheedii* J.F. GMELIN. Inflorescence and fruit (GEESINK & HIEPKO 7831). Photogr. HIEPKO, Dec. 1974.

long persistent; stigma 4-lobed. *Drupe* orange, 10-13 (-15) by 7-9 (-12) mm. *Seed* with deeply sunken basal hilum; embryo about 1/3 as long as the seed.

Distr. From Nepal, India, and Sri Lanka to S. China and western Malesia: Sumatra (East Coast, Palembang), Malaya (mostly southern half), Borneo (NW, Kalimantan, Sarawak, Sabah), Philippines (Mindoro, Cebu, Sulu Is.). Fig. 15.

Ecol. In deciduous and evergreen forest, often in beach forest, from sea level up to 1000 m, in S. China up to 1400 m. Often on sandy soil. *Fl.* Jan.-Dec.

Root parasite; roots and haustoria have been studied recently (cf. WEBER, Naturwissenschaften 64, 1977, 640, fig.; HIEPKO & WEBER, Willdenowia 8, 1978, 351-362; WEBER, Beitr. Biol. Pfl. 53, 1978, 371-410; WEBER & HILDENBRAND, Ber. Deut. Bot. Ges. 91, 1978, 231-242).

Vern. Malay Peninsula: *buah champerei*; Sandakan: *tomou*.

Notes. Stem of young shrubs growing in an inclined position, branches spreading. The spines become teat-like through secondary growth (cf. HIEPKO & WEBER, Willdenowia 8, 1978, 356, f. 3).

Form, size, and venation of the leaves are variable. Often a pair of arcuate side-nerves shortly above the base are nearly as strong as the midrib; such 3-nerved forms have been named *C. zizyphifolia*. The flowers are fairly uniform, but the fruits vary in size and form (sometimes more globular).

2. *Cansjera leptostachya* BTH. London J. Bot. 2 (1843) 231; M. ROEMER, Syn. Hesper. 1 (1846) 16; MEISN. in DC. Prod. 14 (1857) 519; BTH. Fl. Austr. 1 (1863) 394; HEMSL. Bot. Chall. 1, 3 (1885) 235; VALET. Crit. Overz. Olacin. (1886) 159; WARB. Bot. Jahrb. 13 (1891) 299; K. SCH. & LAUT. Fl. Schutzgeb. (1900) 301; VALET. Bull. Dép. Agric. Ind. Néerl. 10 (1907) 8; SCHELLENB. Bot. Jahrb. 58 (1923) 156; BACK. & BAKH. f. Fl. Java 2 (1965) 67; HIEPKO, Willdenowia 9 (1979) 49. — *C. timorensis* DECNE, Voy. Venus, Bot. (1864) 12 ('*Candjera*'); Atl. (1846) pl. 8; FORBES, Wand. (1885) 502. — Fig. 14f–g, 17.

Liana, up to 6 m, branches hanging, or erect shrub; young twigs puberulous, often soon becoming glabrous. Leaves herbaceous in dry state, glabrous, ovate-lanceolate, long-narrowed, 4–9 (–11) by (1–) 1.5–4 cm; apex acute or ± acuminate; base attenuate to shortly attenuate; midrib and main lateral nerves rarely somewhat prominent beneath, (6–) 7–9 pairs of mostly inconspicuous nerves; petiole (2–) 4–6 mm, hairy. Spikes 1–4 (–5) in the axil of one leaf, (1–) 2–3 cm long when flowering; bracts lanceolate, 0.5–1 mm long. Perianth urceolate, greenish yellow or white, tube c. 1.5 mm long, lobes recurved. Stamens as long as the perianth tube. Disk scales slightly fleshy, oblong, apex 3-toothed, c. 0.5 mm long. Ovary ovoid, c. 1 mm long; style c. 0.5 mm long; stigma shallowly 4-lobed. Drupe orange-red, ellipsoid to nearly globular, 11–15 by 9–13 mm.

Distr. Northern Australia; in Malesia: New Guinea (incl. Bismarcks), Moluccas (Key and Sula Is.), Lesser Sunda Is. (Sumba, Alor, Timor), and E. Java (Surabaya). Fig. 15.

VALETON (*l.c.* 1886, 159) mentioned 'Nova Zeelandia', but this is obviously an error for 'Nova Guinea'.

Ecol. In evergreen forest or in semi-deciduous thickets, often climbing on the edge of woods; from sea level up to 700 m; on calcareous rocks (Java) or on sandy soil. According to STAUFFER (*in sched.*) parasitic on Leguminosae and Sapindaceae. Fl. Jan.–Dec. Flowers with sweet scent.

Uses. According to DUNLOP *c.s.* (N. Territ. Bot. Bull. 1, 1976, 59) the fruits are edible.

Vern. Lesser Sunda Is.: *kema raberi*, Sumba,



Fig. 17. *Cansjera leptostachya* BTH. With the flowering pendent branches. Ifar near Hollandia (Jayapura), W. New Guinea (VAN ROYEN & SLEUMER 6174; photogr. SLEUMER, July 1961).

kape bila, Alor; Moluccas: *méó menumpang*, Sula Is.

Note. *Cansjera leptostachya* is undoubtedly closely allied to *C. rheedii*. But since it differs from this species in several floral and vegetative characters (inflorescences more lax, perianth tube clearly shorter; leaves smaller, lanceolate, and more herbaceous; spines never reported) I prefer to maintain *C. leptostachya* as a distinct species.

Excluded

Cansjera grossularioides BLCO, Fl. Filip. (1837) 73 ('*Cansiera*') = *Antidesma ghaesembilla* GAERTN. (*Euphorbiaceae*).

Cansjera pentandra BLCO, l.c. = *Antidesma pentandrum* (BLCO) MERR. (*Euphorbiaceae*).

Cansjera rheedii BLCO, l.c., non J.F. GMELIN = *Antidesma pentandrum* (BLCO) MERR. (*Euphorbiaceae*).

Champereia perrottetiana BAILL. [Adansonia 3 (1862) 125] is doubtless a *Scleropyrum* sp. and probably rightly regarded as *Scleropyrum pentandrum* (DENNST.) MABBERLEY [= *S. wallichianum* (W. & A.) ARN.], *Santalaceae*; cf. BAILLON, Hist. Pl. 11 (1892) 467; HOOK. f. Fl. Br. India 5 (1886) 235.

Lepionurus pubescens RIDL. Trans. Linn. Soc. Bot. 9, 1 (1916) 27 = *Scleropyrum aurantiacum* (LAUT. & K. SCH.) PILGER (*Santalaceae*).