

DICHAPETALACEAE (P. W. Leenhouts, Leyden)

1. DICHAPETALUM

THOU. Gen. Nov. Madagasc. (1808) 23; LEENH. Reinwardtia 4 (1956) 75.—*Chailletia* DC. Ann. Mus. Hist. Nat. Paris 17 (1811) 153.—*Moacurra* ROXB. [Hort. Beng. (1814) 21, *nomen*] Fl. Ind. 2 (1832) 69.—*Quilesia* BLANCO, Fl. Filip. (1837) 177.—*Pentastira* RIDL. Trans. Linn. Soc. Bot. II, 9 (1916) 27.—Fig. 1–3.

Monoecious or dioecious trees, (often scrambling) shrubs, or lianas. Twigs and bark rather tough; medullary rays in twigs many, distinct; pith rather small, usually dark-coloured and often disappearing early; wood rather hard. *Stipules* narrowly triangular to subulate, sometimes rather early caducous. *Leaves* spirally arranged but usually pseudo-distichous, short-petioled, pinnatinerved; margin entire, thickened by a nerve; orbicular flat glands nearly always present on the surface of the leaf, mostly beneath in the basal part; base not rarely slightly inequilateral. Growth mode: apparently mostly in flushes. *Inflorescences* axillary (sometimes pseudo-terminal on leafless axillary shoots), dichotomously branched or glomerulous, sometimes reduced to 2 or 1 flower(s); lower forks with 1 transverse bractlet. *Pedicels* articulated near the apex. *Flowers* small, 5-merous, bi- or unisexual, in Mal. *spp.* hypo- or only slightly epigynous. *Sepals* ovate, imbricate, slightly confluent at the base, usually pubescent on either side. *Petals* (in Mal. *spp.*) free, more or less spatulate, bifid to emarginate, creamy to white when fresh, dark when dried. *Stamens* 5, episepalous, (in Mal. *spp.*) free; anthers introrse, opening by a longitudinal slit; connective strongly thickened. *Disk* consisting of 5 intrastaminal, epipetalous lobes. *Pistil* 2- or 3-merous; styles free or more or less connate; ovules 2 per cell, apical, pendent, anatropous, only one developing into a seed. *Drupe* usually tomentose, more or less lobed, in Mal. *spp.* orange or yellow when fresh; pericarp thin, fleshy, the angles usually with distinct sutures apparently indehiscent; endocarp crustaceous; stones 1–3, 1-seeded, often faintly united. *Seeds* exalbuminous; cotyledons fleshy, planoconvex.

Distribution. The family *Dichapetalaceae* comprises 4 nearly exclusively tropical genera. Three of them, with c. 20 *spp.* are confined to South America & Africa. *Dichapetalum* itself is much larger and is distributed throughout the tropical zone (Polynesia and Micronesia excepted). Its main centre of speciation is Africa, to which three of its four sections are confined.

All Malaysian *spp.* belong to the fourth *sect.* *Dichapetalum* (*sect.* *Eu-Dichapetalum* ENGL. Bot. Jahrb. 23, 1896, 133).

About 200 *spp.* have been described in the genus, most of them local endemics in Africa; it has appeared that in the past specific limits have frequently been drawn too narrow and that a considerable number will have to be reduced. In this I have come to a similar conclusion for Malaysia as suggested by HAUMAN for Africa (Bull. Jard. Bot. Brux. 25, 1955, 339).

Ecology. The Malaysian species are mostly confined to the substage of the rain-forest, ascending to c. 1800 m altitude. Only one species (*D. timoriense*) is growing in part of its area under semi-arid (seasonal) climatic conditions in SE. Java and the Lesser Sunda Islands.

None of the species plays a predominant role in the forest vegetation and as a matter of fact the genus is on the whole inconspicuous and scarce. No data worthy of note are available on pollination or dispersal.

In most species the 'lobes' of the drupes show a marked marginal lengthwise 'suture' suggesting a line of dehiscence; however, no dehiscence has been observed.

Wood anatomy. See under Taxonomy.

Uses. No useful plants of any repute are among Malaysian *Dichapetalum*. In Africa some species are very poisonous by a most remarkable toxic compound (acetic fluor, $\text{CH}_2\text{F COOH}$), unique in the plant kingdom. See R. PETERS (Endeavour 13, 1954, 147).

Taxonomy. There is no unanimity of opinion about the taxonomic place of the family. Numerous authors (BENTHAM & HOOKER, VAN TIEGHEM, HALLIER *f.*, and HUTCHINSON) arrange it in the affinity of *Rosaceae*. ENGLER, BAILLON, and VON WETTSTEIN plead for its affinity with the *Euphorbiaceae* which is also accepted here.

This opinion is strengthened by the pollen structure which ERDTMAN 'finds rather similar for instance with that in several *Euphorbiaceae*' (Pollenmorph. & Tax. 1950, 146).

HEIMSCH (Lilloa 8, 1942, 186) considers that the wood anatomy indicates a position either near to the *Tremandraceae*, *Polygalaceae* and *Trigoniaceae*, or near to the *Euphorbiaceae*. CHALK in Metcalfe and Chalk (1950) refrains from expressing an opinion because of the scanty anatomical evidence available. The affinities of the family probably could be better established by studying the elements of the ground tissue with respect to their identification as fibre tracheids or libriform fibres (cf. REINDERS, Handl. 1951, 142-147; English ed. in preparation).—C.A.R.-G.

Specific delimitation has in some cases appeared to be difficult through a few rather common and widely distributed species (specially *D. gelonioides* and *D. timoriense*), which have produced a number of more or less distinct, local partial populations which differ rather conspicuously in vegetative characters. Besides, some important characters as uni- or bisexual flowers and 2- or 3-merous pistil appear not to be constant specific characters in all species and not even in one homogeneous partial population. Another difficulty with the Malaysian material is that of several dioecious species only material of one sex has hitherto been collected.

The most reliable taxonomic characters have been found in the size and shape of the inflorescences and in the structure of the fruit; the nervation is in several species characteristic but difficult to circumscribe. In several species vegetative characters have proved very variable. Except in a few cases the flowers have not yielded valuable features.

The construction of the key to the species has been particularly difficult. It has been found unsatisfactory to base a key on flowering and one on fruiting material. The key offered here has been framed in making use of both flowering and fruiting and of vegetative characters. It will not be found possible to find with it at once a name for any random flowering or incomplete specimen.

Notes. In the herbaria specially sterile material has often preliminarily been referred to *Euphorbiaceae* and there appears also to be a likeness with *Flacourtiaceae* and *Connaraceae*. Collectors are urgently requested to collect in the field as complete material as possible; it is desirable to have ♂ and ♀ flowers and fruits; the latter are specially important.

Thanks are due to Dr J. G. B. BEUMÉE, Wageningen, who has put MS notes on Malaysian *Dichapetalum* at my disposal.

KEY TO THE SPECIES

- 1. At least the young branches, petiole, and base of the leaf beneath shaggy pilose.
- 2. Monoecious. Branches dark-coloured. Nerves 9-16 pairs. Fruits 3½-4 cm long, shaggy ferruginous-pilose 8. *D. griffithii*
- 2. Dioecious. Branches often light-coloured. Nerves 5-11 pairs. Fruits up to 2 cm long, fulvous velvety pubescent.
- 3. Branches purple-brown. Leaves up to c. 12 cm long, dark-brown when dry (*D. ciliatum*). 6. *D. tricapsulare*
- 3. Branches greyish- or yellowish-brown, very rarely dark-brown. Leaves 10-20 cm long, green when dry.
- 4. Leaves narrowly elliptic (2½-3 times as long as wide). Inflorescences glomerulous. Disk-lobes nail-shaped, the upper part thickened and tuberculate. Pistil 2-3-merous. Fruits 1¼ by 1½ cm, faintly emarginate at the apex 10. *D. steenisii*
- 4. Leaves broad-elliptic (c. 2 times as long as wide). Inflorescences short-stalked. Disk-lobes quadrangular. Pistil 2-merous. Fruits 1¾-2 by 2-2½ cm, deeply emarginate at the apex. 9. *D. setosum*
- 1. Branches sericeous, tomentose, velutinous or (sub) glabrous.
- 5. Leaves 16-22 cm, very thin, in the living state the parenchyma convex between the main nerves, in the dry state irregularly corrugated with the nerves shallowly sunken. Plant ± glabrous. 7. *D. tenuifolium*
- 5. Leaves otherwise.
- 6. Leaves elliptic-lanceolate, c. 4 times as long as wide, up to 14 cm long (rarely some of the leaves slightly broader). Fruits more or less pubescent, sutures distinct 6. *D. tricapsulare*
- 6. Leaves usually 2-3 times as long as wide (if c. 4 times as long as wide, then leaves often more than 14 cm long, and either fruits otherwise, or inflorescences distinctly branched and stalked).
- 7. Branches fully glabrous, even when young, black. Receptacle of the flowers slightly hollowed. Leaves (dark) brown or dark olive-green when dry; nerves rather inconspicuous, distinctly interarching 13. *D. laurocerasus*
- 7. Branches more or less pubescent, at least when young. Receptacle of the flowers not hollowed. (In some specimens of *D. papuanum* the branches are fully glabrous; then the leaves are greyish green, and only the apical nerves are distinctly interarching.)
- 8. Inflorescences glomerulous, (sub) sessile (sometimes short-stalked or together on leafless axillary shoots with scale-like bracts!) or flowers solitary; fruits usually solitary on a short pedicel.
- 9. Flowers 1 or 2 in one leaf-axil.
- 10. Pedicel rather long; flowers solitary. Pistil 2-merous. Fruits 2-lobed, 1-1¼ cm long, with distinct sutures 15. *D. tenerum*

- 10. Flowers subsessile, 1-2 in one leaf-axil. Pistil 3-merous. Fruits suborbicular, rounded or blunt-triangular in section, 3 cm long, without sutures 14. *D. sessiliflorum*
- 9. Flowers together in few- to many-flowered inflorescences (fruits often solitary!).
- 11. Glands usually on the upper side of the leaf; lower side shining dark purple-brown when dry, the nerves ferrugineous-tomentose. Flowers without disk 2. *D. sordidum*
- 11. Glands exclusively on the lower side of the leaf. Flowers with disk.
- 12. Monoecious. Petals twice as long as sepals. Branches often blunt-quadrangular. Fruits 1 1/2-2 1/2 cm, smooth, suture not distinct 11. *D. longipetalum*
- 12. Dioecious. Petals as long as the sepals or only slightly longer. Branches terete. Fruits up to 1 1/2 cm long, always with distinct sutures 5. *D. gelonioides*
- 8. Inflorescences distinctly branched, stalked (peduncle, or, if peduncle very short, the two main branches, at least half as long as the total inflorescence); infructescences usually branched and with some to many fruits.
- 13. Fruits globular, tomentose, without sutures. Inflorescences usually 5-7 cm long, repeatedly branched, many-flowered, densely tomentose 1. *D. timoriense*
- 13. Fruits lobed, with distinct sutures.
- 14. Fruits glabrous with the exception of very few appressed hairs, sutures narrow. 3. *D. papuanum*
- 14. Fruits tomentose, sutures conspicuous.
- 15. Pistil 2-merous.
- 16. Style 1, more or less deeply cleft. Nervation very conspicuous 5. *D. gelonioides*
- 16. Styles 2. Nervation rather inconspicuous 12. *D. helferianum*
- 15. Pistil 3-merous (if fruits 1- or 2-celled, remains of a 2nd and/or 3rd cell are always present).
- 17. Branches early glabrescent, greyish-brown. Leaves glabrous above, nearly glabrous beneath, rather large (15-22 by 5-11 cm) 4. *D. platyphyllum*
- 17. Branches minutely tomentose, gradually glabrescent, dark (purple)-brown. Leaves tomentose on midrib and nerves above, on midrib, nerves, and veins beneath, rather small (6-12 by 3-5 cm) 2. *D. sordidum*

1. *Dichapetalum timoriense* (DC.) BOERL. *Handl.* 1 (1890) 199; ENGL. in *E. & P. Pfl. Fam.* 3, 4 (1896) 348; HOCHR. *Pl. Bog. Eks.* (1904) 17; BACK. *Schoolf.* (1911) 219; KOORD. *Ekk. Fl. Java* 2 (1912) 454; MERR. *En. Philip.* 2 (1923) 389; HEYNE, *Nutt. Pl.* (1927) 902; MEEUSE in BACK. *Bekn. Fl. Java* (em. ed.) 4c (1943) fam. 117, p. 1; LEENHOUTS, *Reinw.* 6 (1954) 78.—*Scrotum cussi* RUMPH. *Herb. Amb., Auct.* (1755) 59, t. 26, f. 2; MERR. *Int. Rumph.* (1917) 510; HEYNE, *Nutt. Pl.* (1927) 902; cf. STEEN. *Bull. Jard. Bot. Btzg* 18 (1950) 458.—*Chailletia timoriensis* DC. *Prod.* 2 (1825) 57; DECNE, *Nouv. Ann. Mus. Hist. Nat.* 3 (1834) 478; MIQ. *Fl. Ind. Bat.* 1, 1 (1855) 637; BECC. *Malesia* 1 (1877) 176.—*Quileisia sericea* BLANCO, *Fl. Filip.* (1837) 177; ed. 2 (1845) 125; ed. 3, 1 (1877) 224; MIQ. *Fl. Ind. Bat.* 1, 1 (1857) 788.—*Villaresia scandens* HASSK. *Nat. Tijds. N.I.* 10 (1856) 152; WALP. *Ann.* 4 (1857) 431; MIQ. *Fl. Ind. Bat.* 1, 2 (1859) 595.—*Chailletia benthamiana* TURCZ. *Bull. Soc. Nat. Mosc.* 36, 1 (1863) 610.—*Chailletia deflexifolia* TURCZ. *Bull. Soc. Nat. Mosc.* 36, 1 (1863) 611; HOOK. *f. Fl. Br. Ind.* 1 (1875) 571, *incl. var. tomentosa*; KING, *J. As. Soc. Beng.* 64, ii (1895) 94; RIDL. *Fl. Mal. Pen.* 1 (1922) 418.—*Chailletia griffithii* (non HOOK. *f.*) F.-VILL. *Nov. App.* (1880) 45 (cf. MERR. *En. Philip.* 2, 1923, 388, *sub. D. sericeum*).—*D. deflexifolia* BOERL. *Handl.* 1 (1890) 199; KOORD. *Ekk. Fl. Java* 2 (1912) 454; BURK. *Dict.* 1 (1935) 803.—*D. scandens* BOERL. *Handl.* 1 (1890) 199, non JOHNSTON, *J. Arn. Arb.* 16 (1935) 44 *quae est D. vestitum* BAILL. *var. scandens* BAILL.—? *Chailletia hookeri* KING, *J. As. Soc. Beng.* 64, ii (1895) 91; RIDL. *Fl. Mal. Pen.* 1 (1922) 418.—*D. benthamianum* (TURCZ.) ENGL. in *E. & P. Pfl. Fam.* 3, 4 (1896) 348, non *D. benthamianum* (F. DIEDR.) ENGL. (1896), *sphalm.* = *Chail-*

letia benthamii F. DIEDR. = *D. benthamii* DE WILD., 1919.—*D. malaccense* ENGL. *Bot. Jahrb.* 23 (1896) 143.—*Chailletia beccariana* STAFF *ex KING*, *J. As. Soc. Beng.* 65, ii (1896) 516.—? *Chailletia tessellata* KING, *J. As. Soc. Beng.* 65, ii (1896) 515; RIDL. *Fl. Mal. Pen.* 1 (1922) 416; CRAIB, *Fl. Siam. En.* 1 (1931) 268.—*D. tessellatum* F. N. WILLIAMS, *Bull. Herb. Boiss.* II, 5 (1905) 219.—*D. luzoniense* MERR. & ROLFE, *Philip. J. Sc.* 3 (1908) *Bot.* 106; MERR. *En. Philip.* 2 (1923) 388.—*D. submaritimum* ELM. *Leaf. Philip. Bot.* 4 (1912) 1493; MERR. *En. Philip.* 2 (1923) 389.—*D. schlechteri* KRAUSE, *Bot. Jahrb.* 49 (1912) 168.—*D. novo-guineense* KRAUSE, *Bot. Jahrb.* 49 (1912) 169.—*D. robinsonii* MERR. *Philip. J. Sc.* 7 (1912) *Bot.* 280; *En. Philip.* 2 (1923) 388.—*D. olivaceum* ELM. *Leaf. Philip. Bot.* 5 (1913) 1769.—*D. sericeum* MERR. *Sp. Blanc.* (1918) 215; *En. Philip.* 2 (1923) 388.—*D. nitidum* MERR. *Philip. J. Sc.* 17 (1921) 270; *En. Philip.* 2 (1923) 388.—*D. longistipulaceum* KRAUSE, *Bot. Jahrb.* 62 (1929) 342.—? *D. peekelii* KRAUSE, *Bot. Jahrb.* 62 (1929) 342.—*D. missionum* KRAUSE, *Bot. Jahrb.* 62 (1929) 344.—*D. validum* KRAUSE, *Bot. Jahrb.* 62 (1929) 344.—*D. maluense* KRAUSE, *Bot. Jahrb.* 62 (1929) 345.—*D. venulosum* C. T. WHITE, *J. Arn. Arb.* 10 (1929) 229.—*D. beccarianum* STAFF *ex RIDL.* *Kew Bull.* (1930) 372.—Fig. 1.

Monoecious or dioecious climbing or creeping shrub, sometimes a small and slender tree up to 10 m; stem 3-5 cm diam. *Branchlets* glabrous or long remaining fulvous- or ferrugineous-tomentose, afterwards purple-brown to greyish. *Leaves* (oblong to) ovate to obovate, 7-18 by 3-10 cm, herbaceous to chartaceous (rarely subcoriaceous), pubescence variable, usually tomentose on midrib and nerves above, lower surface all over more or less densely pubescent, rarely fully glabrous;

glands (absent or) near the base, usually on the upper, sometimes on the lower surface of the leaf, rarely on both sides; base equilateral or oblique, acute to rounded, sometimes decurrent; margin revolute; apex usually abruptly acuminate, acumen

short, cuneate, subacute, sometimes mucronate; nerves (5)6-8(-12) pairs, usually rather distant, strongly curved, often distinctly interarching at some distance from the margin. *Inflorescences* repeatedly dichotomously branched, usually rather



Fig. 1. *Dichapetalum timoriense* (DC.) BOERL.—a. Flowering twig, b. flower, c. petal from outside and inside respectively, d. stamen from inside and outside respectively, e. opened anther from inside, f. disk-lobe, g. pistil, h. fruit, i. ditto, cross-section ($a \times \frac{2}{3}$, $b \times 7$, $c-d, f-g \times 10$, $e \times 16$, $h-i$ nat. size; after VAN HASSELT *s.n.*, $h-i$ HB 6701).

long-stalked, sometimes sessile with 2 collateral small inflorescences in one axil, (1-)5-7(-10) cm long, many-flowered, densely tomentose. *Flowers* 2½-4 mm long, uni- or bisexual. *Petals* spatulate (to rhomboid), slightly to more than half-way incised, glabrous or more or less densely pilose outside, sometimes rather caducous. *Disk-lobes* usually c. 1/3 mm, 2-lobed, glabrous (rarely with some hairs), sometimes spatulate and up to 1 mm, not rarely absent. *Ovary* densely woolly pubescent, 2-3-celled; styles usually nearly entirely connate. *Fruits* 1-6, globular to ovoid or more or less pear-shaped or cordate, c. 1½-2½ cm diam., densely fulvous velvety pubescent, (golden-)brown when fresh; pericarp apparently thick and fleshy, without sutures; seeds 1-3.

Distr. Throughout *Malaysia* (the mainland of Sumatra excepted), dubious from Melanesia (New Britain and New Ireland).

Ecol. In primary and secondary forests, apparently preferably along the edges, on riverbanks, etc., 0-1800 m. *Fl.* Jan.-Dec. (in the Philippines mainly April-June); *fr.* Jan.-Dec.

Uses. In the Moluccas the fruits and young leaves are eaten and the young branches are used as ropes.

Vern. *Akar kachang-kachang, a. pah kudah, a. sarang punai, torog pontianak akar*, Mal. Pen., *dérang dang (ur das) aroi*, S, *loloikith*, Sumba, *akar lara*, E. Borneo; Philippines: *alibot-bot*, P. Bis., *ariskis*, Tagb., *dekdek*, Ilk.; *torang*, Ceram, *popolèr kussu*, Ambon, *buah mulo*, Aru Isl., *daralac, wohota*, New Guinea (Morobe Distr.).

Notes. Extremely variable species, comprising a number of more or less distinct local races. Most distinctive are the relatively large, many-flowered, densely tomentose inflorescences, which are usually rather long-stalked; furthermore the mostly relatively broad and rather hairy leaves, and the relatively large, velvety pubescent fruits.

The identity of *D. tessellatum* and *D. hookeri* is not quite certain. The flowers of both and the inflorescences of *D. hookeri* are identical with those of *D. timoriense*; the former mainly differs by its small, dense clustered inflorescences and in its stiff-chartaceous, fully glabrous leaves, the latter by its oblong, stiff-chartaceous, nearly glabrous leaves with 10-12 pairs of nerves transverse to the midrib, faintly curved, and distinctly interarching.

According to the description, *D. peekelii*, from New Ireland, is very close or possibly identical. Unfortunately the type has been lost; a specimen (FLOYD NGF 6699 from New Britain) is very probably identical with *D. peekelii* but its conspecificity with *D. timoriense* is, however, not beyond all doubt.

The interpretation of RUMPHIUS's *Scrotum cussi* has been uncertain for a long time. HASKARL (Abh. Naturf. Ges. Halle 9, 1866, 334) assumed it to be apocynaceous; MERR. *l.c.* cites it among the doubtful species; VAN STEENIS *l.c.* erroneously referred it to *Poikilospermum* (Morac.). I agree with (BACKER in) HEYNE that it represents *D. timoriense*.

2. *Dichapetalum sordidum* (RIDL.) LEENH. Reinw. 4 (1956) 80.—*Chailletia deflexifolia* TURCZ. var. *sordida* HOOK. f. Fl. Br. Ind. 1 (1875) 571.—*Chailletia sordida* RIDL. Fl. Mal. Pen. 1 (1922) 418.—Fig. 21.

Diocious (possibly sometimes monoecious) shrub or small tree. *Branchlets* minutely fulvous-pubescent at the tips, afterwards glabrous, purple-(to greyish-)brown. *Leaves* (subobovate or) elliptic to oblong, 6-12 by 3-5 cm, chartaceous, dark purple-brown when dry, at least at the lower side, minutely yellowish-tomentose on midrib and nerves above, on midrib, nerves, and larger veins beneath; glands few, small, usually on the upper surface; base usually slightly oblique, acute to rounded; apex acute to shortly acute-acuminate; nervation slightly sunken above, prominent beneath, nerves 5-8 pairs, strongly curved, usually distinctly interarching. *Inflorescences* axillary, not rarely pseudo-terminal on leafless axillary shoots (sometimes truly terminal?), laxly glomerulous, densely ferruginous-tomentose, many-flowered. *Flowers* 3 mm long. *Petals* oblong, rather abruptly rhomboid in the upper part, 3 mm long, 2/3 mm incised, the outer side with some long median hairs. *Disk* absent. *Ovary* woolly pubescent, 3-celled; style 1, 3-parted at the tip. *Fruits* 1(-2), broadly obovate, flattened, 2-1-lobed, 1½ by 2 cm, with a distinct suture on the margin, slightly warty, shortly velvety golden-brown pubescent, 2-1-seeded.

Distr. Malaysia: Malay Peninsula (Malacca, Johore, Singapore), Riouw Arch.

Ecol. Forest-edges at low altitudes. *Fl.* Sept.-Dec.; *fr.* Sept.-Jan.

Note. Related to *D. timoriense*; especially different in its fruit, by the flower-clusters, and by the shape of the petals. Best characterized by its rather small, elliptic leaves, which are dark purple-brown when dry, with the nerves yellowish tomentose.

3. *Dichapetalum papuanum* (BECC.) BOERL. Handl. 1 (1890) 199; ENGL. in E. & P. Pfl. Fam. 3, 4 (1896) 348; LEENH. Reinw. 4 (1956) 80.—? *Funis butonicus* RUMPH. Herb. Amb. 5 (1747) 77, t. 41, f. 1.—*Chailletia papuana* BECC. Malesia 1 (1877) 176.—*Pentastira flava* RIDL. Trans. Linn. Soc. Bot. 9 (1916) 27; SCHELLENBERG, Bot. Jahrb. 58 (1923) 158; SLEUM. in E. & P. Pfl. Fam. ed. 2, 20 b (1942) 392.—*Pentastira nitida* RIDL. *l.c.* 28; SCHELLENBERG, *l.c.*; SLEUM. *l.c.*—*D. moluccanum* MERR. Int. Rumph. (1917) 312.—*D. glabratum* KRAUSE, Bot. Jahrb. 62 (1929) 346.—*D. pullei* KRAUSE, Bot. Jahrb. 62 (1929) 346.—*D. grandifolium* RIDL. Kew Bull. (1930) 373.—*D. australianum* C. T. WHITE, Proc. R. Soc. Queensl. 53 (1942) 211.—Fig. 2c.

ssp. papuanum.—All synonyms except *D. grandifolium*.

Diocious climbing shrub, sometimes treelet up to c. 8-10 m, or the basal part tree-like, 2-3 m high, 3-4 cm diam. *Branchlets* (minutely pubescent to) glabrous, purple-brown. *Petioles* cm,

scattered-pilose, glabrescent. *Leaves* elliptic (sometimes slightly inequilateral), 9–17 by $3\frac{1}{2}$ – $6\frac{1}{2}$ cm, stiff-herbaceous, glabrous (young leaves often scattered pilose on the nerves beneath); glands conspicuous, on the lower surface mainly near the base; base acute, slightly decurrent; apex gradually acuminate, acumen short, blunt; nerves 4–8 pairs, at distances (along the midrib) of $1\frac{1}{2}$ –3 cm, strongly curved, only the apical ones distinctly interarching. *Inflorescences* $1\frac{1}{2}$ – $2\frac{1}{2}$ cm long, short-stalked (sometimes dichotomously branched from the very base), rather laxly branched and many-flowered. *Flowers* 1 (σ)–2 (ρ) mm long. *Petals* obovate, apex truncate to slightly emarginate, glabrous or the outer surface with some hairs near the base. *Disk-lobes* minute, 2-lobed, minutely tomentose. *Pistil* densely tomentose, in ρ flowers the ovary 3-celled; styles 3, confluent at the base, or stigma sessile, 3-lobed. *Fruits* 1–2, 3(–)2-lobed, obovate, $\frac{3}{4}$ – $1\frac{3}{4}$ by 1 – $1\frac{3}{4}$ cm, slightly warty and with a few scattered, short, appressed hairs; suture narrow.

Distr. N. Queensland, Solomon Isl., and *Malaysia*: New Guinea and Moluccas (Aru Isl., Ceram, Ambon).

Ecol. Primary and secondary rain- and monsoon-forests, from sea-level up to 1600 m. *Fl.* mainly Sept.–Jan., *fr.* mainly Nov.–March.

Notes. The identity of RUMPHIUS'S *Funis butonicus* remains doubtful; especially the fruits are rather different from those of the present species. It is even possible that it belongs to quite another family.

This species is best characterized by its obovate, nearly glabrous fruits.

RIDLEY, in describing *Pentastira*, recorded the ovary as 1-celled; he had only σ flowers in hand in which the pistiloid is often hollow.

ssp. borneense LEENH. Reinw. 4 (1956) 81.—*D. grandifolium* RIDL.

Leaves 13–22 by $5\frac{1}{2}$ –11 cm; nerves 7–10 pairs. Petioles $\frac{3}{4}$ – $1\frac{1}{2}$ cm. Inflorescences 1–4 cm long, usually distinctly stalked. Flowers (ρ unknown) $5\frac{1}{2}$ mm; petals halfway incised. Inflorescences and fruits unknown.

Distr. *Malaysia*: North Borneo.

Note. The taxonomical position of *D. grandifolium* remains somewhat uncertain. Vegetatively it is very close to *D. papuanum*; the inflorescences are only slightly coarser, the flowers are much larger, but otherwise similar. Fruiting material is desirable to settle its status.

4. *Dichapetalum platyphyllum* MERR. Philip. J. Sc. 30 (1926) 401; LEENH. Reinw. 4 (1956) 81.

?Dioecious, erect shrub, c. 1 m. *Branches* glabrous, greyish. *Leaves* (broad-)elliptic, 15–22 by 5–11 cm, thin-coriaceous, glabrous above, subglabrous beneath; glands few, very small, on the lower surface; base acute, decurrent; apex subabruptly acuminate, acumen short, broad, blunt to acute; nerves c. 7 pairs, straight to faintly curved, more or less distinctly interarching near the margin. *Inflorescences* 1–4 cm long, shortly

stalked, densely fulvous tomentose, with c. 10–20 flowers. *Flowers* known only in bud and from remains under the fruit. *Calyx* c. 3 mm, densely fulvous-tomentose outside. *Petals* slightly emarginate, glabrous. *Infructescences* c. $1\frac{1}{2}$ cm, sparsely pilose, with up to 4 fruits. *Fruits* (young) (2–)3-lobed, 1 by 1 cm, the lobes obovate, more or less densely fulvous-tomentose, probably more or less glabrescent; sutures distinct.

Distr. *Malaysia*: Philippines (Leyte, Sulu Isl.). Ecol. Damp forests at low altitude. *Fl.* July–Aug.

Note. Apparently close to *D. gelonioides* from which it differs, however, by its 3-merous fruits.

5. *Dichapetalum gelonioides* (ROXB.) ENGL. in E. & P. Pfl. Fam. 3, 4 (1896) 348; RIDL. Kew Bull. (1930) 372; LEENH. Reinw. 4 (1956) 81.—*Moacurra gelonioides* ROXB. [Hort. Beng. (1814) 21, *nomen*] Fl. Ind. 2 (1832) 69; LINDLEY, Veg. Kingdom (1846) f. 345¹⁻⁸; BAILL. Étud. Euphorb. (1858) 587; DALZ. & GIBS. Bombay Fl. (1861) 52; THWAITES, Enum. (1864) 79, *incl.* also *var. β*; MUELL. ARG. in DC. Prod. 15, 2 (1866) 227.—*Celastrus ?acuminatus* WALL. Cat. (1831) no 4342, *nomen, pro min. part., part. alt.* = *Drypetes sp.* (G), *non* LINNÉ f. 1781, *nec* RAFIN. 1838.—?*Elaeocarpus ?integrefolius* (*non* LAMK) BLANCO, Fl. Filip. ed. 2 (1845) 306; ed. 3, 2 (1878) 202.—*Chaillietia sumatrana* MIQ. Sum. (1861) 328; TRIM. Fl. Ceyl. 1 (1893) 254.—*Chaillietia gelonioides* BEDD. Fl. Sylv. 3 (1871) 59, t. 9 f. 1; HOOK. f. Fl. Br. Ind. 1 (1875) 570; KURZ, Fl. Burm. 1 (1877) 230; F.-VILL. Nov. App. (1880) 45; BRANDIS, Ind. Trees (1906) 146; TALBOT, Fl. Bombay 1 (1909) 253.—*D. sumatranum* BOERL. Handl. 1 (1890) 199.—*Chaillietia andamanica* KING, J. As. Soc. Beng. 64, ii (1895) 93.—*D. andamanicum* ENGL. in E. & P. Pfl. Fam. 3, 4 (1896) 348.—*Ellipanthus scortechinii* KING, J. As. Soc. Beng. 66, ii (1897) 8; RIDL. Fl. Mal. Pen. 1 (1922) 548.—*D. monospermum* MERR. Govt Lab. Publ. no 35 (1906) 34; PELLEGRIN in Fl. Gén. I.-C. 1 (1911) 798; MERR. En. Philip. 2 (1923) 388.—*D. holopetalum* MERR. Philip. J. Sc. 17 (1921) 271, *non* RUHL. (1904); En. Philip. 2 (1923) 388.—*D. euphlebium* MERR. Philip. J. Sc. 20 (1922) 394; En. Philip. 2 (1923) 388.—*D. kerrii* CRAIB, Kew Bull. (1926) 346.—*D. borneense* MERR. Pl. Elm. Born. (1929) 138.—*D. ciliatum* (*non* MERR.) MERR. Pl. Elm. Born. (1929) 138.—*D. howii* MERR. & CHUN, Sunyatsenia 2 (1935) 256, f. 28; LEENH. Reinw. 4 (1956) 87.—*D. tenuifolium* (*non* ENGL.) SCHELLENB. Pfl. R. Heft 103 (1938) 189.—*D. gagnepainii* PELLEGRIN, Bull. Soc. Bot. France 91 (1945) 180; in Fl. Gén. I.-C. Suppl. 1 (1948) 729.—Fig. 2g–g'.

Dioecious tree up to 20–25 m by 20 cm, or (climbing or creeping) shrub or liana. *Branchlets* scattered shortly pubescent, soon glabrescent, grey to purple-brown, usually with many small, orbicular, white lenticels. *Leaves* rather variable in size and shape, elliptic, 6–16 by 2–6 cm, (herbaceous to) thin-chartaceous, (sub)glabrous (only in *ssp. pilosum* slightly more hairy); glands few, usually only beneath near the base; base

slightly oblique, acute (to rounded), usually decurrent; apex gradually long-acuminate, acumen blunt to acute, often mucronulate; nervation often slightly sunken above, distinctly prominent be-

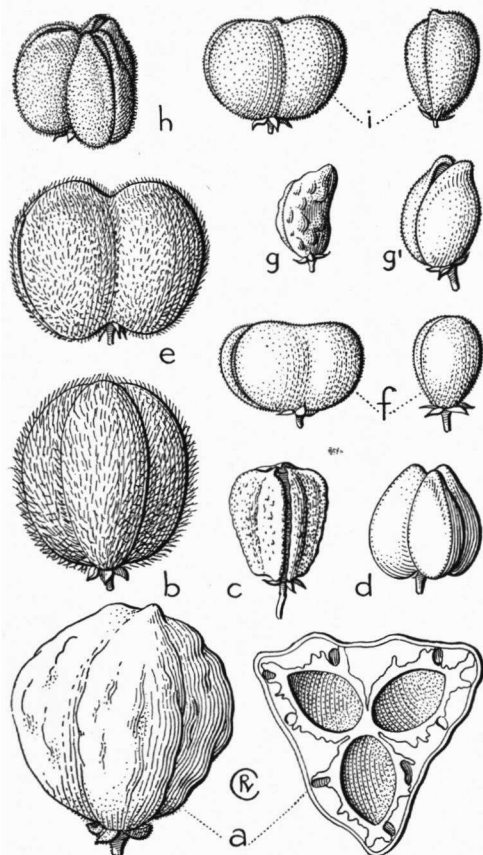


Fig. 2. Different fruit forms in Malaysian *Dichapetalum*.—a. *D. sessiliflorum* LEENH., with cross-section, b. *D. griffithii* (HOOK. f.) ENGL., c. *D. papuanum* (BECC.) BOERL. *ssp. papuanum*, d. *D. tenuifolium* (KING) ENGL., e. *D. setosum* LEENH., f. *D. helferianum* (KURZ) PIERRE, left with 2, right with 1 cell developed, g. *D. gelonioides* (ROXB.) ENGL. *ssp. tuberculatum* LEENH., g'. *ditto ssp. sumatranum* (MIQ.) LEENH., h. *D. steenisi* LEENH. *ssp. celebicum* LEENH., i. *D. sordidum* (HOOK. f.) LEENH., left with 2, right with 1 developed cell (all natural size; a CARR 13487, b KEP 7419, c CARR 14938, d WRAY 3304, e CLEMENS 21803, f CURTIS 1687, g PIERRE 4000, g' KOSTERMANS 5472, h ELBERT 3215, i TEYSMANN HB 6702).

neath; nerves 6–10 pairs, distant, angle acute; strongly curved, more or less distinctly inter-arching near the margin. *Inflorescences* axillary (sometimes some to many on axillary shoots with early caducous leaves and then pseudo-paniculate), glomerulous, 3/4–1 cm (rarely more lax and 1 1/2–2

cm long), c. 7–10-flowered, minutely pubescent. *Flowers* 2 1/2–3 mm. *Petals* broadly spatulate, slightly emarginate (up to 1/4 of their length) to nearly entire. *Disk-lobes* 1/4–3/4 mm, rounded to cordate, glabrous to minutely pubescent. *Ovary* in ♀ flowers densely fulvous-velvety pubescent, 2-celled (very rarely 3-celled), in ♂ flowers densely white woolly pubescent; style 1, more or less deeply cleft. *Fruits* usually 1 (in *ssp. pilosum* often 5–6, glomerulous), 1(–2)-lobed, lobes bean-shaped, 1–1 1/2 cm long, usually densely shortly fulvous-tomentose, suture broad very distinct; stone tuberculate.

Distr. From the Deccan & Ceylon to Yunnan, Hainan, and the Andamans, in *Malaysia*: Sumatra, Malay Peninsula, Borneo, and the Philippines.

Ecol. In primary and secondary forests at low to medium altitudes (up to 1500 m). *Fl.* and *fr.* probably Jan.–Dec.

KEY TO THE SUBSPECIES

1. Leaves distinctly obovate. *ssp. andamanicum*
1. Leaves elliptic (sometimes ovate).
2. Leaves scattered soft-hairy, especially on the nerves beneath *ssp. pilosum*
2. Leaves (nearly)glabrous.
3. Leaves small, up to 9 by 3 1/2 cm; nervation sunken above, strongly prominent beneath. *Inflorescences* often slightly more lax. *ssp. sumatranum*
3. Leaves larger, usually 12 by 3 cm or more; nervation not or very slightly sunken above, less prominent beneath. *Inflorescences* glomerulous.
4. Fruits tuberculate, subglabrescent. *ssp. tuberculatum*
4. Fruits smooth, densely pilose. *ssp. gelonioides*

ssp. gelonioides.—*Celastrus ?acuminatus* WALL. —*D. kerrii* CRAIB.

Small tree, up to 10 m high, or shrub. Leaves elliptic, acute at base, apex caudate; dull greyish-green when dry. Fruits usually 1-lobed, smooth, densely fulvous-tomentose.

Distr. S. Deccan, Ceylon, Bengal, Assam, Burma, Yunnan, Upper Siam, and *Malaysia*: Sumatra (Simalur and E. coast).

Vern. *Tutun awang buluk*, Simalur, *bolon doctan*, *kaju si lambok*, Sum. E. coast.

ssp. tuberculatum LEENH. Reinw. 4 (1956) 82.—*?Elaeocarpus ?integrifolius* (non LAMK) BLANCO. —*Ellipanthis scortechinii* KING.—*D. monospermum* MERR.—*D. tenuifolium* (non ENGL.) SCHELLENB. —*D. gagnepainii* PELLEGRIN.—Fig. 2g.

(Shrub-like) tree. Leaves as in *ssp. gelonioides*, greyish-green (Philippine & Bornean specimens) to brown (Malayan specimens) when dry. Fruits 1(–very rarely 2)-lobed, tuberculate, subglabrous.

Distr. Indo-China (S. Annam and Cochinchina), Lower Siam, and *Malaysia*: Malay Peninsula, North Borneo, and the Philippines (Mindanao excluded).

Vern. Philippines: *bagakolon*, *makahaboy*, P. Bis., *buta-buta*, *porotpot*, Tagb.

Note. In the other subspecies the endocarp is also tuberculate, but in *ssp. tuberculatum* the pericarp is apparently much thinner and distinctly less hairy.

ssp. andamanicum (KING) LEENH. Reinw. 4 (1956) 83.—*Chailletia andamanica* KING.

Leaves very shortly petioled, rather small (up to c. 10 by 4 cm), distinctly obovate, yellowish-green when dry; apex short and blunt; nerves more transverse. Fruits usually 2-lobed, otherwise as in *ssp. gelonioides*.

Distr. S. Andaman.

ssp. sumatranum (MIQ.) LEENH. Reinw. 4 (1956) 82.—*Chailletia sumatrana* MIQ.—*D. borneense* MERR.—Fig. 2g'.

Tree, erect or climbing shrub, or liana. Leaves rather small (c. 6–7 by 2–3 cm), long-petioled, greyish-green (Sumatra) to brown (Borneo) when dry; nerves 5–8 pairs, distinctly sunken above, strongly prominent beneath. Inflorescences often slightly more lax, 1–2 cm. Fruits 1(–2)-lobed, otherwise as in *ssp. gelonioides*.

Distr. Malaysia: Sumatra, Borneo, Mindanao. Vern. Akar-barak, Sum., vingol, N. Born.

Note. The specimens from Sum. E. Coast are slightly different; the leaves are larger, and pubescent on the nerves, the inflorescences are more lax and up to 2 cm long.

ssp. pilosum LEENH. Reinw. 4 (1956) 82.—*D. holopetalum* MERR.—*D. euphlebiium* MERR.—*D. ciliatum* (non MERR.) MERR.

Liana, not rarely tree or shrub. Leaves herbaceous, bright-green when dry, scattered pilose on the base of the midrib above, along the margin, and on the nerves and veins beneath; venation more conspicuous than in the other subspecies. Fruits in glomerules, 1–2-lobed, more globular than in the other subspecies, faintly tuberculate, densely minutely fulvous pubescent, more or less glabrescent.

Distr. Malaysia: N. and E. Borneo, Mindanao.

Vern. Angar-angar, anjaruba ambok, sari panggil, Borneo.

Notes. The species as a whole is much less variable than is *D. timoriense*; in contradistinction to the latter species, however, the boundaries between the local races are more clear.

The identity of *Elaeocarpus ?integrifolius* (non LAMK) BLANCO is not entirely certain. The present reduction was proposed already by F.-VILLAR, l.c.; MERRILL (Sp. Blanc. 1918, 237) was convinced of the identity of this species with *Urandra luzoniensis* (Jacq.). BLANCO's description of the flowers is very imperfect indeed; the description of the leaves holds better for *Dichapetalum* than for *Urandra* (especially as BLANCO says 'folia brevissimèque petiolata', which does not hold at all for *Urandra*, but fits very well for *Dichapetalum*).

Specially in *ssp. gelonioides* the inflorescences are sometimes inserted on axillary shoots with very caducous leaves; such inflorescences make at first sight the impression of being narrowly paniculate.

The species as a whole is best characterized by its fruits, which are either densely, minutely fulvous-tomentose and with very conspicuous suture, or subglabrous and strongly warty; moreover, especially in *ssp. gelonioides*, *tuberculatum*, and *sumatranum*, by its leaves, which are rather slender and tapering at both ends; the few, strongly curved and rather conspicuous nerves are also characteristic.

6. *Dichapetalum tricapsulare* (BLANCO) MERR. Publ. Gov. Lab. Philip. no 35 (1906) 35; Sp. Blanc. (1918) 215; En. Philip. 2 (1923) 389; LEENH. Reinw. 4 (1956) 83.—*Riana tricapsularis* BLANCO, Fl. Filip. (1837) 850; ed. 2 (1845) 126; ed. 3, 1 (1877) 225.—*Chailletia helferiana* (non KURZ) F.-VILL. Nov. App. (1880) 45.—*D. glabrum* ELM. Leaf. Philip. Bot. 2 (1908) 483; MERR. En. Philip. 2 (1923) 388.—*D. ciliatum* MERR. Philip. J. Sc. 7 (1912) Bot. 279; En. Philip. 2 (1923) 387; non Pl. Elm. Born. (1929) 138 (= *D. gelonioides* *ssp. pilosum*).—*D. oblongifolium* MERR. Philip. J. Sc. 17 (1921) 271; En. Philip. 2 (1923) 388.

Diocious small tree (4–5 m by 4–5 cm), lax shrub (up to 3 m) or liana. Branchlets densely fulvous-tomentose (sometimes rather shaggy) to glabrous, purple-brown. Leaves (elliptic to) lanceolate, (8–)10–14 by 1½–3(–5) cm, pubescent on both sides, especially beneath, and along the margin; glands few, small, on the lower surface near the base; base slightly oblique, acute to rounded; apex usually long tapering, blunt, mucronate; nerves 6–10 pairs, strongly curved, the apical ones distinctly interarching; intermediate veins distinctly developed. Inflorescences glomerulous, ½–1 cm long, with c. 5 flowers, shaggy pilose. Flowers (♀ unknown) 4 mm. Petals obovate, 3 mm long, ½ mm incised, outside with some long hairs near the base (on margin and midrib). Disk-lobes ¼ mm high, slightly cordate, glabrous. Pistilloid densely woolly pubescent. Fruits usually solitary, short-stalked, (1–)3-lobed, broad-obovate, c. 1½ by 1½ cm, densely minutely fulvous pubescent, more or less glabrescent, sutures distinct.

Distr. Malaysia: Philippines (Luzon, Leyte, Bohol, Bucas Grande Isl., Mindanao).

Ecol. In forests and brushwood, up to 1000 m. Fl. March–Aug.; fr. Oct.–Jan.

Uses. The timber is used as construction-material.

Vern. Kayotcot, Mbo.

Notes. The specimens from Leyte are slightly different: Leaves are (sub)glabrous, inflorescences more lax and up to 3 cm long, flowers 2½ mm long, petals fully glabrous. *D. ciliatum* is only slightly different in being more shaggy pilose and having somewhat broader leaves.

Closely related to *D. gelonioides*; different by its narrow, usually hairy leaves, and its 3-celled fruits.

7. *Dichapetalum tenuifolium* (KING) ENGL. in E. & P. Pfl. Fam. 3, 4 (1896) 348; non SCHELLENB. Pfl. R. Heft 103 (1938) 189 (= *D. gelonioides*); LEENH. Reinw. 4 (1956) 83.—*Chailletia tenuifolia* KING, J. As. Soc. Beng. 64, ii (1895) 91; RIDL. Fl. Mal. Pen. 1 (1922) 416.—Fig. 2d.

Dioecious small tree (up to 5 m by 5 cm) or shrub. *Branchlets* early glabrescent, reddish brown to black. *Leaves* elliptic-oblong, 16–22 by 4½–6 cm, papery, irregularly corrugated, glabrous; glands, if present, few, on the lower side, mainly near the base; base acute; apex tapering, blunt to acute; nervation sunken above, prominent beneath; nerves 7–9 pairs, curved, usually distinctly interarching. *Inflorescences* glomerulous, ½–1 cm, scattered pilose, with 10–12 flowers. *Flowers* mm long. *Petals* broadly spatulate, slightly emarginate. *Disk-lobes* ¼ mm, cordate, glabrous. *Pistil* densely woolly pubescent; ovary 3-celled; style 1, tripartite at the tip. *Fruits* solitary, short-stalked, 3-lobed (one lobe much smaller), obovate, 1¼ by 1½ cm, not distinctly grooved, faintly tuberculate, subglabrous.

Distr. *Malaysia*: Malay Peninsula (Perak).

Ecol. Dense jungle, up to c. 600 m. *Fl.* May–Oct.; *fr.* Oct.

Note. Closely related to *D. gelonioides*; distinct by different by its thin leaves and fruit characters.

8. *Dichapetalum griffithii* (HOOK. f.) ENGL. in E. & P. Pfl. Fam. 3, 4 (1896) 348; BURK. Dict. 1 (1935) 803; LEENH. Reinw. 4 (1956) 83.—*Chailletia griffithii* HOOK. f. Fl. Br. Ind. 1 (1875) 571; KING, J. As. Soc. Beng. 64, ii (1895) 92; RIDL. Fl. Mal. Pen. 1 (1922) 419; non F.-VILL. Nov. App. (1880) 45 (= *D. timoriense*).—*Chailletia setosa* KING, J. As. Soc. Beng. 65, ii (1896) 515; RIDL. Fl. Mal. Pen. 1 (1922) 419.—Fig. 2b.

Monoecious climbing or creeping shrub, sometimes erect shrub or up to 4 m high treelet. *Branchlets* ferruginous shaggy pilose. *Leaves* subsessile, lanceolate to elliptic, 12–18–22 by 4–6–11 cm, herbaceous, pubescence variable, usually shaggy pilose on the midrib above, on midrib and nerves beneath; glands on the lower side of the leaf, especially near the base, not rarely absent; base cordate; apex gradually acuminate, acumen cuneate, acute (rarely blunt); nervation prominent beneath, nerves 10–16 pairs, straight to rather strongly curved, distinctly interarching at some distance from the margin. *Glomerules* axillary, many-flowered, ¾–1 cm long, shaggy pilose. *Flowers* 3½–4 mm, bisexual. *Petals* spatulate, 3½ mm long, 1 mm incised, glabrous. *Disk-lobes* c. ¼ mm high, quadrangular to faintly 2-lobed, glabrous. *Ovary* woolly pubescent, 3-celled; style 1, ± tripartite at the tip. *Fruits* solitary, 1 cm long stalked, obovoid, 2(–3)-lobed, 3½–4 by 2–2½ cm, shaggy ferruginous-pilose; stones rugose; 1–2(–3) seeded.

Distr. *Malaysia*: Malay Peninsula.

Ecol. In mixed primary & secondary, and in bamboo forests, up to c. 200 m. *Fl.* mainly May–July; *fr.* mainly Sept.–Febr.

Uses. The fruits are edible. The Sakais drink a decoction of the roots during 3 days after childbirth.

Vern. *Akar*, (a.) *kërutot*, (a.) *pëleh angin*, (a.) *pëlih* (or *pulëh*) *kambang*, *këdondong bulan*, *kërupok bukit* (or *kurupó butrit*), (*mëroyan*) *katut*.

Notes. Characterized by its pubescence and by the rather large, densely shaggy-pilose fruits.

9. *Dichapetalum setosum* LEENH. Reinwardtia 4 (1956) 84.—non *Chailletia setosa* KING *quae est D. griffithii* ENGL.—Fig. 2e.

Dioecious scandent shrub. *Branches* shaggy pilose, glabrescent, light-coloured. *Leaves* elliptic, 10–20 by 6–10 cm, stiff herbaceous to subcoriaceous, scattered to densely pubescent above, specially on midrib and nerves, along the margin, and beneath, hairs patent, rather long, stiff, bulbous-based; glands rather many beneath; base rounded to broadly cuneate; apex gradually acuminate, acumen up to 1½ cm long, slender, acute; nervation sunken above, rather strongly prominent beneath; nerves 5–11 pairs, curved, distinctly interarching at some distance from the margin. *Inflorescences* lax, 2½ cm long, 1 cm long stalked, shaggy pilose, few- to many-flowered. *Flowers* (♀ unknown) 5 mm. *Petals* narrowly spatulate, 4½ mm long, ½ mm incised, glabrous. *Disk-lobes* quadrangular, ½ mm, glabrous. *Pistilloid* densely woolly pubescent. *Fruits* c. 2, 2-lobed, 1¾–2 by 2–2½ cm, rather densely patently pilose, with very distinct sutures; stone thin-walled, hard, 2-celled.

Distr. *Malaysia*: Borneo (3 collections only).

Ecol. In thickets. *Fl.* in Aug., *fr.* in July.

Note. A very characteristic species, possibly related to *D. gelonioides*.

10. *Dichapetalum steenisii* LEENH. Reinwardtia 4 (1956) 84.

Dioecious liana. *Branches* scattered shaggy pilose when young, gradually glabrescent, finally greyish brown. *Leaves* elliptic to lanceolate, 13–19 by 4–7 cm, herbaceous, sparsely, shaggy pilose, especially on the nerves beneath; glands rather many, scattered all over the lower surface; base acute; apex tapering acute-acuminate; midrib and nerves slightly sunken above, prominent beneath; nerves 8–10 pairs, curved, distinctly interarching. *Inflorescences* glomerulous, c. 1 cm long, many-flowered, shaggy pilose. *Flowers* (♀ unknown) 3 mm. *Calyx* shaggy fulvous pilose. *Petals* spatulate, slightly incised at the apex, glabrous. *Disk-lobes* nail-shaped, ¼ mm, thickened and tuberculate in the broadened upper part, glabrous. *Pistilloid* woolly pubescent. *Fruits* 1–3, subsessile, 2–3-lobed, ovate, c. 13 by 16 mm, densely fulvous-tomentose, with distinct sutures.

Distr. *Malaysia*: Natuna Isl. (Bunguran), SE. Celebes.

Ecol. Primary forest, up to c. 500 m.

ssp. steenisii.

Nerves c. 8 pairs. *Fruits* 2-lobed (no remains of a 3rd one).

Distr.: Natuna Isl. (Bunguran: Mt Ranai). *Fl.* and *fr.* April.

Vern. *Bulu* (Mal.).

ssp. celebicum LEENH. Reinwardtia 4 (1956) 84.—Fig. 2h.

Nerves c. 10 pairs. *Fruits* 3-lobed. *Flowers* unknown.

Distr. SE. Celebes, twice collected. *Fr.* Sept.

11. *Dichapetalum longipetalum* (TURCZ.) ENGL. in E. & P. Pfl. Fam. 3, 4 (1896) 348; CRAIB, Fl. Siam. En. 1 (1931) 268; LEENH. Reinw. 4 (1956) 84.—*Chailletia longipetala* TURCZ. Bull. Soc. Nat. Mosc. 36, 1 (1863) 611; HOOK. f. Fl. Br. Ind. 1 (1875) 571; KURZ, Fl. Burm. 1 (1877) 231 (*sphalm. 'macropetala'*).—*D. baillonii* PIERRE, Fl. Coch. 1 (1882) t. 47; PELLEGRIN in Fl. Gén. I.-C. 1 (1911) 800.—*Chailletia hainanensis* HANCE, J. Bot. 23 (1885) 322.—*D. tonkinense* ENGL. Bot. Jahrb. 23 (1896) 143; PELLEGRIN in Fl. Gén. I.-C. 1 (1911)

799, f. 881-7; Suppl. 1 (1948) 730.—*D. hainanense* ENGL. in E. & P. Pfl. Fam. 3, 4 (1896) 348; PELLEGRIN in Fl. Gén. I.-C. Suppl. 1 (1948) 730.—Fig. 3.

Monoecious liana, shrub, or small tree (up to 10 m by 15 cm). *Branchlets* bluntly quadrangular in cross-section, densely ferruginously tomentose when young, older ones glabrous, lenticellate, grey to purple-brown. *Leaves* ovate- to obovate-elliptic, 10-17 by 3½-9 cm, thin-chartaceous, shining dark-brown above when dry, minutely pilose on

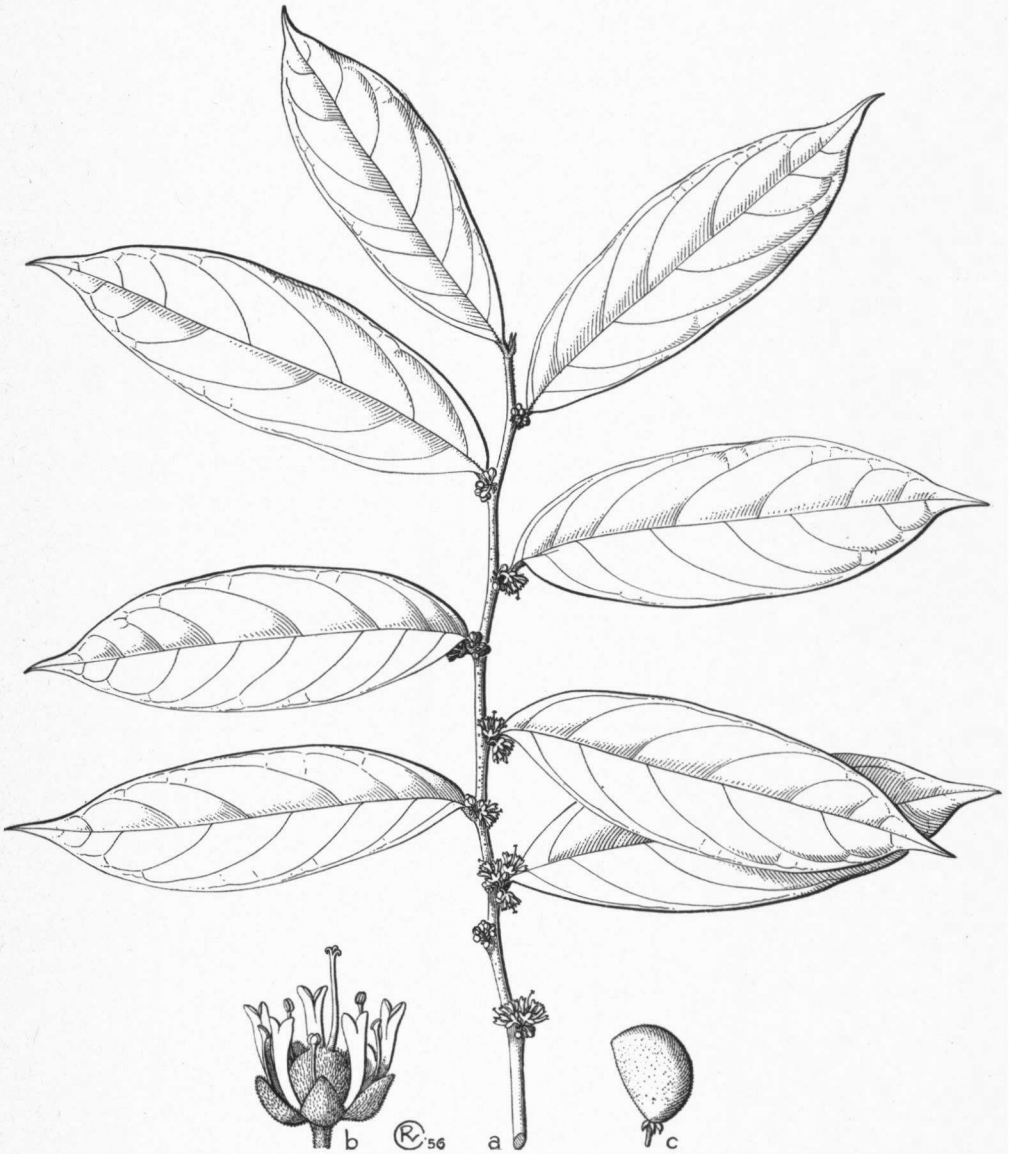


Fig. 3. *Dichapetalum longipetalum* (TURCZ.) ENGL.—a. Flowering twig, b. flower, c. fruit. (a $\times \frac{1}{2}$, b $\times 3\frac{1}{2}$, c $\times \frac{1}{2}$; a-b after LEI 100, c BALANSA 3852).

midrib and nerves above, densely to very sparsely velutinous beneath, without glands; base acute to subcordate; apex gradually to subabruptly acuminate, acumen cuneate, acute (to blunt); nervation sometimes slightly sunken above, midrib and nerves distinctly prominent beneath; nerves 7-9 pairs, faintly curved, slightly interarching. *Inflorescences* glomerulous, $\frac{3}{4}$ -1 cm, sessile, many-flowered. *Flowers* 5 mm, bisexual. *Petals* oblanceolate, $4\frac{1}{2}$ -5 mm, twice as long as the calyx, 1-1 $\frac{1}{2}$ mm incised, glabrous. *Disk-lobes* quadrangular, faintly 2-lobed, $\frac{1}{2}$ mm, glabrous. *Ovary* densely velvety pubescent, (2-)-3-celled; style 1, filiformous, 4 mm long, its tip slit up into (2-)-3 recurved parts. *Fruits* solitary, short-stalked, 1(-)-2-lobed, bean-shaped, $1\frac{1}{2}$ -2 $\frac{1}{2}$ by 1-1 $\frac{1}{2}$ cm, densely minutely fulvous-tomentose, more or less glabrescent, suture indistinct; endocarp c. 1 mm thick, hard.

Distr. S. Burma, Cambodia, Annam, Tonkin, Hainan, and *Malaysia*: Malay Peninsula.

Ecol. In forests, bamboo forests, and thickets, up to c. 500 m. *Fl.* mainly Oct.-March; *fr.* mainly May-June.

Notes. Best characterized by the very long petals and strongly oblique fruits, moreover by the often quadrangular branchlets. The ovary is usually 3-celled, but on the same specimen often some flowers with a 2-merous ovary are to be found.

HOOKEER *f.*, *l.c.*, and all authors afterwards, described the flowers of this species as being unisexual, though ♂ and ♀ inflorescences were to be found on the same plant. The ♂ inflorescences were said to be more lax and larger than the ♀ ones, the ♂ flowers smaller, their petals not exceeding the calyx, and more than halfway slit up. The source of this error is the specimen HELFER (Kew distr.) 2171 in HOOKEER'S herbarium, in which a loose ♂ inflorescence of *D. cf. timoriense* is mounted over one of the branches, which itself is also in full flower.

12. *Dichapetalum helferianum* (KURZ) PIERRE, *Fl. Coch.* 1 (1881) t. 48; PELLEGRIN in *Fl. Gén. I.-C.* 1 (1911) 797, f. 88⁸⁻⁹; LEENH. *Reinw.* 4 (1956) 85.—*Chailletia helferiana* KURZ, *J. As. Soc. Beng.* 41, ii (1872) 297; HOOK. *f.* *Fl. Br. Ind.* 1 (1875) 570; KURZ, *Fl. Burm.* 1 (1877) 230; KING, *J. As. Soc. Beng.* 64, ii (1895) 92; RIDL. *Fl. Mal. Pen.* 1 (1922) 417; non F.-VILL. *Nov. App.* (1880) 45 *quae est D. tricapsulare*.—Fig. 2f.

Diocious scandent shrub, rarely a tree (up to 8 m high). *Branchlets* minutely pubescent when young, greyish- to yellowish-brown. *Leaves* elliptic to oblong, 8-14 by 2 $\frac{1}{2}$ -5 $\frac{1}{2}$ cm, thin-coriaceous, dull-brown when dry, glabrous except stipules, petiole, and midrib beneath; glands 2-3, on the lower surface near the base; base equilateral, acute; apex subabruptly acuminate, acumen $\frac{1}{2}$ -1 cm long, acute; nervation inconspicuous; nerves 7-8 pairs, curved, distinctly interarching, some intermediate veins well-developed. *Inflorescences* axillary, 1-2 cm, minutely tomentose, 7-11-flowered. *Flowers* 2 $\frac{1}{2}$ mm long. *Petals* obovate-spathulate, 2 mm long, $\frac{1}{3}$ mm incised, glabrous.

Disk-lobes quadrangular, $\frac{1}{4}$ mm, glabrous. *Ovary* densely woolly pubescent, 2-celled; styles 2. *Inflorescences* $\frac{1}{2}$ -2 cm, with 1-2 fruits. *Fruits* 1-2(-)-3-lobed, ovate, c. 1 by 1 $\frac{1}{2}$ cm, minutely fulvous-tomentose; suture distinct; stone slightly rugose.

Distr. S. Burma (from Moulmein southwards), S. Siam, and *Malaysia*: Malay Peninsula (Perlis, Langkawi Isl.). According to PELLEGRIN *l.c.* also in Cambodia; I did not see the specimen, but I doubt its identity.

Ecol. Low altitude. *Fl.* March-April, July; *fr.* June-Jan.

Vern. *Gunda mahmot*, Mal. Pen.

Notes. KURZ, apparently erroneously, mentions the petals as being 'silky pubescent outside.'

At first sight this species looks rather like *D. laurocerasus*: apart from the important differences in flower and fruit, it mainly differs in its vegetative parts by light-coloured branches (black in *laurocerasus*) and its leaves being not fully glabrous.

13. *Dichapetalum laurocerasus* (HOOK. *f.*) ENGL. in *E. & P. Fl. Fam.* 3, 4 (1896) 348; LEENH. *Reinw.* 4 (1956) 85.—*Chailletia laurocerasus* PLANCH. ex HOOK. *f.* *Fl. Br. Ind.* 1 (1875) 572; KING, *J. As. Soc. Beng.* 64, ii (1895) 93; RIDL. *Fl. Mal. Pen.* 1 (1922) 417, f. 41.

Monococious woody climber or creeper, sometimes shrub or small tree. *Branchlets* glabrous, black. *Leaves* elliptic (rarely ovate), 8-12 by 4-6 $\frac{1}{2}$ cm, thin-coriaceous, glabrous (except sometimes a few hairs on stipules and petiole), usually yellowish- to reddish-brown when dry; glands beneath few, mainly near the base; base slightly oblique, broadly cuneate to subrotundate; apex more or less acuminate, acumen small, broad, and blunt; nervation inconspicuous, nerves (6-)-8-10 pairs, straight, curved and distinctly interarching towards the margin. *Inflorescences* axillary, dichotomous, 1-1 $\frac{1}{2}$ cm long, stalked or not, with c. 15 flowers, scattered-pilose. *Flowers* 5 mm, bisexual, receptacle slightly hollowed. *Petals* narrowly spatulate, $4\frac{1}{2}$ mm long, 1 mm incised, glabrous. *Disk-lobes* $\frac{1}{2}$ mm, glabrous to minutely tomentose, sometimes more or less mutually connate. *Ovary* densely patently stiff-pilose, 3-celled; style long and slender, nearly glabrous, stigma 3-lobed. *Fruits* solitary, on a thick 1 cm long stalk, 1(-)-2 lobed, usually oblique, 2 $\frac{1}{2}$ by 2-3 cm, densely minutely fulvous-tomentose; sutures absent.

Distr. *Malaysia*: Malay Peninsula (mainly P. Penang, once in Perak).

Ecol. Dense jungle, up to about 600 m. *Fl.* Febr.-March(-May); *fr.* June-Aug.

Vern. *Bua akar larak kucing, tahi ulat*, Mal. Pen.

Note. Very distinct, especially in its flowers differing from all other Malaysian species, in vegetative parts showing some superficial resemblance to *D. helferianum*.

14. *Dichapetalum sessiliflorum* LEENH. *Reinwardtia* 4 (1956) 85.—Fig. 2a.

Diocious liana. *Branches* densely fulvous-

tomentose when young, glabrescent, greyish brown. *Leaves* elliptic to lanceolate, 9–15 by 3–5 cm, chartaceous, (sub)glabrous above, faintly appressedly pilose on midrib and nerves beneath; glands few, beneath, near the base; base acute; margin minutely crenulate; apex acuminate, acumen usually long, slender, and acute; nerves 7–10 pairs, usually strongly curved, distinctly interarching. *Flowers* (only ♂ buds known) 1–2, subsessile, axillary. *Calyx* densely ferruginous-tomentose. *Petals* ovate, slightly emarginate, outside (margin excepted) and inside at the base long-pilose. *Disk* absent(?). *Pistilloid* patently stiff-pilose. *Fruits* solitary, short-stalked, triangular-ovoid, c. 3 by 2½–3 cm, smooth, densely shortly ferruginous-tomentose, glabrescent, 3(–1)-celled; stones free, woody, strongly corrugated.

Distr. *Malaysia*: SE. New Guinea.

Ecol. In forests, 1200–1500 m. *Fl.* and *fr.* Oct.–Nov.

Notes. Characterized by the large, rounded fruits and the very small inflorescences; moreover the only species with petals which are even inside pubescent.

15. *Dichapetalum tenerum* LEENH. Reinwardtia 4 (1956) 86.

Diocious ?liana, sometimes treelet. *Branches* velvety fulvous-pubescent, gradually glabrescent, purple-brown. *Leaves* elliptic, 6–10 by 2½–4 cm, herbaceous, pilose along the margin, on the midrib above, and on midrib, nerves, and part of the veins beneath; some small glands scattered over the lower surface; base acute (to rounded); apex gradually acuminate, acumen usually long, blunt, mucronate; nerves 8–10 pairs, curved (rarely nearly straight), not or indistinctly interarching. *Inflorescences* ¾ cm long, 1(–2)-flowered. *Flowers* (probably only ♀ seen) 2½ mm. *Petals* broad-spathulate, 1–1¼ mm long, c. ¼ mm incised. *Disk-lobes* ⅓ mm high, 2-lobed, glabrous. *Ovary* woolly pubescent, 2-celled; styles 2, stigmas 2-lobed. *Fruits* 2(–1)-lobed, emarginate, 1¼ by 1¼ cm, with distinct sutures, densely velvety ferruginous pubescent, slightly warty; seeds dark orange.

Distr. *Malaysia*: West New Guinea (one doubtful specimen from Papua, Central Div.).

Ecol. Rain-forest, up to 50 m. *Fl.* Oct.–April.

Doubtful

Dichapetalum ledermannii KRAUSE, Bot. Jahrb. 62 (1929) 343.

NE. New Guinea (Lordberg).

Possibly related to *D. tenerum* from which it differs by rather long petioles (1 cm), narrow leaves (c. 9 by 2½ cm), and c. 5-flowered inflorescences. The only specimen still in existence, as far as I know, is a male one (LEDERMANN 10179, L.). Its flowers possess stamens with a very broad filament pilose outside; there is no disk; the pistilloid is rather large and possibly points to a 3-merous pistil.

This specimen belongs to a small group of New Guinean ones, all apparently related to *D. tenerum* or *D. timoriense*. They are either each representing a distinct species or, what is more probable, belong to one variable species. As the material of this assemblage of sheets is still quite insufficient, I think it preferable for the present to leave all material, not belonging to the only well circumscribed *D. tenerum*, undetermined, even with the inclusion of *D. ledermannii*.

Excluded

Chailletia bojeri TUL. Ann. Sc. Nat. Bot. IV, 8 (1857) 85, has erroneously been mentioned (Ind. Kew. 1, 1895, 501) as being described from 'Malacca'; this should be Madagascar.

Dichapetalum obovatum ELM. Leaf. Philip. Bot. 2 (1908) 483 = *Oncocarpus obovatus* (ELM.) MERR. (*Anac.*).

Dichapetalum spicatum ELM. Leaf. Philip. Bot. 1 (1908) 299 = *Osmelia philippina* (TURCZ.) BENTH. (*Flacourt.*).

Dichapetalum tetramerum RIDL. Kew Bull. (1938) 234 = *Ellipanthus beccarii* PIERRE (*Connar.*).

Digaster MIQ. Sum. (1861) 329, originally described as possibly belonging to *Chailletiaceae*, has been reduced to *Pygeum* GAERTN. (*Rosac.*).