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FLORA MALESIANA

UNDER THE AUSPICES OF
THE BOTANIC GARDENS OF INDONESIA, BOGOR,
AND THE RIJKSHERBARIUM, LEYDEN

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BOTANICAL GARDEN



2. ANDRESIA

SLEUM., *nom. nov.* — *Wirtgenia* ANDRES, Verh. Bot. Ver. Brandenb. 56 (1914) 58, 59, 61, 68, f. 1 H, *in text*; DOMIN, Sitz. Ber. Böhm. Ges. Wiss. M.-N. Kl. (1915) 104, *non* SCH.-BIP. 1842. — *Cheilothea* (*non* HOOK. f.) PRAIN in K. & G. J. As. Soc. Beng. 74, ii (1905) 81; RIDL. Fl. Mal. Pen. 2 (1923) 222, f. 93. — **Fig. 54.**

Echlorophyllose, ephemeral, leafless, white or coloured herbs; stem stoutish, erect, simple or 2-3-forked, densely set with large, imbricate scales; roots fleshy. *Flower* regular, solitary, terminal. *Sepaloid scales* 5, free, erect, oblong-lanceolate, like the uppermost stem scales. *Petals* 3, free, erect, imbricate, linear-oblong, blunt and somewhat cucullate at the apex. *Stamens* 6, included; filaments linear, flattened; anthers linear, basifix, subextrorse, hippocrepiform, cells 2, smooth, confluent at apex, dehiscing by marginal pores which gradually extend into slits. *Disk* hypogynous, low. *Ovary* fusiform, 1-celled, gradually narrowed into the cylindrical style; stigma subcapitate or subglobose, obscurely 4- or 6-lobed; placentas 6, parietal, only slightly prominent, with rather numerous ovules. *Fruit* fleshy, indehiscent, baccate, crowned by the \pm persistent \pm truncate style, not yet known in perfectly ripe state.

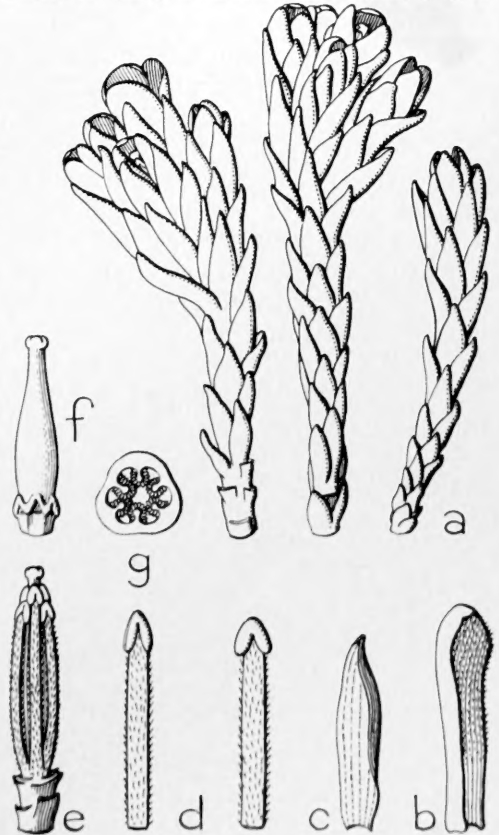
Distr. Monotypic and endemic in *Malesia* (Malay Peninsula).

Ecol. In dense woods, reported to be a root-parasite, but surely a mycotrophous saprophyte, as true parasites are not known within the *Ericales*.

1. *Andresia malayana* (SCORT. in Hook. f.) SLEUM., *nov. comb.* — *Wirtgenia malayana* (SCORT. in Hook f.) ANDRES, Verh. Bot. Ver. Brandenb. 56 (1914) 58, 59, 61, 68, f. 1 H, *in text*. — *Cheilothea malayana* SCORT. in Hook. f. Ic. Pl. (1887) t. 1564; PRAIN, J. As. Soc. Beng. 73, ii (1904) 205; in K. & G. *ibid.* 74, ii (1905) 81; ANDRES, Deutsch. Bot. Monatsschr. 22, 4 (1911) 53; RIDL. Fl. Mal. Pen. 2 (1923) 222, f. 93. — **Fig. 54.**

Stem 15-22 cm. *Scales* ovate-oblong, obtuse, upwards gradually increasing in size, lurid-purple (SCORTECHINI), dilutely purple (RIDLEY) or waxy white (KUNSTLER), glabrous, 0.6-1.8 by 0.3-0.7 cm. *Flower* c. 2.5 cm, hidden within the uppermost scales and bright yellow (KUNSTLER), or with the tips of the petals exserted and white (SCORTECHINI, RIDLEY). *Sepaloid scales* 5, resembling the uppermost scales, but rather larger and all close together, oblong-lanceolate, subacute or obtuse, glabrous, c. 1.5-1.8 by 0.5 cm. *Petals* larger and more concave than the sepals, rounded-cucullate at the apex, glabrous outside, rather densely to sparingly short-hairy inside in the upper $\frac{2}{3}$, c. 2-2.5 by 0.6 cm. Outer filaments somewhat shorter than the inner ones, laxly hairy all the length (SCORTECHINI), or inside near the base only (KUNSTLER), c. 1.5 by 0.1 cm; anthers c. 2 mm (SCORTECHINI) or c. 4 mm

Fig. 54. *Andresia malayana* (SCORT. in Hook. f.) SLEUM. a. Habit, $\times \frac{2}{3}$, b. sepal, $\times \frac{1}{3}$, c. petal, $\times \frac{1}{3}$, d. two stamens, $\times 2$, e. flower, the perianth removed, $\times \frac{1}{3}$, f. ovary and disk, $\times 1$, g. transverse section of ovary, $\times 2$ (after Hook. Ic. t. 1564).



(KUNSTLER). *Disk* sinuate. *Ovary* narrow-fusiform, c. 2 mm ϕ , faintly 6-grooved, pistil c. 1.7 cm; stigma obscurely 4-lobed (SCORTECHINI) or 6-lobed (KUNSTLER). *Immature berry* white, c. 1.8 cm ϕ .

Distr. Malesia: Malay Peninsula, Perak (Larut), discovered both by SCORTECHINI and KUNSTLER between 1882 and 1886, later also found by RIDLEY, whose material was not preserved.

Ecol. Humiculous, in dense jungle (KUNSTLER: 'underneath the rock', c. 1065 m), in dense bamboo (RIDLEY in litt.: c. 1000–1500 m).

Note. According to the field notes recorded by the collectors, the specimens of SCORTECHINI and KUNSTLER differ in the characters mentioned in the description above. Their essential characters agree, however, and the plants seem to be conspecific. The species has not been refound recently, and new complete material, conserved in alcohol, is

urgently needed, to enlarge our knowledge of the plant.

Andresia shares the peculiarities of the petals, anthers, stigma and placentation with *Monotropastrum* ANDRES (from the Himalayas to China and S. Kuriles, Japan, Korea, Formosa and N. Sumatra), *Monotropanthum* ANDRES (India, China, Korea, Formosa) and *Pityopus* SMALL (N. America), but is certainly not congeneric with *Cheilothea* HOOK. f. (Khasia) as assumed by HOOKER f., PRAIN and RIDLEY. In *Cheilothea* there are only 3–4 sepaloid scales, the petals are flat, the stigma has the form of a pileus or reversed cup, the anthers have parallel cells, with contractions or swellings at intervals, each cell opening by an irregular, longitudinal slit; the placentas are laterally expanded and bear few ovules only.

3. MONOTROPASTRUM

ANDRES, Notizbl. Berl.–Dahl. 12 (1935) 696, f. 8; in Hand.–Mazz. Symb. Sin. 7 (1936) 766, f. 23; Bot. Jahrb. 76 (1953) 103; HARA, J. Jap. Bot. 36 (1961) 78, f. 2; *ibid.* 40 (1965) 100. — **Fig. 55.**

Echlorophyllose, small, ephemeral, saprophytic, leafless herbs, white or with bluish tinge; stem stoutish, erect, simple, laxly to subdensely set with large or rather small, \pm imbricate or rather distant spiral scales; roots fleshy. *Flower* regular, solitary, terminal. *Sepaloid scales* inserted immediately below the petals, 0–2. *Petals* 3–4(–5), free, erect, imbricate, forming a kind of campanulate corolla. *Stamens* 6–8(–10), equal or alternately a little longer; filaments linear, flattened, or thick-filiform; anthers subreniform, almost basifix, cells parallel to each other, dehiscent by transverse slits. *Ovary* ovoid to pear-shaped, gradually narrowed to a short (or rarely to a longer) style; stigma thick, cushion-like, somewhat deepened in its centre, very shortly 4- or 5-lobed; placentas 6–13, parietal, slightly prominent, with many ovules. *Fruit* fleshy, baccate, remaining reflexed as is the flower. *Seeds* ∞ , oval to roundish without appendages; testa \pm reticulate.

Distr. 1 variable *sp.* in the Himalayas (Punjab to Bhutan), S. Tibet, Assam, Manipur, N. Burma, Indochina (Laos to S. Annam), China (Yunnan to Hunan and Hupeh), S. Ussuri, S. Saghalin, S. Kuriles, Japan, Korea, Formosa, in *Malesia* once found in N. Sumatra.

Ecol. In dense mountain forest.

Notes. *Monotropastrum* has the general habit of *Monotropa* (*M. uniflora* L.), with which it shares the asepalous flower and the type of the anthers. *Monotropa*, however, has a distinct shallow circular depression at the summit of the ovary, which is filled by the base of the short, stout, slightly obconical style (which thus – in contrast with *Monotropastrum* – is set off markedly from the proper ovary), an axile placenta (at least so below), and a loculicidal capsule which becomes erect and is filled with small elongate and tailed seeds.

1. *Monotropastrum humile* (D. DON) HARA, J. Jap. Bot. 36 (1961) 78, f. 2; *ibid.* 40 (1965) 100, with further syn. and lit. — *Monotropa humilis* D. DON, Prod. Fl. Nepal. (1825) 151. — **Fig. 55.**

Stem c. 9 cm. Lower *scales* dense, imbricate, ovate to ovate-lanceolate, obtuse, 8 by 3–4 mm, middle and upper ones gradually more spaced, partly or not imbricate, lanceolate, subacuminate,

12–15 by 4 mm, of a greyish bluish tinge when fresh, turning black when dry, especially the lower part inside covered with rather long, cobweb-like, brown or rufous hairs, which are also found on the stem, \pm glabrous elsewhere. *Flower* reflexed. *Petals* broad oblong, apex \pm truncate, saccate at the base inside, either irregularly clothed with longish, brown, woolly hairs on both faces, or

partly glabrescent, c. 13 by 5–6 mm. *Stamens* 8; filaments thick-filiform, with sparse hairs or \pm glabrous. *Disk* lobes apparently 8, short-cylindrical, alternating with the stamens. *Ovary* c. 9 mm long, 2.5 mm ϕ in the lower $\frac{1}{3}$, gradually attenuate to a very broad and short style c. $\frac{1}{5}$ as long as the ovary.

Distr. East Asia, in *Malesia*: N. Sumatra (Tapanuli), once found in forest near Lae Pandom, E. of Sidikalang, at c. 1500 m, by H. SURBECK. *Fl.* Apr.

Note. Though the Sumatran material is scanty and no fruit was collected, I refer this to *M. humile* seen the enormous variability of this species indicated by HARA.

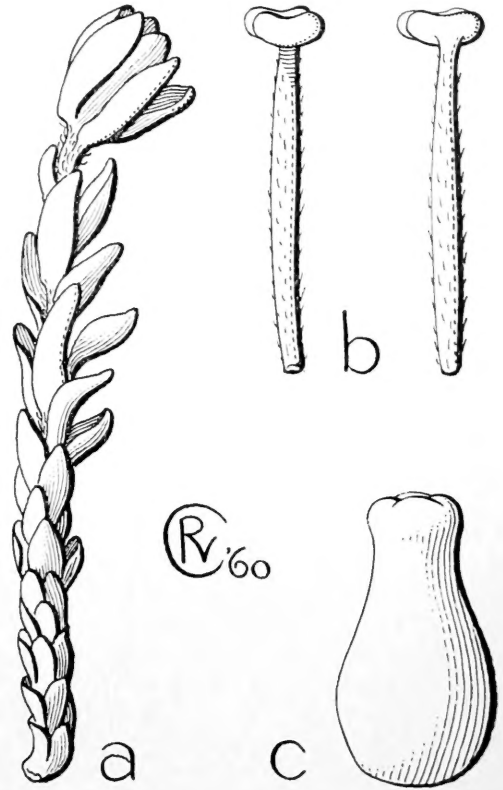


Fig. 55. *Monotropastrum humile* (D. DON) HARA. a. Habit, $\times 1$, b. stamens, $\times 3$, c. ovary, $\times 3$ (SURBECK s.n.).

4. PYROLA

TOURN. ex LINNÉ, Gen. Pl. ed. 5 (1754) 188; Sp. Pl. (1753) 396. — Fig. 56.

Perennial glabrous herbs or small half-shrubs, with rhizomes, short leafy stems. *Leaves* spiral, persistent, entire or denticulate, long-petioled. *Flowers* in terminal, simple, bracteate racemes, nodding, white (Mal.), actinomorphic or slightly zygomorphic. *Calyx* deeply 5-lobed, persistent. *Petals* 5, concave, sessile, \pm arranged in form of a bell or somewhat spreading, caducous. *Stamens* 10; filaments subulate; anthers incompletely 4-celled, dehiscent by terminal pores. *Ovary* 5-celled; ovules ∞ ; style columnar, thickened upwards, straight (Mal.); stigma truncate or with a shortly 5-lobed stigma. *Capsule* depressed-subglobose, somewhat pentagonal, 5-celled, loculicidally 5-valved from the base, crowned by a persistent style. *Seeds* minute; testa lax, produced on both ends.

Distr. About 35 spp. mostly in cold and temperate regions of the northern hemisphere, also present in the temperate zone of tropical America (S. to Mexico) and Asia (Himalaya to Korea and Japan), in *Malesia* 1 sp. in N. Sumatra.

1. *Pyrola sumatrana* ANDRES, Bull. Jard. Bot. Btzg III, 14 (1936) 5, f. 1. — *P. japonica* (non KLENZE ex ALEFELD) STEEN. *ibid.* III, 13 (1934) 206. — Fig. 56.

Plant 12–35 cm, with stoutish, creeping stem, normal leaves in a lax to subdense rosette, other upper and reduced ones numerous, scale-like,

subulate, remote, entire, somewhat keeled, 10–15 by 1–1.5 mm. *Leaves* remote, elliptic or ovate-elliptic, apex broad-attenuate to nearly rounded, obtuse, but with a marked terminal glandular tooth, base short-cuneate into the petiole, subcoriaceous, firm, glabrous, dark green and slightly suffused with red above, reddish to purple-brown



Fig. 56. *Pyrola sumatrana* ANDRES. a. Habit, $\times \frac{1}{2}$, b. flower bud, $\times 1\frac{1}{2}$, c. flower, $\times 1\frac{1}{2}$, d. end of style with stigma, $\times 5$ (VAN STEENIS 6492).

beneath, a little shining above, paler beneath, margin somewhat thickened, minutely remotely denticulate by the protruding veins, sometimes nearly entire, (4-)5-7 by 2-3.5 cm, midrib stoutish, somewhat raised beneath, nerves (3-)4-5 pairs, curved-anastomosing, veins very lax, rather little conspicuous; petiole 4-6.5 cm. *Scape* 17-25 cm, terete, purplish, with several narrow foliar scales below. *Raceme* lax, 3-6-flowered. *Flowers* shortly and broadly campanulate, up to 2.5 cm ϕ . Pedicels slender, 0.8-1.2 cm; bract subamplectent, linear, \pm as long as the pedicel. *Calyx* light green, lobes subovate-lanceolate to lanceolate, subacute, c. 5-6 by 2 mm. *Petals* white, elliptic to broad-elliptic or subobovate-elliptic, 9-11 by c. 6 mm. *Stamens* 10; filaments flat, linear, 5-6 mm;

anthers narrow-oblong, 3 by 1.2 mm, the apex of each cell narrowed into a short recurved tube, which bears a fine pore. *Ovary* depressed-globose, slightly 5-grooved longitudinally; style light green, columnar, rather slender, c. 6 mm, broadened towards the patelliform apex; stigma immersed, with 5 large and broad tooth-like lobes.

Distr. Malesia: N. Sumatra, Atjeh, Gajo Lands (Mts Bur ni Geredong, 4°80'N, 96°80'E, and Losir).

Ecol. In ridge scrub, forming mats, 2650-2800 m. *Fl.* Sept., Jan.

Note. Nearest to *P. japonica* KLENZE ex ALEFELD from Japan (with a *ssp. coreana* ANDRES in Korea), which differs by cream and distinctly smaller flowers, anther-cells but 2 mm long.



Fig. 57. *Lyonia ovalifolia* (WALL.) DRUDE. a. Habit, $\times \frac{2}{3}$, b. flower, $\times 3$, c. ovary and style, $\times 3$, d. ovary, $\times 7$, e. longitudinal section of ovary, $\times 7$, f. cross section of ovary, $\times 7$, g. stamen, $\times 7$ (KEP 71940 WYATT-SMITH).

5. LYONIA

NUTT. Gen. N. Am. Pl. 1 (1818) 266, *nom. cons.* — *Pieris* (non D. DON, 1834, *s. str.*) CLARKE in Hook. f. Fl. Br. Ind. 3 (1882) 460; K. & G. J. As. Soc. Beng. 74, ii (1905) 72; RIDL. Fl. Mal. Pen. 2 (1923) 215. — *Xolisma* RAF. Am. Monthly Mag. 4 (1819) 193, *nom. rejic.* — **Fig. 57–59.**

Evergreen or deciduous shrubs or rarely small trees. *Leaves* spirally arranged, short-petioled, entire (Mal.). *Flowers* 5-merous; racemes axillary or at the end of short lateral branches (Mal.). *Calyx* deeply (rarely 4–8-)lobed, lobes valvate. *Corolla* urceolate (Mal.), with short recurved lobes. *Stamens* 10 (rarely 8–16),



Fig. 58. *Lyonia ovalifolia* (WALL.) DRUDE. Flowering branch from tree on top of Robinson Falls, 1450 m, Cameron Highlands, Malaya (SLEUMER 4662) (SLEUMER, 1963).

included; filaments flat, dilated near the base, with a pair of appendages near the apex (Mal.); anthers ovoid, obtuse, dorsifix, awnless, opening by apical pores. *Ovary* 4-6-celled, globose or depressed; style columnar; stigma truncate. *Disk* (5-)8-12-lobed. *Capsule* loculicidal, dry, sutures thickened and appearing before the dehiscence as 5 rounded longitudinal ribs. *Seeds* ∞, small, linear-oblong, falcate, not winged, albuminous; testa loose.

Distr. About 40 spp., chiefly in the eastern and southeastern States of North America and the West Indies, *c. 7 spp.* described from E. and SE. Asia, of which one extends to *Malesia* (Malay Peninsula only). Ecol. In Malesia in montane forest.

1. *Lyonia ovalifolia* (WALL.) DRUDE in E. & P. Pfl. Fam. 4, 1 (1889) 44. — *Andromeda ovalifolia* WALL. As. Res. As. Soc. Beng. 13 (1820) 391, fig.; Cat. (1829) n. 763. — *Pieris ovalifolia* (WALL.) D. DON, Edinb. Phil. J. 17 (1834) 159; CLARKE in Hook. f. Fl. Br. Ind. 3 (1882) 460; K. & G. J. As. Soc. Beng. 74, ii (1905) 73; RIDL. J. Linn. Soc. Bot. 38 (1908) 313, reimpr. J. Fed. Mal. St. Mus. 2 (1908) 120; *ibid.* 6 (1915) 49, 157; Fl. Mal. Pen. 2 (1923) 215; HENDERS. J. Mal. Br. R. As. Soc. 5 (1927) 256; DOP, in Fl. Gén. I.-C. 3 (1930) 725; STEEN. Bull. Jard. Bot. Btzg III, 13 (1934) 206; KANJILAL, DAS, *c.s.* Fl. Assam 3 (1939) 150. — *Xolisma ovalifolia* (WALL.) REHD. J. Arn. Arb. 5 (1924) 52; KANEH. Formos. Tr. (1936) 556, f. 517; FLETCH. in Fl. Siam. En. 2 (1938) 315. — Fig. 57-59.

Small, often crooked tree 4-6(-8) m high, trunk up to 10 cm ø, or bushy spreading shrub, occasionally epiphytic, with blackish brown or grey, deeply longitudinally fissured fibrous bark. Young branches terete, at first whitish puberulous, afterwards becoming glabrous and blackish. *Leaves* (in Mal.) evergreen, ovate, rather variable and sometimes ovate-elliptic or ovate-oblong (Mal.), apex short-acuminate, ± acute, base broad-attenuate or mostly rounded, sometimes subcordate, thinly coriaceous, firm, dark glossy green and glabrous above except the midrib, rusty-pubescent at least initially beneath at the midrib and nerves, glabrescent, edge very slightly recurved, (5-)6-10(-15) by (3-)4-5.5(-7) cm, midrib flat above, prominent beneath, nerves (8-)10-15 pairs, spreading, ± parallel, slightly curved upwards near the edge, sharply prominent beneath, veins ± transverse, reticulation dense, minutely or hardly prominent on both faces; petiole puberulous, 3-10(-12) mm. *Racemes* by suppression or early fall of the leaves sometimes forming a terminal false panicle, (5-)6-15(-20) cm long, ± pubescent. *Flowers* close together, second, drooping. Bract linear or lanceolate, acute, caducous, 2.5-4 mm. Bracteoles

small, linear-oblong. Pedicels slender, pubescent, 2-3 mm. *Calyx* lobes triangular-lanceolate or ovate, ± acute, ± pubescent, *c.* 2 mm. *Corolla* early caducous, narrowly elongate-ovoid to urceolate-cylindric, white to very pale cream, pubescent outside, puberulous within, 13 by 5 mm in fresh, (5-)7-9 mm in dry specimens. *Stamens* half as long as the corolla; filaments white, woolly at the broad base, with 2 divaricate setaceous appendices near the apex; anthers ovoid, 1-1.5 mm. *Disk* lobes thick, deltoid, obtuse, alternating with the 5 faint ribs of the ovary. *Ovary* subglobose, pubescent; style cylindric, ± as long as the corolla. *Capsule* globose, 4-5 mm ø, glabrous, supported by the persistent calyx.

Distr. Temperate Himalayas from Kashmir to Bhotan, Sikkim, Assam, Burma, Indochina, N. Siam, S. and SE. China, Formosa and Japan (*var.*), in *Malesia*: Malay Peninsula (Kedah: Kedah Peak; Perak: Mt Kerbau, Cameron Highlands; Pahang: Mt Tahan). Fig. 59.



Fig. 59. Distribution of *Lyonia ovalifolia* (WALL.) DRUDE in SE. Asia and Malesia.

Ecol. In flattish or hilly mountain localities („padangs”), often from 915 m up, from other places recorded from 1220-2135 m. *Fl.* March-Aug., *fr.* May-Sept. Leafless for a short time in March in the Cameron Highlands.

6. PERNETTYOPSIS

K. & G. J. As. Soc. Beng. 74, ii (1905) 79; RIDL. Fl. Mal. Pen. 2 (1923) 221. — Fig. 60.

Small, rigid, epiphytic or terrestrial shrubs. *Leaves* spirally arranged, shortly petioled, coriaceous, minutely subserrate-crenulate, persistent. *Flowers* axillary,

solitary or in twos, rarely 3 or 4 in a fascicle. Pedicels stout, with several basal small bracts. Bracteoles 2 (rarely 3), rather large, inserted immediately below the calyx, forming a kind of involucre cup. *Calyx* as long as or mostly a little longer than the corolla, very deeply 5-partite, persistent, unchanged in fruit, lobes \pm spreading. *Corolla* short-urceolate to ovoid-subglobose, throat slightly constricted and with 5 short reflexed lobes. *Stamens* 10, equal, included; filaments linear, slightly attached to the bottom of the corolla, or inserted outside the disk lobes; anthers rather short, exappendiculate, apically prolonged into 2 porously dehiscent tubules. *Disk* lobes 10, scale-like and attached to the ovary. *Ovary* free, subglobose, 5-celled; style columnar; stigma simple; placentas on the inner angle of the loculi, many-ovuled. *Berry* globose, 5-celled, with a thin wall and but scanty pulp. *Seeds* ∞ , minute, compressed, angled, filling the cells nearly completely; testa crustaceous.

Distr. Monotypic in *Malesia* (Malay Peninsula).

1. *Pernettyopsis malayana* K. & G. J. As. Soc. Beng. 74, ii (1905) 79; RIDL., J. Fed. Mal. St. Mus. 4 (1909) 44; *ibid.* 5 (1914) 39; *ibid.* 6 (1915) 49; Fl. Mal. Pen. 2 (1923) 221. — *P. subglabra* K. & G. J. As. Soc. Beng. 74, ii (1905) 80; RIDL. Fl. Mal. Pen. 2 (1923) 221. — *Diplycosia breviflora* RIDL. J. Fed. Mal. St. Mus. 6 (1915) 158. — *P. breviflora*

(RIDL.) RIDL. Fl. Mal. Pen. 2 (1923) 222; HENDERS. J. Fed. Mal. St. Mus. 13 (1927) 5. — Fig. 60.

Epiphytic or terrestrial shrub, 25–60 cm, not rarely trailing over moss cushions. Branches terete, blackish, younger parts brown, glabrous, bark very thin, branchlets sparsely to subdensely clothed with flat, manifestly appressed bristles (1–2 mm). *Leaves* 2–4, \pm close to the end of the shoots, elliptic to obovate-elliptic, more rarely obovate or subrotund, apex very broadly attenuate to rounded, obtuse, the terminal gland thick, \pm sharply prominent, base broadly narrowed into the petiole, dark green and \pm shining above, paler (sometimes more reddish brown) and rather dull beneath, glabrous above, laxly short-setulose beneath, the bristles longer persistent on the midrib and in the lower half of the blade, otherwise early caducous, their bases leaving brownish blackish subglandular pits, margin \pm flat, the crenulations ending in short, \pm caducous, appressed bristles, (2–)3–5 by (1.8–)2–4 cm, midrib and nerves mostly \pm deeply depressed above, less so beneath, nerves (2–)3–4 pairs, the lowest 1–2 pair(s) from the base of the lamina, curving upwards and inwards and inarching, reticulation lax, slightly impressed above, almost obscure beneath; petiole thick, with appressed bristles, 2–5 by 1–1.5 mm. *Flowers* both in foliate and defoliate axils. Pedicels at anthesis 4–10 by 1–1.5 mm, accrescent, densely rusty-tomentose and recurved when young, erect and less woolly with age, the basal bracts ovate, c. 1.5 mm. Bracteoles red, thick, broad-ovate, obtuse, rusty-tomentose outside, glabrous inside, 2(–3) mm. *Calyx* green or red, lobes subovate-lanceolate and somewhat spreading subacute, 5–8(–12) mm long, 2–4 mm wide at the base, with a dense rusty \pm easily deterrent woolly tomentum outside initially, early glabrescent from the base upwards, at anthesis mostly only the tips short-tomentose, similarly inside, where the lower half is glabrous from the beginning. *Corolla* rather thin, glabrous, reported to be green, white with purplish marks, pink, or mostly red when fresh, 4–7 mm, lobes 1 mm; filaments rather flattened and wavy, glabrous,

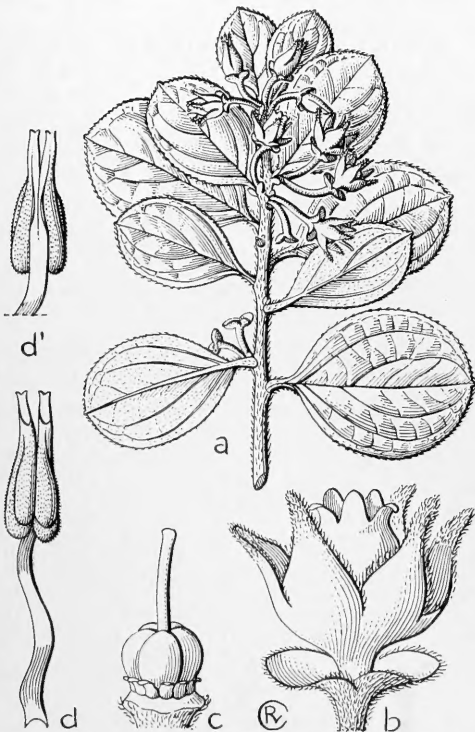


Fig. 60. *Pernettyopsis malayana* K. & G. a. Habit, $\times 2/3$, b. flower, $\times 3$, c. ovary and disk, $\times 3$, d. stamen, front, $\times 6$, d'. anther dorsally, $\times 6$ (For. Dep. F. M. S. 25943).

3–4 mm; cells subovate-oblong, cordate at the base, granular, *c.* 2 mm, the apex prolonged into 2 white rather slender tubules (1 mm) with oblique apical pores. *Ovary* laxly caducously tomentose initially or glabrous; style slightly grooved, 3–4 mm; stigma obtuse. *Berry* subglobular, *c.* 5 mm, said to be pale blue or violet when ripe. *Seeds* red, *c.* 0.7 mm.

Distr. Malesia: Malay Peninsula (Kedah/Perak border: Mt Bintang; Perak: Mts Kerbau, Bubu, and Batu Puteh; Pahang: Cameron Highlands,

Mts Benom and Tahan; Selangor: Mt Mengkuang Lebak).

Ecol. In submossy light forest or summit scrub, 1525–2135 m. *Fl.* Jan.–Sept.

Note. As the woolly indumentum of the calyx lobes is apparently detersile and early gone and the length of the pedicels varies, the recognition of several *spp.* based chiefly on these characters has been abandoned in favour of accepting only one species.

7. GAULTHERIA

KALM *ex* LINNÉ, Gen. Pl. ed. 5 (1754) 187; Sp. Pl. 1 (1753) 395; SLEUM. Reinwardtia 4 (1957) 163–188; Blumea 11 (1961) 1; *ibid.* 12 (1963) 114; *ibid.* 12 (1964) 342. — **Fig. 61–68.**

Evergreen shrubs or half-shrubs, mostly terrestrial, rarely epiphytic, erect or rarely procumbent, prostrate or creeping. *Leaves* spirally arranged or very rarely opposite, mostly serrate. *Racemes* simple or compound, *i.e.* forming panicles, whether or not leafy, perulate (*i.e.* with basal bracts) or practically eperulate, axillary or terminal, sometimes reduced to few-flowered fascicles or a solitary flower. *Flowers* rather small. Pedicel sustained by a large basal bract and 2(–3) higher inserted, mostly small bracteoles. *Calyx* 5-partite to various degree, lobes \pm imbricate, persistent, becoming enlarged and swollen (and succulent) in fruit, finally rarely white or pinkish, mostly dark purple or almost blackish. *Corolla* campanulate or urceolate, shortly 5-lobed, lobes spreading or recurved, \pm imbricate. *Stamens* 10 (in a few extra-Mal. *spp.* 8), included, attached around the disk to the base of the corolla; filaments mostly dilated at or above the base; anthers dorsiflex, introrse, each cell produced at the apex into a very short and often broad tubule which opens by an apical \pm oblique pore or slit, and whose back wall mostly is bidentate or biaristate apically. *Disk* \pm 10-lobed, glabrous. *Ovary* superior or semi-inferior, 5-ribbed, 5-celled, with thick, bilobed axile, ∞ -ovuled placentas; style simple, columnar; stigma small, \pm obtuse. *Capsule* thin- to thick-walled, 5-celled, \pm globose, dry, mostly rather completely included by the enlarged and \pm succulent calyx, loculicidally dehiscent from the apex into 5 valves. *Seeds* ∞ , minute, subglobose, angled; testa reticulate; albumen carnosae; embryo cylindric.

Distr. About 150 *spp.*, of which 5 are found in North America, *c.* 32 in eastern Asia including also Japan, *c.* 10 in Australia including also Tasmania and New Zealand, *c.* 85 in Central and South America, in *Malesia* 24 *spp.*. Fig. 61.

Ecol. The genus is nearly exclusively terrestrial, much in contrast to the predominantly epiphytic genus *Diplycosia*. Most *spp.* occur as a substage in mountain forests, or in open country scrub, especially on mountain tops.

Dispersal. The fruits are devoured by smaller animals as birds (DOCTERS VAN LEEUWEN, *l.c.*), rodents (CLEMENS *in sched.*) and hens (VAN DER PIJL, personal information), and dispersal is probable this way.

Uses. Many species contain in all their parts a volatile oil of peculiar odour, the so-called „winter-green-oil“ (methyl-salicylate), which is greatly in repute against rheumatism. The smell becomes apparent or stronger after crushing the leaves or flowers. From the Malesian species *G. punctata* is used in the first place, known as „gondopuro“ or „gandapura“ to the Javanese. Less used are *G. leucocarpa* or *G. nummularioides*; from several other species in Malesia a strong smell has been stated by the collectors, but no use has been reported. The leaves are chewed occasionally together with „sirih“, or used as a medicinal tea. The fruits are edible, but apparently not eaten by man.

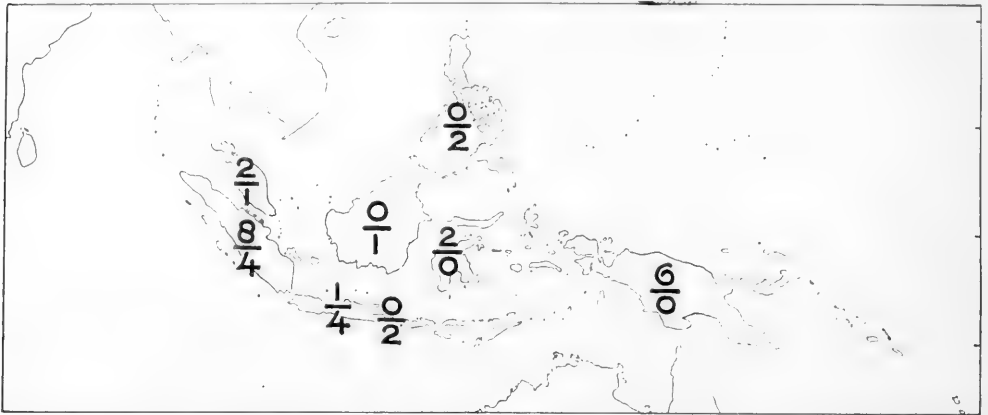


Fig. 61. Distribution of the species of *Gaultheria* in Malesia. The number above the hyphen indicates the number of endemic species, that below the hyphen the number of non-endemic species in each island or district.

KEY TO THE SPECIES

1. Bracteoles at flowering time at a marked distance from the calyx, or, in case of very short and condensed inflorescences or solitary subsessile flowers, bracteoles anyway not strictly opposite.
2. Inflorescences in terminal and/or axillary, simple or compound racemes, *i.e.* each flower in the axil of a small, subsistent bract.
3. Racemes generally rather short and few-flowered. Leaves 0.8–2.5 (very rarely in part in the same specimen up to 4) by 0.3–1.6 cm.
4. Leaves obovate-oblong or oblanceolate, sometimes elliptic-oblong, (0.8–)1–2 (very rarely up to 4) by 0.3–0.7 (very rarely up to 1.2) cm. Branchlets minutely pubescent 1. *G. borneensis*
4. Leaves ovate, (1–)1.2–1.8 (–2.5) by 0.7–1.4 (–1.6) cm. Branchlets finely pubescent *and* setulose, or setulose only.
5. Rachis and pedicels finely pubescent only. (Corolla shortly 5-lobed. Filaments villous their entire length.) 2. *G. atjehensis*
5. Rachis setulose only, not pubescent. Pedicels glabrous.
6. Corolla shortly 5-lobed, densely short-hairy inside. Filaments laxly subpatently hairy in their middle, glabrous at base and apex 3. *G. solitaria*
6. Corolla deeply 5-cleft, completely glabrous inside. Filaments papillose 4. *G. dialypetala*
3. Racemes \pm elongate, generally many-flowered. Leaves at least 3 by 2 cm, mostly much larger.
7. Branchlets with scattered sessile glands, otherwise glabrous. Pedicels short-hairy, not glandular-hairy, mostly glabrescent upwards or almost glabrous immediately below the calyx. 5. *G. acroleia*
7. Branchlets (and inflorescences) finely pubescent *and* subdensely to more laxly set with slender, \pm spreading glandular bristles. Pedicels hairy, with a ring of dense, patent, glandular setulose hairs immediately below the calyx 6. *G. barbulata*
2. Flowers in axillary fascicles, or solitary in the axil of a \pm normal leaf (in the latter case sometimes forming a leafy *terminal* raceme, when present in the axils of all upper decrescent leaves).
8. Flowers in few-flowered fascicles.
9. Branchlets glabrous or practically so. Reticulation not impressed on the leaf-surface.
10. Leaves ovate, rounded at the base, 5.5–9.5 (–10.5) by 3.5–5.5 (–6) cm 7. *G. kemiriensis*
10. Leaves elliptic to broadly ovate-lanceolate, acute at the base, 3.5–4.5 by 1.8–2.5 cm. 8. *G. losirensis*
9. Branchlets rather densely clothed with \pm longish bristles. Reticulation \pm distinctly impressed on the leaf-surface 9. *G. abbreviata*
8. Flowers solitary or in a terminal leafy raceme.
11. Stem weak, creeping. Each leaf tooth ending in a fine longish \pm persistent bristle. 10. *G. nummularioides*
11. Stem stiff. Each leaf tooth thickly and obtusely gland-tipped 11. *G. mundula*
1. Bracteoles at flowering time strictly opposite and inserted on the pedicel immediately below the calyx (may be very shortly distant from the calyx in fruiting stage).
12. Flowers in racemes or panicles.

- 13. Flowers in terminal panicles, or flowers both in terminal panicles and solitary axillary (only upper) racemes, *i.e.* the upper 3-4 racemes forming a panicle in which here or there an occasional \pm reduced leaf may be found.
- 14. Branchlets permanently glandular-setulose or setulose.
- 15. Panicles \pm coarctate, rather short.
- 16. Rachis (and pedicels) in part hirtellous and glandular-setulose 12. *G. celebica*
- 16. Rachis and pedicels exclusively hairy. 13. *G. berberidifolia*
- 15. Panicles slender, \pm elongate 14. *G. graciliscens*
- 14. Branchlets finely pubescent or glabrous.
- 17. Branchlets \pm sharply trigonous or winged by the decurrent petioles. Panicles exclusively terminal 15. *G. punctata*
- 17. Branchlets terete or nearly so, petioles not properly decurrent. Both terminal panicles and solitary (upper) racemes present in the same specimen.
- 18. Leaves cordate at base 16. *G. arfakana*
- 18. Leaves broadly cuneate to rounded at base.
- 19. Leaves elliptic to suborbicular, or broadly obovate-, rarely oblong-elliptic, obtusely attenuate to rounded at apex, laxly to rather densely blackish punctulate beneath . 17. *G. malayana*
- 19. Leaves oblong-ovate, gradually acuminate at apex, not punctulate underneath. 18. *G. intermedia*
- 13. Flowers exclusively in solitary racemes in the axils of normal leaves, the uppermost raceme often seemingly terminal.
- 20. Leaves pubescent beneath. Corolla pubescent.
- 21. Leaves (laxly) longish glandular-pubescent, especially beneath and along the margin, teeth minute, ending in a longish, glandular, bristle-like hair. 19. *G. hirta*
- 21. Leaves glabrous above, rather densely, shortly, non-glandular-hairy beneath, teeth \pm coarse, ending in a very short thick glandular point. 22. *G. leucocarpa* var. *hirta*
- 20. Leaves and corolla glabrous.
- 22. Leaves short-acuminate at the apex.
- 23. Leaves ovate-oblong or -lanceolate, cuneate at base, very laxly or not punctate beneath. Corolla subcampanulate, 3.5-4 by 3(-4) mm 20. *G. viridiflora*
- 23. Leaves ovate to ovate-elliptic, rarely elliptic-oblong, broadly attenuate to rounded or even subcordate at base, generally manifestly laxly punctate beneath. Corolla cylindrical-urceolate, 5-7 by c. 3 mm 21. *G. pullei*
- 22. Leaves \pm subcaudate- or elongate-acuminate at the apex (\pm ovate, base rounded to cordate, rarely broad-attenuate) 22. *G. leucocarpa*
- 12. Flowers solitary in the axils of the upper leaves.
- 24. Flowers successive, *i.e.* in the axils of all upper (manifestly decrescent) leaves, thus in a leafy raceme. Branchlets somewhat winged at the tips, glabrous or minutely pubescent. 23. *G. novaguineensis*
- 24. Flowers remote, *i.e.* in the axils of some and not successive upper (slightly or not decrescent) leaves. Branchlets terete, setulose 24. *G. pernettyoides*

1. *Gaultheria borneensis* STAFF, Trans. Linn. Soc. II, Bot. 4 (1894) 190, t. 15, f. C 4-6; RENDLE, J. Bot. 34 (1896) 355; MERR. Philip. J. Sc. 3 (1908) Bot. 378; HAYATA, Mat. Fl. Formosa (1911), 169; GIBBS, J. Linn. Soc. Bot. 42 (1914) 101; MERR. En. Born. (1921) 465; En. Philip. 3 (1923) 246; KANEH. Formos. Tr. (1936) 533, f. 492, *incl. G. itoana* HAYATA, Fl. Mont. Formosa (1908) 150, t. 25; SLEUM. Bot. Jahrb. 71 (1940) 141, *in text*; Reinwardtia 4 (1957) 167; Blumea 12 (1963) 114. — *G. benquetensis* COPEL. f. Philip. J. Sc. 47 (1932) 58, pl. 1, f. 4 & 5; STEEN. Bull. Jard. Bot. Btzg III, 13 (1934) 205. — Fig. 62a.

Shrub, sometimes in form of \pm dense cushions, 15-50(-60, very rarely up to 120) cm; branches prostrate or erect, generally slender, virgate, youngest parts reddish brown, subterete, minutely greyish pubescent, older parts greyish corticate. Leaves with a distinct „wintergreen-oil” fragrance, obovate-oblong or oblanceolate, sometimes elliptic-oblong, apex subobtuse, base cuneate, subcoriaceous, rather dull, glabrous, though laxly punctate beneath, regularly glandular-crenate,

(0.8-)1-2(-4) by 0.3-0.6(-1.2) cm, midrib slightly impressed above, prominent beneath, nerves in 3-4 ascendent pairs somewhat sunken above, slightly raised beneath, reticulation lax and not much conspicuous; petiole 0.5-1.5(-2) mm. Raceme in specimens from Luzon and the summit area of Mt Kinabalu from the uppermost axil (pseudoterminal) and 2-4-flowered, in specimens from lower places on Mt Kinabalu also with racemes from each of the upper 2-3(-5) axils and thus forming a panicle. Rachis (1-)-1.5-2.5(-4) cm, finely pubescent, with several small basal bracts. Pedicels 3-5 mm, with some stalked glands in the upper part, otherwise finely pubescent or glabrous. Bract ovate-elliptic, small. Bracteoles broad-lanceolate, inserted at some distance from the calyx, whether or not ciliolate and glandular-fimbriate, suffused with red. Calyx obconical, glabrous, greenish or pink, 2.5 mm, lobes ovate-triangular, obtuse, whether or not ciliolate, c. 1.5 mm. Corolla ovoid-urceolate, c. 5 by 3.5 mm, glabrous, fragrant, white or cream with purple limb, or pink. Filaments papillose, 2 mm; anthers

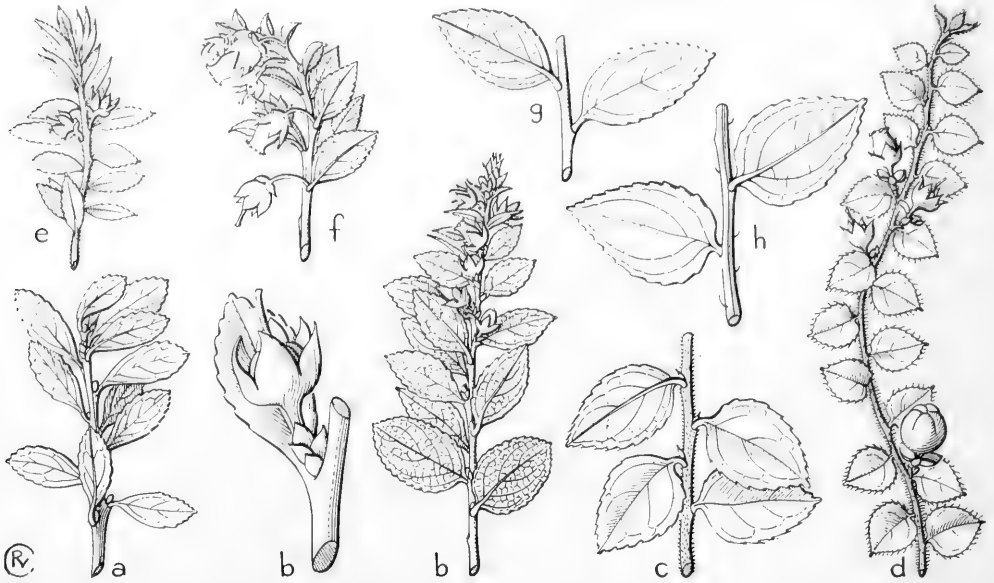


Fig. 62. Habit of *Gaultheria* spp., all nat. size. — a. *G. borneensis* STAPP. — b. *G. mundula* F. v. M., b'. ditto, detail, $\times \frac{8}{3}$. — c. *G. dialypetala* SLEUM. — d. *G. nummularioides* D. DON. — e. *G. pernettyoides* SLEUM. — f. *G. novaguineensis* J. J. S. — g. *G. atjehensis* J. J. S. — h. *G. solitaria* SLEUM. (a CLEMENS 51405, b-b' BRASS 4745, c BÜNNEMEIJER 978, d SCHIFFNER 2355, e VAN STEENIS 8648, f BRASS & MEIJER DREES 10114, g FREY-WYSSLING 27, h BREMEKAMP s.n.).

c. 15. mm, the cells divergently biaristate (0.8 mm). Disk dark green, rather obscure. Ovary pubescent; style pale green, glabrous, 3 mm. Fruit 5–9(–10) by 6–9 mm, white or pink, rarely purple, berry-like, the fleshy sepals including a small, thin-coriaceous, white or brownish capsule. Seeds brownish, 0.7 mm.

Distr. *Malesia*: North Borneo (Mt Kinabalu) and Philippines (Luzon, in a very limited region in the central part of the Mountain Prov.).

Ecol. On Mt Kinabalu a low shrub in subsummit low forest, becoming dwarfish in crevices and among wind swept granite rocks on the summit plateau, from 3350–4000 m, a more stiff and erect shrub (up to 1.2 m) with larger leaves (1.5–4 by 0.7–1.2 cm) and richer inflorescences (from more numerous upper axils) and purple fruits on exposed crest among bracken and grasses of the east slope at 2440–2750 m; in Luzon a prostrate, not rarely cushion-like low shrublet in \pm open places along pine-forest edges, or on bogs, not rarely on artificial talud along road, 1800–2900 m. Fl. fr. Jan.–Dec.

Note. Certainly very near to *G. itoana* HAYATA from Formosa (Mt Arisan), which, however, differs by a shorter, distinctly globose-suburceolate corolla.

2. *Gaultheria atjehensis* J. J. S. in Fedde, Rep. 53 (1934) 293; STEEN. Bull. Jard. Bot. Btzg III, 13 (1934) 205; AIRY SHAW, Kew Bull. 1940 (1941) 313; *ibid.* (1948) 158, f. 3; SLEUM. Reinwardtia 4 (1957) 167. — Fig. 62g.

Small shrub with apparently \pm prostrate stems. Branchlets minutely pubescent and rather long and finely setose, or setose only. Leaves ovate, apex broad-attenuate and provided with a rather thick, somewhat protracted terminal gland, base \pm rounded, subcoriaceous to coriaceous, glabrous above, subsdensely caducously setulose or finally punctate beneath, densely serrate, the teeth setose-ciliate, hardly 0.5 mm and 1–1.5 mm spaced, 1.3–2.4 by 0.7–1.6 cm, midrib impressed above, rather strongly prominent beneath, nerves c. 3 pairs, curved-ascendent, lower ones \pm from or from above the base, slightly impressed above, raised beneath, reticulation rather lax, somewhat impressed above, slightly prominent beneath; petiole setulose, 1–3 mm. Racemes from the upper 2–4 axils, 4–6-flowered. Rachis 1.5–2 cm, rather densely short-pubescent, with several small basal perulae. Pedicels subsdensely short-pubescent, 6–10 mm. Bract ovate, obtuse, ciliolate. Bracteoles lanceolate, inserted in the lower third of the pedicel. Calyx glabrous outside, puberulous inside, c. 5 mm, deeply 5-lobed, lobes acute, ciliate. Corolla conical-urceolate, white, glabrous outside, pubescent inside, c. 6 mm, lobes 1 mm. Filaments subferruginous-villous their entire length; anther-cells ovate-oblong, c. 1.3 mm, each very short tubule with 2 divergent and \pm reflexed horns. Ovary subferruginous-hirsute; style hairy at the base only, c. 3 mm.

Distr. *Malesia*: N. Sumatra (Atjeh, Gajo Lands: Bur ni Telong, Mt Kemiri, Mt Losir).

Ecol. In ridge forest, ridge scrub or table land,

near edge of crater among rocks, 2500–3500 m. Fl. Febr., March, June.

Note. *G. atjehensis* is remarkably near to *G. notabilis* ANTHONY (figured in Kew Bull. 1948, 160, f. 2) from Yunnan, which differs by larger leaves, a more campanulate corolla, and glabrous corolla and filaments.

3. *Gaultheria solitaria* SLEUM. Reinwardtia 4 (1957) 167. — Fig. 62h.

Shrublet. Branchlets slender (2 mm), apparently prostrate, terete, laxly caducously setulose or punctate by the persistent bases of the bristles, furthermore short-pubescent towards the tips. *Leaves* ovate, apex short-acuminate, the terminal gland thick and prominent, base rounded, \pm coriaceous, rather shining on both faces, glabrous above, sparsely very shortly setulose or punctate beneath, \pm regularly serrate, teeth glandular, 0.3–0.5 mm, 1–2 mm spaced, not ciliate, 1.8–2.5 by 1.2–1.5 cm, midrib sunken above, raised beneath, nerves 3 pairs, high-ascending from the base and the lower third of the midrib, very slightly or not impressed above, prominent beneath, veins \pm transverse, impressed above, reticulation rather distinct underneath; petiole stoutish, setulose, c. 2 mm. *Racemes* solitary, in the rather poor type specimen (where the top is destroyed) coming from the upper 2 axils, 2–3 cm, 6–8-flowered, with several small perulae. Rachis stoutish, laxly setulose only. Pedicels glabrous, 3–5 mm, the lowest coming from the axil of a rather small foliaceous bract, (3–6 by 2–3 mm), the upper ones from the axils of less distinctly foliaceous, decrescent ones. Bracteoles inserted above the base or nearly in the middle of the pedicels, subopposite, ovate-oblong, one higher additional bracteole inserted at a short distance from the calyx. *Calyx* 3 mm, lobes ovate-acuminate, c. 2 mm, glabrous outside, puberulous inside, ciliolate. *Corolla* urceolate, c. 5.5 mm, glabrous outside, manifestly puberulous inside at least in the lower half, lobes 1–1.5 mm. *Filaments* laxly \pm patently hairy in the middle third; anther-cells not well developed. *Ovary* glabrous or very sparsely hairy; style glabrous, 2.5 mm.

Distr. *Malesia*: E. Java (Mt Ardjuno: Kembar summit), once collected by BREMEKAMP.

Ecol. In "Vaccinietum", at 2900 m. Fl. July.

Note. Similar in habit as *G. atjehensis* and certainly allied to it.

4. *Gaultheria dialypetala* SLEUM. Reinwardtia 4 (1957) 168. — Fig. 62c.

Prostrate shrublet, much branched below, 30–40 cm, branches from a thick tuber-like base. Branchlets slender (1–2 mm), subterete, rather densely foliate, rather densely covered with rufous, \pm spreading, bristle-like, eglandular hairs (c. 1.5 mm). *Leaves* ovate, apex short-acuminate, the terminal gland thickish and prominent, base rounded or very broadly attenuate, coriaceous, \pm shining on both faces, glabrous above, laxly, very shortly and caducously setulose or punctate beneath, \pm regularly serrate, teeth caducously se-

tulose-ciliate, 1–2 mm spaced, hardly 0.5 mm high, margin slightly revolute, (1–)1.2–1.8(–2) by 0.8–1.3 cm, midrib slightly sunken above, distinctly prominent beneath, nerves 3(–4) pairs, high curved-ascending, \pm raised above, more distinctly so beneath, reticulation rather lax, somewhat prominent especially beneath; petiole laxly setulose, thickish, 1–2 mm. *Racemes* from the upper 3–5 axils, lower ones 3–5-flowered, upper ones 2-flowered or reduced to a single flower. Rachis 0.5–1 cm, glabrous, with 2–3 small perulae. Pedicels glabrous, 1–2(–3) mm. Bract oblong, ciliolate, c. 2 mm. Bracteoles ovate, alternate, inserted on the pedicel at a short, but marked distance from the calyx. *Calyx* 4 mm, lobes ovate-acuminate, acutish, ciliolate, glabrous outside, puberulous along the mediane inside, c. 2.5 mm. *Corolla* urceolate, white, somewhat 5-angular, glabrous in- and outside, 4 mm, at full anthesis 5-partite to $\frac{3}{4}$. *Stamens* not well developed; filaments (possibly not normal) narrow-subulate, papillose; anther-cells not seen. *Ovary* rather densely yellowish hairy; style clothed with some spreading hairs, 3 mm.

Distr. *Malesia*: Central West Sumatra (Mt Talakmau = Mt Ophir), once found on summit, said to be common on the boulder plain at 2900 m. Fl. June.

Note. The anomalies noticed in the description of the corolla and stamens may be due to insects.

5. *Gaultheria acroleia* SLEUM. Reinwardtia 4 (1957) 169; Blumea 11 (1961) 1. — Fig. 63c.

Shrub. Branchlets flattened or subangular at the tips, subterete below, with sparse sessile glands (i.e. the persistent bases of caducous bristles), otherwise glabrous. *Leaves* subovate-elliptic or -oblong, apex gradually rather shortly acuminate, the terminal gland thick, base broad-cuneate or sometimes nearly rounded, subcoriaceous to coriaceous, rather stiff, regularly serrulate, teeth c. 1 mm high and 1.5–2(–3) mm spaced, caducously setular-ciliate, rather blunt, glabrous above, laxly to subdensely glandular-punctate beneath, (3–)4–7(–8) by (2–)2.2–3(–3.5) cm, midrib, nerves and veins \pm distinctly impressed above, midrib very prominent beneath, nerves 5(–6) pairs, curved and high ascending, anastomosing near the edge, prominent beneath, veins \pm transverse, slightly raised beneath, veinlets subobscure; petiole grooved above, glabrous, 7–9 mm. *Racemes* solitary from the upper axils, (3–)3.5–5 cm, \pm obliquely spreading, rather many-flowered, provided at the base with 2 ovate or ovate-oblong, acutish, subcoriaceous rather early caducous perulae. Rachis rather stiff, c. 1.5 mm ϕ at base, very densely and exclusively clad with fine, crisped whitish yellowish, minutely gland-tipped hairs. Pedicels rather slender, pubescent below, quite glabrous below the calyx, 6–8 mm at anthesis, elongate in fruit. Bract ovate-oblong, pubescent, 2–3 by 1.5–2 mm. Bracteoles inserted at $\frac{1}{3}$ to $\frac{1}{2}$ on the pedicel, subopposite, pubescent, c. 2 by 1 mm. *Calyx* 2.5 mm, lobes ovate, subacute, glabrous dorsally,

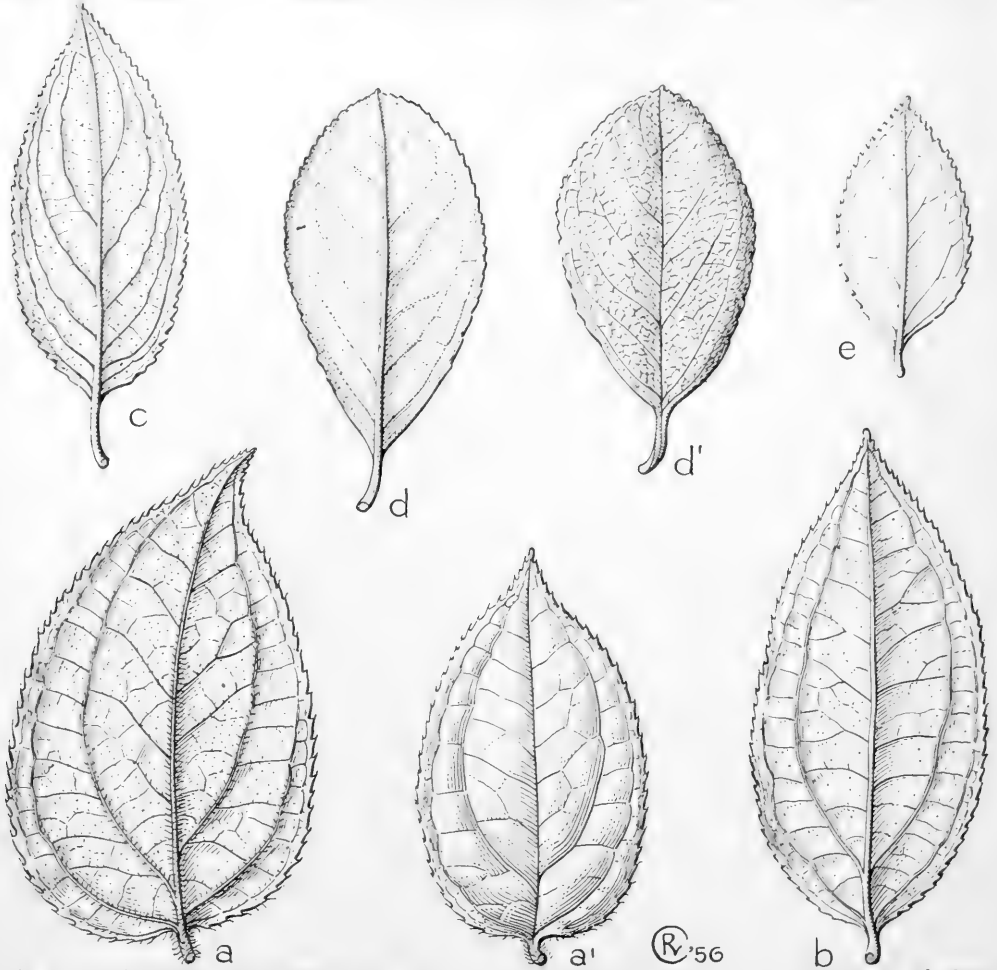


Fig. 63. Leaf surfaces of *Gaultheria* spp., all $\times \frac{2}{3}$. — a. *G. abbreviata* J. J. S., undersurface, a', ditto, upper surface. — b. *G. kemiriensis* SLEUM., undersurface. — c. *G. acroleia* SLEUM., undersurface. — d. *G. malayana* AIRY SHAW, undersurface, d', ditto, upper surface. — e. *G. losirensis* SLEUM., undersurface (a BÜNNEMEIJER 963, a' LEEFMANS 46, b VAN STEENIS 9654, c VAN STEENIS 9644, d-d' HANCOCK s.n., e VAN STEENIS 8568).

slightly pubescent internally, ciliate. *Corolla* urceolate, white or pink, glabrous outside, laxly pubescent inside, c. 5 by 2.5 mm, only slightly contracted at the limb, very shortly 5-lobed. *Stamens* half as long as the corolla; filaments papillose, moreover laxly hairy below; anther-cells ovate-oblong, the very short tubules biaristate (0.7 mm). *Ovary* densely pubescent; style pubescent below only, 2.5 mm. *Fruit* c. 6 mm \varnothing , blackish at full maturity.

Distr. Malesia: Sumatra (Atjeh, Gajo Lands: Mt Kemiri, Mt Losir and Putjuk Angasan).

Ecol. Apparently not rare in the subalpine zone of the Losir massif, in ridge forest or ridge scrub, 2250–3500 m. *Fl. fr.* Jan.–March.

6. *Gaultheria barbulate* SLEUM. *Reinwardtia* 4 (1957) 170.

Shrub. Branchlets rather flattened at the tips, rather densely clothed with very short, whitish hairs and longish, subpatent, glandular bristle-like hairs, dark brown red when dry. *Leaves* ovate or oblong-ovate, apex shortly rather abruptly acuminate, subacute, the terminal gland small, base contracted into the petiole, subtruncate-rounded or -subcordate, firmly subcoriaceous, very shortly pubescent along the midrib and nerves on both sides, otherwise glabrous above, but initially rather densely clad with short bristle-like hairs all over beneath especially on the midrib and nerves, finally punctate beneath, regularly serrulate, the teeth caducously glandular-ciliate, 0.5 mm high and c. 1 mm spaced, (3–)3.5–6 by (2–) 2.5–3.5 cm, midrib rather deeply sunken above, robust and prominent beneath, nerves 4–5, long curved-ascending pairs, slightly immersed above

as are the veins, \pm raised beneath, veins conspicuous beneath, veinlets less so; petiole setulose, 3–6 mm. *Racemes* solitary, axillary, rather slender, 4–8(–10) cm, many-flowered. Rachis densely clad with very short whitish or yellowish \pm spreading hairs and laxly glandular-setulose (1–1.5 mm), perulae few, early caducous, inflorescence practically eperulate at full anthesis. Pedicels rather slender, 6–8 mm, densely very shortly pubescent and laxly glandular-setulose, with a ring of very dense glandular hairs below the calyx. Bract ovate-lanceolate, acute, pubescent, 2–2.5 mm. Bracteoles inserted at or slightly above the middle of the pedicels, distinctly alternate, at least 1 mm remote from the calyx. *Calyx* 2 mm, lobes ovate, subappressed-pubescent on both sides. *Corolla* urceolate-cylindric, glabrous outside, patently hairy inside, c. 6 by 3.5 mm, very shortly 5-lobed. *Filaments* very laxly hairy below, papillate elsewhere, 2.5 mm; anther-cells broad-oblong, curved, c. 1 mm, tubules very short, each ending with a pair of longish (1 mm) horns. *Ovary* densely clad with whitish erect hairs; style rather densely pubescent, but glabrous on the very top, c. 3 mm.

Distr. *Malesia*: Sumatra (Atjeh, Gajo Lands: Mt Losir, Putjuk Angasan) in ridge forest at 2500 m, one collection. *Fl.* Jan.

7. *Gaultheria kemiriensis* SLEUM. *Reinwardtia* 4 (1957) 171; *Blumea* 11 (1961) 1. — **Fig. 63b.**

Shrub. Branchlets slender, subangular, glabrous. *Leaves* ovate, apex short-acuminate, subacute, the terminal gland thick, but not much protruding, base \pm rounded, coriaceous, glabrous above, rather densely punctulate beneath otherwise glabrous, appressed-serrulate, the teeth thickish glandular, barely 0.2–0.4 mm high, 1.5–3 mm distant from each other, each ending in a fine caducous bristle, 5.5–9.5(–10.5) by 3.5–5.5(–6) cm, midrib slightly impressed above, thick-prominent beneath, nerves 2(–3) pairs, lowest pair from the base, upper ones from the midrib, all high curved-ascending, anastomosing near the top, slightly impressed above, prominent beneath, veins transverse, prominent beneath only, reticulation fine, lax and not very conspicuous; petiole 4–5 mm. *Fascicles* axillary, 3–7-flowered, many-bracteate at the base. Pedicels rather slender, 3–4 mm at anthesis, up to 7 mm in fruit, somewhat above the base with 2 ovate-acuminate bracteoles. *Calyx* 5-partite halfway, 2.5–3 mm, glabrous, lobes acute. *Corolla* shortly urceolate, green, glabrous, c. 4 by 3 mm, shortly 5-lobed. *Stamens* not well developed in the specimens at hand; filaments papillose; anther-cells reduced in size, each biaristate. *Ovary* densely yellowish hairy; style glabrous, 3 mm.

Distr. *Malesia*: Sumatra (Atjeh, Gajo Lands: Mt Losir, Mt Kemiri; Pang-Mog).

Ecol. In scrub forest or summit scrub, 2200–3314 m. *Fl.* March. Vern. *Këtimitiel*.

8. *Gaultheria losirensis* SLEUM. *Reinwardtia* 4 (1957) 171. — **Fig. 63c.**

Shrub. Branchlets subangular, glabrous, dark

red brown when dry. *Leaves* elliptic or broadly ovate-lanceolate, apex acuminate, subacute, the terminal gland thick and blunt, base cuneate into the petiole, coriaceous, glabrous above, laxly to subdensely blackish punctulate beneath, rather sharply serrulate, the teeth ending in caducous bristles, c. 0.5 mm high, 2–3 mm distant from each other, 3.5–4.5 by 1.8–2.5 cm, midrib impressed above, prominent beneath, nerves in 2 pairs, the outer pair from the base of the lamina and excurrent near the edge, the inner and upper one properly from the midrib, curved-ascending to the top, all nerves slightly sunken above, raised beneath, veins \pm transverse, forming with the veinlets a lax net, which is rather inconspicuous on both faces; petiole robust, 3–4 by c. 1.5 mm. *Fascicles* axillary, 6–8-flowered, with numerous basal ovate-acuminate ciliolate bracts and bracteoles. Pedicels stoutish, glabrous, 6–8 mm. *Calyx* deeply 5-lobed, glabrous, c. 2.5 mm, lobes acute, ciliolate towards the apex. *Corolla* and *stamens* not seen. *Ovary* rather densely yellowish-pubescent; style glabrous, c. 3 mm.

Distr. *Malesia*: Sumatra (Atjeh, Gajo Lands: central summit of Mt Losir), 3300–3460 m, one collection. *Fl.* Febr.

9. *Gaultheria abbreviata* J. J. S. in Fedde, Rep. 35 (1934) 292; STEEN. Bull. Jard. Bot. Btzg III, 13 (1934) 204; AIRY SHAW, Kew Bull. 1940 (1941) 311; *ibid.* (1948) 158, f. 1; SLEUM. *Reinwardtia* 4 (1957) 172; *Blumea* 11 (1961) 1. — **Fig. 63a-a'.**

Shrub, 1–3 m. Branchlets terete, rather densely clothed with long (c. 2 mm) \pm spreading bristles. *Leaves* ovate, apex short-acuminate, the terminal gland thickish, but not protracted, base rounded to subcordate, coriaceous, glabrous above, the undersurface initially rather densely set with numerous short \pm caducous bristles, finally punctate by the persistent bases of these bristles, regularly serrulate, teeth thick-glandular, caducously setose-ciliate, 0.3–1 mm high, 1.5–3 mm spaced, 3.4–9.2 by 2.2–5.8 cm, 5-plinerved, main nerves oriented from and from somewhat above the base of the lamina, curved-ascending to the top, all \pm deeply impressed above as is the midrib, or prominent beneath, numerous other nerves or veins \pm transverse, forming a very lax net together with the veins or veinlets, all these slightly impressed above or raised beneath, or sometimes rather obscure; petiole stout, setose, 2–5 mm. *Fascicles* in many upper axils, each 7–12-flowered, provided with numerous ovate-acuminate ciliolate bracts and bracteoles at and near the base. Pedicels glabrous, rather slender, 3–6 mm. *Calyx* glabrous, 3–4 mm, deeply 5-partite, lobes acute. *Corolla* broadly subglobose-urceolate, glabrous, sordid-whitish or greenish with red, 4–5 mm, shortly 5-lobed. *Stamens* nearly 3 mm; filaments ciliolate; anther-cells oblong, each cell with 2 subulate divergent horns distally. *Ovary* pubescent; style glabrous, 2.5 mm. *Fruit* c. 5–6 mm \varnothing , blackish red when ripe, fruit-pedicel 6–8 mm.

Distr. *Malesia*: Sumatra and Central Sumatra (Eastcoast Res.: Mt Pinto; Tapanuli: S. of Sidi

Kalang; Westcoast Res.: Mt Talakmau = Mt Ophir and Mt Singalang).

Ecol. In subalpine forest or summit scrub, on lava boulders or stony ground, 1800–2800 m. *Fl. fr.* Jan.–July.

10. *Gaultheria nummularioides* D. DON, *Prod. Fl. Nepal.* (1825) 150; WALL. *Cat.* (1829) *n.* 1524; G. DON, *Gen. Syst.* 3 (1834) 839; ROYLE, III. (1835) 260, t. 63, f. 2 a–e; CLARKE in Hook. *f. Fl. Br. Ind.* 3 (1882) 457; HALL. *f. Med. Rijksherb. n.* 12 (1912) 28; KOORD. *Exk. Fl. Java* 3 (1912) 10; KOORD.-SCHUM. *Syst. Verz.* 1 (1912) fam. 233, p. 108; J. J. S. in K. & V. *Bijdr.* 13 (1914) 114; RIDL. *J. Fed. Mal. St. Mus.* 8 (1917) 57; KOORD. *Fl. Tjib.* 3 (1918) fam. 233, p. 6; DOCTERS VAN LEEUWEN, *Trop. Natuur* 13 (1924) 99, fig.; SP. MOORE, *J. Bot.* 63 (1925) Suppl. 57; HOCHR. *Candollea* 2 (1925) 496; HEYNE, *Nutt. Pl.* (1927) 1218; DOCTERS VAN LEEUWEN, *Pangrango* (1933) 202, f. 45; STEEN. *Bull. Jard. Bot. Btzg III*, 13 (1934) 205; J. J. S. in *Merr. Contr. Arn. Arb.* 8 (1934) 127; KANJILAL, DAS, *c.s.* *Fl. Assam* 3 (1939) 148; AIRY SHAW, *Kew Bull.* 1940 (1941) 314; AMSH. in *Back. Bekn. Fl. Java* (em. ed.) 7 (1948) fam. 162, p. 5; SLEUM. *Reinwardtia* 4 (1957) 172; Blumea 11 (1961) 2. — *G. repens* BL. *Bijdr.* (1826) 857, *non* RAFIN. 1828; G. DON, *Gen. Syst.* 3 (1834) 839; DC. *Prod.* 7 (1839) 593; HASSK. *Cat. Hort. Bog.* (1844) 160; ZOLL. *Nat. Geneesk. Arch. N.I.* 2 (1845) 9; MIQ. *Ann. Mus. Bot. Lugd.-Bat.* 1 (1863) 41; BL. *Fl. Jav. Pl. inéd.* (1863–83) t. 15. — *Pernettya repens* (BL.) ZOLL. & MOR. *Syst. Verz.* (1846) 42; ZOLL. *Syst. Verz.* 2 (1854) 138; MIQ. *Fl. Ind. Bat.* 2 (1859) 1054. — *G. trichophylla* (*non* ROYLE in DC.) HASSK. *Retzia* ed. 1 (1855) 108; *Nat. Tijds. N.I.* 10 (1856) 108; *Retzia* ed. nov. 1 (1858) 148; MIQ. *Fl. Ind. Bat.* 2 (1859) 1056; KOORD. *Nat. Tijds. N.I.* 60 (1901) 265, — *Brossaea nummularioides* (D. DON) O. KTZE, *Rev. Gen. P.* 2 (1891) 388, *incl. a normalis et β glauca* O. KTZE. — **Fig. 62d.**

Shrublet, prostrate or creeping, forming mats, 5–10(–20) cm long. Branchlets elongate, ramose, rooting at the nodes, terete, densely ± longish brownish setulose, reddish when fresh. *Leaves* alternate (subdistichous), ovate, sometimes oblong, ovate or nearly rounded, apex obtusely acuminate, base rounded or subcordate, ± coriaceous, dark green above, much paler beneath, glabrous above, ± laxly setulose beneath, serrulate, each tooth ending in a longish fine subsistent bristle, sometimes subentire, margin slightly recurved, (4–) 6–13 by (3–) 5–9 mm, midrib a little impressed above, prominent beneath, nerves 2(–4) pairs from and somewhat from above the base, inarched and high ascendent towards the edge, subinconspicuous above, raised beneath, transverse veins visible beneath only; petiole setulose, 1–2.5 mm. *Flowers* solitary in most, but not all upper axils. Pedicels 1–2 mm, provided with 6–7 small triangular-ovate acute ciliolate bracts and bracteoles at and somewhat above the base. *Calyx* c. 3 mm, deeply 5-partite, whitish green to reddish, lobes ± triangular, acute. *Corolla* ovoid-urceolate,

white or pink, 5–7 by 2.5–5 mm, widest in the lower third, shortly 5-lobed. *Filaments* linear, slightly hairy, 2 mm; anther-cells oblong, the very short tubules shortly biaristate. *Ovary* glabrous; style c. 2.5 mm. *Fruit* blue-blackish or blackish purplish when ripe, succulent, 8–9 mm ø, ± completely including the depressed-globose capsule, which is c. 5 mm ø. *Seeds* subglobose, apiculate, very small.

Distr. Himalayas to SE. Tibet and W. Szechuan, Assam and Upper Burma, in *Malesia*: Sumatra, Java and Bali.

Ecol. In the upper mountain zone, terrestrial on open sunny, rocky places and volcanic debris, on steep crater slopes, not rarely covering the rocks, rarely in ravines within the upper limit of the forest or in ericoid shrub vegetation, occasionally epiphytically there in the moss at the base of the trees, 1300–3500 m, mostly above 2000 m. Rather frequent in Java. Said to be a pioneer plant, holding the loose soil together. *Fl. fr.* Jan.–Dec.

Vern. *Girinting kawak*, S, *grinting dieng*, J, *krakap gunung*, M (Korinchi).

Uses. The fruits are sweet, but somewhat acid to the taste, and edible. The aromatic leaves contain wintergreen-oil and are occasionally used internally as a medicine.

Pollination. After DOCTERS VAN LEEUWEN “the stigma projects slightly beyond the anthers. The latter are still white in the old buds, but the pores are already open while the stigma is still dry. In that stage the flowers are therefore male. As soon as the flowers open, the anthers shrivel, and the stigma becomes receptive. After one day the corolla falls off, and the anthers slip across the stigma. In consequence of the position of the flowers, especially when they are hidden in the moss, visiting by insects is rendered very difficult; no visitor on the flowers has been noticed. Fruits, however, are regularly set by means of autogamy”.

Dispersal. The fruits are probably eaten by birds and rodents.

11. *Gaultheria mundula* F. v. M. *Trans. R. Soc. Vict. n. s.* 1, 2 (1889) 21; DIELS, *Bot. Jahrb.* 62 (1929) 487; STEEN. *Bull. Jard. Bot. Btzg III*, 13 (1934) 205; SLEUM. *Bot. Jahrb.* 72 (1942) 214; *Reinwardtia* 4 (1957) 173; HOOGL. *Blumea Suppl.* 4 (1958) 232; SLEUM. *Blumea* 11 (1961) 2; *ibid.* 12 (1963) 115; *ibid.* 12 (1964) 342. — *Diplycosia mundula* (F. v. M.) SCHLTR, *Bot. Jahrb.* 55 (1918) 162; LANE-POOLE, *For. Res. Papua* (1925) 130; WHITE & FRANCIS, *Proc. R. Soc. Queensl.* 39 (1928) 68. — **Fig. 62 b–b', 64.**

KEY TO THE VARIETIES

1. Leaves lanceolate- to elliptic-ovate, cuneate to rounded at the base. Fruit calyx ± red-purple at maturity 1. *var. mundula*
1. Leaves ovate, ± distinctly cordate at the base. Fruit calyx white at maturity.
 2. Leaves not or very slightly setose at the midrib beneath only 2. *var. tanythrix*
 2. Leaves laxly setose all over the undersurface. 3. *var. setifolia*

var. mundula. — Fig. 64.

Compact, stiff, sometimes rather flat-topped shrub, (0.1–)0.3–0.6(–1.2) m, usually terrestrial, rarely epiphytic. Branchlets terete, rather densely clothed with scattered \pm appressed setular brownish hairs, moreover minutely pubescent at the youngest red parts. *Leaves* dense, lanceolate- to elliptic-ovate, apex short-acuminate, bluntish, base broad-attenuate to rounded, rarely part of the leaves in the same specimen subcordate, firmly subcoriaceous, glabrous, glossy on both faces, regularly crenulate-serrulate, each tooth obtusely glandular, ending in an early caducous bristle-like hair, 0.8–2 by 0.5–1.3 cm, midrib subimpressed above, raised beneath, nerves 2–3 pairs, long ascending, often reddish, anastomosing with the rather dense reticulation, which is conspicuously raised beneath; petiole red, *c.* 1 mm. *Flowers* solitary in the axils of all or nearly all upper decrescent leaves, thus in a leafy raceme. Pedicels stoutish, red, glabrous or finely pubescent, mostly with some stalked glands, 2–3 mm, with several

\pm blunt bracts and bracteoles inserted at or slightly above the base. *Calyx* *c.* 2.5 mm, deeply 5-cleft, glabrous, lobes triangular, subacute, red when fresh. *Corolla* cylindric-urceolate, *c.* 4.5 by 2–3 mm, somewhat fleshy, white or pink when fresh, glabrous at both sides, shortly 5-lobed. *Stamens* $\frac{1}{2}$ – $\frac{1}{3}$ as long as the corolla; filaments papillate; anthers ovate, 0.6 mm, obliquely truncate, mucicous, or each cell ending with 2 very short horns. *Ovary* glabrous; style 1.5–2 mm. *Fruit* 6–8(–9) mm σ , the calyx lobes first white, later pink to red-purple, or reddish from the beginning.

Distr. Malesia: East New Guinea (Saruwaged Mts, Kubor Ra., Hagen Ra., Bismarck Mts, Mt Michael, Mt Piora, Wharton Ra., Owen Stanley Ra. and Maneau Ra.).

Ecol. In upper montane or subalpine forest borders, or in alpine open grassland, on exposed ridges or near summits, on stony or peaty soil, mostly scattered, rarely growing socially, locally common, 2000–3600(–c.4050) m. *Fl. fr.* Jan.–Dec.



Fig. 64. *Gaultheria mundula* F. v. M. *var. mundula*. Mt Wilhelm, 3500 m, E. New Guinea (SLEUMER, 1961).

Vern. *Mukefifa*, Dunantina, *hineh ku hais*, Asaro: Kefamo, *muasopu*, Chimbu: Masul, *kiberu*, Hagen: Togoba, *nehmengeh*, Mairi: Mondo, *wamengare*, *wamangali*, Enga: Poio, *wambwampso*, Mendi.

var. tanythrix (SLEUM.) SLEUM. *Blumea* 11 (1961) 2. — *G. tanythrix* SLEUM. Bot. Jahrb. 72 (1942) 214; Reinwardtia 4 (1957) 173.

Shrub, 0.3–0.5 m, stiff, much branched; branchlets terete, red, densely clothed with \pm spreading rufous bristle-like hairs. *Leaves* dense, ovate, apex subobtuse, base \pm distinctly cordate, in other respects like *var. mundula*, but with scattered bristles underneath on the midrib and on the petiole. *Fruit* subglobose, apparently permanently white, c. 5 mm ϕ , fruit-pedicle 1–2 mm.

Distr. *Malesia*: New Guinea (Orange Mts: Mt Wilhelm, twice found at 3750–3800 m; Eastern Highlands: Mt Kerigomna and Mt Wilhelm at 3000 and 3700 m), in edges of subalpine forest and on open rocky mountain slope. *Fl.* March–Sept.

var. setifolia (SLEUM.) SLEUM. *Blumea* 11 (1961) 2. — *G. tanythrix* SLEUM. *var. setifolia* SLEUM. Bot. Jahrb. 72 (1942) 215; Reinwardtia 4 (1957) 173.

Erect shrub, 1–2 m, densely clothed with rufous, \pm spreading bristles. *Leaves* similar to those of *var. tanythrix*, but laxly setulose all over beneath. Pedicels laxly setulose, 1.5 mm, provided with several minute bracts and bracteoles at the base. *Calyx* 3.5 mm, deeply 5-partite, glabrous, lobes including $\frac{2}{3}$ of the corolla.

Distr. *Malesia*: New Guinea (Oranje Mts: Lake Habbema; Star Mts: Sirius plateau) twice collected, 3000–3225 m, in alpine grassland shrubberies and in forest marginal communities. *Fl.* Apr., Aug.

12. *Gaultheria celebica* J. J. S. Bull. Jard. Bot. Btzg III, 1 (1920) 404, t. 52; STEEN. *ibid.* III, 13 (1934) 205; SLEUM. Reinwardtia 4 (1957) 173.

var. celebica.

Shrub. Branchlets terete, finely pubescent and long setose-hirsute. *Leaves* ovate, apex acuminate, subacute, glandular-apiculate, base cordate, subsessile, coriaceous, shining and glabrous above, dull and \pm densely setulose or punctate all over beneath, regularly serrulate, teeth strigose-setulose initially, (3.5–)4–6.5(–7.6) by 2–3.7(–4) cm, midrib flat above, strongly prominent beneath, nerves c. 3 pairs from and somewhat from above the base, high curved-ascending to nearly the top, prominent beneath, other nerves or veins from the midrib and \pm transverse, forming a lax reticulation with the veins and veinlets, all these equally subimpressed above, less distinct beneath; petiole 1–2 mm. *Inflorescence* terminal, paniculate, 6–10 cm, formed by 2–7 racemes, each raceme in the axil of a leaf which is very reduced in size, spreading, rather laxly many-flowered, 3–5 cm. Rachis subangular, 1–1.3 mm ϕ , pubescent and laxly setulose. Pedicels stoutish, densely pubescent

and more laxly glandular-setulose, 4–5 mm. Bract broadly ovate-triangular, acuminate, ciliolate, \pm setulose. Bracteoles opposite, semi-orbulate-triangular, concave, ciliolate, inserted immediately below the calyx. *Calyx* deeply 5-partite, glabrous, c. 4 mm, lobes ovate, acute, ciliolate. *Corolla* said to be red when fresh, subglobose-urceolate, glabrous, 6–7 by c. 5 mm. *Stamens* c. $\frac{1}{3}$ as long as the corolla; filaments papillose; anthers ovate, each cell obliquely truncate and shortly biaristate apically. *Ovary* yellowish villous; style glabrous, c. 4 mm. *Fruit* c. 6 mm ϕ ; colour unknown.

Distr. *Malesia*: Central Celebes (Quarles Mts: top of Mt Sinadji), one collection. *Fl.* Nov.

var. petiolata J. J. S. in Fedde, Rep. 30 (1932) 171; Bot. Jahrb. 68 (1937) 204; SLEUM. Reinwardtia 4 (1957) 174.

Shrub 1–3 m; indumentum as in *var. celebica*. *Leaves* distinctly petioled (5–10 mm), \pm rounded at the base. *Corolla* white or pink. *Fruit* blackish blue.

Distr. *Malesia*: Central and SW. Celebes (Quarles and Latimodjong Mts; Peak of Bonthain).

Ecol. In low forest or ridge forest, in open grass-fern and shrub vegetation, locally common, 1000–3000 m. *Fl.* May–July.

13. *Gaultheria berberidifolia* SLEUM. *Blumea* 12 (1963) 115. — Fig. 65.

Shrub with pendent or almost prostrate, 0.5–0.8 m long, densely leaved branches, which are few-branched distally and clothed with numerous longish spreading, gland-bearing bristles except the tips and the floral region, where a tomentum of short fine crisped hairs is found exclusively. *Leaves* ovate, apex \pm acuminate, base cordate, subsessile, coriaceous, dull, mature ones dark green, young ones glaucescent, very shortly hairy at the petiole and midrib, otherwise glabrous above, laxly set with glandular bristles or finally blackish red points below, (2–)2.5–3.5 by (1.5–)2–3 cm, narrowly serrate, each tooth ending in a rather persistent long glandular bristle, midrib and nerves slightly or not raised above, more so beneath, reticulation dense, conspicuous on both faces; petiole c. 1 mm. *Panicles* terminal, erect, \pm condensed, many-flowered, formed by the racemes from the axils of several uppermost, very reduced leaves, and additional racemes from the axils of 1–3 successive lower, almost normal leaves. Rachises (2–5 cm) and pedicels (2–3 mm) covered with a fine greyish pubescence; no bristles. Bracteoles inserted immediately below the calyx, ovate-acute, ciliate, 2 mm. *Calyx* glabrous, lobes narrow-ovate, ciliate distally, 2 mm. *Corolla* urceolate, white, glabrous, c. 4.5 by 2 mm, lobes 1 mm. *Filaments* papillose, 1.5 mm; anthers ovate-oblong, 1 mm, each cell biaristate. *Ovary* densely hairy; style glabrous, 2.5 mm. *Fruit* c. 4 mm ϕ , blackish bluish at full maturity.

Distr. *Malesia*: New Guinea (Arfak Mts: Mt Sensenemés and Mt Gwamongga).

Ecol. Collected in summit areas in open, heath-like ridge vegetation, 2500–2600 m. *Fl.* Jr. Jan.



Fig. 65. *Gaultheria berberidifolia* SLEUM. Mt Gwamongga, 2500 m, Arfak Mts, NW. New Guinea (SLEUMER, 1962).

Note. Recently introduced into several botanic gardens.

14. *Gaultheria gracilescens* SLEUM. Reinwardtia 4 (1957) 174.

Shrub. Branchlets rather densely very shortly pubescent and patent-setulose, terete, brown-red when dry. *Leaves* ovate or oblong-ovate, apex shortly subacutely acuminate, the terminal gland small, base subcordate, subcoriaceous, glabrous above, the puberulous midrib excepted, rather densely short-setulose, finally punctate beneath, regularly serrulate, the teeth close, c. 0.5 mm, each ending in a fine caducous bristle, (2-)2.5-4.5 (-5) by (1.5-)1.8-2.5(-2.8) cm, midrib and nerves very slightly impressed above or rather obscure, distinct beneath, midrib thick-prominent beneath,

nerves 2-3 pairs, high curved-ascending and anastomosing, the lowest 1-2 pairs from, the upper ones from above the base of the lamina, other nerves or veins \pm transverse from the midrib, forming with the veinlets a lax reticulation which is a little raised beneath; petiole pubescent, laxly setulose, rather flattened, 1.5-2 by 1-1.5 mm. *Panicles* terminal, formed by racemes which come from the axils of the upper, rather abruptly decrescent leaves, sometimes with additional racemes from the axils from lower and normal leaves, all racemes \pm spreading, rather dense-flowered, slender, (4-)5-12 cm. Rachis 0.5-0.7 mm σ , densely shortly yellowish pubescent and laxly setulose especially in its lower part. Pedicels exclusively densely yellowish pubescent, c. 3 mm. Bract ovate, subacuminate, pubescent, 2-3 mm.

Bracteoles subovate-semiorbiculate, pubescent, c. 1.5 mm, inserted immediately below the calyx. *Calyx* rather deeply 5-partite, 2.5 mm, short-pubescent dorsally, lobes ovate-acute, densely ciliate. *Corolla* subcylindric-urceolate, 4.5–5 by c. 2.5 mm, somewhat contracted at the mouth, glabrous. *Stamens* c. 2.5 mm; filaments papillose; anthers ovate-oblong, the very short tubules biaristate (c. 0.7 mm). *Ovary* whitish yellowish hirsute; style glabrous, 3 mm.

Distr. *Malesia*: West New Guinea (Wissel Lakes region), twice found, 1750 m. *Fl. Jan.*, May–June.

15. *Gaultheria punctata* BL. Bijdr. (1826) 856, non HOOK. & ARN. 1834; G. DON, Gen. Syst. 3 (1834) 840; DC. Prod. 7 (1839) 593; HASSK. Cat. Hort. Bog. (1844) 160; ZOLL. Nat. Geneesk. Arch. N. I. 2 (1845) 9; Syst. Verz. 2 (1854) 138; MIQ. Fl. Ind. Bat. 2 (1859) 1055; Ann. Mus. Bot. Lugd.-Bat. 1 (1863) 41; BL. Fl. Jav. Pl. inéd. (1863–83) t. 13; BOERL. in Veth, Midden Sumatra (1884) 22; GRESH. Schets. (1894) 33, fig.; KOORD. Teysmannia 10 (1899) 454; SP. MOORE, J. Bot. 63 (1925) Suppl. 57; SLEUM. Reinwardtia 4 (1957) 175, non KURZ, J. As. Soc. Beng. 46, ii (1877) 215 & For. Fl. Burma 2 (1877) 92. — *G. fragrantissima* (non WALL.) MOR. Syst. Verz. (1846) 42; KOORD.-SCHUM. Syst. Verz. 1 (1912) fam. 233, p. 107; KOORD. Exk. Fl. Java 3 (1912) 10; RIDL. J. Fed. Mal. St. Mus. 8 (1917) 57; KOORD. Fl. Tjib. 3 (1918) fam. 233, p. 5; FREY-WYSSLING, Trop. Natuur 22 (1933) 7, f. 10; DE VOOGD, *ibid.* 23 (1934) 82, 83, f. 1 (phot.); STEEN. Bull. Jard. Bot. Btzg III, 13 (1934) 205; MERR. Not. Nat. Ac. Nat. Sc. Philad. 47 (1940) 2. — *G. fragrantissima* var. *punctata* (BL.) J. J. S. in K. & V. Bijdr. 13 (1914) 121; HOCHR. Candollea 2 (1925) 495; HEYNE, Nutt. Pl. (1927) 1217; DOCTERS VAN LEEUWEN, Pangrango (1933) 198, f. 42; J. J. S. in MERR. Contr. Arn. Arb. 8 (1934) 127; AMSH. in Back. Bekn. Fl. Java (em. ed.) 7 (1948) fam. 162, p. 5. — *Brossaea fragrantissima* (non WALL.) O. KTZE, Rev. Gen. Pl. 2 (1891) 388. — Fig. 66.

Treelet or mostly large shrub, (0.25–)1–2(–5) m, erect or ± decumbent-scandent. Branchlets stout, glabrous or very laxly glandular-punctate, generally ± sharply triquetrous, *i.e.* winged by the decurrent petioles, less so in specimens which have apparently grown in shady situations. *Leaves* ± erect, elliptic-oblong, sometimes more elliptic-lanceolate or elliptic, apex gradually acuminate, obtuse by a callous terminal gland, base cuneate, often ± decurrent into the petiole, subcoriaceous to coriaceous, dark green and glossy above, greenish whitish and ± dull beneath, aromatic, glabrous above, ± minutely rather densely glandular-punctate beneath, regularly and coarsely glandular-serrate, the teeth rather blunt, c. 1 mm high and 2–3(–4) mm spaced, (2–)4.5–8.5 (–10) by 0.8–3(–4) cm, midrib rather flat or somewhat sunken above, reddish and prominent beneath, nerves (3–)4–6(–7) pairs, high ascendent and joined near the edge, slightly impressed above in fresh, ± raised in dry specimens, more distinct-

ly prominent beneath, veins ± transverse, visible on both faces, reticulation rather obscure; petiole flattened, grooved above, red, 1.5–8 mm. *Panicles* composed of numerous ± erect simple racemes from the axils of several decrescent upper leaves, (5–)7–10(–12.5) cm long, 3–7 cm wide at the base. Rachis greenish when fresh, manifestly trigonous, glabrous or nearly so, laxly glandular-punctate. Pedicels white or pink, very laxly minutely pubescent as is the ovate-acuminate subtending bract, secund, (2–)4–7(–9) mm. Bracteoles inserted immediately below the calyx, opposite, ovate-acute, pubescent inside, ciliate, 1.5 mm. *Calyx* deeply 5-lobed, glabrous or nearly so, 3–3.5 mm, tube white, lobes ovate-acute, reddish, pubescent inside, ciliate. *Corolla* subovate-urceolate, somewhat 5-angular, with 5 recurved broadly triangular lobes, white, or whitish pinkish, or tipped pale carmine, 5–7 by 4–5 mm, glabrous. *Stamens* c. 3 mm; filaments white at the base, purplish at the top, papillose, ciliate, c. 2 mm; anther-cells orange, ovate-oblong, the tubules very short, rather long biaristate. *Ovary* light green, densely coarse-pubescent; style glabrous except the very base, c. 2.5 mm. *Fruit* 8–10 mm ø, dull red to dark red or blackish purplish. *Seeds* obliquely obovoid-triangular, c. 0.5 mm.

Distr. *Malesia*: Sumatra, Java (especially W. Java), Lesser Sunda Is. (Bali).

Ecol. In the upper part of the mountains, rarely in forests, mostly in open country, in mountain shrub, on rocky or stony ground or volcanic soil, on stony mud-flow, not rarely in the neighbourhood of active craters and exposed to volcanic gasses. Locally common. In Sumatra from 1000–3700 m, in Java from 1400–3100 m. *Fl. Jan.*–Dec.

Pollination. DOCTERS VAN LEEUWEN mentioned that the anthers are already open as soon as the flowers begin to expand, and the pollen may easily drop on the stigma, which as a matter of fact is very soon covered with it. In fact all flowers produce fruits. Practically no pollinators have been observed.

Vern. *Gandarasa*, *tjantigi*, *t. sènugit*, *t. wangi*, *S. gandapura*, *gondapura*, *gondapuro*, *g. maiso*, *purwu* (*purwa*) *djambu*, *J. sarik mëndjari*, *s. mudjari* (Korintji), *talimu jari* (Merapi, West-coast), *sirih gunung* (Padang Highlands), M.

Uses. Both leaves and flowers have a characteristic odour, especially when crushed; they contain c. 1% of a volatile substance, “winter-green-oil”, which mainly consists of methyl-salicylate, bound as a glucoside, a strong antiseptic. The oil is distilled in Java from the wilted leaves, and is used both internally and externally for treatment of rheumatism, as hair oil and to perfume sarongs. The leaves are sometimes chewed together with “*sirih*”. The fruits are sweet, with a bitter aftertaste, edible, but apparently eaten by animals (birds, rodents, hens) only.

Note. *G. punctata* has been regarded previously as belonging to *G. fragrantissima* WALL. or being a mere variety of it. *G. fragrantissima*, however, has exclusively short, ± recurved racemes in the axil of a few spaced upper leaves, a densely hairy



Fig. 66. *Gaultheria punctata* BL. a. Twig with inflorescence, $\times \frac{2}{3}$, b. flower bud, $\times 4$, c. flower, $\times 4$, d. ovary and style, $\times 5$, e. stamen, front view, $\times 9$, f. thecae, front view, $\times 15$, g. ditto from the back, $\times 15$, h. ditto from the side, $\times 15$, i. infructescence, $\times \frac{2}{3}$, j. seeds, $\times 10$ (a-i after BLUME, Fl. Javae, pl. inéd. t. 13, j FREY-WYSSLING 28).

rachis, much smaller flowers and is restricted to the East Himalayas and Khasia Hills.

16. *Gaultheria arfakana* SLEUM. Bot. Jahrb. 72 (1942) 215; Reinwardtia 4 (1957) 176; Blumea 12 (1963) 115. — *G. leucocarpa* BL. var. *papuana* BECC. Malesia 1 (1878) 213.

Slender shrub, (0.5-)1-2(-3) m. Branchlets

terete below, somewhat obtusely angular towards the tips, glabrous but with some scattered sessile glands. Leaves ovate, apex gradually acuminate, subacute, the terminal gland distinct, base manifestly cordate, subcoriaceous to coriaceous, dark green above, pale beneath, glabrous and a little shining on both faces, scantily punctate beneath, obtusely serrate, the teeth 0.5-0.75 mm high, 2-4

mm spaced, ending in very early caducous short bristles, (4–)5–8 by 2.5–4.5(–5.5) cm, midrib and nerves yellowish in fresh specimens, midrib prominent beneath only, nerves *c.* 5 pairs, the lower 2 from the base, all curved-ascending and anastomosing, somewhat raised on both faces, reticulation coarse, slightly prominent on both sides; petiole 3–5 mm. *Racemes* from the upper 3–4 axils of very reduced leaves, forming a terminal, few-to many-branched panicle 6–12(–15) cm long, other shorter racemes in the axils of subsequent lower normal 2–3 leaves also present, practically eperulate at anthesis; rachises slender, rather densely clothed with short greyish, \pm crisped hairs, (3–)5–10 cm, few-to many-flowered. Pedicels rather slender, 4–6 mm. Bract ovate-subulate, 3 mm. Bracteoles inserted immediately below the calyx at anthesis, a little distant from the calyx in fruit, ovate-acuminate, ciliate, 1.5 mm. *Calyx* greenish, deeply 5-partite, lobes deltoid, subacute, ciliate, 2 mm. *Corolla* urceolate-cylindric, 5.5 by 2.5 mm, pure white, or more rarely cream with pink spots, glabrous, shortly (1 mm) 5-lobed. *Filaments* papillose, *c.* 2 mm; anther-cells ovate-elliptic, nearly 2 mm including the tubules, the latter short, each ending in 2 hornlets or bristles (1 mm). *Ovary* densely pubescent; style glabrous, *c.* 3 mm. *Fruit* pubescent on top, 5–6 mm ϕ , finally purplish blackish.

Distr. *Malesia*: NW. New Guinea (Vogelkop Peninsula; Nettoti and Arfak Mts).

Ecol. In open ridge scrub, on landslide with fern regrowth, edge of (mossy) forest, steep rocky slope, at 1900–2000 m. *Fl. fr.* July, Oct.–Jan.

Note. The whole plant has a fine smell of wintergreen-oil.

17. *Gaultheria malayana* AIRY SHAW, Kew Bull. 1940 (1941) 304; HENDERS. Mal. Nat. J. 6 (1950) 263, f. 246, A, B; SLEUM. Reinwardtia 4 (1957) 176. — *G. fragrantissima* (non WALL.) K. & G. J. As. Soc. Beng. 74, ii (1905) 69; RIDL. J. Fed. Mal. St. Mus. 6 (1915) 49; Fl. Mal. Pen. 2 (1923) 212; HENDERS. J. Mal. Br. R. As. Soc. 5 (1927) 256. — Fig. 63d–d'.

Shrub or treelet. Branchlets terete or slightly obtusangular, glabrous or nearly so. *Leaves* aromatic, elliptic, broad elliptic-obovate or suborbicular-obovate, rarely oblong-elliptic, apex obtuse, the terminal gland rather obscure, forming a short apiculus with a \pm apical teeth, base broadly attenuate to rounded, thick-coriaceous, rigid, dull, dark green above, whitish green beneath with reddish midrib, glabrous above, laxly to subdensely blackish punctulate beneath, somewhat irregularly and \pm obtusely serrate-crenate, the teeth *c.* 0.5 mm high, 1–3 mm spaced, 3.5–6.5 by 1.5–4.7 cm, midrib slightly impressed above, much raised beneath, nerves 5(–7) pairs, rather steeply curved-ascending, the lowest 1–2 pairs from or a little from above the base, all slightly impressed above, prominent beneath, as is the distinct but rather lax reticulation; petiole subterete, slightly grooved above, glabrous, 5–10 mm. *Racemes* from the uppermost axils forming a

terminal nearly aphyllous panicle, those from the lower axils of normal leaves solitary, the single racemes 10–16-flowered, mostly suberect, 2.5–5.5 (–7) cm, with several small \pm caducous perulae, pinkish red at rachis, pedicels and calyces. Rachis slender, minutely pubescent. Pedicels slender, 4–5 mm, puberulous. Bract ovate, ciliolate. Bracteoles inserted immediately below the calyx, broadly ovate, ciliate, 1 mm. *Calyx* *c.* 3 mm, glabrous outside, short-pubescent inside, lobes ovate, acute, ciliolate, 2 mm. *Corolla* ovoid-urceolate, *c.* 4 by 3 mm, white or pink, glabrous, shortly 5-lobed. *Stamens* 10; filaments densely papillose, long-ciliate; anther-cells oblong-ovate, 1 mm; tubules nearly 1 mm, biaristate. *Ovary* pubescent; style puberulous at the base, glabrescent towards the apex, *c.* 2 mm. *Fruit* 4–5 mm ϕ , purple-blackish, fruit-pedicel 6–7 mm.

Distr. *Malesia*: Malay Peninsula (Perak, Main Range between Mt Kerbau and Mt Batu Putih; not rare in the Cameron Highlands).

Ecol. On forest edges or ridges of summits, on peaty soils locally abundant, 1370–2030 m. *Fl.* Nov.–June.

Note. The leaves have a strong smell of wintergreen-oil when crushed.

18. *Gaultheria intermedia* J. J. S. Med. Rijksherb. n. 30 (1916) 1, f. 1 & pl.; STEEN. Bull. Jard. Bot. Btgg III, 13 (1934) 205; SLEUM. Reinwardtia 4 (1957) 176.

Shrub. Branchlets subterete, glabrous. *Leaves* oblong-ovate, apex gradually acuminate, obtusely glandular-apiculate, base rounded, very shortly contracted into the petiole, subcoriaceous, glabrous, somewhat shining above, dull beneath, densely crenate-serrate, 5–9.7 by (1.7–)2–3.7 cm, midrib slightly sunken above, prominent beneath, nerves 3–4 pairs curved-ascending, anastomosing, higher inserted ones shorter and more straight to the edge, all slightly but distinctly raised on both faces, reticulation rather dense and prominent; petiole glabrous, 3–8 mm. *Panicles* terminal, laxly divaricate, eperulate at anthesis, consisting of simple or rarely racemously arranged racemes, some of these in the axils of the upper \pm normal leaves, most of them from upper practically aphyllous axils, 4–10 cm, *c.* 20-flowered. Rachis slender, subangular, densely short-pubescent. Pedicels 4–6 mm, short-pubescent. Bract ovate-triangular, ciliate, puberulous. Bracteoles inserted immediately below the calyx, broad-ovate, ciliate, puberulous inside, 2 mm. *Calyx* *c.* 2.5 mm, deeply 5-laciniate, lobes acute, ciliolate, puberulous inside. *Corolla* urceolate, somewhat 5-angular, glabrous, *c.* 5 by 2.5 mm, probably white. *Stamens* *c.* 2.5 mm; filaments papillose; anther-cells oblong; tubules short, manifestly biaristate. *Ovary* sericeous; style glabrous, *c.* 3 mm.

Distr. *Malesia*: Java (Merapi) or Sumatra (Lower Tapanuli), once found by JUNGHUHN; his specimens are not adequately labelled.

Note. J. J. SMITH discussed the possibility that *G. intermedia* might be a hybrid between *G. punctata* and *G. leucocarpa*, having the terminal

panicles of the first, the epunctate leaves of the latter. As *G. intermedia* has not been recollected, and actual hybrids between the above-mentioned supposed parents (which in many places occur together in Java and Sumatra) have not yet been observed, the true nature of *G. intermedia* remains uncertain.

19. *Gaultheria hirta* RIDL. J. Fed. Mal. St. Mus. 6 (1915) 49; Fl. Mal. Pen. 2 (1923) 213; STEEN. Bull. Jard. Bot. Btzig III, 13 (1934) 205; SLEUM. Reinwardtia 4 (1957) 176.

Scandent shrub. Branchlets slender, flexuous, densely covered with fine, spreading, whitish hairs and larger, red, bristle-like, gland-clubbed hairs. *Leaves* ovate, apex subcaudate-acuminate, the terminal gland small, base rounded to subcordate, subcoriaceous, initially laxly clothed with short eglandular and longer (1–2 mm), slender, gland-tipped, reddish hairs above, more densely so beneath, glabrescent with age, but remaining pubescent on midrib and nerves beneath, obsoletely serrate, the teeth indicated by long (c. 2 mm), slender, bristle-like and gland-tipped hairs which are persistent for a rather long time, 5–7(–11) by (1.5–)2–5(–7) cm, midrib and nerves slightly prominent above, more distinctly so beneath, nerves 4(–5) pairs, ascending, anastomosing, the lowest 1–2 pair(s) from the base of the lamina, veins \pm transverse, slightly raised on both faces, forming a lax reticulation with the veinlets; petiole 3–5(–7) mm, glandular-setulose. *Racemes* axillary, practically eperulate at anthesis, lax-flowered, the supporting leaves sometimes early caducous so that a very lax terminal panicle is formed. Rachis slender, 2.5–5.6(–8) cm, as the pedicels with similar indument as the branchlets. Pedicels stoutish, (4–)6–8 mm. Bract ovate-acute, 1.5 mm. Bracteoles inserted immediately below the calyx, ovate-apiculate, hairy, 1.5 mm. *Calyx* 2.5 mm, densely non-glandular hairy outside especially at the tips as are the bracteoles, lobes ovate, c. 2 mm. *Corolla* subcylindric-urceolate, 5–6 by 3.5 mm, shortly 5-lobed, said to be light red, subdensely eglandular-pubescent outside especially in the upper half, glabrous inside. *Filaments* glabrous, papillose, 2 mm; anther-cells oblong-ovate, granular, each biaristate apically. *Ovary* densely hairy; style glabrous, 3 mm.

Distr. Malesia: Malay Peninsula (Perak: top of Mt Kerbau), twice found, 1370–1525 m. Fl. March, May.

Note. *G. hirta* approaches *G. crenulata* KURZ (Yunnan) by the same type of the gland-tipped pubescence both on the leaves and the inflorescence; in *G. crenulata*, however, the pedicels and calyces are glabrous, and the leaves are distinctly crenulate.

20. *Gaultheria viridiflora* SLEUM. Reinwardtia 4 (1957) 176; Blumca 11 (1961) 3.

Shrub, c. 1 m. Branchlets subterete, glabrous, dark brown red when dry. *Leaves* ovate-oblong or -lanceolate, apex gradually acuminate, the terminal gland rather small, base cuneate, sub-

coriaceous, olivaceous or brown above when dry, paler beneath, dull, glabrous, very laxly or not punctate beneath, \pm regularly serrate, the teeth glandular, obtuse, c. 1 mm high and 2–3 mm spaced, 4–5.5(–6) by (1.7–)2–3 cm, midrib flat or slightly sunken above, reddish when dry, prominent beneath, nerves c. 4 pairs high curved-ascending and anastomosing, rather inconspicuous above, raised beneath, veins and veinlets forming a rather dense reticulation which is distinctly prominent beneath only; petiole thick, glabrous, 2–3(–4) by 1 mm. *Racemes* simple, mostly axillary, sometimes the uppermost pseudoterminal, slender, \pm erect, 8–12-flowered, practically eperulate at anthesis. Rachis c. 0.5 mm ϕ , rather densely clothed with short spreading hairs as are the pedicels, these 3–5 mm long. Bract lanceolate, ciliate, 2–3 mm. Bracteoles inserted immediately below the calyx, ovate, ciliate, 2 mm. *Calyx* reddish, 2.5 mm, glabrous, lobes ovate ciliate. *Corolla* subcampanulate, green-white with reddish base, 3.5–4 by 3(–4) mm, 5-partite nearly halfway, glabrous. *Filaments* papillose, 1 mm; anthers ovate-oblong, c. 1.5 mm, the very short tubules biaristate. *Ovary* yellowish hairy; style glabrous, 2 mm. *Fruit* apparently blackish purple when ripe, c. 6 mm ϕ .

Distr. Malesia: SW. Central Celebes (Latimodjong Mts).

Ecol. In open arid country, on sandy ridges, locally not rare, 2700–3300 m. Fl. June.

21. *Gaultheria pullei* J. J. S. Med. Rijksherb. n. 25 (1915) 7; Nova Guinea 12 (1917) 513; *ibid.* (1918) t. 207; STEEN. Bull. Jard. Bot. Btzig III, 13 (1934) 205; SLEUM. Bot. Jahrb. 72 (1942) 214; Reinwardtia 4 (1957) 177; Blumca 11 (1961) 2; *ibid.* 12 (1963) 116; *ibid.* 12 (1964) 342. — *G. calyculata* WERNH. Trans. Linn. Soc. II, Bot. 9 (1916) 93; STEEN. Bull. Jard. Bot. Btzig III, 13 (1934) 205. — *G. fragrantissima* var. *papuana* J. J. S. Nova Guinea 12 (1914) 143; STEEN. Bull. Jard. Bot. Btzig III, 13 (1934) 205.

var. pullei.

Aromatic shrub, 0.3–0.5(–1.5) m. Branches spreading or scandent. Branchlets reddish, mostly obtusely trigonous, glabrous or minutely patent-pubescent at the tips, terete and completely glabrous below. *Leaves* ovate to oblong- or elliptic-ovate, apex shortly acuminate, the terminal gland thick, base mostly rounded, rarely subcordate or broadly cuneate, subcoriaceous, serrate, the teeth ending in \pm caducous bristles, glabrous above, laxly glandular-punctate beneath, \pm dull, (1.7–)2.5–5(–7) by (1.2–)1.5–2.5(–3.5) cm, midrib and nerves slightly impressed above, prominent beneath, nerves 3–4 pairs curved upwards, high ascending and anastomosing, reticulation lax, rather obscure above, raised beneath; petiole reddish, thick, 2–5(–7) mm, glabrescent. *Racemes* in the axils both of the upper and lower leaves, the leaves not or slightly decrescent in size towards the tips of the branchlets, the uppermost leaf sometimes excepted, never forming a distinct terminal panicle,

(1.5-)3-7 cm; flowers rather numerous and \pm laxly set on the shortly pubescent rachis, with 2-3 small basal bracts. Pedicels rather stoutish, 4-6 mm, pubescent. Bract ovate, glabrous, ciliate, *c.* 2 mm. Bracteoles inserted immediately below the calyx, glabrous, ciliate, *c.* 1.5 mm. *Calyx* 2.5-3 mm, glabrous, lobes ovate, ciliate. *Corolla* cylindrical-urceolate, white, or rarely pale pink, glabrous at both sides, 5-7 by *c.* 3 mm. *Filaments* papillose; anthers subovate-oblong, tubules rather conspicuous, manifestly biaristate. *Ovary* densely pubescent; style glabrous, 4 mm. *Fruit* blackish blue or purple, (6-)8(-10) mm ϕ .

Distr. Malesia: New Guinea (Main Range from Mt Carstensz through the Western and Eastern Highlands to the Wharton Ra., also on Mt Saruwaged, and on Mt Manamau, Milne Bay Distr.).

Ecol. In forest edge shrubberies or (open) moss forest, also in open subalpine or alpine country among grasses and ferns, on open ground of old mine workings or cleared summits, on wet peaty or clayey soil, locally common, 2060-3450 m. *Fl. fr.* Jan.-Dec.

Vern. *Porowata*, Mendi.

var. leiotecha (SLEUM.) SLEUM. *Reinwardtia* 4 (1957) 177. — *G. leiotecha* SLEUM. *Bot. Jahrb.* 72 (1942) 213.

Shrub 1-1.5 m. *Ovary* glabrous or nearly so.

Distr. Malesia: E. New Guinea (Morobe Distr.: Rawlinson Ra.; Central Distr.: Mt Gagneve), open hill side, 2135-3655 m.

KEY TO INFRASPECIFIC TAXA

1. Leaves pubescent beneath. Corolla pubescent.
 2. *var. hirta*
1. Leaves and corolla glabrous.
 2. Ovary densely pubescent or hirsute.
 1. *var. leucocarpa*
 3. Inflorescence glabrous or practically so.
 4. Fruit white or rose tinged at maturity.
 - a. *f. leucocarpa*
 4. Fruit deep-red or purple to blackish at maturity b. *f. cumingiana*
 3. Inflorescence densely short-pubescent.
 5. Fruit white or rose tinged at maturity.
 - c. *f. scandens*
 5. Fruit blackish purple at maturity.
 - d. *f. melanocarpa*
 2. Ovary glabrous or practically so.
 3. *var. psilocarpa*

1. *var. leucocarpa.*

a. *f. leucocarpa.* — Fig. 68.

Slender shrub, 0.25-2(-3) m, climbing or sometimes somewhat decumbent; branches flexuous, often pendulous. Branchlets reddish or purplish, tips subobtusangular, elsewhere terete, glabrous in adult specimens, sometimes sparsely pubescent and setulose in juvenile plants. *Leaves* aromatic, ovate to lanceolate-ovate, apex \pm long-acuminate to subcaudate, the terminal gland small, base mostly subcordate, rarely rounded or very broadly attenuate, firmly subcoriaceous, dull, dark green above, paler beneath when fresh, \pm brown when dry, a little shining above, normally glabrous and epunctate, occasionally provided with short scattered bristles underneath in juvenile specimens, regularly obtusely crenate-serrate, teeth glandular, orange coloured in the living plant, fine or rather coarse, mostly dense, 3.5-14 by (1.5-)2-6.5 cm, upper leaves generally smaller, midrib slightly sunken above, prominent beneath, nerves 3-4 pairs much curved and ascendent, anastomosing, the lowest from or a little from above the base, flat or slightly impressed above, raised beneath, reticulation mostly rather dense, subinconspicuous above, distinct beneath; petiole purplish, grooved, glabrous, 3-9 mm. *Racemes* simple, rarely branched, axillary, the uppermost raceme seemingly terminal, practically eperulate at flowering time, lax, many-flowered, completely glabrous, up to 10 cm. Rachis mostly rather slender, flexuous, zig-zag, red when fresh. Pedicels recurved, rather stoutish, glabrous, 3-10 mm. Bract ovate-lanceolate, ciliate. Bracteoles ovate-triangular, inserted immediately below the calyx, ciliate, *c.* 1.5 mm. *Calyx* *c.* 2.5 mm, deeply 5-partite, glabrous at both sides, or puberulous inside only, lobes pale green or red, ovate, ciliate. *Corolla* campanulate, glabrous, white or yellowish white to greenish white, sometimes pinkish at margin, \pm fragrant, 3.5-4 by 3-4(-5) mm, shortly 5-lobed. *Filaments* curved, much dilated in the middle, papillose; anthers ovate-oblong; tubules short, recurved, biaristate. *Ovary* densely pubescent;

22. *Gaultheria leucocarpa* Bl. *Bijdr.* (1826) 856; G. DON, *Gen. Syst.* 3 (1834) 840; DC. *Prod.* 7 (1839) 593; HASSK. *Cat. Hort. Bog.* (1844) 160; ZOLL. *Nat. Geneesk. Arch. N. I.* 2 (1845) 9; MOR. *Syst. Verz.* (1846) 42; ZOLL. *Syst. Verz.* 2 (1854) 138; MIQ. *Fl. Ind. Bat.* 2 (1859) 1056; *Ann. Mus. Bot. Lugd.-Bat.* 1 (1863) 41; BL. *Fl. Jav. Pl. inéd.* (1863-83) t. 14; KOORD. *Nat. Tijds. N. I.* 60 (1901) 264; *ibid.* 63 (1904) 41; K. & G. J. *As. Soc. Beng.* 74, ii (1905) 70; RIDL. *J. Fed. Mal. St. Mus.* 4 (1909) 44; KOORD. *Exk. Fl. Java* 3 (1912) 9; KOORD.-SCHUM. *Syst. Verz.* 1 (1912) fam. 233, p. 107; BACK. *Bull. Jard. Bot. Btzg II*, 12 (1913) 16; J. J. S. in K. & V. *Bijdr.* 13 (1914) 117, *incl. f. glabra, nom. nud.*; KOORD. *Fl. Tjib.* 3 (1918) fam. 233, p. 6; RIDL. *J. Mal. Br. R. As. Soc. n.* 87 (1923) 75; *Fl. Mal. Pen.* 2 (1923) 212; SP. MOORE, *J. Bot.* 63 (1925) *Suppl.* 57; HOCHR. *Candollea* 2 (1925) 494; HEYNE, *Nutt. Pl.* (1927) 1218; HENDERS. *J. Mal. Br. R. As. Soc.* 5 (1927) 256; STEEN. *Arch. Hydrobiol. Suppl.* 11 (1932) 317, f. 25 (*veg.*); DOCTERS VAN LEEUWEN, *Pangrango* (1933) 200, f. 43, t. 26; J. J. S. in *Merr. Contr. Arn. Arb.* 8 (1934) 127; STEEN. *Bull. Jard. Bot. Btzg III*, 13 (1934) 205; AMSH. in *Back. Bekn. Fl. Java (em. ed.)* 7 (1948) fam. 162, p. 5; STEEN. *Bull. Jard. Bot. Btzg III*, 17 (1948) 388; HENDERS. *Mal. Nat. J.* 6 (1950) 264, f. 246 C (*leaf*); SLEUM. *Reinwardtia* 4 (1957) 178; *Blumea* 11 (1961) 1. — *Brossaea leucocarpa* (BL.) O. KTZE, *Rev. Gen. Pl.* 2 (1891) 388. — Fig. 67, 68.



Fig. 67. *Gaultheria leucocarpa* BL. Branch with flowers and fruits, $\times \frac{2}{3}$ (after BLUME, Fl. Javae, pl. inéd. t. 14).

style glabrous, 2.5 mm. *Fruit* white or rose tinged, (6–)9–11 by 6–9 mm, villous on top. *Seeds* brown, triangular-obovoid, 0.5 mm.

Distr. Malesia: Sumatra (apparently rare), Java.

Ecol. Both in mountain forest and open, \pm sunny, exposed places among montane brushwood or scrub, 1300–3300 m, rather common, often on the margin of craters, steep slopes, on stony ground, rocks, volcanic or occasionally peaty and generally poor soil, mostly terrestrial, occasionally epiphytic. *Fl.* Jan.–Dec.

Pollination. According to DOCTERS VAN LEEUWEN the anthers open by two extrorse pores; the pollen is sticky. The stigma projects for about 1.5 mm above the anthers. Some flowers are protandrous with the stamens ripening on the first day, and the stigma attaining maturity on the next day. On the same plant, however, homogamous flowers can be found. The flowers remain unchanged for up to 5 days. They are but seldom visited by insects, especially *Bombus rufipes*. The pollen may easily drop on the stigmas because the latter protrude beyond the anthers, and because the flowers are pendulous. When the corolla falls off, the anthers shove therefore along the stigma. In young flowers, opened but one day, the stigma is already thickly covered with germinating pollen. All flowers set fruit. Selfpollination seems to be the rule. Flowering alternates more or less with fruiting, that is while a plant is abundantly fruiting, it generally bears but few flowers.

Dispersal. The fruits are eaten by birds.

Vern. *Këring, tjangti bodas, t. wangi, S, gondopuro, kapirosok, purworoko, purwosada, sanglir, tandjang, tēmigi, t. kasar, J; M: sae sae, Toba, sae sae angur, Tapanuli, sal-sal, Eastcoast, sirih gunung, Padang Highlands, kalintjajak, Karo Highland.*

Uses. *G. leucocarpa* and its varieties or forms are used in the same manner as *G. punctata*, although the plant yields much less wintergreen-oil.

Notes. *G. leucocarpa* in a broad sense is a species widely distributed beyond Malesia into East Asia. In this immense area, several varieties or forms can be distinguished, based on certain characters of the indument and the colour of the fruit; each of these varieties or forms, as far as can be seen from the material at hand, has its peculiar geographical range. Thus *f. leucocarpa*, with glabrous inflorescences and leaves, white or rose tinged fruits and a pubescent ovary, seems to be restricted to Sumatra and Java, at least is not known with certainty from other parts of Malesia.

It is remarkable that in Java *f. leucocarpa* and *f. scandens* seem to exclude each other in most places. However, to verify this, the present herbarium material, which too often bears neither ripe fruits nor complete collector's notes, is insufficient; in future collectors of *Gaultheria* should always note the fruit colour.

b. *f. cumingiana* (VIDAL) SLEUM. *Reinwardtia* 4 (1957) 179; *Blumea* 11 (1961) 1. — *G. cumingiana* VIDAL, *Phan. Cuming*. Philip. (1885) 184; *Rev.*

Pl. Vasc. Filip. (1886) 170; HAYATA, *Bot. Mag.* Tokyo 20 (1906) 72; MERR. *Philip. J. Sc.* 2 (1907) *Bot.* 292 *p.p.*; *ibid.* 3 (1908) *Bot.* 378; HAYATA, *Fl. Mont. Formosa* (1908) 150; *Icon.* 2 (1912) 118, t. 13; KANEH. *Formos. Tr.* (1917) 315; *ibid. rev. ed.* (1936) 533, f. 493; MERR. *En. Philip.* 3 (1923) 246 *p.p.*; *Lingn. Agr. Rev.* 4 (1927) 132; COPEL. *f. Philip. J. Sc.* 47 (1932) 61, t. 1, f. 2. — *G. laxiflora* DIELS, *Bot. Jahrb.* 29 (1900) 515. — *G. yunnanensis* (FRANCH.) REHD. *J. Arn. Arb.* 15 (1934) 282, *et syn. alt.* — *G. crenulata* (non KURZ) J. J. S. in *Merr. Contr. Arn. Arb.* 8 (1934) 127; STEEN. *Bull. Jard. Bot. Btzg III*, 13 (1934) 205; FLETCH. in *Fl. Siam. En.* 2 (1938) 315.

Inflorescence glabrous. *Ovary* densely pubescent. *Fruit* dark red to purplish blackish.

Distr. Upper Burma, SW. and S. China, Siam, Indochina, Formosa, in *Malesia*: Malay Peninsula, Sumatra, E. Java, Philippines (Luzon).

c. *f. scandens* HOCHR. *Candollea* 2 (1925) 494; SLEUM. *Reinwardtia* 4 (1957) 180; *Blumea* 11 (1961) 2. — ? *G. bandongensis* ZOLL. *Syst. Verz.* 2 (1854) 138, *nom. nud.*; ZOLL. *ex MIQ. Fl. Ind. Bat.* 2 (1859) 1056, *descr.* — ? *G. leucocarpa* var. *seminuda* J. J. S. *Bull. Jard. Bot. Btzg III*, 13

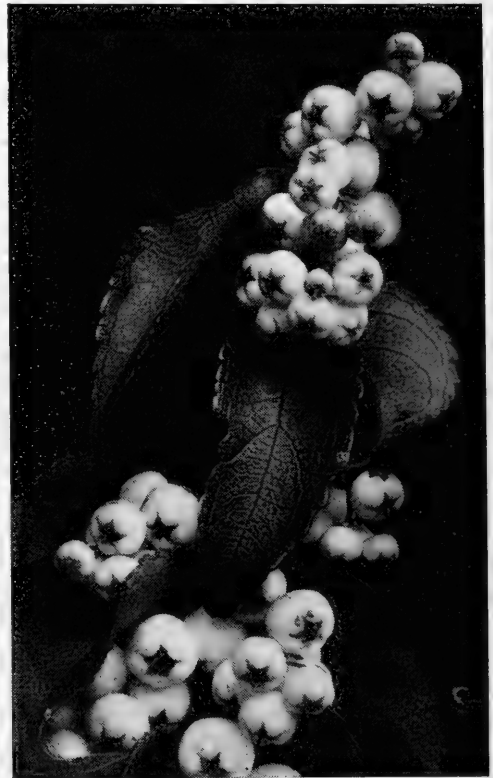


Fig. 68. *Gaultheria leucocarpa* BL. *f. leucocarpa*. Twig with fully mature white fruits, Mt Pangrango (DOCTERS VAN LEEUWEN, 1924).

(1935) 455. — *G. leucocarpa* f. *pubescens* J. J. S. in K. & V. Bijdr. 13 (1914) 119, *nom. nud.* — ? *Brossaea bandongensis* (ZOLL. ex MIQ.) O. Ktze, Rev. Gen. Pl. 2 (1891) 388.

Inflorescence densely rather yellowish short-pubescent. *Ovary* densely pubescent. *Fruit* white or with pink hue.

Distr. *Malesia*: Sumatra (apparently rare), Java (apparently the most common form there).

Vern. *Litjajo*, *litjaujo*, Karo, *tjojo*, Keling.

d. f. *melanocarpa* J. J. S. ex AMSH. in Back. Bekn. Fl. Java (em. ed.) 7 (1948) fam. 162, p. 5; SLEUM. Reinwardtia 4 (1957) 182. — *G. leucocarpa* var. *melanocarpa* J. J. S. ex STEEN. Bull. Jard. Bot. Btzg III, 17 (1948) 388; Arch. Hydrobiol. Suppl. 11 (1932) 317 ('*melanocephala*'). — ? *G. bandongensis* ZOLL. Syst. Verz. 2 (1854) 138, *nom. nud.*; ZOLL. ex MIQ. Fl. Ind. Bat. 2 (1859) 1056, *descr.* — ? *Brossaea bandongensis* (ZOLL. ex MIQ.) O. Ktze, Rev. Gen. Pl. 2 (1891) 388.

Inflorescence rather densely yellowish short-pubescent. *Ovary* densely pubescent. *Fruit* dark red to purplish blackish.

Distr. *Malesia*: Mal. Peninsula, Sumatra, E. Java.

Ecol. Mentioned by DE VOOGD (Trop. Natuur 23, 1934, 82) from the stony mud-flow (*lahar*) of Beriti volcano in S. Sumatra, *i.e.* from an extremely dry, treeless locality on acid soil.

2. var. *hirta* VAL. ex J. J. S. Bull. Jard. Bot. Btzg III, 13 (1935) 454; SLEUM. Reinwardtia 4 (1957) 179.

Branchlets ± patently and rather densely glandular-setose and finely pubescent. *Leaves* clothed with soft non-glandular hairs all over the undersurface. *Inflorescence* densely finely patent-pubescent; occasionally some scattered longish gland-tipped bristle-like hairs are also present. *Corolla* laxly non-glandular pubescent.

Distr. *Malesia*: North Sumatra (Tapanuli: Toba Batak near Kuta Lekole), once found.

3. var. *psilocarpa* (COPEL. f.) SLEUM. Reinwardtia 4 (1957) 183. — *G. psilocarpa* COPEL. f. Philip. J. Sc. 47 (1932) 62, t. 1, f. 3. — *G. cumingiana* (non VIDAL) MERR. Philip. J. Sc. 2 (1907) Bot. 292 p.p.; ELM. Leaf. Philip. Bot. 3 (1911) 1091; MERR. En. Philip. 3 (1923) 246 p.p.

Inflorescence glabrous. *Ovary* practically glabrous. *Fruit* dark red to purplish blackish.

Distr. *Malesia*: Philippines (Mindanao, Negros; once found in S. Luzon).

Vern. *Logauwoy*, Bag.

23. *Gaultheria novaguineensis* J. J. S. Med. Rijks-herb. n. 25 (1915) 5; Nova Guinea 12 (1917) 512; *ibid.* (1918) t. 206; STEEN. Bull. Jard. Bot. Btzg III, 13 (1934) 205; SLEUM. Bot. Jahrb. 72 (1942) 213; Reinwardtia 4 (1957) 183; Blumea 11 (1961) 2. — Fig. 62f.

var. *novaguineensis*.

Stiff, glaucous shrub, 0.8–1 m. Branchlets manifestly trigonous in the youngest parts by the decurrent petioles, terete below, glabrous or mi-

nutely pubescent. *Leaves* ovate or ovate-elliptic, apex attenuate, tip obtuse by a callous gland, base obtuse, broadly attenuate to rounded, coriaceous, rather rigid, shining above, ± dull beneath, glabrous, not punctate beneath, crenate-serrate, teeth glandular, somewhat curved, margin revolute, 1.1–1.5(–2.1) by 0.5–0.9(–1.3) cm, midrib and nerves slightly impressed above, prominent beneath, nerves 2–3(–4) pairs, high curved-ascending and joined near the edge, reticulation ± obscure on both faces; petiole red, blackish when dry, glabrous, thick, 1–3 mm. *Flowers* solitary in the axils of all upper leaves, thus forming a leafy terminal raceme, leaves decrescent towards the top of the branchlets. Pedicels reddish, stoutish, finely pubescent or glabrous, recurved, 3–4(–6) mm. Bract absent. Bracteoles 2, apical, ovate, acute, ciliate, 1.5 mm. *Calyx* 3–3.5 mm, deeply 5-partite, lobes triangular-ovate, ciliate. *Corolla* urceolate, white or light cream, 5–6 by c. 3 mm, shortly 5-lobed, glabrous. *Stamens* c. 3.2 mm; filaments papillose, c. 2 mm; anther-cells oblong-ovate, granular; tubules shortly biaristate. *Ovary* glabrous at least on the apex; style 3.5 mm. *Fruit* blue-blackish, 6–7 mm ø, pedicel 3–6 mm.

Distr. *Malesia*: West New Guinea (Oranje and Star Mts).

Ecol. On shrubby banks of stream, or on swampy localities, apparently rare, 3000–4000 m. *Fl.* Febr., July, Sept.

var. *pascua* SLEUM. Reinwardtia 4 (1957) 183; Blumea 11 (1961) 2.

Ovary subdensely short-pubescent. Rachis and pedicels rather densely short-pubescent. *Fruit*-pedicel (7–)8–10 mm.

Distr. *Malesia*: West New Guinea (Mt Carstensz), twice collected in meadow-like vegetation at 3700–4000 m. *Fr.* Nov.–Dec.

24. *Gaultheria pernettyoides* SLEUM. Reinwardtia 4 (1957) 184; Blumea 11 (1961) 3. — Fig. 62e.

Shrub, probably prostrate. Branchlets slender (1 mm), terete, densely subappressed-setulose. *Leaves* lanceolate, rarely subelliptic-lanceolate, slightly minor towards the tips of the branchlets and subsessile there, apex attenuate, subacute, base attenuate, subcoriaceous, dark brown above when dry, paler beneath, regularly serrulate, teeth caducously ciliate, 0.2–0.3 mm high, c. 1 mm spaced, 0.8–1.3 cm by (2–)3.5 mm, puberulous above on the lower part of the midrib, with solitary scattered short bristles beneath, midrib very slightly sunken above, ± prominent beneath, nerves 2 pairs, high-ascending, very slightly impressed above, ± raised beneath, reticulation ± obscure; petiole glabrous, c. 1 mm. *Flowers* solitary, remote *i.e.* not in successive axils. Pedicels recurved, glabrous, stoutish, c. 2 mm. Bract absent. Bracteoles 2, opposite, immediately below the calyx, ovate-acuminate, c. 2 mm. *Calyx* 2.5 mm, deeply 5-partite, glabrous outside, lobes ovate, abruptly acuminate, puberulous inside, ciliate at the tip. *Ovary* puberulous; style glabrous, 2 mm. *Fruit*

calyx moderately accrescent, subcarnose at the base, chartaceous at the tip, including the glabrous capsule.

Distr. *Malesia*: Sumatra (Atjeh, Gajo Lands: summit of Mt Losir), in mountain heath at 2950–3500 m, two collections. *Fl. Febr.*

8. DIPLYCOSIA

BL. Bijdr. (1826) 857; SLEUM. Reinwardtia 4 (1957) 119–161; Blumea 11 (1961) 4; *ibid.* 12 (1963) 116; *ibid.* 12 (1964) 342. — *Gaultheria* sect. *Amphicalyx* ENDL. Gen. (1839) 756. — **Fig. 69–80.**

Shrubs, not rarely epiphytic, often with thick roots and/or swollen base. *Leaves* spiral, persistent, entire or ciliate-serrate or -crenate; axillary buds sometimes reduced to stipule-like perulae. *Flowers* axillary or from defoliate axils, solitary or in fascicles, small. Pedicels bracteolate at the base, with 2 apical persistent bracteoles \pm connate into a calyculus. *Calyx* deeply 5 (rarely 4)-toothed or -lobed, free or half-inferior, persistent, becoming \pm fleshy and accrescent in later stages, mostly completely including the capsule at maturity, rarely incompletely so. *Corolla* campanulate to urceolate, rarely cylindric or subglobose, not rarely rather fleshy, with 5 (rarely 4) slightly imbricate, erect or recurved lobes, early caducous. *Stamens* 10 (rarely 8), mostly as long as the corolla or slightly exerted, rarely shorter than the corolla, inserted at the base of the corolla. Anthers introrse, dorsifix, anther-cells oblong to ovate, with 2 deep longitudinal grooves, irregularly 4-lobed at the base, mostly very granular, produced at the apex into 2 short (and rather broad) or mostly elongate (and slender) straight tubules, dehiscing by \pm oblique short or prolonged slits; neither apical nor dorsal appendages. Filaments mostly linear, flat, sometimes disk-like dilated above the base and S-curved. *Disk* cupular, 10(–8)-lobed, pressed against the ovary. *Ovary* superior or half-inferior, 5(–4)-celled, with numerous ovules on the thick placentas. Style filiform; stigma simple. *Capsule* thin-walled, opening late, regularly or somewhat irregularly, completely filled with the seeds, included to various degree by the accrescent \pm succulent calyx. *Seeds* minute, cuneate irregularly; testa laxly reticulate; albumen fleshy; embryo axile, cylindric.

Distr. In all 97 *spp.*, of which 1 endemic in S. Annam, 3 (1 endemic) in Peninsular Siam, the rest in *Malesia*. All species of the genus described from the East Himalaya and Upper Burma have now been transferred to the genus *Gaultheria*. Fig. 69.

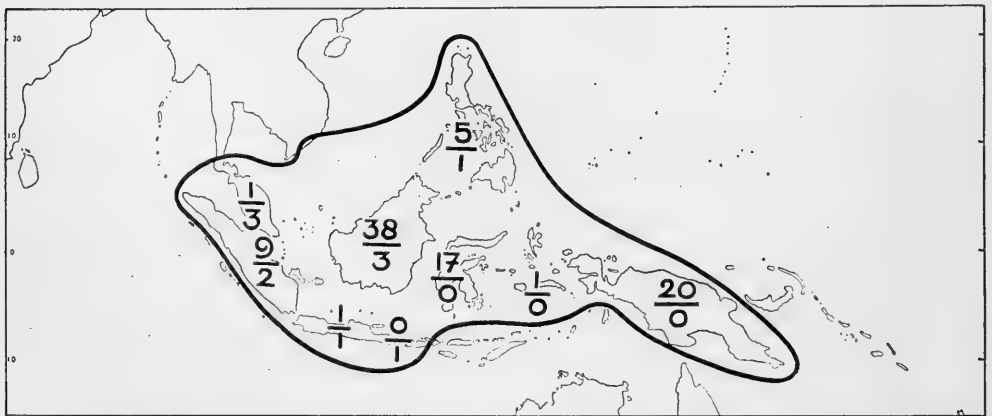


Fig. 69. Distribution of *Diplycosia*. The number above the hyphen indicates the number of endemic species, that below the hyphen the number of non-endemic species in each island or district.

Almost half of all Malesian species occur in Borneo, and many of these are only known from Mt Kinabalu. In New Guinea, the Vogelkop Peninsula seems to be richer in *Diplycosia* than the rest of the island. Many species occupy a very restricted area or have only been collected once.

Ecol. Most species are found in the montane forest, especially in the mossy forest and in summit scrub. A few live in open rocky places above the timber line, and attain 3960 m close to the summit of Mt Kinabalu, and 3650 m in New Guinea (Hagen Mts).

Uses. No use is known, though several species have a peculiar smell and apparently contain wintergreen-oil similar as *Gaultheria*.

Note. In the key to the species, which is in many respects artificial, various indument types and their occurrence on certain organs are used in the first place. It is therefore necessary to investigate the material thoroughly as to the different types of hairs, bristles or glands, and to use a lens to make sure, that no fine puberulence is overlooked, especially on the branchlets. The occurrence of a certain indument type or the combination of such types is apparently constant enough to characterize a species or variety to a high degree. Complete lack of indument, however, is much less significant, and for that reason all species of which a gradual decay of the indument has been observed in later stages, figure in the key under different positions.

KEY TO THE SPECIES

1. Branchlets (young shoots) laxly to very densely setose or setulose, otherwise whether or not patent-puberulous.
2. Branchlets (young shoots) exclusively setose or setulose. (Sometimes greyish or blackish fungi may wrongly suggest the presence of a fine patent pubescence!)
3. Calyx dorsally densely and \pm longish setose or setulose.
4. Pedicels, if any, stoutish. Bristles on the calyx all or for their greater number \pm appressed or obliquely suberect, 2.5–5 mm.
5. Leaves underneath with \pm coarse, patent bristles.
6. Nerves 1–3 pairs, slightly distinct or \pm inconspicuous.
7. Corolla \pm shortly setulose-hairy in its upper part.
 8. Leaves subcaudate-acuminate (coriaceous, shining above, strongly revolute at the margin), 3–5(–7) cm long **1. *D. rufa***
 8. Leaves short-acuminate, 1–3 cm long.
 9. Leaves coriaceous, slightly revolute at the margin, shining above, (1–)1.5–2(–3) by 0.7–1.2 cm. Ovary laxly hairy **2. *D. chrysothrix***
 9. Leaves subcoriaceous, quite flat, dull above, 2–3 by 1.2–1.9 cm. Ovary glabrous. **3. *D. carrii***
7. Corolla entirely glabrous.
 10. Leaves 0.6–1(–1.5) by 0.3–0.6 cm **4. *D. abscondita***
 10. Leaves surpassing 2 by 1.5 cm.
 11. Leaves ovate or elliptic-ovate, apex acuminate, 2–4.5 by 1.5–2.6 cm; petiole 1–2 by 1–1.5 mm. **5. *D. barbiger***
 11. Leaves broad-elliptic, sometimes subrotundate, apex broadly obtusely attenuate to almost rounded, 4–6.5 by 2.5–5 cm; petiole (4–)5–7 by 2–3 mm **6. *D. schramii***
6. Nerves (5–)6–7 pairs, \pm distinct.
 12. Pedicels 3–5(–7) mm. Calyx lobes 1.5–2 mm **7. *D. saurauoides***
 12. Pedicels (8–)10–13 mm. Calyx lobes c. 3.5 mm **8. *D. clementium***
5. Leaves underneath with fine and manifestly appressed bristles **9. *D. aurea***
4. Pedicels slender. Bristles on the calyx spreading in all directions, (1–)1.5–2.5 mm.
 13. Bristles manifestly gland-tipped. Pedicels exclusively setose, 5–8 mm. **10. *D. lilianae***
 13. Bristles eglandular. Pedicels besides the bristles rather densely covered with fine whitish hairs, 10–25 mm **11. *D. loheri***
3. Calyx dorsally rather laxly and shortly (0.5–1 mm), generally crisped- or manifestly appressed-setulose, or puberulous, or muriculate, or glabrous.
14. Style \pm densely shortly patent-pubescent **12. *D. aperta***
14. Style completely glabrous.
 15. Corolla \pm densely pubescent, at least in the upper half. (Ovary densely hairy.)
 16. Branchlets densely setose. Corolla longish crisped-hairy in the upper half. **13. *D. pubivertex***
 16. Branchlets very laxly setulose (finally glabrous). Corolla nearly entirely covered with straight, \pm appressed hairs **14. *D. atjehensis***
 15. Corolla glabrous or practically so (some glandular hairs occasionally present in 26. *D. tetramera*). (Ovary pubescent or glabrous.)
 17. Flowers 1 or 2 per axil (occasionally also 3 in other axils of the same specimen).
 18. Leaves over 11 cm long. Pedicels (2–)2.5–3.5 cm **15. *D. penduliflora***
 18. Leaves not longer than 11 cm. Pedicels rarely up to 2 cm.
 19. Leaves \pm lanceolate, up to 7 mm wide.

20. Leaves very densely arranged, partly covering each other, on very densely setose branchlets. Ovary hirsute **16. *D. ciliolata***
20. Leaves subdensely to laxly arranged, not partly covering each other, on laxly to subdensely setose branchlets. Ovary glabrous.
21. Pedicels at anthesis 3–7 mm.
22. Pedicels slender, laxly setulose at anthesis. Corolla red **17. *D. filipes***
22. Pedicels rather stoutish, subdensely setulose at anthesis. Corolla white, with pink tinge. **32. *D. morobeensis* var. *morobeensis***
21. Pedicels at anthesis 1–2 mm (stoutish, muriculate and finely hairy. Corolla pale green). **34. *D. pendens***
19. Leaves, if lanceolate, wider than 7 mm, or leaves of other shape.
23. Pedicels laxly or mostly rather densely longish (1.5–2 mm) and \pm patently setulose, longer than 3 mm. (Ovary glabrous.)
24. Calyx dorsally glabrous or practically so.
25. Corolla subglobose-urceolate, 5 mm. Leaves narrowly oblong-elliptic, (2–)2.5–5 by 0.8–1.7(–2) cm **18. *D. rufescens***
25. Corolla subcampanulate, 4 mm. Leaves elliptic to ovate, 0.9–1.7(–1.9) by 0.5–1 cm. **19. *D. triangulanthera***
24. Calyx dorsally \pm laxly clad with \pm appressed and \pm crisped, stoutish, bristle-like or glandular hairs.
26. Leaves ovate or elliptic, \pm abruptly acuminate at apex, the terminal gland small.
27. Corolla 6.5 mm **20. *D. kjellbergii***
27. Corolla 1–1.1 cm **21. *D. hirsuta***
26. Leaves elliptic or subobovate-elliptic, broadly attenuate or \pm rounded at apex, the terminal gland thick and protruding beyond the leaf margin.
28. Pedicels with fine, gland-tipped bristle-like hairs. (Corolla (5–)6 by 2.5 mm.). **22. *D. rosea***
28. Pedicels with \pm coarse, eglandular bristles or bristly hairs.
29. Corolla 7–9 by 3.5 mm. Pedicels 1.2–2 cm **23. *D. setosa***
29. Corolla 5(–6) by 2.5–3 mm. Pedicels 6–7 mm **24. *D. kosteri***
23. Pedicels laxly to subdensely short- and crisped-, or, if the bristles are longer, appressed-setulose, or muriculate, or pubescent, or glabrous, or pedicels up to 3 mm long. (Ovary pubescent or glabrous.)
30. Ovary sparsely to densely pubescent.
31. Leaves up to 3.5 cm long, but for the greater part shorter than 2.8 cm in the same specimen.
32. Leaves ovate or elliptic-ovate **25. *D. pseudorufescens* var. *pseudorufescens***
32. Leaves lanceolate or (broadly) elliptic to elliptic-oblong or subovate-elliptic, rarely subovate-elliptic.
33. Style 5–6 mm. (Stamens 8.) **26. *D. tetramera***
33. Style up to 3 mm. (Stamens 8 or 10.)
34. Bristles on the branchlets \pm spreading, very dense. **25. *D. pseudorufescens* var. *elliptifolia***
34. Bristles on the branchlets \pm appressed, lax to subdense.
35. Stamens 8 **27. *D. parvifolia***
35. Stamens 10.
36. Leaves \pm elliptic, 0.9–2(–2.5) cm wide **28. *D. soror***
36. Leaves \pm lanceolate, 0.5–0.8(–1) cm wide **34. *D. pendens***
31. Leaves at least in part in the same specimen longer than 2.8 cm.
37. Leaves ovate or elliptic-ovate, \pm persistently rufous-setulose beneath. **29. *D. glauciflora***
37. Leaves (broadly) elliptic or elliptic-oblong or obovate, caducously setulose, respectively punctate underneath or entirely glabrous in later stages.
38. Corolla ovoid **30. *D. ledermannii***
38. Corolla campanulate **31. *D. brachyantha***
30. Ovary entirely glabrous.
39. Flowers 4-merous. Stamens 8.
40. Corolla *c.* 2.5 mm. Style 2 mm **27. *D. parvifolia***
40. Corolla 6–7 mm. Style 5–6 mm **26. *D. tetramera***
39. Flowers 5-merous. Stamens 10.
41. Leaves small, (0.8–)1.3–2.2 by 0.4–0.8, very rarely in part up to 1 cm.
42. Calyx lobes with a distinct paler, almost translucent margin, which is densely ciliate over the whole length. Corolla at least 4 mm. Pedicels 3–6 mm.
43. Corolla 4 mm. Style 3.5 mm **32. *D. morobeensis***
43. Corolla (7–)8–10 mm. Style 5–6 mm **33. *D. rupicola***

42. Calyx lobes showing no paler margin, the latter ciliate distally only. Corolla 3 mm. Pedicels 1-2 mm at anthesis. (Leaves \pm lanceolate.) 34. *D. pendens*
41. Leaves larger for the greater part in the same specimen, the smallest ones at least 1.3 by 0.9 cm.
44. Corolla 8-9 mm.
45. Leaves triplinerved 35. *D. schultzei*
45. Leaves sub-5- or 7-plinerved from and from above the base.
46. Leaves obovate to obovate-elliptic, losing the marginal bristles completely towards maturity. 36. *D. stellaris*
46. Leaves suborbicular to elliptic, the marginal bristles \pm persistent into maturity.
47. Pedicels 8-10(-12) mm at anthesis. 37. *D. undata*
47. Pedicels (3-)-4-5 mm at anthesis. 38. *D. varians*
44. Corolla up to 6 mm.
48. Corolla 5-6 mm. Pedicels (5-)-7-12 mm. Style 4-5 mm 89. *D. edulis*
48. Corolla up to 4 mm. Pedicels 2-4(-7) mm. Style up to 3.5 mm.
49. Corolla subglobular, 2 mm 39. *D. subglobularis*
49. Corolla urceolate or subcampanulate, 3-4 mm.
50. Leaves entire or practically so. Young shoots densely and \pm patently setose.
51. Petiole 3 mm. Pedicels setose and pubescent 40. *D. apoensis*
51. Petiole (4-)-5-6 mm. Pedicels glabrous 41. *D. muscicola*
50. Leaves crenulate, especially in the upper half. Young shoots subdensely or laxly and more appressedly setose.
52. Pedicels with sparse, rather appressed bristle-like hairs, 6-7 mm. 42. *D. amboinensis*
52. Pedicels sparsely muriculate or glandular-hairy, glabrescent, up to 4 mm. 28. *D. soror*
17. Flowers 3-6(-9) in all or at least in the lower axils, the uppermost axil(s) sometimes bearing only 2, or very rarely but 1 flower in the same specimen.
53. Leaves narrow-lanceolate, 3-6 mm wide 43. *D. kalmiiifolia*
53. Leaves various in shape, wider than 7 mm.
54. Corolla (9-)-10-11 mm. Leaves with \pm persistent longish marginal bristles. 44. *D. kinabaluensis*
54. Corolla up to 8 mm. Leaves with \pm early caducous marginal bristles.
55. Calyx lobes c. 4 mm. Ovary laxly to densely pubescent.
56. Corolla campanulate 31. *D. brachyantha*
56. Corolla subcylindric-urceolate 45. *D. sumatrensis*
55. Calyx lobes 1.5-2(-3) mm. Ovary completely glabrous.
57. Perulae very numerous, ovate-acuminate to lanceolate, 2-4 mm. Bracteoles (2-)-2.5-3 mm.
58. Pedicels densely crisped-rusty-pubescent 46. *D. crassiramea*
58. Pedicels densely patently glandular-setulose 81. *D. pittosporifolia* var. *punctiloba*
57. Perulae mostly few, rarely rather numerous, \pm ovate, obtuse, up to 1.5 mm. Bracteoles 1-1.5 mm.
59. Leaves 3-5-plinerved from and from above the base (lower half of the midrib), upper lateral nerves, if any, much less distinct.
60. Anthers linear-oblong, tubules as or nearly as long as the anther-cells. Corolla short-cylindric to subcampanulate 47. *D. trinervia*
60. Anthers oblong to ovate-oblong, tubules much shorter than the anther-cells.
61. Leaves rigidly coriaceous, \pm concave when dry 48. *D. lamii*
61. Leaves subcoriaceous to coriaceous, \pm flat when dry.
62. Leaves (10-)-12-17 by 3.5-5.5 cm 49. *D. orophila*
62. Leaves smaller, (2-)-3-6 (rarely partly in the same specimen up to 10) cm long. 50. *D. luzonica*
59. Leaves penninerved or practically so, *i.e.* basal and upper nerves equally distinct, the latter also from the upper half of the midrib.
63. Calyx tube markedly funnel-shaped attenuate (2 mm), almost stipitate in later stages (3 mm). (Pedicels laxly subpatently hairy. Bristles, if any, glandular at the tip of the branchlets) 51. *D. caryophylloides*
63. Calyx tube gradually attenuate or shortly (up to 1 mm) contracted at the base.
64. Pedicels stoutish, 3-8 mm, their hairs or bristles \pm appressed and non-glandular.
65. Pedicels densely rusty-setulose and furfuraceous as are the tips of the branchlets. 52. *D. scabrinda*
65. Pedicels densely rusty-tomentose. Tips of the branchlets very laxly setose (finally glabrous) 53. *D. capitata*
64. Pedicels slender, 1-1.3 cm, their hairs glandular and horizontally spreading. 54. *D. fimbriata*

2. Branchlets (young shoots) both very laxly to densely setose or setulose and patent-puberulous, or distinctly patent-puberulous only.
66. Stipule-like axillary perulae \pm persistent, well recognizable at least at the uppermost leaves, subulate, as long as or slightly longer than the petiole. (Anthers sagittate.)
67. Margin of the calyx lobes set with longish (c. 1.5 mm) and coarse, non-glandular bristles. **55. *D. sagittanthera***
67. Margin of the calyx lobes ciliolate, or very shortly glandular-muriculate or -fimbriate.
68. Leaves (ovate) subcaudate-acuminate and \pm acutish at the apex **56. *D. acuminata***
68. Leaves (ovate to elliptic or subrotundate) short-attenuate and obtuse to rounded at the apex.
69. Corolla 6–6.5 by c. 4 mm. Leaves ovate to subrotundate, all slightly though distinctly cordate at base **57. *D. crenulata***
69. Corolla 4–5 by 2.5–3 mm. Leaves ovate to elliptic, broadly cuneate to rounded (rarely in part also subcordate) at the base **58. *D. elliptica***
66. Stipule-like axillary perulae absent (or not well recognizable, being too small or very early caducous).
70. Anthers manifestly sagittate.
71. Ovary glabrous.
72. Leaves elliptic-oblong or elliptic, 4–7 mm wide **59. *D. microphylla***
72. Leaves lanceolate or elliptic-oblong, c. 2 mm wide **60. *D. kostermansii***
71. Ovary subdensely hairy. (Leaves ovate-elliptic or elliptic.) **61. *D. consobrina***
70. Anthers hardly or not sagittate.
73. Margin of the calyx lobes set with coarse, longish (0.6–0.8 mm), non-glandular bristles, or bristle-like glandular hairs.
74. Leaves manifestly crenate, apex almost tridentate, 0.7–1.4 by (0.4–)0.5–0.7 cm. Corolla red. **62. *D. cinnabarina***
74. Leaves subentire, apex acuminate-attenuate, 1.5–2.5(–3) by 0.8–1.5(–1.8) cm. Corolla light green **63. *D. setiloba***
73. Margin of the calyx lobes ciliolate or glandular-fimbriate.
75. Leaves linear, *i.e.* equally wide (up to 2.5 mm) over their entire length, proper apex and base excepted.
76. Leaves (1–)1.5–2 cm by 0.5–0.8 mm. Ovary glabrous **64. *D. piceifolia***
76. Leaves (3–)4.5–5.5(–8) by 1.5–2(–3) mm.
77. Calyx lobes fimbriate by fine hairs in the upper part. Ovary laxly pubescent **65. *D. pinifolia***
77. Calyx lobes laxly fimbriate by rather coarse glandular hairs in the upper part. Ovary quite glabrous **66. *D. lavandulifolia***
75. Leaves not linear, and wider than 3 mm.
78. Leaves narrow-lanceolate or narrowly elliptic-oblong, or elliptic, 4–6(–7) mm wide.
79. Leaves (2–)2.3–3.5 cm long **67. *D. stenophylla***
79. Leaves (0.8–)1.2–1.4(–1.7) cm long.
80. Leaves narrowly elliptic-oblong **68. *D. myrtillus***
80. Leaves elliptic **25. *D. pseudorufescens* var. *elliptifolia***
78. Leaves of various shape, wider than 7 mm.
81. Branchlets besides the spreading puberulence manifestly setose. Leaves \pm persistently setose beneath, at least laxly so in the lower half and/or along the midrib.
82. Leaves up to 1.7 cm long **25. *D. pseudorufescens***
82. Leaves at least 3 cm long.
83. Bristles on the branchlets short (1–2 mm), subdense. Leaf base \pm attenuate or cuneate.
84. Pedicels glabrous. Corolla red **69. *D. rubella***
84. Pedicels glandular-setulose. Corolla greenish **70. *D. lancifolia***
83. Bristles on the branchlets longish (2–3 mm), dense. Leaf base rounded or mostly so. (Pedicels \pm densely crisped-setulose. Corolla light yellow or greenish.) **71. *D. pilosa***
81. Branchlets besides the spreading puberulence very laxly or mostly not setose or setulose. Leaves early glabrescent, whether or not punctate beneath.
85. Leaves \pm abruptly caudate or subcaudate-acuminate at apex.
86. Leaves lanceolate-ovate, up to 2.1 cm wide. Flowers mostly solitary, rarely in twos. Pedicels c. 2 mm **72. *D. caudatifolia***
86. Leaves ovate-elliptic, all or at least partly 2.5–4 cm wide in the same specimen. Flowers generally 3–4(–6) per fascicle. Pedicels (3–)4–6 mm **73. *D. memecyloides***
85. Leaves gradually and \pm broadly attenuate-acuminate, or obtuse to rounded at apex.
87. Corolla c. 1 cm, campanulate. (Pedicels very slender, 1.2–2.6 cm.) **74. *D. gracilipes***
87. Corolla up to 7 mm, (broadly) tubular, urceolate, subglobose-urceolate or subcampanulate.
88. Corolla 6.5–7 mm. (Ovary glabrous.)
89. Pedicels 1.5–3 mm, rather stoutish. Corolla white **75. *D. celebensis***
89. Pedicels 6–8(–10) mm, slender. Corolla blood red **76. *D. haemantha***
88. Corolla 3–3.5 mm.

90. Ovary hairy. Leaves subdensely punctate beneath 77. *D. minutiflora*
 90. Ovary glabrous. Leaves very laxly or not punctate 78. *D. kemulensis*
1. Branchlets (young shoots) completely glabrous, *i.e.* bearing no trace of hairs or bristles besides maybe some glandular points.
91. Leaves (mostly obtuse at the apex) markedly apiculate by a thick gland, which protrudes beyond the leaf margin.
92. Leaves linear, *i.e.* equally wide over their entire length, (3-)5-7.5 cm by (1.5-)1.8-3 mm.
 79. *D. rosmarinifolia*
92. Leaves not linear, all or at least most of them wider than 4 mm in the same specimen.
93. Flower tetramerous 78. *D. kemulensis*
93. Flowers pentamerous.
94. Corolla \pm densely appressedly hairy outside 14. *D. atjehensis*
94. Corolla glabrous outside or practically so.
95. Ovary laxly to densely hairy.
96. Corolla (\pm tubular) (9-)10-11 by 5 mm 80. *D. apiculifera*
96. Corolla up to 7 mm long.
97. Corolla (widely) campanulate. Calyx lobes 4 mm 31. *D. brachyantha*
97. Corolla ovoid, 7 mm. Calyx lobes *c.* 2 mm 30. *D. ledermannii*
95. Ovary entirely glabrous.
98. Pedicels laxly to subdensely longish (1-1.3 mm) and \pm patently glandular-setulose.
 81. *D. pittosporifolia* var. *pittosporifolia*
98. Pedicels very shortly (whether or not glandular-)subsetulose or muriculate and/or short-pubescent, or glabrous.
99. Corolla longer than 9 mm.
100. Corolla (9-)10-11 mm. Pedicels glabrous.
 101. Leaves (6-)7-12 by (3-)4-6 cm 44. *D. kinabaluensis*
 101. Leaves 3-4 by 1.5-2 cm 82. *D. retusa*
100. Corolla 13-15 mm long. Pedicels densely hirtellous 83. *D. sanguinolenta*
99. Corolla up to 8 mm long.
102. Leaves elongate-spathulate (apex rounded-obtuse and \pm retuse) . . 84. *D. sphenophylla*
102. Leaf-shape otherwise.
103. Pedicels \pm densely clad with short, rufescent, eglandular, subappressed or spreading, permanent hairs, besides maybe some muriculate hairs.
104. Petiole 3-5 mm 85. *D. rubidiflora*
104. Petiole 10-13 mm.
105. Leaves 3-4-penninerved 46. *D. crassiramea*
105. Leaves 5(-9)-plinerved 86. *D. urceolata*
103. Pedicels \pm laxly clad with fine hairs and/or bristle-like, rather thickish glandular or muriculate hairs, mostly \pm glabrescent during anthesis.
106. Pedicels (1-)2-3 mm at anthesis, up to 4 mm in fruit.
107. Leaves (3.5-)4-6(-7) by (0.8-)1-2(-3) cm.
 108. Flowers solitary, rarely in twos 87. *D. lysolepis*
 108. Flowers 3-4 per fascicle 88. *D. commutata*
107. Leaves (1.5-)2-2.8(-4.5) by (0.9-)1-1.6(-2.8) cm. (Flowers solitary, rarely in twos.)
 28. *D. soror* var. *nuda*
106. Pedicels 4-8 mm at anthesis, up to 15 mm in fruit.
109. Leaves broadly subrotundate- or obovate-elliptic to obovate.
 110. Pedicels laxly and persistently set with rather coarse glandular or muriculate hairs.
 89. *D. edulis*
110. Pedicels laxly and exclusively set with short hairs initially, early glabrescent.
 90. *D. lorentzii*
109. Leaves ovate to elliptic, sometimes lanceolate- to oblong-elliptic.
111. Leaves markedly crenulate. An alpine form of 89. *D. edulis*
111. Leaves glandular punctate beneath only, subcrenulate to entire.
112. Corolla subglobose-urceolate 50. *D. luzonica*
112. Corolla narrowly (or subtubular-)campanulate . 96. *D. heterophylla* var. *latifolia*
91. Leaves (mostly acuminate or acute at the apex) not or not manifestly apiculate, the apical gland being small and within the margin of the lamina, or if, more conspicuous, found on the (obtuse) apex underneath.
113. Pedicel very slender, (2-)2.5-3.5 cm 15. *D. penduliflora*
113. Pedicel rather slender or mostly \pm stoutish, generally up to 1, rarely up to 2 cm long.
114. Leaves manifestly penninerved; nerves 8-10, strongly inarching, the lowest pair short and straight to the margin 91. *D. punctulata*
114. Leaves pli- or pli- and penninerved, the lowest pair of nerves always curved and \pm high ascending, the upper nerves not or not manifestly inarching.

115. Leaves long-attenuate to \pm caudate-acuminate at apex.
 116. Leaves \pm shortly attenuate, or rounded to subcordate at base.
 117. Leaves 1 to 4(-5) times longer than wide, oblong-ovate or ovate.
 118. Calyx lobes rufous-tomentulose dorsally 49. *D. orophila*
 118. Calyx lobes very laxly muriculate or glabrous dorsally 92. *D. cinnamomifolia*
 117. Leaves (6-)8-10 times longer than wide, ensiform 93. *D. ensifolia*
 116. Leaves \pm long attenuate-acuminate at base 94. *D. salicifolia*
 115. Leaves \pm shortly attenuate or acuminate at apex, mostly broadly attenuate, rarely subrotundate at base.
 119. Leaves lanceolate to subovate-oblong-lanceolate (very coriaceous), trinerved from the very base 95. *D. viridiflora*
 119. Leaves subovate-oblong, or oblong, or elliptic (sometimes almost ovate or obovate), 3-5-plinerved from and from above the base, moreover with \pm pinnate upper nerves.
 120. Pedicels and bracteoles (dorsally) rusty-tomentose 53. *D. capitata*
 120. Pedicels \pm laxly hirtellous, moreover whether or not laxly set with short, thickish glandular hairs. Bracteoles \pm glabrous dorsally 96. *D. heterophylla*

1. *Diplycosia rufa* STAPP, Trans. Linn. Soc. II, Bot. 4 (1894) 191, t. 14, f. D 8-9; MERR. En. Born. (1921) 465 *p.p.*; SLEUM. Reinwardtia 4 (1957) 129; Blumea 12 (1963) 116.

Shrub, epiphytic or terrestrial and rambling amongst dense shrubs, with pendent branches, up to 2.5 m. Branchlets densely patently and longish (2-3 mm) brown-setulose in the younger, greyish and glabrescent in the older parts. *Leaves* ovate, apex caudate-acuminate, acute, the apical gland small, base rounded to subcordate, coriaceous, dark green and glossy above, glabrous (except the midrib) and shining above, densely brownish patent-setulose (1-2 mm, especially on the midrib and nerves) and rather dull beneath, margin entire, \pm revolute, (3-)3.5-5(-7) by 1.6-2.8(-3) cm, midrib impressed above, prominent beneath, nerves 2-3 pairs from and from above the base of the lamina, curved-ascending, very slightly impressed above, the basal pair \pm raised beneath; petiole stout, 1-2 mm, densely setulose. *Flowers* axillary, solitary or in few-flowered fascicles, all over longish rusty-rufous-setulose except the inside of the bracteoles, the inner basal part of the calyx lobes and the corolla at the commissures and its very base. Pedicels stoutish, 4-6 by 1-1.5 mm, basal bracts small. Bracteoles broad-ovate, 2-2.5 mm. *Calyx* 6-7(-8) mm, deeply 5-lobed, lobes ovate-lanceolate, 5-6(-7) by 1.5-2 mm (at the base). *Corolla* \pm open campanulate, angular, pink red to purple, hairy outside, rather fleshy, 7-8 mm, 5-lobed in the upper $\frac{2}{3}$. *Filaments* slender, glabrous, c. 2.5 mm; anther-cells ovate, granular, 2 mm; tubules straight, nearly 2 mm. *Ovary* hirtellous; style 4 mm. *Fruit* pale violet when ripe.

Distr. *Malesia*: North Borneo (Mt Kinabalu).

Ecol. In low mossy forest or ridge forest, 2130-3050 m. *Fl. fr.* May-Nov.

Vern. *Akar*.

2. *Diplycosia chrysothrix* STAPP, Trans. Linn. Soc. II, Bot. 4 (1894) 191, t. 14, f. E 10-14; MERR. En. Born. (1921) 463; SLEUM. Reinwardtia 4 (1957) 129; Blumea 12 (1963) 116.

Low, epiphytic shrub, (0.3-)1-2 m. Branches pendent, slender, greyish, laxly setose. Branchlets very slender, densely clothed with long (2-3 mm)

\pm appressed golden-brown or rusty bristles. *Leaves* \pm ovate or oblong-ovate, rather densely arranged, apex short-acuminate, subacute, the terminal gland small, slightly protracted, base rounded or sometimes broadly attenuate, \pm coriaceous, rather stiff and concave when dry, dark green and shining above, juvenile ones laxly setulose above, becoming soon glabrous, but remaining somewhat rough to the touch, under-surface persistently laxly to subdensely covered with long (1-2 mm) \pm obliquely patent brown bristles, more densely so along the revolute margin and the petiole, (1-)1.5-2.5(-3) by (0.6-)0.8-1.5 cm, midrib impressed above, slightly prominent beneath, nerves 1-2 pairs, high-ascending, very slightly impressed above, or indistinct on both faces; petiole 1-2.5 mm. *Flowers* solitary in the upper axils, sometimes also in twos, densely longish rufous-setulose on the pedicels, the bracteoles and the back of the calyx. Pedicels stoutish, (2-)3-5(-6) mm, basal bracts minute and glabrous. Bracteoles ovate, glabrous inside, 2 mm. *Calyx* 5-6(-7) mm, 5-lobed to nearly its base, lobes ovate-acuminate, minutely adpressed-hairy or nearly glabrous inside. *Corolla* cupular-campanulate, white to pale violet, also cream-green, 0.8 by 1-1.2 cm in fresh, 5-8 mm in dry specimens, lobes 5 broad-ovate c. 3 mm, outside laxly to subdensely hairy in the upper half especially at the lobes, glabrous along the commissures and the lower half as well as inside. *Filaments* subulate, glabrous, 2.5-3 mm; anther-cells ovate-oblong to ovate, slightly granular, 1 mm; tubules slender, 1-1.5 mm. *Ovary* laxly yellowish hairy; style green, 4-5 mm. *Fruit* said to be blue-black.

Distr. *Malesia*: North Borneo (Mt Kinabalu).

Ecol. In mossy forest or crest jungle, 1525-3100 m, locally plentiful. *Fl.* March-Nov.

3. *Diplycosia carriei* SLEUM. Reinwardtia 4 (1957) 129; Blumea 12 (1964) 342.

Epiphytic shrub, slender, with pendent branches, 30-50 cm. Branchlets very slender, very densely clothed with rather fine rufous-brown patent bristles (3-4 mm) only. *Leaves* ovate, apex short acuminate, \pm obtuse, the apical gland small and not very prominent, base \pm rounded, subcoriaceous, glabrescent above the midrib and base of

the blade excepted, densely and apparently \pm persistently patent-setulose (2–3 mm) beneath and along the margin, entire, remaining flat when dry, not revolute, 2–3 by (1.2–)1.3–1.9 cm, midrib slightly grooved above, prominent beneath, nerves 2–3 distant pairs, curved-ascending, very slightly impressed above or mostly as \pm obscure as beneath; petiole slender, 2–3 mm, densely setulose. *Flowers* axillary, solitary. Pedicels rather slender, 4–5 mm at flowering time, finally up to 7 mm, densely patently rufous-setulose, basal bract minute. Bracteoles ovate, setulose dorsally, 1 mm. *Calyx* 3 mm, densely and very patently rufous-setulose (c. 4 mm), lobes ovate, subacute, c. 2 mm. *Corolla* white, shortly and broadly subcylindric-campanulate or depressedly urceolate, 5 by 6(–8) mm, rather densely clothed in the upper $\frac{2}{3}$ with appressed rufous bristle-like hairs, which are crisped at the tips, glabrous towards the base, lobes deltoid, obtuse, erect, with two purple spots when fresh, c. 1.5 mm. *Filaments* linear, somewhat broadened above the base, c. 2 mm; anther-cells ovate-oblong, minutely echinulate, 1.3 mm; tubules rather narrow, c. 0.7 mm. *Ovary* glabrous; style 3 mm.

Distr. *Malesia*: North Borneo (Mt Kinabalu, eastern slope), twice found.

Ecol. Swampy forest, 1465–1500 m. *Fl.* April, July.

4. *Diplycosia abscondita* SLEUM. *Blumea* 11 (1961) 4; *ibid.* 12 (1963) 116; *ibid.* 12 (1964) 342.

Terrestrial shrublet, semidecumbent or erect up to 45 cm. Branchlets \pm curved-ascending, brown red when fresh, densely set with subappressed, red brown or finally greyish, c. 2 mm long bristles. *Leaves* condensed at the upper part of the branchlets, subimbricate at the tips, elliptic-oblong, apex subacuminate, subacute, with a thickish terminal gland, base broadly attenuate, subcoriaceous, somewhat shining above, \pm dull beneath, glabrous above, subdensely set underneath and along the margin with reddrown bristles, 1–2(–2.5) mm long and with a thickened base, tardily glabrescent, 6–10(–13) by 3–5(–6) mm, edge subserrate-crenulate (the teeth ending in a bristle), midrib a little impressed or inconspicuous above, slightly raised beneath, nerves and veins obscure; petiole setulose, 1–1.5 mm. *Flowers* solitary in distant upper axils. Pedicels stoutish, bent downwards, 3–4 mm at anthesis, setulose, with 2 or 3 ovate glabrous basal bracteoles (1–1.5 mm), and 2 bracteoles below the calyx. *Calyx* campanulate, c. 5 mm long in all, 5-partite to almost the base, subdensely rufous-setulose dorsally, lobes elongate-subovate, subacute. *Corolla* subcampanulate-cylindric, white, membranous, quite glabrous, 7–8 by 3–4 mm, lobes subacute, c. 2.5 mm, finally reflexed distally. *Filaments* filiform, glabrous, white, 4.5 mm; cells 1.7 mm, brownish, ovate-oblong, echinulate; tubules as long as, but much narrower than the anther-cells, filiform-cylindric, very shortly biaristate at the apex. *Ovary* laxly hairy, pale green when fresh; style white, glabrous, slender, 7 mm.

Distr. *Malesia*: North Borneo (Mt Kinabalu).

Ecol. On bare rock on ridge, 2440–3200 m, apparently rare. *Fl.* July, Oct.

5. *Diplycosia barbiger* SLEUM. *Bot. Jahrb.* 71 (1940) 149; *Reinwardtia* 4 (1957) 130.

Climbing shrub, 3–4 m. Branchlets densely covered with dark rufous \pm appressed bristles (c. 3 mm) at the tips, less densely so or scabrous by the remaining bases of the bristles in the older parts, dark brown when dry. *Leaves* ovate or elliptic-ovate, gradually acuminate towards the apex, acute, the apical gland small, base rounded or nearly so, coriaceous, stiff, shining especially above, mature ones entirely glabrescent above, laxly to subdensely set with curved, \pm patent, dark rufous bristle-like hairs, or ultimately their bases below, more densely so at the somewhat revolute margin, (2–)2.5–4(–4.5) by 1.5–2.3(–2.6) cm, midrib impressed above, slightly prominent beneath, nerves 1–2 pairs from or somewhat above the base of the lamina, curved and high-ascending, very slightly impressed above, obsolete beneath; petiole stout, 1–2 mm. *Flowers* 1–2 in each of the upper axils, densely covered with long (3–4 mm) rather fine rufous bristles on the pedicels, and the external sides of both the bracteoles and the calyx lobes. Pedicels stoutish, c. 3(–4) mm, basal bracts subulate, minute. Bracteoles ovate, 1.2 mm. *Calyx* campanulate, lobes narrow-ovate, acuminate, 2 mm. *Corolla* urceolate, white or cream when fresh, rather thin, glabrous, 5 mm, lobes 2 mm. *Filaments* linear, glabrous, 2 mm; anther-cells 1.4 mm; tubules narrow, 1.2 mm. *Ovary* densely whitish hairy; style 4 mm. *Fruit* pale bluish.

Distr. *Malesia*: Borneo (Sarawak: Mt Lumut, Mt Dulit), thrice found.

Ecol. In open moss forest on exposed peak, 950–1300 m. *Fl.* Sept.

6. *Diplycosia schramii* SLEUM. *Blumea* 12 (1963) 116.

Epiphytic, few-stemmed shrub. Branches pendent, 1–2 m, few-branched distally. Branchlets 4–5 mm ϕ , young shoots very densely, older parts densely covered both with shorter, slender and \pm crisped, and with longer and more robust, erect, 2–4 mm long, rusty, subappressed bristles. *Leaves* laxly arranged, broadly elliptic to almost rounded, apex shortly attenuate to subrotundate-obtuse, the terminal gland thick and protruding, base broadly attenuate into the petiole, more rarely almost rounded, coriaceous, dark green above, paler beneath, initially rather densely set on both faces with soft rusty subappressed bristles, glabrescent with age above only, entire, edge slightly revolute, (4–)4.5–6.5 by (2.5–)3–4.5(–5) cm, midrib and nerves narrowly impressed above, obtusely prominent beneath, nerves 2(–3) pairs high curved-ascending, the lowest pair coming from the base of the lamina, the other(s) from the midrib c. 1 cm above the base, shorter and less conspicuous than the basal pair; petiole (4–)5–8 by 2–3 mm. *Flowers* solitary, rarely in twos, very

rarely in threes in the upper axils, all over covered with the indumentum found on the branchlets and leaves, except the glabrous corolla. Pedicels stout, 5 mm at anthesis, up to 1 cm in fruit. Bracteoles ovate, *c.* 2 mm. *Calyx* cup-shaped, tube very short, lobes ovate-deltoid, *c.* 2.5 mm. *Corolla* urceolate-campanulate, thin, white, *c.* 4 mm. *Ovary* glabrous; style thickish, glabrous, 2.5 mm. *Fruit* first white-greenish, turning light bluish-purple with maturity, 5–6 mm ϕ .

Distr. Malesia: NW. New Guinea (Vogelkop Peninsula: from the crest of Mt Nettoti).

Ecol. In dense mossy forest, 1850–1950 m, apparently rare. *Fl. fr.* Nov.–Dec.

7. *Diplycosia sauruioides* J. J. S. Bull. Jard. Bot. Btzg III, 13 (1935) 456; SLEUM. Reinwardtia 4 (1957) 130.

Epiphytic shrub. Branchlets longish and coarsely setose in the older, very densely lanate-setose in the younger parts, the bristles rufous, \pm crisped and \pm patent. *Leaves* ovate to elliptic-ovate, apex mostly shortly abrupt-acuminate, the terminal gland distinct, base \pm rounded, subcoriaceous, firm, entire, juvenile ones densely rusty lanate-setose on both faces, mature ones glabrescent above except the midrib, but rather densely persistently and coarsely setose underneath, the bristles \pm erecto-patent, with thickened bases, rather short all over the proper undersurface, longer and more patent at the midrib beneath, 7.5–14 by 4.5–7.8 cm, midrib impressed above, strongly prominent beneath, nerves 5–6 pairs (with some more shorter and less distinct ones between them) curved-ascending, obscurely anastomosing, slightly impressed above, raised beneath, reticulation faint above, obsolete beneath; petiole stout, densely long-setose, 4–11 mm. *Fascicles* axillary, 4–5-flowered, patent- and crisped-setose in all parts, the corolla excepted. Pedicels rather slender, (3–)4–5(–7) mm. Bracteoles nearly reniform, covering each other at the base, glabrous inside, 1.5–2 mm. *Calyx* \pm patent, 3 mm, lobes triangular, \pm acute, inflexed, 1.5–2 mm. *Corolla* campanulate, suffused reddish violet, *c.* 6.5 mm, glabrous, lobes recurved, 2 mm. *Filaments* narrow, wavy, glabrous, 3 mm; anther-cells oblong, granular, *c.* 1.5 mm; tubules straight, 1 mm. *Ovary* glabrous; style 5 mm.

Distr. Malesia: Central East Borneo (summit of Mt Kemul), once found.

Ecol. Primary forest at 1850 m. *Fl.* Oct.

8. *Diplycosia clementium* SLEUM. Bot. Jahrb. 71 (1940) 151; Reinwardtia 4 (1957) 130; Blumea 12 (1963) 116. — **Fig. 70.**

Epiphytic, climbing or decumbent shrub, *c.* 2 m. Branchlets greyish corticate, glabrescent, young shoots very densely clad with rufous, patent, bristle-like hairs (2–3 mm). *Leaves* ovate to sub-oblong-ovate, apex gradually acuminate, sub-acute, slightly curved, the terminal gland small, base rounded to subcordate, or sometimes nearly truncate, firmly subcoriaceous, the very young ones longish rufous- or golden-brown-hairy on

both faces, glabrescent and becoming scabrous with age, finally glabrous above, rather densely \pm patently long-setulose beneath, especially on the midrib and along the margin, entire or sub-denticulate by the persistent bases of the marginal bristles, 5–9(–10) by (2.3–)3–4.5(–5.5) cm, midrib and nerves impressed above, the first markedly, the latter less distinctly prominent beneath, nerves 6–7 pairs curved-ascending and inarching in some distance from the edge; petiole patent-rufous-setose, stoutish, 4–6 mm. *Flowers* axillary, 2–4 per fascicle, or rarely solitary. Pedicels slender, densely covered with (2–)3–4(–5) mm long bristle-like rufous hairs as are the bracteoles and the calyx outside, (8–)10–13 mm, basal bracts small, scarioso. Bracteoles ovate, 1 mm. *Calyx* campanulate, 3.5–4 mm, lobes triangular, subacute, *c.* 2 mm. *Corolla* narrow-campanulate, cream, pale green or mostly slate blue to brownish purple, lobes pink to purplish, inner base greenish, somewhat fleshy, very densely covered outside with longish ferruginous and \pm crisped, not setose hairs, glabrous inside, 6–7 mm, lobes acutish, 2.5 mm. *Filaments* subulate, glabrous, 3.5 mm; anther-cells very granular, 2.8 mm; tubules rigid, 1.2 mm. *Ovary* glabrous; style 5 mm. *Fruit* greenish purplish, *c.* 3.5 mm ϕ .

Distr. Malesia: North Borneo (Mt Kinabalu).

Ecol. In low jungle and jungle ridge, occasionally also in moss forest, 1370–2900 m, once reported from 3650 m, not rare. *Fl.* Jan.–Dec.

9. *Diplycosia aurea* SLEUM. Bot. Jahrb. 71 (1940) 148; Reinwardtia 4 (1957) 131. — *D. rufa* (non STAFF) MERR. En. Born. (1921) 465 *p.p.*

Epiphytic shrub or small recumbent tree. Branchlets densely clothed with fine, golden, manifestly appressed subsetulose hairs in the young parts, glabrescent and greyish in the older ones. *Leaves* ovate to oblong-ovate, apex gradually or rather abruptly acuminate, acute, not rarely somewhat curved, the terminal gland small, base rounded to subcordate, subcoriaceous or coriaceous, very young ones subdensely covered with long appressed dilutely golden setose hairs on both faces, mature ones entirely glabrescent and shining above, but \pm permanently hairy beneath, especially along the margin, the hairs finally caducous, the undersurface becoming punctate then, margin ciliate-serrulate, 5–8(–11) by 2.5–3.5(–4.5) cm, midrib impressed above, prominent beneath, nerves 3–4 pairs, curved-ascending and anastomosing, slightly impressed above, obsolete beneath; petiole densely rufous-setulose, 2–3(–4) mm. *Flowers* axillary, solitary or mostly 2 or 3 in a fascicle, very densely hirsute by long, rufous-golden, bristle-like, \pm appressed hairs in all parts, the corolla excepted. Pedicels stout, 7–8(–10) by 1–1.5 mm, basal bracts minute. Bracteoles ovate-acuminate, *c.* 4 mm, glabrous inside. *Calyx* *c.* 6 mm, 5-lobed to nearly the base, lobes glabrous at the base only, \pm including the corolla. *Corolla* urceolate, fleshy, glabrous, greenish or brownish creamy, 6–7 mm, lobes short-reflexed, purplish. *Filaments* glabrous, linear,



Fig. 70. *Diplycosia clementium* SLEUM. a. Habit, $\times \frac{2}{3}$, b. flower bud, $\times 3$, c. flower, $\times 3$, d. stamen, front view, $\times 6$, e. ovary and style, $\times 3$, f. bristle, $\times 14$ (a-f CLEMENS 33132).

3.5 mm; anther-cells granular, 2 mm; tubules narrow, slender, 1.6 mm. *Ovary* glabrous; style 4 mm.

Distr. *Malesia*: North Borneo (Mt Kinabalu).

Ecol. In dense jungle ridge, 1220–1525 m, locally frequent. *Fl.* Jan.–April.

10. *Diplycosia lilianae* J. J. S. in Gibbs, Arfak (1917) 170; SLEUM. Bot. Jahrb. 72 (1942) 211; Reinwardtia 4 (1957) 131; Blumea 12 (1963) 117.

Erect shrub, 0.5–1 m, few-stemmed. Branchlets in the younger parts exclusively and rather densely covered with \pm patent, gland-tipped bristles. *Leaves* elliptic, sometimes more obovate, apex broadly attenuate, obtuse or rounded, the terminal gland thick, manifestly protruding, base broad-cuneate into the petiole, coriaceous, margin sub-crenulate and slightly revolute, glabrous and shining above, dull and laxly set with \pm caducous bristles beneath as are the margin and the petiole, (1.5–)2–3.5(–4.3) by (0.9–)1.2–2.5(–3.5) cm, midrib and 1–2 lateral nerves markedly impressed above, slightly so beneath, the inferior pair of nerves curved-ascending from near the base of the lamina, the other upper pair from above the base and mostly rather indistinct; petiole thickish, grooved above, rather flattened, 3–5 mm. *Flowers* axillary, 2–3(–4) per fascicle. Pedicels recurved, rather slender, reddish brownish, densely clad with patent, longish (2 mm), gland-tipped bristles, 5–8 mm, basal bracts minute. Bracteoles ovate-semiorbicular, ciliate, setose dorsally, c. 1 mm. *Calyx* c. 5 mm, densely patently glandular-setose, reddish, 5-lobed halfway, lobes ovate-acuminate, subacute, ciliate at the paler, almost whitish margin. *Corolla* cylindrical-urceolate, bright brick red to rather dark crimson red, (5–)6 mm, glabrous, lobes white, 1 mm. *Filaments* linear, slightly dilated below, papillose, c. 3.5 mm; anther-cells ovate-oblong, granular, 1.5 mm including the short tubules. *Ovary* glabrous; style 3 mm. *Fruit* pale violet at full maturity, c. 5 mm ϕ .

Distr. *Malesia*: NW. New Guinea (Arfak Mts: Koëbré ridge between Anggi Lakes and Mt Mesenuk on Lake Anggi Gita).

Ecol. Undergrowth in moss or ridge forest or forest edge, (1900–)2150–2300 m, not rare locally. *Fl. fr.* Dec.–Jan.

11. *Diplycosia loheri* MERR. Philip. J. Sc. 27 (1925) 44; En. Philip. 4 (1925) 253; COPEL. f. Philip. J. Sc. 47 (1932) 67, t. 1, f. 6, 7; SLEUM. Reinwardtia 4 (1957) 131.

Shrub, apparently scandent. Branches glabrous, dark when dry. Branchlets setulose with spreading brown hairs (0.5–3 mm) in the youngest parts. *Leaves* ovate or elliptic-ovate, subinequilateral, apex gradually \pm shortly acuminate, the terminal gland slightly or not prominent, base broad-attenuate to rounded, subcoriaceous with scattered rufous bristle-like hairs (1–2 mm) on both faces and along the margin, later \pm glabrescent above, the hairs in part caducous beneath, leaving dark glandular points, 2.5–4 by 1.5–2.5 cm, midrib impressed above, somewhat raised beneath, nerves

obscure, frequently only a subbasal curved-ascending pair visible, never more than 2 pairs present, these evanescent, reticulations obsolete; petiole setulose (hairs up to 5 mm), 2–3 mm. *Flowers* axillary, solitary or in pairs, rarely in threes. Pedicels slender, conspicuously bristly, moreover densely pubescent with minute simple white hairs, 1–2.5 cm. Bracteoles not mentioned in the original description, nor figured. *Calyx* 3 mm, densely clad with patent-setose hairs (1–2.5 mm), lobes triangular, acute, hardly 1 mm, glabrous except for the finely white-ciliate margins. *Corolla* subturbinate, glabrous, 5.5 mm, lobes recurved, broadly ovate, obtuse, 1.5 mm. *Filaments* linear, glabrous, 1.5–2 mm; anthers c. 1.4 mm including the short, rather broad tubules. *Ovary* glabrous; style c. 2 mm.

Distr. *Malesia*: Philippines (Luzon, Nueva Vizcaya Prov.: Caraballo Mts), once found.

12. *Diplycosia aperta* J. J. S. Bot. Jahrb. 68 (1937) 208; SLEUM. Reinwardtia 4 (1957) 131. — *D. pokapindjangensis* J. J. S. Bot. Jahrb. 68 (1937) 204. — *D. undata* (non J. J. S.) H. J. LAM, Blumea 5 (1945) 574.

Shrub, epiphytic, sometimes scandent, 1 m, with long branches or stolones, which bear rather short branchlets, these terete, brownish, rather densely and \pm patently covered with longish (2–3 mm) rufous bristle-like hairs. *Leaves* elliptic, rarely oblong-elliptic or ovate-elliptic, apex shortly gradually acuminate, subacute or obtuse, manifestly apiculate by the thick terminal gland, base broad-attenuate, subcoriaceous to coriaceous, minutely remotely denticulate, the teeth ciliate by longish, rather early caducous bristles, or sub-entire, glabrous, though subdensely blackish punctulate on both faces especially beneath, (1.2–)2–3(–4) by (0.7–)1.3–2(–2.5) cm, midrib slightly impressed above, prominent beneath, nerves in 2 pairs, one of them coming from base of the lamina, the other from the lower third of the midrib, all curved-ascending to the apex of the lamina, slightly impressed above, obscure beneath; petiole laxly set with short bristles, 2–4 mm. *Flowers* 1 or 2, rarely 3 in each of the upper axils. Pedicels slender, 0.8–1.1 cm, laxly set with subappressed, longish, fine caducous bristles, or finally with their gland-like bases, basal bracts minute. Bracteoles ovate, obtuse, muriculate-ciliate, c. 1.5 mm. *Calyx* c. 3 mm, contracted at the base, glabrous or with some fine glandular warts dorsally, lobes ovate, rather obtuse, ciliate and glandular-muriculate, 2 mm. *Corolla* elongate-urceolate, 8–9 mm long, c. 2.5 mm ϕ , red or rose, glabrous, lobes pale, 1.5 mm. *Filaments* slender, slightly dilated towards the base, glabrous, wavy, 4–5 mm; anthers including the very short tubules c. 2.8 mm. *Ovary* glabrous or with some scattered hairs; style c. 4 mm, completely or at least in its upper $\frac{2}{3}$ shortly patent-pubescent. *Fruit* said to be blue.

Distr. *Malesia*: SW. Central Celebes (Lati modjong Ra.: Mt Pokapindjang and its spurs Mt Mambuliling, N of Mamasa).

Ecol. In ridge forest and subalpine thickets, 2400–3000 m, locally not rare. *Fl.* June, Aug., Nov.

13. *Diplycosia pubivertex* SLEUM. Reinwardtia 4 (1957) 131.

Shrub. Branches terete, straight, c. 3 mm σ , densely rufous-strigose. Branchlets very densely subappressedly rufous-setose (2–3 mm). *Leaves* oblong-elliptic, or sometimes obovate-elliptic, apex shortly, also rather abruptly acuminate, subacute to rather obtuse, the terminal gland thick and protruding, base attenuate into the petiole, coriaceous, firm, juvenile ones appressed-rufous-setulose on both faces, mature ones \pm glabrous above, the whole undersurface and the margin with rufous bristle-like hairs, which are longer on the midrib and towards the base of the lamina, obscurely crenulate or nearly entire, somewhat concave in dry state, margin slightly revolute, 2–3(–3.5) by 0.9–1.5 cm, midrib impressed above, prominent beneath, nerves 2 pairs from and from above the base of the lamina, curved and high-ascendent, very slightly immersed above, \pm obscure beneath; petiole stoutish, setulose, 3–4 by 1 mm. *Flowers* axillary, solitary. Pedicels stout, densely clad with rufescent crisped, sometimes minutely gland-tipped hairs, 4–5 by nearly 1 mm, basal bracts numerous, small. Bracteoles ovate-acuminate, subacute, nearly glabrous dorsally, margin very shortly muciculate-fimbriate, 2 mm. *Calyx* campanulate, 8–9 mm, dorsally and especially at the lobes subdensely clad with rufescent rather crisped setulose hairs, lobes narrow-triangular, subacute, upright, 5–6 mm. *Corolla* subcylindric, 8–9 by c. 2.5 mm, shortly 5-lobed, rather densely clothed outside in the upper half with longish rufescent \pm crisped hairs, glabrous below as well as inside. *Filaments* linear, dilated towards the base, glabrous, c. 4.5 mm; anthers subovate-oblong, 3 mm including the tubules (1 mm). *Ovary* densely yellowish pubescent; style 7 mm.

Distr. Malesia: N. Sumatra (Atjeh, Gajo Lands: Mt Losir), two collections.

Ecol. In mountain scrub and burned vegetation on ridge, 2950–3500 m. *Fl.* Febr.

14. *Diplycosia atjehensis* SLEUM. Reinwardtia 4 (1957) 132.

Shrub. Branchlets obtusangular, covered with greyish cork, tips brownish with some scattered short caducous bristles, or their bases, or glabrous. *Leaves* elliptic to obovate, sometimes oblong or broad-elliptic to nearly rounded, apex broad-attenuate, obtuse or rounded, also emarginate, apiculate by a thick dark protruding gland, base broadly cuneate into the petiole, or rarely nearly rounded, stiff-coriaceous, shining and glabrous above, dull and laxly blackish punctate beneath, margin revolute and with very minute impressed crenulations, (2.5–)4–5 by 1.5–2.5(–3) cm, midrib impressed above, thick and prominent beneath, nerves 2–3 pairs, rather inconspicuous on both faces; petiole stout, rugulose, glabrous or sometimes with some short bristles on the uppermost leaves, 4–6 by 1.5–2 mm. *Flowers* 1–2, rarely 3

per axil. Pedicels clothed with short rufescent rough hairs with some short thick glandular hairs between, glabrescent in later stages, 4–6 by c. 1 mm, basal bracts ovate, acute, few in number. Bracteoles ovate, apiculate, rough-haired dorsally, ciliate, c. 1.5 mm. *Calyx* 5 mm, contracted at the very base, 5-lobed to nearly the base, lobes narrow-ovate, acuminate, laxly appressed-hairy dorsally, especially towards the tips, margin muciculate and ciliate, c. 4 mm. *Corolla* urceolate, c. 6 mm, glabrous on the very base, otherwise densely covered with yellowish appressed hairs, lobes reflexed, c. 1 mm. *Filaments* linear, dilated towards the base, papillose, 2.8 mm; anthers ovate-oblong, echinulate, 2.5 mm including the rather short tubules. *Ovary* rather densely yellowish hirsute; style as long as the corolla. *Fruit* blackish, c. 5 mm σ , calyx lobes somewhat spreading in their upper half; capsule hirsute on top.

Distr. Malesia: N. Sumatra (Atjeh, Gajo Lands: Mt Losir and Putjuk Angasan).

Ecol. In ridge forest or scrub, 2500–3500 m. *Fl.* Jan.–Febr.

15. *Diplycosia penduliflora* STAPP, Trans. Linn. Soc. II, Bot. 4 (1894) 193, t. 14, f. C 7; MERR. En. Born. (1921) 465; SLEUM. Reinwardtia 4 (1957) 133; Blumea 12 (1963) 117. — **Fig. 78c.**

Shrub, c. 1 m, lax, decumbent, terrestrial or epiphyte, sometimes climbing. Branches terete, greyish corticate. Branchlets subangular, brownish, with some scattered long and \pm appressed bristles in the youngest parts, which bear not yet fully developed leaves, otherwise glabrous. *Leaves* elliptic or ovate-elliptic, sometimes \pm ovate or oblong, apex rather shortly and \pm abruptly caudate-acuminate, acute, the terminal gland small, not protruding, base rounded or broad-cuneate, occasionally slightly cordate, coriaceous at full maturity, very young ones with scattered very short glandular appressed hairs underneath, mature ones glabrous on both faces, but with rather indistinct blackish points underneath, entire, (11–) 12–18 by (4–)5–9(–12) cm, midrib \pm distinctly impressed above, thickly raised beneath, nerves 4–5 pairs, remote, curved-ascendent and inarching with several less distinct or shorter and more straight ones between them, slightly immersed above, prominent beneath, veins mostly rather inconspicuous; petiole thick, canaliculate above, thick, 4–5 by 1.5–2 mm. *Flowers* mostly solitary, sometimes in twos, from the axils of the inferior defoliate part of the branchlets. Pedicels filiform, at anthesis (2–)2.5–3.5 cm, laxly set with longish appressed early caducous bristle-like hairs. Bracteoles narrow-ovate, subacute, glabrous, ciliolate, 1–1.5 mm. *Calyx* pear- or funnel-shaped, rugulose, 3–4 mm, only slightly accrescent in fruit, glabrous, lobes patent, ovate, acute, glandular-ciliate, 1–1.5 mm. *Corolla* pale green, short-urceolate, rounded at the base, the mouth broadly open, 4 mm, glabrous, shortly 5-lobed, lobes rather straight, 1.5 mm. *Filaments* linear, glabrous, 1.5 mm; anther-cells ovate-oblong, granular, 1.3 mm; tubules 0.7 mm. *Ovary* glabrous; style 2–2.5 mm. *Fruit*

blue or purplish, finally blackish.

Distr. *Malesia*: North Borneo (Mt Kinabalu).

Ecol. In wet (*Tristania*-)forest, 1070–1525 m. *Fl. Jan.*, Aug.

16. *Diplycosia ciliolata* HOOK. f. *Ic. Pl.* (1852) t. 894; STAPP, *Trans. Linn. Soc. II, Bot.* 4 (1894) 192; GIBBS, *J. Linn. Soc. Bot.* 42 (1914) 101; MERR. *En. Born.* (1921) 463; COX, *Am. Midl. Nat.* 40 (1948) 499 (*anat.*); SLEUM. *Reinwardtia* 4 (1957) 133; Blumea 12 (1963) 117. — *Gaultheria ciliolata* (HOOK. f.) F. v. M. *Trans. R. Soc. Vict. n.s.* 1, 2 (1889) 21, *in text.* — **Fig. 77f.**

Treelet or shrub, 1–2(–3, sometimes up to 4) m. Branches erect and \pm spreading, terete, glabrous, blackish when dry. Branchlets densely subappressed rufous-setose in the young parts, greyish so in the older ones. *Leaves* very dense, \pm patent, narrow-elliptic-lanceolate, apex acuminate, subacute, the terminal gland small, but well visible, base attenuate, subcoriaceous, reddish when very young, margin subcartilaginous, crenate-serrulate, the teeth minute and \pm long, but caducously ciliate, glabrous above, laxly caducously setulose or punctate beneath, 8–14 by (1.8–)3–4.5 mm, midrib impressed above, poorly visible beneath, nerves inconspicuous; petiole *c.* 1 mm. *Flowers* axillary, solitary. Pedicels rather stoutish, short-hairy, 2–3 mm, basal bracts minute. Bracteoles ovate, acuminate, glabrous dorsally, ciliate, 1 mm. *Calyx* 3 mm, deeply 5-lobed, green with purple tinge, glabrous, lobes narrow-ovate, acuminate, shortly glandular-fimbriate, 2.5 mm. *Corolla* urceolate-cylindric, white or pink, sometimes cream-green, glabrous, 5–6 by 2.5(–3.5) mm, lobes suberect, 1.5 mm. *Filaments* linear, glabrous, 3.5 mm; anther-cells ovate-oblong, very granular, including tubules 2.5 mm. *Ovary* yellowish hirsute; style 4.5 mm. *Fruit* blackish blue, somewhat shining, *c.* 4 mm ϕ .

Distr. *Malesia*: North Borneo (Mt Kinabalu and Mt Trus Madi).

Ecol. In mossy forest, dwarf forest, on exposed ridge crest, rather common in open places on the granite core of Mt Kinabalu, 1830–3500 (–3650) m. *Fl. fr.* Jan.–Oct.

17. *Diplycosia filipes* SLEUM. *Reinwardtia* 4 (1957) 133. — **Fig. 77j.**

Epiphytic shrublet. Branchlets subterete, slender, greyish corticate in the older parts, rather densely and longish (1.5–2 mm) clothed with appressed rufescent fine bristles in the younger ones. *Leaves* lanceolate or oblong-lanceolate, apex gradually short-acuminate, subacute, the terminal gland small and only slightly protruding, base attenuate into the petiole, acute, subcoriaceous, glabrous above, sparsely blackish punctate beneath, regularly minutely crenulate-denticulate, the teeth in the young leaves passing into a rather long, early caducous bristle-like hair, 12–20 by 4–6 mm, midrib impressed above, slightly prominent beneath, nerves obscure; petiole setulose, *c.* 1.5 mm. *Flowers* axillary, solitary. Pedicels slender, laxly and shortly \pm appressed-setulose

initially, finally glabrous, (5–)6–7 mm, basal bracts minute. Bracteoles small, ovate-obtuse, glabrous. *Calyx* 2.5–3 mm, glabrous, 5-lobed halfway, lobes ovate, acutish, glandular-fimbriate. *Corolla* not seen in a fully developed state, apparently urceolate and, to conclude from the length of the style, *c.* 4 mm long, glabrous, said to be red. *Stamens* not yet known in a fully developed state. *Ovary* glabrous; style 3.5 mm. Immature *fruit* contracted at the base, *c.* 3 mm ϕ .

Distr. *Malesia*: Central Celebes (between Kam-buno and Tomadu), one collection.

Ecol. In rather light forest, near rockery, 2550–2800 m. *Fl.* July.

18. *Diplycosia rufescens* SCHLTR. *Bot. Jahrb.* 55 (1918) 163, f. 7 A–G; SLEUM. *ibid.* 72 (1942) 211; *Reinwardtia* 4 (1957) 134.

Erect shrub, *c.* 1 m, epiphytic. Branches and branchlets terete, the latter densely subappressed-rufous-setose (*c.* 1.5 mm), laxly leaved. *Leaves* rather narrowly oblong-elliptic, apex gradually acuminate, subacute, the terminal gland small, only slightly protracted, base \pm broadly attenuate, firmly subcoriaceous, glabrous above at maturity, laxly to subdensely covered with stiff rather coarse and \pm appressed rufous bristles (2–3 mm) beneath, which partly go, partly persist for a long time especially on the midrib, finally only brownish punctate underneath, entire or indistinctly denticulate, (2–)2.5–4(–5) by (0.8–)1–1.7 (–2) cm, midrib impressed above, slightly raised beneath, nerves 2(–3) pairs high curved-ascending, indistinctly anastomosing, mostly hardly visible above, rather obscurely raised beneath; petiole stoutish, setulose, 2–3 mm. *Flowers* solitary or in twos in the upper axils. Pedicels recurved, densely and \pm patently (subglandular-)setulose, (5–)6–8 mm at anthesis, up to 10 mm in later stages, basal bracts scarious, minute. Bracteoles ovate, glabrous, ciliolate, 1 mm. *Calyx* *c.* 3 mm, glabrous, lobes ovate, ciliolate, *c.* 2 mm. *Corolla* subglobose-urceolate, glabrous, whitish or rose when fresh, *c.* 5 mm ϕ , very shortly 5-lobed. *Filaments* filiform, glabrous, 2.5 mm; anther-cells oblong-ovate, very granular, *c.* 2 mm including the very short tubules. *Ovary* glabrous; style 3.5 mm. *Fruit* red, *c.* 7 mm ϕ .

Distr. *Malesia*: NE. New Guinea (Sepik region).

Ecol. In dense mountain forest, 850–1500 m. *Fl. fr.* July–Oct.

19. *Diplycosia triangulathera* J. J. S. *Bot. Jahrb.* 68 (1937) 207; SLEUM. *Reinwardtia* 4 (1957) 134.

Shrub, whether or not epiphytic, 0.5 m. Branches elongate, divergent, slender. Branchlets densely and rather patently rufous-setulose (*c.* 1.5 mm) in the young, gradually glabrescent in the older parts. *Leaves* elliptic to ovate, apex broad-acuminate, the terminal gland rather thick and protruding, base broadly attenuate to rounded, young ones laxly clothed with longish \pm patent setulose hairs on both faces and the margin, glabrescent with age, the marginal bristles \pm

permanent, the undersurface finally dotted with blackish points, margin superficially denticulate, (0.9-)1.2-1.7(-1.9) by (0.5-)0.6-1 cm, midrib slightly impressed above, other nervation obscure; petiole setulose, 1-2 mm. *Flowers* 1-2(-3) in the upper axils. Pedicels slender, shortly patent-setulose, (6-)8-10 mm, basal bracts several, very small. Bracteoles broad-ovate, subglandular-ciliolate, 1 mm. *Calyx* 2.5 mm, contracted at the base, glabrous, lobes broad-ovate, 1.4 mm, margin very shortly glandular-muriculate and ciliolate. *Corolla* broadly campanulate-urceolate, slightly constricted at the mouth, glabrous, white, c. 4 mm long and wide, lobes short, recurved. *Filaments* linear, inflexed, glabrous, 1.5 mm; anthers triangular-ovate, granular, c. 1 mm including the very short tubules. *Ovary* glabrous; style 2 mm. *Fruit* blackish blue, c. 5 mm ϕ .

Distr. Malesia: Central Celebes (Todjambu near Palopo; Puna near Poso).

Ecol. In open primary rain-forest, on quartzite, peaty soil, 1000-1800 m. *Fl. fr.* June.

20. *Diplycosia kjellbergii* J. J. S. Bot. Jahrb. 68 (1937) 206; SLEUM. Reinwardtia 4 (1957) 122, *in clavi*; Blumea 11 (1961) 6.

Epiphytic, scandent shrub. Branches slender, laxly setulose or glabrescent. Branchlets densely, their angular tips even more densely and \pm patently setulose (1.5-2 mm). *Leaves* elliptic, apex shortly or subabruptly acuminate, the apical gland rather small, base cuneate, subcoriaceous to chartaceous, very laxly setulose on both faces when young, glabrescent with age above, minutely denticulate, each tooth passing into a long \pm persistent bristle, (1.4-)2-3.2 by (0.8-)1.2-1.7 cm, midrib slightly impressed above, prominent beneath, nerves 2 pairs, one pair low, the other higher from the midrib, \pm faintly visible beneath as are the mayor veins; petiole setulose, 1.5-2 mm. *Flowers* axillary, solitary. Pedicels slender, subdensely and \pm patently longish setulose, (3-)4 (-5) mm. Bracteoles ovate-suborbicular, very laxly setulose dorsally, ciliate, c. 1.2 mm. *Calyx* 4 mm, all over subdensely and \pm patently covered with longish (2 mm), \pm crisped, rufescent hairs, lobes ovate-triangular, subacute, 2.5 mm. *Corolla* urceolate, glabrous or with some solitary scattered hairs at the lobes, red, 6.5 by 2.5 mm, lobes 1 mm. *Filaments* linear, very slightly dilated towards the base, glabrous, 3 mm; anthers 1.8 mm including the very short and broad tubules. *Ovary* glabrous; style nearly 3 mm. *Fruit* dark blue, laxly set with rufescent setose hairs, c. 5 mm ϕ .

Distr. Malesia: SE. Celebes (Porema S of Malili), 1500 m. One collection. *Fl. fr.* Oct.

21. *Diplycosia hirsuta* SLEUM. Bot. Jahrb. 71 (1940) 154; Reinwardtia 4 (1957) 135.

Shrub, terrestrial or epiphytic. Branchlets greyish and laxly patently setose in the older, reddish brown and very densely setose (2-3 mm) in the recent parts. *Leaves* ovate, shortly, sometimes \pm abruptly acuminate, acute, the terminal gland small, base rounded to slightly cordate, sub-

coriaceous, entire, soft-setulose along the midrib and nerves above, densely and patently so (0.5-1.5 mm) all over the undersurface especially on the midrib, longish setulose-ciliate along the margin, 3.5-6 by (2-)2.5-3.5 cm, midrib impressed above, prominent beneath, nerves 2 pairs from and somewhat from above the base of the lamina, curved-ascending, other nerves from the midrib in 1-2 less distinct pairs, all slightly impressed above, \pm raised beneath, reticulation only visible on the upperside of old leaves; petiole stout, densely setose, 2-3(-4) by 1.5 mm. *Flowers* axillary, solitary or in twos. Pedicels very slender, nearly filiform, rather laxly set with patent bristle-like hairs, 0.8-1.3 cm, accrescent in fruit up to 2 cm. Bracteoles broad-ovate, glabrous, ciliate, c. 1 mm. *Calyx* c. 3 mm, with some bristle-like hairs dorsally and at the lobes, glabrous otherwise, lobes ovate, obtuse, shortly glandular-fimbriate, 1.5 mm. *Corolla* urceolate, glabrous, deeply red, 1-1.1 cm long, 4-5 mm ϕ (c. 6 mm at base), shortly 5-lobed. *Filaments* linear, glabrous, 4-5 mm; anthers inflexed at base, oblong, echinulate, 2.5 mm including the rather short tubules. *Ovary* glabrous; style 6-7 mm. *Fruit* black when dry, bluish when fresh, glabrous, 6-7 mm ϕ .

Distr. Malesia: Central Celebes (Mt Ponáa and the Kambuno massif).

Ecol. Margin of a quartzite peaty plateau, 1500-1700 m. *Fl.* Aug.-Sept.

22. *Diplycosia rosea* SLEUM. Reinwardtia 4 (1957) 135; Blumea 12 (1963) 117. — Fig. 71.

Epiphytic or mostly terrestrial, few-stemmed shrub, 0.5-1(-2) m. Branchlets elongate, terete, rather densely and \pm patently greyish setose in the older parts, very densely clothed with patent, rufous bristles on young shoots. *Leaves* elliptic, broadly attenuate to \pm rounded at the apex, the terminal gland thick and prominent, base rounded or rarely truncate, coriaceous and stiff at maturity, somewhat convex, dark olive green above, lighter green below, young ones clad with scattered brownish bristle-like appressed hairs (1.5-2 mm), when full-grown blackish punctulate above, more persistently and \pm patently rufous-setulose beneath, minutely crenulate or obscurely denticulate, setose-ciliate, (1.5-)2-3(-5) by 1.2-1.6(-2) cm, midrib impressed above, indistinct beneath, nerves 1-2 pairs from and from above the base and curved upwards to the apex of the lamina, very slightly impressed above, other nerves in 2-3 pairs higher from the midrib, less visible or nearly obscure; petiole setose, (2-)3-4 by 1 mm. *Flowers* axillary, solitary or in twos, rarely in threes. Pedicels slender, nodding, \pm densely clad with subpatent \pm crisped and minutely gland-tipped setose hairs, 6-10(-12) mm. Bracteoles ovate-acuminate, glabrous dorsally, glandular-muriculate and ciliolate at the margin, 1 mm. *Calyx* pinkish red, 3 mm, covered \pm densely, especially towards the darker base, with short, stoutish and \pm crisped glandular hairs except the lobes, the latter ovate obtuse, glandular-muriculate and ciliolate along the margin, 2 mm. *Corolla* urceolate-cylindric, rather fleshy, glabrous,



Fig. 71. *Diplycosia rosea* SLEUM. Mt Nettoti, 1900 m, NW. New Guinea (VAN ROYEN & SLEUMER 7438 (SLEUMER, 1961).

deep pink, tips whitish, (5-)6 by 2.5 mm. *Filaments* linear, somewhat dilated towards the base, glabrous, 4 mm; anthers oblong, 2 mm including the rather short and broad tubules. *Ovary* glabrous; style 3 mm. *Fruit* dark purple, c. 5 mm ø.

Distr. *Malesia*: NW. New Guinea (Vogelkop Peninsula: Nettoti Ra.).

Ecol. Mossy *Nothofagus*-, *Xanthomyrtus*-, and *Podocarpus*-forest and in more open heath vegetation, common, 1750-2100 m. *Fl. fr.* Oct.-Dec.

23. *Diplycosia setosa* J. J. S. Bull. Jard. Bot. Btzg II, 8 (1912) 51; Nova Guinea 12 (1914) 145, t. 37 B; *ibid.* 18 (1936) 99; SLEUM. Bot. Jahrb. 72 (1942) 211; Reinwardtia 4 (1957) 135; Blumea 12 (1963) 117.

Shrub up to 1 m, terrestrial or mostly epiphytic, creeping or climbing on tree trunks. Branchlets

lobes narrow-triangular, acute, erecto-patent, ciliolate, 2.5-3 mm. *Corolla* urceolate, 6 mm long, stout, terete, tips exclusively and densely subappressed-setose. *Leaves* elliptic to subovate-elliptic, apex obtuse or broadly attenuate, the terminal gland callous and protruding, base cuneate, coriaceous, dark green above, greyish or light green below, when young appressedly rufous-setose on both faces, mature ones glabrous and rather shining above, dull beneath, ± densely set with short (0.5-1 mm) subappressed bristles, these rather early caducous except the bases which remain as blackish, glandular points, margin subrevolute, entire or almost so, 3-5(-6.5) by (1.3-)2.5-3.5(-4.5) cm, midrib markedly impressed above, raised beneath, nerves 2-3 pairs, 1 or 2 of them ± basal, the other from the midrib, all curved and high-ascending, slightly impressed above, somewhat raised beneath, or ± obscure; petiole grooved above, rufous-setose initially, glabrescent, (3-)4-8 by 1.5-2(-3) mm. *Flowers* 1-2 per axil. Pedicels rather stoutish, especially in later stages, densely subappressed- or crisped-setulose (1.5-2 mm), 1.2-1.8(-2) cm. Bracteoles ovate-subacuminate, dorsally shortly subappressed or ± crisped-setulose, c. 2 mm. *Calyx* c. 4.5 mm, glabrous at the very base, otherwise ± densely and shortly setulose (at least in the upper part of the lobes), lobes spreading, triangular, subacute, c. 3 mm. *Corolla* urceolate, pale to dark pink, lobes paler to almost white, fleshy, glabrous, 7-9 by 3.5 mm, lobes obtuse, ± spreading, 1.3 mm. *Filaments* linear, wavy, glabrous, 3 mm; anthers ovate-oblong, papillose, 2 mm including the very short tubules. *Ovary* glabrous; style 5-6 mm. *Fruit* greenish-purplish, c. 6 mm ø.

Distr. *Malesia*: N. New Guinea (Cycloop Mts).

Ecol. In ridge forest, 1400-1880 m. *Fl. fr.* June-Sept.

24. *Diplycosia kosteri* SLEUM. Blumea 12 (1963) 117.

Scandent, epiphytic, divaricately branched shrub. Branchlets rather slender, tips densely set with forward-directed, rufescent or paler bristles (2 mm), early glabrescent and covered with fissured cork below, laxly leaved. *Leaves* elliptic, rarely subobovate-elliptic, apex broadly attenuate to rounded, apiculate by a thick, protruding gland, base broadly cuneate, rarely almost rounded, coriaceous, glabrous and shining above, densely set with short suberect setular hairs with dark thickened base beneath, edge somewhat revolute and densely crenulate, (2.5-)2.8-4.5 (-5.5) by (1.5-)2-3(-3.2) cm, 5-plinerved, midrib and nerves narrowly impressed above, obtusely raised beneath, nerves not rarely almost obscure; petiole 3-5(-6) by 1.5(-2) mm. *Flowers* axillary, solitary or in twos. Pedicels rather slender, densely clad with strigose or setular, crisp or subpatent, eglandular hairs (c. 1.5 mm), 6-7 mm. Bracteoles ovate, c. 1 mm, margin fimbriate by a few short glandular and numerous finer eglandular hairs. *Calyx* cup-shaped, much contracted at the base and glabrous there, otherwise provided with appressed setular hairs up to the lobes, tube 2 mm,

2 mm σ at the attenuate base, 3 mm σ at the limb, thin, glabrous, red to pink, sometimes yellowish, lobes reflexed, 1 mm. *Filaments* filiform, glabrous, 3.5 mm; anthers narrow-oblong, 1.8 mm including the tubules. *Ovary* glabrous; style slender, glabrous, 4 mm. Submature *fruit* reddish.

Distr. *Malesia*: W. New Guinea (Wondiwoi Mts, Wandammen Peninsula).

Ecol. In primary forest, 800–1800 m. *Fl. fr.* March.

25. *Diplycosia pseudorufescens* SLEUM. Bot. Jahrb. 71 (1940) 157; Reinwardtia 4 (1957) 135.

var. pseudorufescens.

Treelet or shrub, up to 6 m. Branches and branchlets divergent, the latter subangular and very densely patently rufous-setulose (1.5–2 mm) and laxly finely patent-puberulous, terete, greyish and less densely setulose and practically not puberulous in the older parts. *Leaves* ovate or elliptic-ovate, apex broadly short-acuminate, the terminal gland conspicuous and somewhat prominent, base rounded to broad-attenuate, subcoriaceous or stiff-chartaceous, young ones \pm densely rufous-setulose on both sides, mature ones glabrous and somewhat shining above, \pm persistently setulose on the undersurface and the margin, finally dark brown-punctate there, entire or minutely denticulate, margin slightly revolute, (10–)12–17 by 8–12(–14) mm, midrib impressed above, prominent beneath, other nerves \pm obscure; petiole setulose, 1–2 mm. *Flowers* axillary, solitary. Pedicels stoutish, very laxly setulose or short-hairy, 2–3 mm, basal bracts several, minute. Bracteoles ovate-acuminate, ciliate, 1 mm. *Calyx* c. 3 mm, glabrous, lobes ovate-acuminate, ciliate, 2 mm. *Corolla* short tubular-subcampanulate, c. 4.5 mm, glabrous, shortly 5-lobed. *Filaments* subulate, slightly dilated at the base, glabrous, 2.2 mm; anther-cells 1.5 mm; tubules nearly 1 mm. *Ovary* rather densely greyish pubescent; style 3 mm. *Fruit* said to be green.

Distr. *Malesia*: North Borneo (Mt Kinabalu, Mt Tambuyokon).

Ecol. On steep rocky ridge, 2300–2895 m, twice found. *Fl. June.*

var. elliptifolia SLEUM. Reinwardtia 4 (1957) 136; Blumea 12 (1963) 118. — *D. consobrina* (non BECC.) RIDL. J. Str. Br. R. As. Soc. n. 39 (1903) 15. — *D. microphylla* (non BECC.) HENDERS. J. Fed. Mal. St. Mus. 13 (1927) 5.

Differs by \pm elliptic leaves, which are subdensely and \pm patently crisped-subsetulose as are the pedicels, (8–)10–17 by 6–12 mm. *Fruit* said to be pinkish or light blue.

Distr. *Malesia*: Malay Peninsula (Perak: Mt Kerbau; Pahang: Kluang Terbang, a subsidiary peak of Mt Benom) and North Borneo (Mt Kinabalu).

Ecol. In low jungle in the Malay Peninsula, at 1370–1525 m, on Mt Kinabalu apparently rare, (1650–)2745–3050 m. *Fl. fr.* March–Aug.

26. *Diplycosia tetramera* SLEUM. Reinwardtia 4 (1957) 136.

Small shrub. Branches erect, terete; bark striate by long blackish fissures. Branchlets rather densely leaved, densely clothed with appressed or somewhat spreading rufous bristles (1.5–3 mm). *Leaves* \pm broad-elliptic to oblong-elliptic, sometimes narrower and oblong, apex short-acuminate, subacute or obtuse, apiculate by a small, slightly protruding gland, coriaceous, \pm stiff, \pm convex when dry, revolute at the margin, shining above, dull beneath, the youngest laxly rufous-setulose on both faces, mature ones early glabrous above, but for a longer time patent-setulose beneath, finally blackish punctate there, rather regularly minutely crenulate, ciliate (1.5 mm) initially, (0.7–)1–1.6(–2) by (0.5–)1.2(–1.4) cm, midrib \pm distinctly impressed above, slightly or not raised beneath, nerves obscure; petiole stoutish, \pm setulose, 2(–3) by 1 mm. *Flowers* axillary, solitary. Pedicels stoutish, rather densely set with fine bristles or scabrid short crisped hairs, 3–4(–6.5) mm at anthesis, somewhat accrescent in fruit. Bracteoles ovate-acuminate, glabrous dorsally, glandular-fimbriate (0.3–0.5 mm) along the margin, ciliate at the apex, 1.5 mm. *Calyx* 4–5 mm, glabrous or with some thickish crisped hairs at the lobes, the latter ovate, subacute, \pm spreading at anthesis, 2–3 mm, laxly and longish caducously glandular-fimbriate, short-pubescent at the very apex. *Corolla* cylindrical-urceolate, 6–7 by c. 2 mm, contracted both at the base and the mouth, glabrous, or initially with some scattered, appressed, glandular hairs in its upper part, white, lobes 4 or 5, c. 1.5 mm. *Stamens* 8; filaments linear, somewhat dilated towards the base, glabrous, c. 4 mm; anthers oblong-ovate, granular, c. 2.5 mm including the tubules. *Ovary* glabrous or sometimes very slightly hairy on the top; style 5–6 mm. *Fruit* purplish to blackish, c. 5 mm σ .

Distr. *Malesia*: Sumatra (Atjeh, Gajo Lands: Mt Lembuh, Mt Losir, Mt Kemiri, Putjuk Angasan).

Ecol. In moss forest, ericoid scrub or ridge forest, open spots, 1850–3000 m. *Fl. fr.* Jan.–March.

27. *Diplycosia parvifolia* MERR. Philip. J. Sc. 5 (1910) Bot. 211; En. Philip. 3 (1923) 247; COPEL. f. Philip. J. Sc. 47 (1932) 81; SLEUM. Reinwardtia 4 (1957) 137.

Small erect epiphytic shrub, up to 1 m, diffusely branched. Branches slender, brown, glabrous, slightly striate, terete. Branchlets laxly subappressedly and rather longish rufous-setose. *Leaves* elliptic or elliptic-oblong, apex acuminate, subacute, the terminal gland thickish, somewhat protruding, base acutely attenuate, subcoriaceous, shining and glabrous above, dull and laxly blackish punctulate beneath, entire or nearly so, setose-ciliate when very young, but in later stages the margin somewhat cartilaginous and set with remote, dark, sessile, subimpressed glands, giving the impression of being crenulate, 1.6–2(–2.5) by 0.7–1 cm, midrib impressed above, scarcely

visible beneath, nerves \pm obsolete; petiole \pm setulose, glabrescent, c. 2 mm. *Flowers* axillary, solitary. Pedicels rather densely appressedly rufous-setulose, with some fine short hairs between the bristles, 3–4 mm in anthesis, accrescent up to 7 mm, basal bract minute. Bracteoles broad-ovate, glabrous dorsally, fimbriate, 1.2 mm. *Calyx* 2.5 mm, glabrous, deeply 5-lobed, lobes ovate, obtuse, shortly glandular-fringed at the margin, the very apex with a tuft of fine hairs. *Corolla* ovate-urceolate, glabrous, nearly full-developed c. 2.5 mm. *Stamens* 8; filaments flat-linear, glabrous; anthers ovate-oblong, tubules narrow, very short. *Ovary* glabrous or with a few hairs; style 2 mm in very young fruit.

Distr. Malesia: Philippines (Negros: Canlaon Volcano; reported also from Luzon: Ifugao, Mt Polis, material not seen), one collection. *Ecol.* In mossy forest, c. 1500 m.

28. *Diplycosia soror* BECC. *Malesia* 1 (1878) 210; SLEUM. *Reinwardtia* 4 (1957) 137; *Blumea* 12 (1963) 118.

var. soror.

Epiphytic or terrestrial, erect shrub, 0.3–1(–1.5) m, one- or few-stemmed. Branchlets slender, subangular, densely to more laxly and \pm appressedly setulose (bristles fine, subglandular, rusty, c. 3 mm), subdensely leaved; young shoots red-brown or reddish. *Leaves* elliptic to subobovate-elliptic, rarely subovate-elliptic, apex shortly acuminate to broadly attenuate, rarely subobtuse or rounded, generally apiculate by a blackish, protruding gland, base \pm broadly attenuate or cuneate, never rounded, coriaceous to subcoriaceous, dark green above, paler beneath, glabrous above, laxly to subdensely clothed with short, subappressed, fine, brownish, \pm caducous bristles and blackish punctate in later stages beneath, margin slightly or hardly revolute, minutely crenulate in the upper part of the lamina, the teeth ending in slender bristles which persist for a long time, 1.5–2.8 by (0.9–)1.2–2 cm, 3-nerved or rarely obscurely 5-nerved from above the base of the blade, midrib impressed above, obtusely prominent beneath, nerves curved-ascending towards the apex of the lamina, very slightly impressed above, hardly visible beneath; petiole blackish in dry specimens, \pm densely setulose, 2–3 mm. *Flowers* axillary, solitary, sometimes in pairs. Pedicels rather slender, set with short, stalked glands or muciculate hairs, no bristles or fine hairs, 2–3 mm at anthesis, up to 4 mm and glabrescent in fruit; basal bracts very small. Bracteoles broad-ovate, glabrous dorsally, ciliolate and laxly shortly glandular-fimbriate. *Calyx* 1.5–2 mm, glabrous, 5-lobed to almost $\frac{2}{3}$, green, lobes ovate, subacute, often with purplish tinge, densely set with whitish hairs along, and with club-shaped, rather caducous glands or glandular hairs in the lower part of the margin. *Corolla* shortly urceolate, green, 3.5 mm, glabrous, lobes 1 mm, often purplish suffused especially in bud. *Filaments* subfiliform, glabrous, 1.2 mm; anthers oblong-ovate, granular, 0.7 mm

including the tubules (0.5 mm). *Ovary* glabrous or with some sparse hairs around the style, the latter slender, glabrous, (2–)2.5 mm. *Fruit* finally bluish purple to blackish, pruinose, (4–)5 mm σ .

Distr. Malesia: New Guinea (Vogelkop Peninsula: Arfak and Nettoti Mts).

Ecol. Epiphyte in riverine and mossy (*Nothofagus*-) forest, terrestrial in more open, devastated crest-forest, heath-like vegetation or summit scrub, (1550–)1650–2650 m, scattered, though rather common locally. *Fl. fr.* Nov.–Jan.

Note. A specimen similar in habit, but with shorter bristles (1.5 mm) on the branchlets, slightly smaller leaves (such as found in *D. amboinensis*), ovary hairy, style 2.5 mm, corolla and stamens not known, once collected in the N. Moluccas: Morotai, Mt Pare, c. 1000 m.

var. nuda SLEUM. *Blumea* 12 (1963) 118.

Young shoots glabrous or practically so, maybe with sparse darker glandular points. *Leaves* glabrous, generally as in *var. soror*, sometimes in part a little larger (up to 4.5 by 2.8 cm). *Flowers* known in bud stage only, apparently not different from those found in *var. soror*.

Distr. Malesia: New Guinea (Vogelkop Peninsula: Tohkiri and Tamrau Mts), 2 collections.

Ecol. Epiphyte in *Castanopsis-Nothofagus* forest, 1400 m. *Fl.* Oct.–Nov.

29. *Diplycosia glauciflora* SLEUM. *Reinwardtia* 4 (1957) 137; *Blumea* 11 (1961) 7.

Shrub, 1.5–3 m. Branches terete, setose. Branchlets densely and exclusively clothed with spreading, dark, rufous-blackish bristles (1.5–2 mm), leaved towards the tips. *Leaves* ovate or elliptic-ovate (inferior ones sometimes elliptic), uppermost ones mostly gradually subcaudate-acuminate, lower ones short-acuminate at apex, the terminal gland slightly thickened, base rounded or rarely broadly cuneate, subcoriaceous, young ones apparently reddish, densely setulose on both faces initially, glabrous and shining above at maturity, rather densely and more persistently and patently rufous-setulose (0.7–1.5 mm) beneath, finally blackish punctulate there, margin slightly revolute, minutely crenulate, the teeth caducously setulose-ciliate, 2.5–4(–5.5) by (1.2–)1.4–2(–2.5) cm, midrib impressed above, raised beneath, one pair of basal nerves curved-ascending along the margin to the top of the lamina, slightly impressed above or as obscure as beneath, other higher pinnate nerves rather inconspicuous; petiole densely patent-setose, 2.5–4 by 1–1.5 mm. *Flowers* axillary, solitary or rarely in twos. Pedicels rather slender, \pm densely crisped-rufous-pilose, 2–3 mm at anthesis, up to 5 mm in fruit. Bracteoles ovate-acuminate, glabrous dorsally, 1.2 mm. *Calyx* campanulate, glabrous or set with sparse thickish hairs, c. 3 mm, 5-lobed to nearly its base, lobes ovate, acute, shortly glandular-fimbriate as are the bracteoles. *Corolla* subcylindric-campanulate, greenish, somewhat glaucous, becoming blackish when dry, glabrous, c. 4 mm, shortly 5-lobed. *Filaments* S-curved, linear, gla-

bròus, c. 2 mm; anthers ovate-oblong, granular, 2 mm including the slender short tubules. *Ovary* with rather sparse yellowish hairs on top; style 3–3.5 mm. *Fruit* bluish, finally blackish, c. 4 mm ø, glabrous on top of the capsule.

Distr. *Malesia*: N. Sumatra (Atjeh; Tapanuli; Eastcoast Res.).

Ecol. In ericoid ridge scrub, 1800–3000 m. *Fl. fr.* Jan., Febr.

Vern. *Daun bibis*, M.

30. *Diplycosia ledermannii* SCHLTR, Bot. Jahrb. 55 (1918) 165; SLEUM. *ibid.* 72 (1942) 211; Reinwardtia 4 (1957) 138.

Epiphytic shrub, 1–1.5 m, ramose. Branches and branchlets erect, terete, sparsely subappressedly setose initially, glabrescent, the bark then fissured. *Leaves* elliptic or subobovate, apex obtuse, the terminal gland manifest and protruding beyond the lamina, base cuneate into the petiole, coriaceous, glabrous above, punctate beneath, margin somewhat recurved, entire, 3.5–5.5(–6.5) by (2–)2.5–3.5 cm, 3-plinerved nearly from the base, midrib and nerves impressed above, rather obscure beneath as are some nerves higher from the midrib, the latter high ascending to the top of the lamina; petiole glabrous, 3–5(–6) mm. *Flowers* axillary, solitary or rarely in pairs. Pedicels slender, whether or not laxly appressedly short-setulose, moreover with a fine rufous pubescence, 8–13(–20) mm. Bracteoles broad-ovate, ciliolate, 0.7 mm. *Calyx* c. 3 mm, glabrous or minutely verruculose, lobes ovoid, obtuse, ciliolate, c. 2 mm. *Corolla* ovoid, whitish pink, glabrous, c. 7 mm, lobes short. *Filaments* filiform, glabrous; anthers oblong-lanceolate, cordate at the base, papillose, 2 mm. *Ovary* laxly to subdensely clad with brownish hairs on the top; style glabrous, rather thick, 4 mm. *Fruit* black, c. 7 mm ø.

Distr. *Malesia*: NE. New Guinea (Sepik region: Hunstein Mts).

Ecol. In mountain forest, 1050–1400 m. *Fl.* Febr., March, July, Aug.

31. *Diplycosia brachyantha* SLEUM. Reinwardtia 4 (1957) 138.

var. brachyantha.

Shrub. Branchlets obtusangular, 4–7 mm ø, greyish brownish, tips very sparsely setose, or glabrous. *Leaves* elliptic or broad-elliptic, rarely oblong-elliptic, apex short-attenuate, obtuse to rounded, the terminal gland thick and protruding, base cuneate into the petiole to nearly rounded, thick-coriaceous, glabrous and shining above, dull and laxly blackish punctulate beneath, entire, margin revolute, (4.5–)5–7.5(–10) by (2.5–)3–6(–6.5) cm, midrib slightly impressed above, thick-prominent beneath, nerves 1–2 pairs from or from a little above the base, high curved-ascending, faintly impressed above, rather distinctly raised beneath, at least in the lower 2/3 of the lamina, other much shorter nerves ± straight in 2–5 pairs but slightly conspicuous; petiole thick, rugose, glabrous, 6–9 by 1.5–3 mm, somewhat winged in its upper third by the decurrent

lamina. *Flowers* axillary, 3–5 per fascicle, rarely also in twos or solitary in other axils of the same specimen, becoming black when dry. Pedicels stout (nearly 1 mm ø), ± densely clad with short, subappressed, brownish, coarse hairs as well glandular-muriculate or -verruculose, glabrescent in fruit, 5–7 mm at anthesis, basal bracts few, ovate-acuminate, rough-hairy, 1–2 mm. Bracteoles broad-ovate, apiculate, glabrous inside, hairy outside, ciliate, 2 mm. *Calyx* 6 mm, 5-lobed to nearly the base, lobes ovate-acuminate, subacute, laxly appressed-hairy dorsally especially on the lobes, or glabrous, ciliate, c. 4 mm long, 3 mm wide at base, spreading after anthesis. *Corolla* campanulate, broad-open, green, 6–7 mm long, 5–6 mm ø at the limb, glabrous or with some solitary hairs outside, lobes erect, c. 3 mm. *Filaments* linear, somewhat dilated above the base, wavy, papillose, 3.5 mm; anther-cells ovate-oblong, echinulate, c. 2.3 mm; tubules narrow, c. 1.2 mm. *Ovary* densely yellowish brownish hirsute; style glabrous, 3–4 mm. *Fruit* blackish when ripe, c. 1.3 cm ø; fruit-pedicel c. 1 cm.

Distr. *Malesia*: N. Sumatra (Atjeh, Gajo Lands: Mt Lembuh, Putjuk Angasan).

Ecol. In mossy forest on ridge or ericoid ridge scrub, 1800–2500 m, apparently not rare. *Fl.* Jan., Febr.

var. parvula SLEUM. Reinwardtia 4 (1957) 139.

Differing by smaller, obovate leaves, 2–3.5 by 1–2 cm, white and slightly smaller flowers (corolla 5–6 by 3 mm).

Distr. Found together with *var. brachyantha*.

32. *Diplycosia morobeensis* SLEUM. Bot. Jahrb. 72 (1942) 210; Reinwardtia 4 (1957) 140; Blumea 11 (1961) 7; *ibid.* 12 (1963) 119.

var. morobeensis.

Low erect shrub, 0.3–1.8(–3) m, often epiphytic. Branchlets rather densely foliate, appressed-setulose and reddish brown in the young, glabrescent and early covered with greyish cork in the older parts. *Leaves* oblong- to subovate-lanceolate, apex acuminate, the terminal gland small but distinct, base cuneate, subcoriaceous, greenish olivaceous when dry, rather dull on both faces, glabrous above, laxly set with ± appressed setulose, finally caducous hairs, becoming punctate at least, minutely denticulate or subentire, (1–)1.5–1.8(–2) by (0.4–)0.5–0.8(–1) cm, midrib ± impressed above, slightly raised beneath, nerves subsobscure; petiole setulose, 1–2 mm. *Flowers* 1 or 2 per axil. Pedicels rather stoutish, subdensely shortly subappressed-setose-hairy at anthesis and 3–6 mm long, glabrescent and up to 10 mm in later stages. Bracteoles broad-ovate, ciliate, glabrous dorsally, 1 mm. *Calyx* 1.5–2 mm, lobes deltoid, blunt, with an almost translucent margin, glabrous, densely ciliate the entire length. *Corolla* cylindrical-urceolate, rather fleshy, glabrous, white with flesh tinge, 4 mm, shortly 5-lobed. *Filaments* filiform, glabrous, 2–2.5 mm; anther-cells subovate, 1 mm; tubules broad, 0.3 mm. *Ovary* glabrous; style

slender, 3.5 mm. *Fruit* subglobose, blackish purplish, c. 3 mm ϕ .

Distr. Malesia: New Guinea (Wau-Edie Creek area; Star Mts; Eastern Highlands; Mt Saruwaged area).

Ecol. In lower montane rain-forest, mossy bush, or marsh meadow, 1525–3000 m. *Fl.* Jan.–Dec.

Vern. *Denugubo*, Chimu: Masul, *jinne*, Wahgi: Minj, *nehra*, Mairi: Watabung.

var. ovatifolia SLEUM. *Reinwardtia* 4 (1957) 140.

Differing by the ovate or elliptic-ovate leaves and shorter pedicels, which are 2–3 mm long at anthesis.

Distr. Malesia: New Guinea (Eastern Highlands; Mt Yule; Mt Victoria).

Ecol. In forest, 2135–2540 m. *Fl.* Jan., Nov.

33. *Diplycosia rupicola* SLEUM. *Reinwardtia* 4 (1957) 140; *Blumea* 11 (1961) 7; *ibid.* 12 (1963) 119; *ibid.* 12 (1964) 343. — *D. morobeensis* (non SLEUM. 1957) SLEUM. *var. ovatifolia* SLEUM. *Blumea* 11 (1961) 7. — **Fig. 77h.**

Small, sometimes climbing shrub, up to 10–60 (–200) cm, sometimes \pm prostrate; also epiphytic. Branchlets fuscous and rather densely clothed with longish (2–3 mm), \pm spreading or subappressed rufous bristles, subangular, rather densely leaved. *Leaves* ovate to ovate-elliptic, apex short-acuminate, obtuse, the terminal gland rather thick, base rounded or more rarely broad-attenuate, coriaceous, rigid, glabrous above, laxly caducously setulose or punctulate beneath, margin slightly revolute and regularly minutely crenulate, the teeth ciliate initially, 0.8–1.1(–1.3) by (0.4–) 0.5–0.7 cm, midrib slightly impressed above, faintly visible beneath, nerves obscure; petiole stoutish, 1–1.5 mm. *Flowers* axillary, solitary. *Pedicels* stoutish, (1–)2–3 mm at anthesis, up to 4 mm in fruit in open, more slender and 5–7 mm at anthesis, up to 8 mm in fruit in shady situations, sparsely glandular-punctate, nodding. *Bracteoles* broad-ovate, obtuse, glabrous dorsally, ciliolate and glandular-muriculate, 1.5 mm. *Calyx* 3(–4) mm, red, glabrous or very laxly muriculate, lobes ovate, obtuse, the margin paler and almost translucent, ciliate and glandular-muriculate or -fimbriate, reflexed after anthesis, 1.8(–2.2) mm. *Corolla* urceolate-cylindrical, glabrous, scarlet or pink, or orange-red, with greenish white lobes, honey-scented, (7–)8–10 by 3–4 mm, lobes pale green, 1.5 mm. *Filaments* linear, glabrous, 4–5 mm; anthers oblong, echinulate, 2.5 mm including the rather broad and short tubules. *Ovary* glabrous; style 5–6 mm. *Fruit* c. 5 mm ϕ , purplish blue, contracted at the base; calyx not much accrescent, the upper part of the capsule remaining uncovered.

Distr. Malesia: New Guinea (Star Mts; Western, Eastern and Southern Highlands).

Ecol. In low mossy forest, among rocks on mountain sides, or in semi-swampy alpine thickets or grassland, 2500–3650 m. *Fl.* Febr.–Sept.

Vern. *Agu-agu*, *ombe*, Mendi.

34. *Diplycosia pendens* SLEUM. *Blumea* 12 (1963) 119.

Epiphytic shrub, few-stemmed, hanging from tree trunks 2–3 m above the ground, 0.5–1 m. Branchlets slender, recent shoots densely, older ones densely to more laxly and exclusively set with rufescent, setular, \pm appressed, eglandular hairs, glabrescent with age, becoming striate and blackish, 2–3 mm ϕ . *Leaves* lax, lanceolate, more rarely subovate- or subelliptic-lanceolate, apex shortly attenuate or subacuminate, the apical gland small and hardly protruding, base attenuate or cuneate to the petiole, subcoriaceous, dirty olivaceous, glabrous above at full maturity, laxly and finely setular below and along the edge, or finally punctulate below, minutely crenulate or subentire, (1–)1.3–2(–2.2) by 0.5–0.8(–1) cm, midrib very narrow and impressed above, slightly prominent beneath, nerves 1(–2) pairs, high curved-ascending, rather obscure generally; petiole slender, c. 1 mm. *Flowers* solitary, or rarely in twos in the upper axils. *Pedicels* stoutish, subdensely or more laxly muriculate and finely hairy, 1–2 mm. *Bracteoles* ovate, acute, 1 mm, ciliolate. *Calyx* cup-shaped, green, glabrous, 2 mm in all, 5-lobed to $\frac{2}{3}$, lobes deltoid, subacute, ciliolate and often laxly glandular-fimbriate below. *Corolla* urceolate, tube light green, purplish towards the lobes, glabrous, 3 mm. *Filaments* linear, glabrous, 1.3 mm; anthers oblong, base obtuse, 1 mm. *Ovary* with a few hairs on top, glabrous otherwise; style slender, c. 1.8 mm. *Fruit* pale bluish, pruinose, c. 3 mm ϕ .

Distr. Malesia: W. New Guinea (Vogelkop Peninsula).

Ecol. In mossy (*Nothofagus*-)forest, also in riverine forest, 1400–1900 m, locally not rare. *Fl. fr.* Nov.–Dec.

35. *Diplycosia schultzei* SCHLTR. *Bot. Jahrb.* 55 (1918) 163; SLEUM. *ibid.* 72 (1942) 211; *Reinwardtia* 4 (1957) 139.

Erect shrub. Branches and branchlets terete, sparsely setose, finally glabrous. *Leaves* lax, elliptic, apex short-acuminate, though obtuse by a pronounced terminal gland, base cuneate-attenuate, coriaceous, very young ones rather densely setulose on both faces, mature ones set with some scattered bristles or finally quite glabrous above, and with longer persistent longish and appressed rufous bristle-like hairs beneath, subentire, 2.5–4.5(–7) by (1.5–)2.5–3.5 cm, impressedly 3-nerved above; petiole 3–6 mm. *Flowers* solitary. *Pedicels* slender, sparsely appressed-setose, (1.2–) 1.5–2 cm. *Bracteoles* ovate, ciliate at apex, otherwise dorsally clad with scabrid, rufous, bristle-like hairs as is the calyx. *Calyx* 3 mm, lobes oblong, obtuse, ciliolate. *Corolla* subglobose-urceolate, glabrous, 9 mm, shortly 5-lobed. *Filaments* filiform, glabrous; anthers ovate-oblong, papillose, 2.8 mm. *Ovary* glabrous; style glabrous, a little longer than the anthers.

Distr. Malesia: NE. New Guinea (Sepik region: c. 65 km S of the mouth of the Tami R.), 1600 m. One collection. *Fl.* July.

Note. No material seen recently (holotype destroyed).

36. *Diplycosia stellaris* SLEUM. Blumea 11 (1961) 6.

Low shrub, c. 0.3 m. Branchlets laxly subpatently rufous-setulose in the juvenile, still less so in the older, already greyish corticate parts, subdensely or more laxly foliate. *Leaves* obovate or obovate-, more rarely subrotundate-elliptic, apex rounded or faintly emarginate, the terminal gland thick and protruding beyond the leaf margin, base broadly cuneate into the petiole, coriaceous, with sparse setular hairs on the midrib beneath and along the edge in immature, glabrous except very short muriculate glandular hairs on the undersurface in fully mature leaves, (1.5-)2-3 by (1-)1.5-2.5 cm, regularly subserrate-crenulate (the teeth 1-2 mm spaced), \pm revolute especially towards the base of the lamina, midrib and nerves distinctly impressed above, subinconspicuous beneath, basal nerves 1, suprabasal ones 1 or 2 pairs, curved-ascending and anastomosing, other shorter nerves or veins from higher parts of the midrib faintly sunken above, or obscure; petiole grooved above, 4-6 by 1-1.5 mm, not rarely a little winged in the upper part by the shortly decurrent lamina. *Flowers* in 2-3-flowered fascicles, or more rarely solitary in the upper axils, nodding. Pedicels rather slender, laxly or very laxly subappressedly setular-hairy, or muriculate, 1-1.5 (-1.8) cm at anthesis. *Calyx* funnel-shaped below, 5 mm long in all, the 2 basal bracteoles ovate, ciliolate, 1-1.2 mm, tube reddish, minutely rugulose and muriculate, lobes ovate-triangular, subacute, ciliolate and glandular-fimbriate, c. 2 mm. *Corolla* cylindrical-urceolate, thin, pink, whitish at the lobes inside, glabrous, c. 9 by 4 mm at full anthesis, lobes obtuse, suberect, 1 mm. *Filaments* narrow-linear, glabrous, a little wavy, c. 4 mm; anthers oblong, 3 mm long including the lobes; cells granular; tubules narrowed towards the apex c. 1.2 mm. *Ovary* glabrous; style slenderly columnar, glabrous, 5.5 mm.

Distr. *Malesia*: New Guinea (Star Mts: Mt Antares), once found; rather rare in alpine shrub vegetation at 3300 m. *Fl.* July.

37. *Diplycosia undata* J. J. S. in Fedde, Rep. 30 (1932) 171; SLEUM. Reinwardtia 4 (1957) 139, non H. J. LAM, 1945.

Small, very branched shrub. Branchlets longish (2-3 mm) \pm patently rufous-setulose in the younger, \pm obtusely angled parts. *Leaves* suborbicular to broad-elliptic, apex subacuminate or mostly \pm obtuse, the terminal gland thick and protruding, base broadly attenuate to rounded, or cuneate in the elliptic ones, firmly subcoriaceous, revolute at the finely crenulate margin, each tooth ending in a fine, longish, rather persistent bristle, rather shining above, glabrous above, \pm laxly punctate beneath by the remaining bases of early caducous bristle-like hairs, 1.3-3.3 by (1-)1.2-2.9 cm, midrib impressed above, raised beneath, nerves 2-3 pairs coming from and from somewhat above the base of the lamina, curved-ascending and anastomosing,

slightly impressed above, visibly raised beneath, other nerves from the upper $\frac{2}{3}$ of the midrib rather inconspicuous; petiole stout, setose, 1.5-3 mm. *Flowers* axillary, solitary. Pedicels rather slender, laxly appressed-setulose, or muriculate, 8-10(-12) mm. Bracteoles suborbicular-ovate, obtuse, glabrous dorsally, shortly glandular-fimbriate or -muriculate, c. 1.8 mm. *Calyx* 3-4 mm, glabrous, rugulose-muriculate externally, lobes ovate, acute, 2.5 mm, glandular-fimbriate. *Corolla* urceolate, slightly contracted apically, red, somewhat fleshy, glabrous, c. 9 by 3.5 mm, lobes obtuse, 1 mm. *Filaments* S-curved, linear, slightly dilated towards the base, glabrous, c. 4 mm; anthers oblong, granular, c. 2 mm including the short tubules. *Ovary* glabrous; style 5 mm.

Distr. *Malesia*: SW. Celebes (Peak of Bonthain).

Ecol. In brushwood, 2700-2890 m. *Fl.* June.

38. *Diplycosia varians* SLEUM. Blumea 12 (1964) 342.

Epiphytic or subscandent small shrub, 0.2-0.4 m. Tips of branchlets subdensely and exclusively set with setular subappressed hairs. *Leaves* lax, variable in shape and size, elliptic or oblong-elliptic, more rarely broad-elliptic, apex shortly attenuate-acuminate, rarely apiculate, the terminal gland a little prominent, base attenuate or rarely \pm rounded, coriaceous, glabrous above, lower surface laxly subsetular-muriculate or finally punctate, margin crenulate, the crenations ending with a long rather persistent bristle, (2.2-)2.5-3.5(-4) by (1-)1.3-1.8(-2) cm, midrib distinctly impressed above, obtusely prominent beneath, nerves 2 pairs, the lower pair a little from above the leaf-base, the upper one from \pm the middle of the midrib, both slightly immersed above, less distinct beneath; petiole 2-3 mm. *Flowers* solitary in the leaf-axils, nodding, 4-5-merous. Pedicels laxly muriculate, 2-3(-4) mm at anthesis, accrescent sometimes to 6 mm in fruit. *Calyx* tube cupular, attenuate at base, pinkish, 4-6(-7) mm in fresh specimens, lobes ovate-acuminate, glandular-ciliate; 2-3 mm. *Corolla* urceolate, rather fleshy, glabrous, pinkish, 8-9 by 6 mm in dry, 10-11 by 8 mm in fresh specimens, lobes whitish, 1.5 mm. *Stamens* 8 or 10; filaments linear, wavy, glabrous, 5 mm; cells 2.8 mm; style glabrous, 5(-6) mm. *Ovary* glabrous. Mature fruit pear-shaped, purple, 6-8 by c. 5 mm.

Distr. *Malesia*: New Guinea (Western Highlands: Nona-Minj Divide).

Ecol. In subalpine *Xanthomyrtus-Papuacedrus-Quintinia* shrubbery, 3250 m. *Fl. fr.* July.

39. *Diplycosia subglobularis* SLEUM. Blumea 11 (1961) 5.

Epiphytic shrub, c. 1 mm. Branchlets divaricate, rather robust, 1.5-3 mm σ , very densely set with rufous setular hairs at the youngest, gradually less densely so in the older parts, densely foliate. *Leaves* elliptic, shortly attenuate or more rarely subrotundate at the apex, which bears a thick, c. 1 mm protruding gland, base broadly attenuate,

coriaceous, dull, glabrous above, sparsely to very sparsely rufous-setulose, more densely appressedly glandular-muriculate beneath, youngest ones subrenulate and caducously setular-ciliate, older ones subentire at full age, (1.5–)1.8–2.5 by (1–)1.2–1.5(–1.7) cm, the edge slightly revolute, midrib and nerves much impressed above, subinconspicuous beneath, the basal or slightly suprabasal nerves 1, upper nerves (from the lower third to half of the midrib) 1 (rarely 2) pairs, all high curved-ascending and anastomosing; petiole setular initially, 2–3 by *c.* 1 mm. *Flowers* solitary in numerous upper axils. Pedicels stoutish, laxly muriculate, at anthesis 1–2, in fruit up to 3 mm, with 2 ovate ciliate opposite bracteoles (1 mm) below the calyx. *Calyx* campanulate, glabrous, tube 0.5–0.7 mm, lobes subovate-deltoid, bluntish, (1–)1.5 mm, glandular-fimbriate. *Corolla* subglobular, much contracted or almost apiculate distally, early caducous, *c.* 2 by 2.5 mm, quite glabrous, pale pink, ± fleshy, lobes erect, hardly 0.5 mm. *Filaments* subulate, glabrous, 0.8–1 mm; anther-cells ovate-oblong, echinulate, 0.5 mm; tubules contracted, *c.* 0.3 mm. *Ovary* glabrous; style slender, glabrous, at anthesis 1–1.5, in fruit 1.5–2 mm. Immature *fruit c.* 2.5 mm, light blue.

Distr. Malesia: Central New Guinea (Star Mts), on peaty soil at 1500 m. One collection. *Fl. Juy.*

40. *Diplycosia apoensis* ELM. *Leaf.* *Philip. Bot.* 3 (1911) 1101; *MERR. En. Philip.* 3 (1923) 246; *COPEL. f. Philip. J. Sc.* 47 (1932) 79, t. 4, f. 2; *SLEUM. Reinwardtia* 4 (1957) 139.

Epiphyte or sprawling over moss-covered ground; stem *c.* 50 cm, branched, bark brown-greyish. Branchlets covered with greyish stout bristly hairs, younger parts only with ± spreading reddish brown bristles (2–3 mm). *Leaves* dense, elliptic, apex broadly acuminate, mostly rather obtuse, though apiculate by a thick protruding gland, base cuneate or rounded, subcoriaceous or coriaceous, shining green on the upper side, much paler and dull underneath when fresh, brownish when dry, laxly set on both faces with ± spreading, strigose, rufous hairs, glabrescent above with age, finally punctate beneath, margin slightly revolute, subentire, with bristle-like hairs (1.5 mm) along the margin, 2–3(–3.5) by 1.3–1.7(–2) cm, midrib a little impressed above, manifestly raised beneath, nerves 1–2 pairs, curved-ascending to the apex of the blade, the lower pair from or nearly from the base of the lamina, all nerves slightly impressed above, somewhat prominent beneath; petiole stout, setulose, *c.* 3 mm. *Flowers* axillary, mostly solitary or in twos, rarely also in threes in other axils of the same specimen. Pedicels setose, more-over scurfy or clothed with crisp brown hairs, 2–3(–5) mm. Bracteoles ovate, obtuse, glandular-fimbriate, 1.5 mm. *Calyx* 5 mm, glabrous, lobes ovate, acute, glandular-fimbriate. *Corolla* subcampanulate, glabrous, 4 mm, lobes short, reflexed. *Filaments* linear, wider below the middle, glabrous, *c.* 2.5 mm; anthers ovate-oblong, 2 mm including the short tubules. *Ovary* glabrous; style 3.5 mm.

Distr. Malesia: Philippines (Mindanao, Davao: Mt Calelan; Bukidnon: Mt Lipa), twice found.

Ecol. In mossy elfinwood, on exposed peaks and ridges, *c.* 2500 m. *Fl. Sept.*

41. *Diplycosia muscicola* SLEUM. *Blumea* 12 (1963) 118.

Weak epiphytic shrublet, trailing over moss cushions. Branches and branchlets 1–2 mm σ , young parts densely set with soft setular, initially glanduliferous, ± spreading, (2–) 3–4 mm long rusty hairs, older parts gradually glabrescent and greyish, laxly foliate. *Leaves* elliptic or subovate-elliptic, apex shortly acuminate, the apical gland rather small, base ± broadly attenuate, subcoriaceous, dark green and shining above, paler beneath when fresh, olivaceous above, brown below when dry, first covered on both sides and along the edge with long, ± appressed, bristle-like hairs, glabrescent above only with age, margin hardly revolute, entire or practically so, (2.5–)3–4 by (1.2–)1.5–2.3 cm, rather indistinctly impressedly trinerved above only; petiole (4–)5–6 mm. *Flowers* solitary, rarely in twos in the upper axils. Pedicels very slender, (2–)3–4(–5) mm, glabrous. Bracteoles ovate, 1 mm, cristate-fimbriate by glandular hairs. *Calyx* funnel-shaped, green, 3 mm long in all, 5-lobed halfway, glabrous, tube much attenuate towards the base, lobes ovate-acuminate, glandular-fimbriate, more-over ciliolate or barbate distally. *Corolla* urceolate, light green when fresh, thin, glabrous, 4–4.5 mm. *Filaments* linear, wavy, glabrous, 3 mm; anthers ovate-oblong, base obtuse, 1.5 mm including the tubules. *Ovary* glabrous; style purplish, 3–3.5 mm.

Distr. Malesia: W. New Guinea (Vogelkop Peninsula: near waterdivide in the eastern part of the Tamrau Mts), once collected.

Ecol. In dense, ± stunted mossy *Nothofagus*-, *Myrtaceae*-, and *Rapanea*-forest, 1900–1950 m. *Fl. Nov.*

42. *Diplycosia amboinensis* BECC. *Malesia* 1 (1878) 210; *SLEUM. Reinwardtia* 4 (1957) 157. — **Fig. 77b.**

Small epiphytic, subdensely foliate shrub. Branchlets subdensely clothed with dark brownish rufous, appressed, non-glandular bristle-like hairs (*c.* 1.5 mm), no other fine pubescence present. *Leaves* elliptic to broadly subobovate-elliptic, apex broad-attenuate to nearly rounded, obtuse, the terminal gland thick and manifestly prominent, base broad-attenuate (not rounded), coriaceous, glabrous and shining above, paler and dull beneath, laxly set with short (0.7 mm), subappressed, setulose hairs underneath and caducously so along the margin, which is finely but distinctly crenulate and subrevolute, 1.4–2(–2.4) by 0.9–1.3(–1.7) cm, midrib strongly impressed above, or robust and prominent beneath, 1 pair of nerves from or somewhat from above the base of the lamina, high curved-ascending, anastomosing at the top, very slightly impressed above, or raised beneath, sometimes rather inconspicuous; petiole appressed-setulose, *c.* 2 mm. *Flowers* solitary. Pedicels slender, 6–7 mm, with sparse, rather appressed bristle-like

hairs. Bracteoles ovate, ciliate, *c.* 1.2 mm. *Calyx* glabrous, tube 1 mm, lobes ciliolate, 2 mm. *Corolla* only known in bud stage, glabrous. *Ovary* glabrous.

Distr. *Malesia*: Moluccas (Ambon: summit of Mt Sal(a)hutu), *c.* 1000 m, once found. *Fl.* Dec.

43. *Diplycosia kalmiifolia* SLEUM. Bot. Jahrb. 71 (1940) 154; Reinwardtia 4 (1957) 141; Blumea 11 (1961) 8.

Straggling shrub, sometimes epiphytic. Branchlets laxly longish rufescent-setulose in the older, more densely so in the younger parts. *Leaves* narrow lanceolate, apex acuminate, subacute, the terminal gland small, base gradually attenuate, subcoriaceous, glabrous above, laxly clothed with sub-appressed, strigose, rufous hairs or bristles, which are caducous except near the base of the lamina, remotely denticulate to subentire, (3.5-)4-5.5 by 0.3-0.6 cm, midrib impressed above the entire length, prominent beneath, nerves obsolete; petiole hirsute, *c.* 2 mm. *Flowers* 3-5 per fascicle in the upper axils. Pedicels rather stoutish, densely shortly rufous-pubescent and -setulose, 6-8 mm in fruit. Bracteoles broad-ovate, glabrous dorsally, ciliate, 1 mm. *Calyx* fleshy in fruit, lobes deltoid

subacuminate, ciliate. *Fruit* subglobose, glabrous, *c.* 4 mm ϕ , blue when ripe; style slender, 5 mm.

Distr. *Malesia*: Borneo (Sarawak: Ulu Koyan on Mt Dulit in heath forest at *c.* 1000 m, said to be common and characteristic there; Hose Mts: Mt Lumut; Merungur Plateau: Bintulu, on open padang at 930 m). *Fr.* July, Oct.

44. *Diplycosia kinabaluensis* STAFF, Trans. Linn. Soc. II, Bot. 4 (1894) 193, t. 14, f. B 4-6; GIBBS, J. Linn. Soc. Bot. 42 (1914) 102; MERR. En. Born. (1921) 464; SLEUM. Reinwardtia 4 (1957) 141; Blumea 12 (1963) 120. — *D. memecyloides* (non STAFF) MERR. En. Born. (1921) 464 *p.p.* — **Fig. 72, 78c.**

Low shrub, 10-30 cm high, recumbent or creeping. Branches thick, terete, the greyish cork fissured lengthwise, scars of fallen leaves large (3-5 mm ϕ). Branchlets brownish, sparsely setose or glabrous, but the young shoots always with scattered, \pm spreading, 2-4 mm long, bristles. *Leaves* obovate, sometimes elliptic or obovate-oblong, aggregated towards the ends of the branchlets, apex broad-attenuate to rounded, the terminal gland thick and protruding, base cuneate into the petiole, rigidly coriaceous, glabrous above,

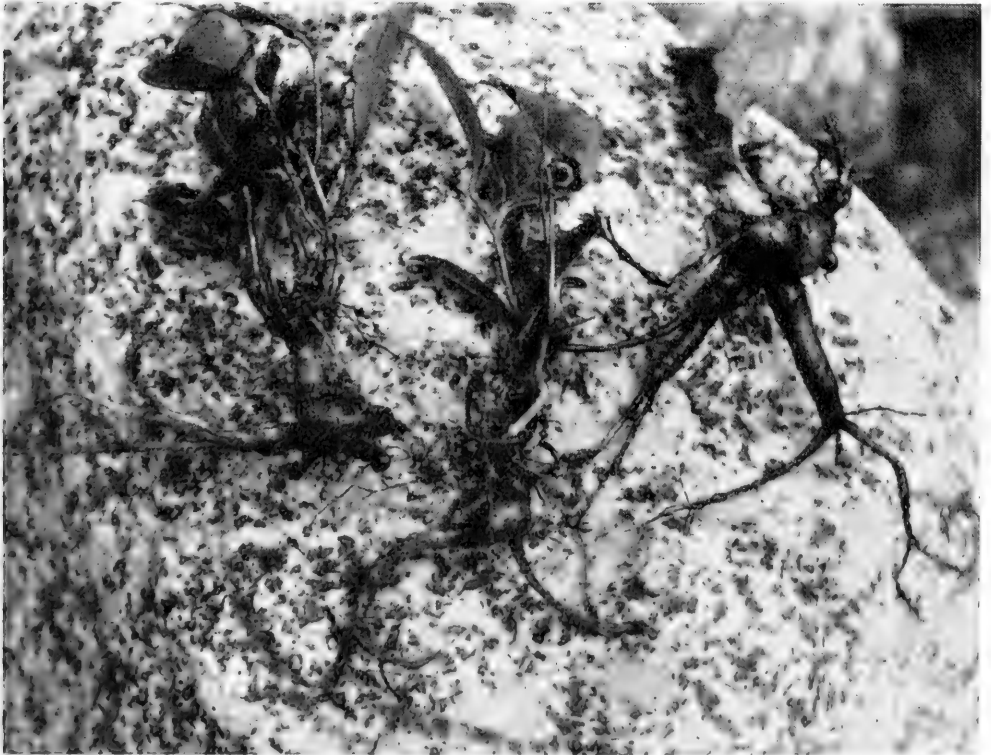


Fig. 72. *Diplycosia cf. kinabaluensis* STAFF, among mosses on temporarily inundated rocks in the Mesilau East R., 1950 m, Mt Kinabalu, North Borneo, showing swollen hypocotylar base and thickened roots (SLEUMER 4737) (SLEUMER, 1963).

laxly to subdensely patently and caducously setose or finally blackish punctate beneath, mostly crenulate in the upper half, the teeth ending in semipersistent, rather long bristle-like hairs, or completely entire, normal ones (6-)7-12 by (3-)4-6 cm, sometimes with other minor ones on the same specimen, margin slightly recurved, midrib mostly strongly impressed above, very prominent beneath, 5(-7)-plinerved, these main nerves curved-ascending and anastomosing, impressed above, prominent beneath, other higher nerves (2-5) from the midrib, less distinct, slightly impressed above, \pm obscure beneath, veins \pm transverse, veinlets coarsely reticulate, both somewhat impressed above, but \pm inconspicuous beneath; petiole glabrous, deep red-purple as is the lower third of the midrib, 4-8 by 2-3 mm, \pm flattened, \pm winged in the upper part by the decurrent leaf blade. *Flowers* generally 3-4 per axil, sometimes only 2 or solitary in the one or other axil of the same specimen, both from the upper foliate axils or defoliate ones near to the ground. Pedicels stoutish, glabrous, 6-8(-10) mm, basal bracts rather large. Bracteoles rounded-ovate, obtuse, glabrous, ciliolate, 2-3 mm. *Calyx* greenish, c. 4 mm, glabrous, 5-lobed to nearly its base, lobes subacute. *Corolla* campanulate, pinkish to greenish, or greenish shaded with red, rarely ivory white, with strong scent, 9-11 mm long, base c. 5 mm ϕ , glabrous, lobes subacute, erect, 3-4 mm. *Filaments* linear, glabrous, papillose in their upper part, c. 5.5 mm; anthers oblong, echinulate, the base inflexed, 5 mm including the rather short tubules. *Ovary* glabrous; style 8 mm. *Fruit* light blue to blackish, c. 6 mm ϕ , the capsule entirely included by the somewhat fleshy calyx lobes.

Distr. *Malesia*: North Borneo (Mt Kinabalu).

Ecol. Abundant wherever the vegetation opens out, both on the olivine-serpentine ridge, the dwarf sub-summit forest and in the cracks of the granite core to the summit, where it forms one of the chief components of the vegetation, on wet places, chiefly between 2440-3960 m, occasionally with creeks down to 1830 m. *Fl.* Dec.-July.

45. *Diplycosia sumatrensis* MERR. Pap. Mich. Ac. Sc. 19 (March 1934) 181; SLEUM. Reinwardtia 4 (1957) 141. — *D. patenticalyx* J. J. S. in Fedde, Rep. 35 (July 1934) 295. — Fig. 73.

Shrub, c. 1.5 m. Branches pallid-corticate. Branchlets angular, tips densely, older parts \pm laxly clothed with rufous, \pm spreading, 2-3 mm long bristles. *Leaves* elliptic, sometimes more ovate, apex shortly and rather broadly acuminate, the terminal gland thick, obtuse, sharply protruding, base cuneate into the petiole, coriaceous, the very young ones laxly rufous-setulose on both faces, mature ones glabrous and shining above, dull and laxly set with subappressed bristle-like hairs beneath, glabrescent, finally blackish punctulate, margin somewhat revolute and crenulate towards the apex of the lamina, the teeth ending in early caducous bristles, (2.2-)3-5(-7) by (1.3-)1.8-3(-4) cm, 3-plinerved, midrib impressed above, raised beneath, 1-2 basal nerves high-ascending, parallel

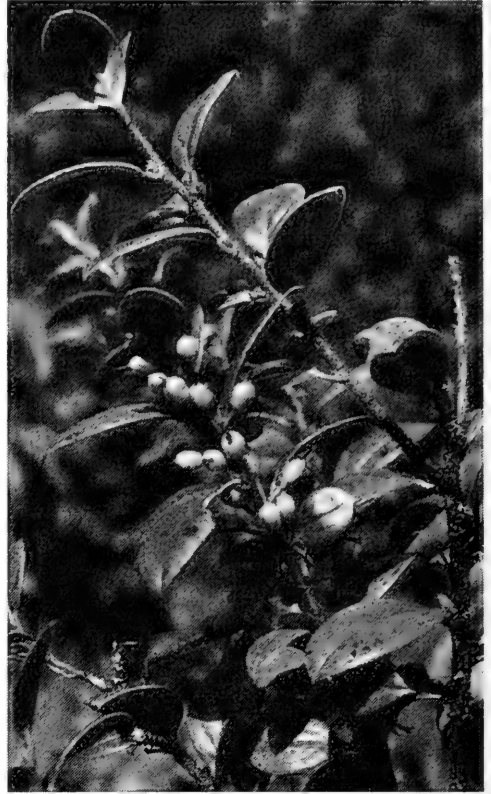


Fig. 73. *Diplycosia sumatrensis* MERR. Mt Singalang, Sumatra, c. 2800 m (MEIJER, 1957).

with the margin to the top of the lamina, slightly impressed above, mostly hardly visible beneath, other (3-)4-6 less visible nerves from the midrib, anastomosing with the marginal nerve, mostly very slightly impressed above, or rather inconspicuous as is the lax reticulation above; petiole grooved, thick, glabrescent, 3-6 mm. *Flowers* 3-6 per fascicle, sometimes only 2 or 1 in one or the other axil of the same specimen. Pedicels stoutish, rather densely clad with appressed, glandular, crisped, bristle-like hairs, (5-)8-11 mm. Bracteoles broad-ovate, subacute, keeled, very laxly muriculate dorsally, shortly glandular-fimbriate, c. 2 mm. *Calyx* constricted at the basal part, nearly stipitate, c. 5 mm, very laxly glandular-crisped-setulose, lobes narrow-ovate, acute, 4 mm. *Corolla* subcylindric-urceolate, (6-)7 mm, glabrous, white, scented, lobes reflexed, 1.5 mm. *Filaments* linear, glabrous, wavy, c. 3.5 mm; anthers oblong, cordate at the base, 3 mm including the slender tubules. *Ovary* laxly hairy on the top; style glabrous, c. 5.5 mm. *Fruit* violet or mostly blue, c. 5 mm ϕ .

Distr. *Malesia*: Sumatra (Tapanuli: Luburadja; Westcoast: Mt Singalang, Mt Malintang).

Ecol. In *Vaccinium*-forest and subalpine low vegetation or thickets, 1700-2870 m, also on lava

soil, apparently common on Mt Singalang. *Fl. fr.* Jan., April-Aug.

Note. Dry material with fine, cumarine-like smell.

46. *Diplycosia crassiramea* SLEUM. Reinwardtia 4 (1957) 141.

Shrub. Branchlets terete in the older, greyish corticate and defoliate (6–8 mm ϕ) parts which bear big rounded scars, angular in the younger, more slender (3–5 mm ϕ) ones which are exclusively clad with scattered bristles (2–3 mm). *Leaves* oblong to obovate, sometimes obovate-elliptic, apex short-acuminate to broad-attenuate or rounded, the terminal gland very thick and protruding, base cuneate into the petiole, rigidly coriaceous, margin \pm revolute, minutely crenulate or entire, glabrous above, rather densely blackish punctate beneath (bristles very early caducous, not to be seen in rather young leaves), (7–)8–13 by (3.5–)4–7.5 cm, midrib slightly impressed above, very thick and prominent beneath, main nerves in 3–4 distinct pairs, curved-ascending and \pm anastomosing, slightly impressed above, raised beneath, other higher and shorter nerves or veins \pm less distinct or obscure; petiole grooved above, winged in its upper part by the decurrent lamina, c. 1 by 0.3 cm. *Flowers* both from the foliate and defoliate axils, 4–8 per fascicle. Pedicels stout, densely ferruginous-cripsed-pubescent (not properly setulose), 7–10(–12) mm, basal bracts numerous, ovate to lanceolate, acute, ferruginous-cripsed-pubescent, 2–4 mm. Bracteoles ovate, subacute, very shortly glandular-fimbriate and ciliate, externally ferruginous-pubescent, (2–)2.5–3 mm. *Calyx* contracted at the base, glabrous or very shortly rufous-hairy at the lobes, 4–4.5 mm, lobes deltoid, subacute, reflexed at anthesis, shortly glandular-fimbriate, 2 mm. *Corolla* subcampanulate, slightly constricted both at the base and the limb, 6 by 4–5 mm, glabrous, green, lobes erect, c. 2 mm. *Filaments* linear, somewhat dilated above the base, papillose, 3–3.5 mm; anther-cells ovate-oblong, incurved at the base, echinulate, c. 2.5 mm; tubules rather narrow, 1.3 mm. *Ovary* glabrous; style c. 5 mm.

Distr. *Malesia*: SW. Central Celebes (Latimodjong Ra.: Rantemario-Pokapindjang massif).

Ecol. On open slopes, 2400–3000 m. *Fl.* June.

47. *Diplycosia trinervia* ELM. Leaf. Philip. Bot. 3 (1911) 1102; MERR. En. Philip. 3 (1923) 247; COPEL. f. Philip. J. Sc. 47 (1932) 68; SLEUM. Reinwardtia 4 (1957) 142. — *D. luzonica* [non (GRAY) MERR.] ELM. Leaf. Philip. Bot. 3 (1911) 1105.

var. trinervia.

Epiphytic shrub, youngest parts of the branchlets \pm densely and \pm patently setose, somewhat angular, older ones early entirely glabrous. *Leaves* elliptic to oblong-elliptic or oblanceolate, apex subacuminate, the terminal gland rather large and protruding, base cuneate, subcoriaceous, margin subrevolute, entire, mature ones glabrous above,

rather laxly punctate beneath, young ones laxly setose-ciliate, (3–)3.5–7 by 1.5–2(–2.5) cm, triplinerved, midrib slightly impressed above, raised beneath, nerves in 1–2 pairs from and/or somewhat from above the base of the lamina, high curved-ascending to and anastomosing at the top of the blade, somewhat impressed above or prominent beneath; petiole 3–7 mm. *Flowers* mostly 3 or 4 per axil, sometimes 2 or 1 in other axils of the same specimen. Pedicels nodding, slender, laxly subappressed-setulose, or nearly glabrous, 1–2 cm. Bracteoles ovate, acute, glabrous, glandular-ciliate, 1 mm. *Calyx* c. 4 mm, glabrous, lobes ovate, acute, glandular-ciliate, c. 2.5 mm. *Corolla* narrowly campanulate, greenish, glabrous, 5–6(–7) by 2.5 mm, lobes obtuse, 1.2 mm. *Filaments* linear, glabrous, S-curved, c. 3 mm; anthers linear-oblong, echinulate, c. 3 mm, the narrow tubules (1.2–1.5 mm) included. *Ovary* glabrous; style 5 mm.

Distr. *Malesia*: Philippines (Mindanao: Mt Calelan).

Ecol. In mossy elfinwood, at c. 2500 m. *Fl.* Sept.

var. urdanetensis (ELM.) SLEUM. Reinwardtia 4 (1957) 143. — *D. urdanetensis* ELM. Leaf. Philip. Bot. 7 (1915) 2628; MERR. En. Philip. 3 (1923) 247.

Differs by the branchlets which are sparsely and \pm appressedly setose from the beginning, and the muriculate, finally glabrescent pedicels.

Distr. *Malesia*: Philippines (Mindanao: mossy forest on Mt Urdaneta), at c. 2000 m. One collection. *Fl.* Sept.

Vern. *Minamol*, Mbo.

48. *Diplycosia lamii* J. J. S. Nova Guinea 18 (1936) 99, t. 21; SLEUM. Bot. Jahrb. 72 (1942) 211; Reinwardtia 4 (1957) 143.

Shrub, 1.5 m, whether or not scandent. Branches elongate, stout. Branchlets short, terete, densely and exclusively \pm patently rufous-setose. *Leaves* elliptic to subobovate-elliptic, rarely obovate, apex broad-attenuate, obtuse, the terminal gland thick and protruding, base cuneate into the petiole, stiff-coriaceous, shining and \pm dark green above, light green and \pm dull beneath, very young ones longsetose on both faces, mature ones laxly punctate above, laxly shortly blackish setulose or finally punctulate all over the undersurface, margin somewhat recurved, the teeth passing into early caducous fine bristles, 1.8–2.7(–3.5) by 1–1.7 cm, midrib strongly impressed above, rather obscure beneath, nerves 1–2 pairs from the base of the lamina or the lower third of the midrib, high curved-ascending, slightly impressed above, obscure beneath, other nerves faintly visible; petiole setose initially, glabrescent, 3–4.5 by 1.2 mm. *Fascicles* mostly 4–6-, in the upper axils sometimes only 3–2-flowered. Pedicels stoutish, recurved, sparsely to subdensely short-cripsed-setulose, glabrescent except the bases of the bristles, (5–)6–8 mm. Bracteoles suborbicular-ovate, ciliate, 1.5 mm. *Calyx* dark red, rugulose, glabrous, 2.5 mm, lobes ovate, subacute, c. 2 mm. *Corolla* pale green, limb reddish, urceolate, somewhat fleshy, glabrous, c. 5.5 mm, lobes 1.5 mm. *Filaments* linear, glabrous,

c. 3 mm; anthers oblong, base subcordate, c. 1.8 mm, the very short and broad tubules included. *Ovary* glabrous; style c. 4 mm. *Fruit* dark red. *Distr. Malesia*: NW. New Guinea (Mt Doorman).

Ecol. On open slopes with rocks and sheltered ravine, 3200–3280 m. *Fl. Oct.*

49. *Diplycosia orophila* SLEUM. Bot. Jahrb. 71 (1940) 155; Reinwardtia 4 (1957) 143.

Shrub, 1–2 m. Branchlets terete, brown, laxly patent-setose to almost glabrous with age. *Leaves* oblong or mostly oblong-ovate, rather long gradually acuminate towards the apex, acute, base somewhat inequilateral, ± broad-attenuate to nearly rounded, coriaceous, glabrous above, laxly minutely punctulate beneath, minutely denticulate to subentire, (10–)12–17 by 3.5–5.5 cm, triplinerved, midrib and nerves slightly impressed above, raised beneath, other nerves or transverse veins higher from the midrib 8–9, very slightly impressed above, ± obsolete beneath; petiole thick, glabrous or sometimes laxly setose initially, c. 8 mm. *Flowers* 3(–5) per fascicle, mostly in the defoliate axils. Pedicels very shortly rufous-tomentose, 3–4 mm, basal bracts few, scarioso, tomentose. Bracteoles ovate, rufous-tomentose externally, ciliate, 1.5 mm. *Calyx* whitish, 3 mm, lobes very shortly rufous-tomentulose outside, glabrous inside, 2 mm. *Corolla* urceolate, pale pink, rather fleshy, glabrous, 4.5 mm, lobes very short. *Filaments* linear, glabrous, 2 mm; anthers ovate-oblong, 1.5 mm, the very short tubules included. *Ovary* glabrous; style 3 mm.

Distr. Malesia: N. Borneo (Sarawak: Mt Dulit), 2 collections.

Ecol. Shady or open moss forest, 1230–1300 m. *Fl. Sept.*

50. *Diplycosia luzonica* (A. GRAY) MERR. Philip. J. Sc. 2 (1907) Bot. 293; *ibid.* 3 (1908) Bot. 378; *ibid.* 5 (1910) Bot. 371; En. Philip. 3 (1923) 247; COPEL. f. Philip. J. Sc. 47 (1932) 71, t. 2, f. 3–6, t. 4, f. 1; COX, Am. Midl. Nat. 40 (1948) 499 (*anat.*); SLEUM. Reinwardtia 4 (1957) 143; Blumea 12 (1963) 120. — *Gaultheria luzonica* A. GRAY, Proc. Am. Ac. Arts Sc. 5 (1861) 324. — *D. scandens* MERR. Philip. J. Sc. 1 (1906) Suppl. 219; En. Philip. 3 (1923) 247. — *D. fasciculiflora* MERR. Philip. J. Sc. 10 (1915) Bot. 52; En. Philip. 3 (1923) 246.

KEY TO THE VARIETIES

- 1. New shoots ± densely setose initially (though glabrescent with age). Pedicels at anthesis rather densely appressed- or crisped-setulose and finely short-pubescent, the bristles ± caducous in fruiting stage. Leaves setose on both faces initially.
- 2. Calyx glabrous 1. *var. luzonica*
- 2. Calyx manifestly greyish puberulous

2. *var. pubens*

- 1. New shoots (very) laxly setulose initially (early entirely glabrescent). Pedicels not or very laxly setulose, ± densely short-pubescent, finally

glabrescent. Leaves glandular-punctulate beneath when young.

- 3. Leaves elliptic, broadly acuminate at apex

3. *var. calelanensis*

- 3. Leaves elliptic-lanceolate, ± long-acuminate at apex 4. *var. merrittii*

1. *var. luzonica*.

Tree, shrub or subshrub, terrestrial or epiphytic, whether or not scandent, 1–6(–10) m. Branches greyish corticate, striate. Branchlets densely ± spreading rufous-setose (2–3 mm) at tips and younger parts, glabrescent with age. *Leaves* aromatic, ovate to elliptic, rarely elliptic-obovate, apex mostly gradually short-acuminate, rarely obtuse, the terminal gland rather small, but protruding, thus the obtuse leaves apiculate, base ± broadly attenuate into the petiole to nearly rounded, subcoriaceous, firm, very young ones rather densely and ± appressedly rufous-setose on both faces, mature ones glabrous above, laxly and often ± persistently rufous-setose (1–1.5 mm) beneath, sometimes glabrescent, the punctiform bases of the bristles excepted, sometimes finally quite glabrous, margin mostly slightly recurved, serrulate in the upper part, the teeth ending with longish caducous bristles, (2–)3–5(–6, sometimes up to 10) by (1–)1.5–3(–6) cm, midrib impressed above, raised beneath, nerves in the smaller leaves 1–2 pairs, one of these ± basal, in the larger leaves 3–4(–5) and ± pinnately arranged, all curved-ascending and slightly impressed above, faintly raised or inconspicuous beneath; petiole setose initially, (2–)3–5(–7) mm. *Flowers* 3–8, sometimes only 2 per axil in the same specimen. Pedicels stoutish, at anthesis shortly appressed- or crisped-setulose and puberulous, 4–8 mm, glabrescent with age and finally accrescent to 15 mm. Bracteoles ovate, rather glabrous dorsally, ciliate, 1.5 mm. *Calyx* c. 3.5 mm, glabrous, lobes ciliate, 2–3 mm. *Corolla* subglobose-urceolate, glabrous, 3–4 by c. 2.5 mm, white or rose, lobes ovate, 1 mm. *Filaments* linear, glabrous, 2–3 mm; anthers oblong, c. 2 mm, the short tubules included. *Ovary* glabrous; style 2–3 mm. *Fruit* first pale blue, finally purplish or blackish blue, c. 7 mm ø. *Seeds* flattened, subtriangular, c. 1 mm.

Distr. Malesia: Philippines (Luzon, Biliran I., Catanduanes, Negros, Mindanao).

Ecol. Both in mossy oak-forest or forest edge, and on dry exposed grassland-slope, 1100–2700 m. *Fl. fr. Jan.-Dec.*

Vern. *Atepen, ginula, Ig., Sagumati, Bag.*

2. *var. pubens* SLEUM. Reinwardtia 4 (1957) 143.

Differing by a dense greyish puberulence on the bracteoles and calyx.

Distr. Malesia: Philippines (Luzon, Benguet Prov., Mt Pulog-Pulogloco).

3. *var. calelanensis* (ELM.) SLEUM. Reinwardtia 4 (1957) 144; Blumea 12 (1963) 120. — *D. calelanensis* ELM. Leaf. Philip. Bot. 3 (1911) 1103; MERR. En. Philip. 3 (1923) 246; COPEL. f. Philip. J. Sc. 47 (1932) 74, t. 5, f. 1. — *D. glabra* MERR. Philip. J.

Sc. 14 (1919) 442; En. Philip. 3 (1923) 246. — *D. opaca* C. B. ROBINSON, Philip. J. Sc. 6 (1911) Bot. 355; MERR. En. Philip. 3 (1923) 247; COPEL. f. Philip. J. Sc. 47 (1932) 77, t. 5, f. 2.

Differs by laxly setulose, early glabrescent branchlets, and not or very laxly setulose (though puberulous), finally glabrescent pedicels. *Leaves* elliptic, broadly acuminate at apex, glandular-punctate when young, i.e. bristles very early caducous. Probably not more than a glabrescent variety of *D. luzonica*.

Distr. *Malesia*: Philippines (Luzon, Palawan, Mindanao).

Ecol. In forest, especially in mossy elfinwood on exposed peaks and ridges, 900–2500 m.

Vern. *Limatmat*, Bag., *dugni-is*, *manitil*, Ig.

4. *var. merrittii* (MERR.) SLEUM. Reinwardtia 4 (1957) 144. — *D. merrittii* MERR. Philip. J. Sc. 2 (1907) Bot. 293; *ibid.* 3 (1908) Bot. 378; En. Philip. 3 (1923) 247.

Similar to the preceding in scarcity of bristles on branchlets, leaves and pedicels, but differing by elliptic-lanceolate, ± long-acuminate leaves.

Distr. *Malesia*: Philippines (Mindoro, Mindanao; reported from Palawan).

51. *Diplycosia caryophylloides* J. J. S. Bot. Jahrb. 68 (1937) 209, 214; SLEUM. Reinwardtia 4 (1957) 144.

var. caryophylloides.

Epiphytic shrub, c. 1 m. Branchlets terete. Branchlets subangulate, early covered with whitish or greyish cork, only tips and very young shoots laxly to rather densely clad with ± patent, gland-tipped bristles (1–1.5 mm) or their relics. *Leaves* inserted on a thick cushion, elliptic to broadly oblong-elliptic, apex broadly attenuate, ± obtuse, the terminal gland thickish and prominent, base broad-cuneate to rounded, coriaceous, glabrous above, setulose initially, glabrescent and finally rather sparsely punctate beneath, margin revolute, entire, the marginal bristles early caducous, 4.5–7 by 2.5–3.6 cm, midrib sharply impressed above, very prominent beneath, nerves in (3–)4–5 pairs curved-ascending and anastomosing, ± distinctly impressed above, mostly rather prominent beneath, reticulation obscure; petiole thick, grooved, glandular-setulose initially, glabrescent, 2.5–5 by 1–1.5 mm. *Flowers* (3–)4–6 per fascicle, both in the foliate and defoliate axils. Pedicels stoutish, laxly covered with rufous fine ± spreading hairs, 3–5 mm, basal bracts rather numerous, small. Bracteoles short-ovate-triangular, rather obtuse, patent-puberulous dorsally, ciliolate, 1.5 mm. *Calyx* obconical, manifestly funnel-shaped attenuate towards the base, tube at anthesis c. 2, in fruit c. 3 mm, glabrous, lobes triangular, subacute, shortly glandular-fimbriate, c. 1.7 mm. *Corolla* campanulate, glabrous, greenish whitish, 5–6 mm, lobes abruptly attenuate towards the tips, c. 2 mm. *Filaments* linear, papillose, c. 2.8 mm; anther-cells ovate-oblong, inflexed at base, echinulate, 1.5 mm; tubules very narrow, 1.5 mm. *Ovary* glabrous; style

5–6 mm. *Fruit* pear-shaped, blue, c. 8 mm long, c. 4 mm ø in its upper part.

Distr. *Malesia*: SE. Celebes (Mengkoka Mts). Ecol. In rain-forest, 1400–1500 m, apparently rare. *Fl.* March, Oct.

var. longipes SLEUM. Reinwardtia 4 (1957) 144.

Differing by smaller leaves (3–5 by 1.5–2.5 cm) and generally longer petioles (4–7 mm).

Distr. *Malesia*: SE. Celebes (mountains N of Kendari), one collection. *Fl.* Oct.

52. *Diplycosia scabrida* BECC. *Malesia* 1 (1878) 211; MERR. En. Born. (1921) 465; SLEUM. Reinwardtia 4 (1957) 144; *Blumea* 11 (1961) 7.

Epiphytic shrub. Branches greyish corticate, angular when dry. Branchlets densely ferruginous setose and setulose at the subterete tips (the shorter bristles becoming furfuraceous), early glabrescent. *Leaves* elliptic or obovate-elliptic, sometimes suborbicular-elliptic, apex short-acuminate or mostly obtuse to rounded, the terminal gland rather small and slightly protruding, base attenuate into the petiole, coriaceous, very young ones covered with a dense dark rusty tomentum which consists of short bristles and shorter bristle-like hairs, the latter becoming furfuraceous, glabrescent with age, but remaining scabrid to the touch for a long time, finally glabrous, subentire, mostly ± distinctly revolute (at least in dry state), (4–)6–10 by (2–)2.5–7.5 cm, midrib mostly impressed above, always strongly raised beneath, nerves in 3–4(–5) pairs curved-ascending and ± distinctly anastomosing, with some other shorter less distinct ones from the upper third of the midrib, all mostly slightly immersed above, only the lower ones somewhat raised beneath, no proper reticulation visible, although both faces are somewhat rugose in the dry state; petiole rugose, glabrescent, 5–8(–12) by c. 2 mm. *Flowers* 3–5 per fascicle. Pedicels stout, densely rusty setulose and -furfuraceous, 3–5 mm at anthesis, basal bracts very small. Bracteoles ovate, apiculate, rather glabrous dorsally, long-ciliate, c. 1.5 mm. *Calyx* very shortly contracted at the base, 2.5–3 mm, subdensely very shortly crisped-hairy in its upper half, lobes ovate, subacute, ciliolate, 2 mm. *Corolla* subcylindric-campanulate, green with red tinge, glabrous, 3.5–4 mm, lobes obtuse, reflexed, 1 mm. *Filaments* linear, glabrous, 2 mm; anther-cells ovate, granular, c. 1 mm; tubules rather broad, c. 0.5 mm. *Ovary* glabrous; style 2.5 mm. *Fruit* red, 3–4 mm ø.

Distr. *Malesia*: Borneo (Sarawak, Central and SE. Borneo).

Ecol. In mossy and *Agathis* forest, on acid sandy loam soil or sandstone, 20–1000 m. *Fl.* Oct.; *fr.* July.

53. *Diplycosia capitata* SLEUM. Bot. Jahrb. 71 (1940) 149; Reinwardtia 4 (1957) 145.

Shrub. Branchlets angular, greyish, with short solitary bristles or finally glabrous. *Leaves* oblong to subovate-oblong, apex acuminate, the terminal gland rather thick, but not distinctly protruding beyond the leaf-margin, base broad-attenuate to nearly rounded, subcoriaceous, laxly to rather

densely clad with short (1 mm) bristles and bristle-like rufous hairs all over the undersurface, entire, margin caducously ciliate (1 mm), (4.5)–6–9(–12) by 2.5–3.5(–5.5) cm, midrib impressed above, distinctly raised beneath, nerves 4–5 pairs, the lowest pair nearly from the base, the upper 2–3 pairs curved, the uppermost pair more straight, all anastomosing and very slightly impressed above, rather indistinct beneath; petiole laxly setulose initially, glabrescent, 5–7 by 1.5–2 mm. *Flowers* 8–9 per fascicle. Pedicels stoutish, densely rusty-tomentose by rather short stiped hairs, 5–8 mm at anthesis, up to 10 mm in fruit, basal bracts small, subulate, tomentose. Bracteoles broad-ovate, obtuse, densely rusty-tomentose externally, glabrous inside, *c.* 2 mm. *Calyx* 2.5 mm, glabrous, lobes broad-ovate, obtuse, tomentulose at the margin, 2 mm. *Corolla* short-campanulate, green, glabrous, 6 by 4–5 mm, lobes triangular, obtuse, 1.5 mm. *Filaments* linear, glabrous, 2 mm; anther-cells oblong, 1.5 mm; tubules slender, 0.7 mm. *Ovary* glabrous; style 4.5 mm.

Distr. Malesia: Central Celebes (Mt Ponáa on the waterdivide N of Paloppo), at 1620 m. One collection. *Fl.* Sept.

54. *Diplycosia fimbriata* SLEUM. *Blumea* 12 (1963) 120.

Shrub, 3–4.5 m. Branchlets rather thick, variously obtusangular, older parts covered with greyish cork which bears the point-like relics of the fallen bristles, younger ones laxly set with spreading glandular-capitate bristly hairs. *Leaves* elliptic, apex rounded or slightly retuse, apiculate by a protruding gland, base broadly and shortly contracted in or decurrent on the petiole, coriaceous, glossy and punctulate above, dull and subdensely caducously glandular-setulose or punctate beneath, 4–5 by 2.5–4 cm, caducously setular and subcrenulate at the slightly revolute margin, midrib immersed above, obtusely prominent beneath, nerves 4(–5) pairs, curved-ascendent, and almost parallel, a little impressed above, the lower ones only \pm prominent beneath, reticulation obscure; petiole slender, flattened, 1–1.5 cm by 1.5–2 mm, grooved above, laxly patently glandular-setulose. *Fascicles* 3–5(–6)-flowered; perulae ovate-acuminate, *c.* 2 mm. Pedicels slender, 1–1.3 cm, subdensely patently glandular-setulose. Bracteoles small, dorsally set with thick subsessile glands. *Calyx* tube cupular, 2.5 mm in all, contracted at the very base only, shining, corrugate in dry specimens, glabrous, lobes deltoid, *c.* 2 mm, fimbriate along the whole margin by thick (sub)sessile glands. *Corolla* narrowly campanulate, thin, pinkish white, glabrous, *c.* 8 mm long in all, 2.5 mm ϕ at base, 5–6 mm ϕ at limb, lobes triangular, 2 mm. *Stamens* 10, equal, connivent, 8 mm; filaments linear, glabrous; anthers elongate-ovate, tubules narrowed distally. *Disk* lobes thick, 0.5 mm. *Ovary* glabrous; style glabrous, rather slender.

Distr. Malesia: Borneo (Sarawak: summit area of Mt Mulu), one collection.

Ecol. Montane forest on exposed ridge, 1980–2380 m. *Fl.* June.

55. *Diplycosia sagittanthera* J. J. S. *Bot. Jahrb.* 68 (1937) 205; SLEUM. *Reinwardtia* 4 (1957) 145.

Epiphytic shrub. Branches slender, terete, rather short (30–40 cm), patent-rufous-setulose in the younger parts, most of the bristles \pm distinctly gland-tipped, furthermore clothed with a fine patent pubescence. *Leaves* ovate to oblong-ovate, apex gradually acuminate, the terminal gland small, not or only a little prominent, base broad-attenuate to rounded, coriaceous, stiff, somewhat convex when dry, olivaceous, glabrous and somewhat shining above, all over the undersurface and along the margin with scattered, \pm caducous, blackish, bristle-like hairs, finally blackish punctate, minutely denticulate, 1.7–3 by 0.9–1.2(–1.5) cm, midrib strongly impressed above, slightly raised beneath, 1 pair of nerves from near base of the lamina ascending to the top, slightly impressed above, subinconspicuous beneath, some higher inserted nerves faintly visible; petiole stout, grooved, setulose, 1.5–2.5 mm. Stipule-like axillary perulae subulate, as long as the petioles, persistent at least in the upper axils. *Flowers* solitary in the upper axils. Pedicels stoutish, subglabrous, 1–2 mm. Bracteoles ovate, obtuse, ciliate and with a few long bristles along the margin, 1 mm. *Calyx* cupular, *c.* 2.5 mm, glabrous dorsally, lobes \pm spreading, 1.5 mm, the very apex ciliate, otherwise with numerous, coarse, longish (*c.* 1.5 mm), marginal bristles. *Corolla* cylindrical or narrow-campanulate, white, glabrous, 5 mm, lobes 2 mm. *Filaments* S-curved, linear, but manifestly dilated above the base, 1.8 mm; anthers sagittate, as long as the filaments, the anther-cells echinulate; tubules narrow and \pm divergent, 0.8 mm. *Ovary* glabrous; style *c.* 3 mm.

Distr. Malesia: Central Celebes (Mt Wawu Meusa, N of Lake Matana), in rain-forest at 800 m, said to be rare. Once collected. *Fl.* Sept.

56. *Diplycosia acuminata* BECC. *Malesia* 1 (1878) 212; MERR. *En. Born.* (1921) 463; SLEUM. *Reinwardtia* 4 (1957) 145; *Blumea* 12 (1963) 120. — *Fig.* 77c.

Small shrub, terrestrial or epiphytic. Branches terete, glabrous, divergent. Branchlets slender, both laxly to densely subpatently rufous-setulose and densely patent-puberulous. *Leaves* ovate, apex subcaudate-acuminate, subacute, the terminal gland small, base broad-attenuate to rounded, coriaceous, rather stiff, flat, glabrous above, with scattered, subappressed, blackish short (1 mm) bristles, or finally punctulate by their remaining bases, indistinctly crenulate especially in the upper half of the lamina, the teeth extending into caducous, very slender bristles (1–1.5 mm) which are persistent for a long time, (1.5)–2–3(–4) by (1)–1.2–1.8(–2.2) cm, midrib impressed above in its entire length, slightly raised beneath, nerves 3–4 pairs, the lower 1–2 pairs from or from above the base of the lamina, ascendent and slightly impressed above, other 2–3 higher pairs from the midrib and less distinct, these very slightly impressed above or altogether inconspicuous on both sides; petiole setulose, 1.5–2 mm. Stipule-like axillary perulae

subulate, as long as the petiole, ciliate, \pm persistent. *Flowers* solitary axillary, subsessile. Pedicels glabrous, at anthesis hardly 1 mm, up to 2.5 mm in fruit. Bracteoles ovate, obtuse, glabrous, ciliolate, 1 mm. *Calyx* 2.5 mm, contracted at the base, glabrous, lobes ovate, obtuse, ciliolate, c. 1.8 mm. *Corolla* campanulate, tender, white, glabrous, 5(–6) mm, lobes obtuse, 1 mm. *Filaments* linear, dilated above the base, S-curved, 2.5 mm; anthers sagittate, echinulate, 2.5 mm including the slender tubules. *Ovary* glabrous; style 3.5–4 mm.

Distr. Malesia: Borneo (Sarawak, Central and Eastern Borneo).

Ecol. In mossy forest, on Mt Beratus also on sandstone, 700–1300 m. *Fl.* June, July, Nov.

57. *Diplycosia crenulata* SLEUM. Bot. Jahrb. 71 (1940) 153; Reinwardtia 4 (1957) 145.

Epiphytic shrub. Branchlets terete, very slender, subdensely covered with fine, rufous, bristle-like hairs (1–1.5 mm) and very densely with spreading, short, brownish, fine hairs. *Leaves* broad-ovate to suborbicular-ovate, apex \pm rounded, the terminal gland \pm indistinct, base slightly though manifestly cordate, subcoriaceous, laxly clad with caducous short bristle-like hairs on both faces when young, \pm glabrous with age above, \pm persistently blackish brownish punctate beneath, margin finely crenulate, the teeth with rather longish caducous bristles, (4–)5–8(–10) by (4–)7(–8) mm, midrib slightly impressed above, obscure beneath, one pair of nerves high curved-ascending, very slightly impressed above or hardly visible above only; petiole setulose, 1–1.5 mm. Stipule-like axillary perulae fuscous, subulate, \pm persistent, c. 1.5 mm. *Flowers* axillary solitary. Pedicels rather stoutish, nearly glabrous, 2(–3) mm. Bracteoles broad-ovate, obtuse, glabrous, ciliolate, 1 mm. *Calyx* contracted at the base, 2.5 mm, glabrous, lobes broad-ovate, rather obtuse, ciliolate, c. 1.7 mm. *Corolla* subcampanulate, rather firm, c. 6 by 4 mm, glabrous, flesh-coloured (or white?), lobes nearly 2 mm. *Filaments* linear, a little dilated above the base, glabrous, S-curved, 2.5 mm; anthers sagittate, 3 mm in all; anther-cells very granular; tubules slender, 1.3 mm. *Ovary* glabrous; style 4 mm.

Distr. Malesia: North Borneo (Mt Kinabalu).

Ecol. In ridge forest, 1220–1680 m. *Fl.* Jan., April, Oct.

58. *Diplycosia elliptica* RIDL. J. Fed. Mal. St. Mus. 10 (1920) 145; Fl. Mal. Pen. 2 (1923) 213; SLEUM. Reinwardtia 4 (1957) 145; Blumea 11 (1961) 7; *ibid.* 12 (1963) 121. — *D. cordifolia* RIDL. J. Fed. Mal. St. Mus. 10 (1920) 145; Fl. Mal. Pen. 2 (1923) 214. — *D. microphylla* (non BECC.) CLARKE in Hook. f. Fl. Br. Ind. 3 (1882) 458; RIDL. J. Str. Br. R. As. Soc. n. 23 (1891) 146; J. Fed. Mal. St. Mus. 10 (1920) 145; Fl. Mal. Pen. 2 (1923) 213; BURK. & HENDERS. Gard. Bull. S. S. 3 (1925) 390; FLETCHER, Fl. Siam. En. 2 (1938) 315; HENDERS. Mal. Nat. J. 6 (1950) 264. — *Vaccinium microphyllum* (non BL.) K. & G. J. As. Soc. Beng. 74, ii (1905) 62; MERR. En. Born. (1921) 464; BURK. & HOLTT. Gard. Bull. S. S. 3 (1923) 57. — *D.*

kingii MERR. Pap. Mich. Ac. Sc. 19 (1933) 182; Contr. Arn. Arb. 8 (1934) 128; Not. Nat. Ac. Nat. Sc. Philad. 47 (1940) 2. — Fig. 77g.

Epiphytic or terrestrial shrub or shrublet, up to 1 m, sometimes creeping or scrambling, with much branched, tough, wiry glabrous branches. Branchlets slender, tips subangular, laxly or rarely more densely clothed with \pm appressed longish (1–2 mm) bristles as well as \pm densely greyish to reddish patent-puberulous, or sometimes puberulous only, subdensely foliate. *Leaves* ovate to elliptic, variable in form, apex broad-attenuate, blunt, not rarely rounded, the terminal gland minute, base mostly rounded or nearly so, rarely (and only partly in the same specimen) cordate, coriaceous, rather stiff, old ones said to be scarlet, young ones purple underneath, glabrous, undersurface laxly set with very short blackish bristles, these caducous except their bases, entire or mostly faintly crenate in the upper half, teeth passing into fine \pm caducous bristles, flat, margin not revolute, (7–)10–17 (–30) by (4–)6–10(–18) mm, triplinerved, midrib and nerves slightly sunken on both faces, sometimes \pm obscure; petiole rather slender, finally glabrous, 1–2 mm. Stipule-like axillary perulae subulate, 1–2 mm, easily recognizable on the young sterile branches, \pm caducous with age. *Flowers* solitary, rarely in twos. Pedicels \pm glabrescent, 1(–2) mm, basal bracts minute. Bracteoles ovate, ciliolate, c. 0.6 mm. *Calyx* initially funnel-shaped, contracted in the lower part, glabrous, 2 mm, lobes subtriangular, subacute, ciliolate. *Corolla* short-cylindric or subcampanulate, glabrous, white to greenish or pale yellow, 4–5 by 2.5–3 mm, lobes erect, 1–1.5 mm. *Filaments* rather filiform upwards, gradually expanded towards the base, somewhat S-curved, glabrous, c. 2.5 mm; anthers sagittate, very echinulate; anther-cells c. 1.5 mm; tubules slender, 1 mm. *Ovary* glabrous; style 3.5 mm. *Fruit* depressedly globular, the lower half only surrounded by the bluish, not much swollen calyx, pale to almost white when ripe, c. 3 by 4 mm.

Distr. S. Siam, in Malesia: Malay Peninsula, N. Sumatra (Gajo Lands, Eastcoast), Borneo.

Ecol. In evergreen mountain forest, moss forest, also in rather open places on crests or summits, within ericoid ridge scrub, in the Malay Peninsula between 915–1825 m, in Sumatra 950–2500 m, locally apparently rather common. *Fl.* Jan.–Dec.

59. *Diplycosia microphylla* BECC. Malesia 1 (1878) 212; MERR. En. Born. (1921) 464; SLEUM. Reinwardtia 4 (1957) 146; Blumea 11 (1961) 7. — Fig. 77i, i'–i''.

Shrublet, epiphytic, up to 40 cm with swollen base. Branches divaricate. Branchlets slender, tips rather densely covered with dark rufous \pm appressed fine bristles (1–2 mm) and a dense to rather lax indument of fine very short spreading hairs, \pm densely foliate. *Leaves* elliptic-oblong or elliptic, sometimes (in the same specimen) in part ovate-elliptic, apex short-attenuate, obtuse to rounded, the terminal gland small, only slightly prominent, base mostly short-attenuate, rarely rounded, coriaceous, stiff, flat, glabrous above, obscurely

punctate or finally completely glabrous beneath, crenulate, the teeth ending in very fine \pm caducous bristles, margin not revolute, (7-)10-18 by (4-)5-7 mm, triplinerved, midrib and nerves slightly impressed on both faces, the latter not rarely rather inconspicuous at all; petiole setulose, glabrescent, 1-1.5 mm. *Flowers* mostly solitary, rarely in twos. Pedicels rather glabrous, 1.5-2 mm. Bracteoles minute, ovate, 0.5 mm. *Calyx* glabrous, 1.5 mm, lobes deltoid, obtuse, ciliate, 1 mm. *Corolla* narrow-campanulate, white, glabrous, c. 5.5 mm, shortly 5-lobed. *Filaments* filiform, glabrous, S-curved, c. 2.5 mm; anthers sagittate, echinulate, 2.6 mm in all; tubules slender, c. 1.5 mm. *Ovary* glabrous; style 4-5 mm. Young *fruit* covered by the apparently slightly accrescent calyx in the lower part only.

Distr. *Malesia*: Borneo (Sarawak: Mt Mattang, Mt Poi; SE. Borneo: W. Kutei, Mt Palimasan).

Ecol. In *Agathis*-forest, 600-1370 m, apparently common on Mt Mattang, said to be frequent on rocks of Mt Poi. *Fl.* Oct.-Dec.

60. *Diplycosia kostermansii* SLEUM. *Blumea* 11 (1961) 5.

Shrublet, hardly 10 cm high, with a few prostrate, slender, rooting stems or twigs 3-8 cm, densely set with subappressed reddbrown setular hairs and a very short spreading pubescence, subdensely foliate. *Leaves* elliptic-oblong or lanceolate, shortly attenuate at both ends, subcoriaceous, with a few crenulations, each crenation ending in a long reddbrown setular and subappressed, finally caducous hair, such as are found here and there on both faces of the lamina, otherwise glabrous, 6-8 by c. 2 mm, midrib slightly sunken above, hardly visible beneath, nerves not visible; petiole slender, c. 1 mm. Stipule-like perulae subulate, early caducous. *Flowers* solitary in a few distant axils. Pedicels glabrous, 1 mm, with 2 distal setaceous-ciliate bracteoles. *Calyx* broadly campanulate, 2 mm, 5-lobed halfway, lobes triangular, obtuse, long subsetose-ciliate, glabrous otherwise. *Corolla* urceolate, 5-angular, rather thin, almost 7 by c. 3.5 mm, white, purplish at angles, glabrous, lobes deltoid, 1.5 mm. *Filaments* linear, dilated at the base, glabrous, 4.5-5 mm, a little wavy; anthers sagittate, 2 mm, cells rather narrow, echinulate; tubules as long as but narrower than the cells. *Ovary* glabrous; style columnar, glabrous, 4.5 mm.

Distr. *Malesia*: Borneo (Mt Palimasan in W. Kutei), in mossy forest on white acid sands at 800 m. One collection. *Fl.* Sept.

61. *Diplycosia consobrina* BECC. *Malesia* 1 (1878) 211; MERR. *En. Born.* (1921) 464; SLEUM. *Reinwardtia* 4 (1957) 146.

Epiphytic shrublet, up to 30 cm. Branchlets terete, slender, dark rufous-subappressed-setulose (1.5-2 mm) and densely patently greyish puberulent. *Leaves* ovate-elliptic or elliptic, sometimes ovate or broadly elliptic-ovate, apex short-acuminate, the very apex rather obtuse, the terminal gland small, not or slightly protracted, base mostly broad-attenuate, rarely rounded, sub-

coriaceous, stiff, flat, glabrous above, shortly and laxly setulose beneath initially, or dark brown-punctate in later stages, minutely crenulate, each tooth ending in a fine \pm caducous bristle, margin not revolute, (13-)15-20 by (6-)7-13 mm, tripli- or irregularly faintly 5-nerved from and from somewhat above the base, midrib and nerves sunken above and beneath, the latter sometimes less distinct or hardly visible; petiole slender, setulose, 1-2 mm. *Flowers* solitary. Pedicels nearly glabrous, 1-2 mm, basal bracts minute. Bracteoles ovate, obtuse, ciliate, 0.7 mm. *Calyx* glabrous, 2 mm, lobes deltoid-ovate, obtuse, ciliate, 1 mm. *Corolla* campanulate, glabrous, c. 4.5 mm, lobes reflexed, c. 1.3 mm. *Filaments* linear, broadened disk-like above the base, glabrous, S-curved, 2 mm; anthers sagittate, anther-cells ovate, very granular, 1 mm; tubules narrow, pipe-like, 1 mm. *Ovary* subdensely pubescent; style 3 mm.

Distr. *Malesia*: Borneo (Sarawak: Mt Mattang), twice found there at 500 m.

62. *Diplycosia cinnabarina* SLEUM. *Reinwardtia* 4 (1957) 146. — *Fig.* 77k.

Shrub, epiphytic, creeping. Branchlets rooting, red-brown and setose in the older parts, rather densely subpatently setulose (1.5-2 mm) and \pm densely (rarely laxly) patently fuscous-puberulous. *Leaves* elliptic, sometimes subovate-elliptic or oblong-elliptic, broad-attenuate at both ends, the apical gland small though distinct, on each side accompanied by a protracted tooth, thus the apex becoming \pm tridentate, rigid, coriaceous, glabrous above, set with scattered blackish, short \pm caducous bristle-like hairs beneath, finally blackish punctulate, manifestly crenate, the teeth obtuse, passing into \pm persistent bristles (1 mm), 0.7-1.4 by 0.4-0.7 cm, triplinerved, midrib distinctly sunken above, a little raised or sunken beneath, nerves impressed above, mostly obsolete, sometimes very slightly impressed beneath; petiole setulose, 1.5-2 mm. *Flowers* solitary. Pedicels slender, glabrous, (6-)7-10 mm. Bracteoles ovate, subacute, \pm reflexed, rather long (0.6 mm) setulose. *Calyx* 2.5 mm, glabrous dorsally, lobes ovate-deltoid, 1.5 mm, margin with coarse longish (0.6-0.8 mm) bristles. *Corolla* urceolate, glabrous, bright red, 8.5-9.5 by c. 3.5 mm, lobes obtuse 1.5 mm. *Filaments* filiform, somewhat dilated above the base, S-curved, glabrous, 4.5 mm; anthers oblong, apiculate-recurved at the base, very granular, 3.5 mm, the rather broad tubules included. *Ovary* glabrous; style 7 mm.

Distr. *Malesia*: Sumatra (Atjeh, Gajo Lands: Mt Losir and vicinity).

Ecol. In mossy forest and mountain heath, 2100-2500 m. *Fl.* Jan.-Febr.

63. *Diplycosia setiloba* SLEUM. *Blumea* 12 (1963) 121.

Epiphytic shrublet or shrub, few-stemmed. Branches suberect or decumbent, rarely pendent, (0.3-)0.5-0.8(-1.5) m, roots thick and fleshy. Branchlets slender, densely set with longish (2-5 mm) rusty and \pm spreading, bristly, and with finer, very short, spreading hairs, the latter disappearing



Fig. 74. *Diplycosia pinifolia* STAPF. a. Habit, $\times \frac{2}{3}$, b. flower bud, $\times 3$, c. flower at the beginning of anthesis, $\times 3$, d. flower at full anthesis, $\times 3$, e. ovary and style, $\times 6$, f. submature fruit, $\times 3$, g. stamens in front and side view, $\times 10$, h. seed, $\times 13$ (a-h CLEMENS 33044).

in the older parts of the branchlets. *Leaves* laxly arranged, elliptic or more rarely subovate-elliptic, apex shortly subacuminate, the apical gland small, base broadly attenuate to almost rounded, subcoriaceous, clad with rufous bristles on both faces and along the edge when young, tardily glabrescent on surfaces, 1.5–2.5(–3) by 0.8–1.5(–1.8) cm, entire or distally subcrenulate, triplinerved, midrib and nerves slightly impressed above, otherwise hardly conspicuous; petiole *c.* 2 mm. *Flowers* solitary, rarely in twos in the upper axils. Pedicels with a few bristles and shorter, muriculate and crisp hairs, 0.5–1.5 mm, hardly accrescent in fruit. Bracteoles ovate, 1 mm, edge laxly setular and/or densely fimbriate by very short hairs. *Calyx* green, flatly campanulate, base abruptly attenuate, 5-lobed halfway, glabrous except some muriculate hairs dorsally, lobes 1.3 mm, the edge with a comb-like indumentum of glandular bristles (0.5–0.8 mm) especially below, ciliolate upwards. *Corolla* urceolate-campanulate, light green or greenish creamy, thin, glabrous, 4–5 by 3–4 mm, lobes reflexed, 1 mm. *Filaments* linear, glabrous, wavy, 2 mm; anther-cells oblong, base slightly retuse or subsagittate, 1.8 mm. *Ovary* with a few longish hairs around the style, otherwise glabrous; style slender, glabrous, 3 mm. *Fruit* finally purplish or bluish, *c.* 5 mm.

Distr. Malesia: New Guinea (Vogelkop Peninsula).

Ecol. In mossy *Nothofagus-Podocarpus-Rapanea* crest forest, 1400–2050 m. *Fl. fr.* Nov.–Jan.

64. *Diplycosia piceifolia* SLEUM. *Reinwardtia* 4 (1957) 147.

Epiphytic shrublet, 10–20 cm. Branches terete *c.* 3–5 mm \varnothing , tips again and again branched. Branchlets short, congested, aggregated in form of a cushion, verruculose in the young parts and very shortly patently brownish puberulous. *Leaves* very dense, acicular, apex subacute, base short-attenuate, subcoriaceous, glabrous, (1–)1.5–2 cm by 0.5–0.8 mm, midrib impressed above, nerves obscure; petiole 0.5–1 mm. *Flowers* axillary, solitary, minute. Pedicels subglabrous, 1.5–2.5 mm, slender. Bracteoles minute, ciliolate. *Calyx* 1.3 mm, glabrous, lobes ovate, obtuse, ciliolate. *Corolla* broad-cylindric, *c.* 2.5 mm, 5-lobed nearly halfway. *Filaments* sublinear, glabrous, 1 mm; anther-cells very granular, oblong, inflexed at the base, 0.8 mm; tubules narrow, 1.2 mm. *Ovary* glabrous; style 1.5 mm. *Fruit c.* 1.5 \varnothing .

Distr. Malesia: Central Borneo (Mueller Mts: Amai Ambit). One collection. *Fl. fr.* April.

65. *Diplycosia pinifolia* STAPF, *Trans. Linn. Soc. II, Bot.* 4 (1894) 192, t. 14, f. A 1–3; MERR. *En. Born.* (1921) 465; SLEUM. *Reinwardtia* 4 (1957) 147; *Blumea* 12 (1963) 121; *ibid.* 12 (1964) 343. — *Fig. 74–76.*

Epiphytic or rarely terrestrial shrub, 0.6–1(–1.5) m, often with thick roots or subglobular-swollen base. Branches terete, striate, dark. Branchlets slender, brownish, exclusively densely patently



Fig. 75. Diplycosia pinifolia STAPF. Young epiphytic plant with swollen subglobular base, Mt Kinabalu, 1300 m, North Borneo (SLEUMER 4688) (SLEUMER, 1963).

papillose-puberulous. *Leaves* dense, linear, apex obtuse, the terminal gland minute, base attenuate into the very short (1 mm) petiole, subcoriaceous, brownish and shining above when dry, slightly paler beneath, entire, (3–)4.5–5.5(–6) cm by 1.5–2(–2.5) mm, midrib slightly impressed the entire length, somewhat prominent beneath, other nerves not visible. *Flowers* axillary, solitary or rarely in twos. Pedicels slender, glabrous or with some scattered stalked glands, 4–6 mm, basal bracts few, ovate-acute, nearly 1 mm. Bracteoles rounded to broad-ovate, ciliolate, 1 mm. *Calyx* green, 3–4 mm, glabrous, lobes ovate-triangular, subacute, glandular-fimbriate below, densely fimbriate by fine hairs towards the apex, 2–3 mm. *Corolla* narrow-urceolate, 5–6 by 3–4 mm, glabrous, white or greenish, or cream with green tinge, lobes triangular-acuminate, subacute, finally reflexed, 2 mm. *Filaments* linear, a little dilated above the base, glabrous, 3 mm; anther-cells oblong, very granular, 1.5 mm; tubules narrow, 1.5 mm. *Ovary* laxly clothed with longish brownish hairs; style *c.* 4 mm. *Fruit c.* 6 mm \varnothing , blackish purple; fruit pedicel 8–10 mm. *Seeds* irregularly triangular, flat, nearly 1 mm.

Distr. Malesia: North Borneo (Mt Kinabalu). *Ecol.* In mossy forest, on open grassy slope on

landslide, even with mosses on stones in rivers, locally frequent but seldom seen in flower, 1065–2285 m. *Fl. fr.* Febr.-Aug.

66. *Diplycosia lavandulifolia* SLEUM. *Blumea* 12 (1963) 121.

Terrestrial, sometimes scandent, apparently small shrub. Branchlets with spreading fine hairs, lax longish bristles and scattered gland-thickened hairs in the recent parts or young shoots, older parts covered with a thin, flaky, early caducous bark, which still shows the bases of the glandular hairs and/or bristles as dark points, old parts striate-corticate and quite glabrous. *Leaves* linear, rather laxly arranged and \pm spreading horizontally, sometimes more reflexed, subcoriaceous, shortly or gradually subacutely attenuate or acuminate, the apical gland minute, base shortly attenuate to the petiole, with a few long bristles along the margin when very young, glabrous at maturity, laxly brownish punctulate below, entire, \pm flat, 4–7(–8) cm by 1.5–2.5(–3) mm, midrib much impressed above, rather obscure beneath, no nerves or veins; petiole 1.5–2 mm. *Flowers* axillary,

solitary or in twos. Bracteoles glandular-fimbriolate. *Calyx* glabrous, 3 mm long, tube rather shortly and abruptly narrowed at the base, lobes ovate-triangular, blunt, c. 1.2 mm, subdensely with thickish sessile glands (no hairs) along the whole margin. *Corolla* urn-shaped, widely opened, thin, glabrous, c. 4 by 2.5 mm, lobes c. 1 mm. *Filaments* linear, glabrous, 2 mm; anther-cells ovate-acuminate, base obtuse, c. 1.8 mm. *Ovary* glabrous; style slender, glabrous, c. 2.5 mm. Immature fruit creamy white.

Distr. Malesia: Borneo (Sarawak: Baram and Limbang Distr.).

Ecol. In padang or peat swamp forest, also in kērangas (peaty *Shorea albida* 'kerapah') forest undergrowth, 60–801 m, locally abundant. *Fl.* April, July–Aug.

67. *Diplycosia stenophylla* SLEUM. *Reinwardtia* 4 (1957) 147. — Fig. 77e.

Erect shrub, c. 30 cm. Branches terete, becoming blackish when dry, striate. Branchlets puberulous, here and there set with a solitary appressed bristle. *Leaves* narrow-lanceolate, apex



Fig. 76. *Diplycosia pinifolia* STAFF. Terrestrial shrub, $\frac{1}{2}$ m, on landslide opposite Mesilau East R. Cave, Mt Kinabalu, 1950 m, North Borneo (SLEUMER 4734) (SLEUMER, 1963).

short-acuminate, the terminal gland small though somewhat prominent, base attenuate into the petiole, subcoriaceous, glabrous except some scattered blackish points underneath, entire or remotely ciliate-denticulate, (2-)2.3-3.5 cm by 4-6 mm, midrib impressed above, a little raised beneath, nerves obscure; petiole stoutish, 1-2 mm, inserted on a thick leaf-cushion. *Flowers* axillary, solitary or rarely in twos. Pedicels pubescent, c. 1.5 mm, basal bracts 2 or 3, minute. Bracteoles broad-ovate, glabrous, ciliate. *Calyx* 2 mm, contracted at the base, glabrous, lobes ovate, obtuse, fimbriate-ciliate, 1 mm. *Corolla* cylindrical-urceolate, red, 2.5-3 by c. 1.5 mm, glabrous, very shortly 4- (or 5-)lobed. *Stamens* 8 (rarely 10); filaments linear, inflexed, glabrous, c. 1.5 mm; anthers ovate, saccate at the base, c. 1.5 mm, the short tubules included. *Ovary* glabrous; style filiform, 2.5 mm.

Distr. *Malesia*: Central Celebes (Lake Poso), twice found.

Ecol. On quartzite peaty plateau, 1700-2000 m. Fl. Oct., Nov.

68. *Diplycosia myrtillus* STAPP, Trans. Linn. Soc. II, Bot. 4 (1894) 192; MERR. En. Born. (1921) 464; SLEUM. Reinwardtia 4 (1957) 148.

Shrub. Branchlets slender, subterete, striate, glabrous. Branchlets subquadrangular, laxly to subdensely covered with \pm appressed, fine, rufescent bristles and densely papillose-puberulent. *Leaves* narrowly elliptic-oblong, subcoriaceous, apex short-acuminate, acute or subobtuse, the terminal gland small, slightly prominent, base cuneate, glabrous and shining above, dull and laxly blackish glandular-punctulate beneath, entire or indistinctly crenulate, the teeth passing into fine, rather early caducous bristles (1 mm), margin slightly revolute, (10-)12-14(-16) by (4-)5-6(-7) mm, midrib impressed above, a little raised beneath in its lower part, nerves obscure; petiole rather slender, rugulose, 1-2 mm. *Flowers* axillary, mostly solitary, rarely in twos. Pedicels laxly setulose, 3-4 mm, basal bracts c. 3, minute. Bracteoles ovate, glabrous, glandular-ciliate, 1 mm. *Calyx* c. 3 mm, glabrous, 5-lobed to the middle, lobes ovate, acute, glandular-ciliate. *Corolla* campanulate, base slightly contracted, glabrous, 6 mm, 5-lobed to nearly halfway. *Filaments* from the dilated base abruptly linear towards the apex, glabrous, c. 2.5 mm; anthers ovate-oblong, granular, 1.5 mm, the rather short tubules included. *Ovary* densely yellowish hairy; style 4-5 mm.

Distr. *Malesia*: North Borneo (Mt Kinabalu), twice found at 1525-2650 m. Fl. June.

69. *Diplycosia rubella* SLEUM. Reinwardtia 4 (1957) 148; Blumea 11 (1961) 8.

Terrestrial or epiphytic shrub. Branchlets (very) slender, terete, greyish brownish corticate, laxly setulose, toward the subangular tips more densely patently or subappressedly rufous-setulose (bristles 1-1.5 mm, gland-tipped initially) and densely patent-puberulent. *Leaves* ovate-lanceolate, subfalcate-caudate-acuminate towards the apex, acute, the terminal gland small, base broadly cuneate

into the petiole, firmly subcoriaceous, glabrous and somewhat shining above, dull and \pm laxly clad with subappressed bristles especially along the midrib, margin subrevolute, subentire, the teeth indicated by bristles which persist for a long time, 4-6 by 1-1.6 cm, triplinerved, midrib distinctly impressed above, prominent beneath, nerves very slightly sunken above only; petiole grooved, short setose, 2-3 mm. *Flowers* axillary, solitary or in twos. Pedicels stoutish, with several small basal bracts, glabrous 5-8 mm at anthesis, (9-)10-12 mm in fruit. Bracteoles cup-like, ovate-acuminate, subacute, glabrous dorsally, puberulous at the apex, very shortly subglandular-ciliate or -fimbriate, 1.5 mm. *Calyx* campanulate, 2.5 mm, 5-lobed to nearly $\frac{2}{3}$, lobes ovate-subacuminate, glabrous dorsally, glandular-fimbriate. *Corolla* broadly urceolate, but slightly contracted at the mouth, red, glabrous, c. 6 mm long in all, c. 3 mm ϕ in the lower third, lobes reflexed, c. 1.5 mm. *Filaments* broadly linear below, becoming almost filiform and distinctly S-curved upwards, c. 2 mm; anthers 2.5 mm long in all, cells ovate-oblong, base obtuse, recurved, passing into the narrow tubules which are as long as the cells. *Ovary* with some hairs on the top, glabrous otherwise; style glabrous, 3 mm.

Distr. *Malesia*: Central W. Sumatra (NW. slope of Mt Talamau (= Mt Ophir) and Mt Sago near Pajakumbuh), in mossy forest, 1700-1950 m. Fl. May, Dec.

70. *Diplycosia lancifolia* RIDL. J. Str. Br. R. As. Soc. n. 39 (1903) 15; Fl. Mal. Pen. 2 (1923) 214; SLEUM. Reinwardtia 4 (1957) 149.

var. lancifolia.

Shrub. Branches divaricate, subterete, dark brown-violaceous-corticate. Branchlets greyish, tips brownish when dry, subdensely clad with rufous patent slender bristles (2 mm) and a fine spreading puberulence. *Leaves* ovate-lanceolate, apex gradually acuminate, the very apex \pm obtuse by the terminal, rather thick and slightly protruding gland, base broad-attenuate, coriaceous, mature ones shining and glabrous above, laxly setulose at the midrib and/or the lower part of the lamina, furthermore blackish punctulate beneath, margin entire or nearly so, with scattered, longish, caducous fine bristles, 3-5(-6.5) by 0.8-1.2(-1.7) cm, midrib slightly impressed above, prominent beneath mostly in the lower half only, nerves 1-2 pairs from or from somewhat above the base of the lamina, high curved-ascending to the top, very slightly impressed above or rather inconspicuous, obscure beneath; petiole setulose, 2-3 mm. *Flowers* axillary, mostly solitary, rarely in twos. Pedicels slender, nodding, at anthesis 5-7(-9) mm, up to 10 mm in later stages, subdensely \pm patently glandular-setulose. Bracteoles ovate, acute, keeled, slightly hairy in the upper half, glabrous elsewhere, glandular-fimbriate, c. 1.5 mm. *Calyx* 3 mm, attenuate at the base, all over densely shortly red-hairy, lobes 4-5, ovate, acute, glandular-fimbriate, 2 mm. *Corolla* urceolate, glabrous, pale greenish, c. 5 by 2.5 mm, shortly 4- or 5-lobed. *Stamens* 10,

rarely 8; filaments linear, a little dilated above the base, glabrous, c. 2 mm; anther-cells ovate-oblong, granular, 1 mm; tubules slender, 1 mm. *Ovary* slightly hairy; style 4 mm.

Distr. *Malesia*: Malay Peninsula (W. Pahang: Kuala Kerbang, a subsidiary peak of Mt Benom), once found.

var. *calvescens* SLEUM. Reinwardtia 4 (1957) 149.

Leaves more ovate-lanceolate, (3.5-)4.5-6.5 by (0.9-)1.1-1.7 cm, equally setulose beneath. *Calyx* slightly muriculate dorsally, otherwise glabrous.

Distr. *Malesia*: Malay Peninsula (Pahang: Mt Tahan, W of Teku Valley), once found in forest near stream, 1370 m. *Fl.* Sept.

71. *Diplycosia pilosa* BL. Bijdr. (1826) 858; DC. Prod. 7 (1839) 591; MIQ. Fl. Ind. Bat. 2 (1859) 1055; NIEDENZU, Bot. Jahrb. 11 (1889) 171, t. IV, f. 1 (*anat. fol.*); KOORD.-SCHUM. Syst. Verz. 1 (1912) fam. 233, p. 107; KOORD. Exk. Fl. Java 3 (1912) 8; BACK. Bull. Jard. Bot. Btzg II, 12 (1913) 15; J. J. S. in K. & V. Bijdr. 13 (1914) 127; AMSH. in Back. Bekn. Fl. Java (em. ed.) 7 (1948) fam. 162, p. 6; SLEUM. Reinwardtia 4 (1957) 149. — *Gaultheria pilosa* (BL.) ZOLL. Nat. Geneesk. Arch. N. I. 2 (1845) 9; ENDL. ex MOR. Syst. Verz. (1846) 42; ZOLL. Syst. Verz. 2 (1854) 138; MIQ. Ann. Mus. Bot. Lugd.-Bat. 1 (1863) 40. — *Amphicalyx pilosa* BL. Fl. Jav. Pl. inéd. (1863-83) t. 9.

Epiphytic shrub, 1-2 m. Branches elongate, hanging, ramose, rather slender. Branchlets slender, terete, densely covered at the tips with fine, yellow, short hairs and much longer (2-3 mm), coarse, \pm spreading, rusty, minutely gland-tipped bristles, which become dark-fuscous at their bases. *Leaves* ovate or long-ovate, apex \pm caudate-acuminate, acute, the terminal gland small, base rounded or mostly so, very shortly contracted into the petiole, subcoriaceous or coriaceous, deep green and shining above, paler and dull beneath, very young ones laxly to subdensely covered with long, appressed, rufous bristles on both faces, mature ones glabrous above, \pm persistently setose beneath especially on the midrib and in the lower part of the lamina, finally \pm glabrescent or minutely blackish punctulate all over the undersurface, margin somewhat revolute in dry specimens, minutely crenulate and \pm persistently setulose-ciliate, 3.5-6.5 by 1-2.4(-4) cm, triplinerved, midrib strongly impressed the entire length above, manifestly raised beneath, nerves running near the leaf-margin to the top, slightly sunken above, obscure beneath, other nerves or transverse veins higher from the midrib (4-6 pairs) minutely impressed above, or \pm inconspicuous on both faces; petiole stoutish, terete, grooved, setulose, 3-5 mm. *Flowers* axillary, mostly solitary, sometimes in twos, occasionally also in threes in other axils of the same specimen. Pedicel rather slender, nodding, \pm densely covered with \pm appressed, crisped, setose, and rufous hairs initially, finally glabrescent, 3-5(-7) mm, basal bracts small. Bracteoles ovate-obtuse, glabrous dorsally, ciliolate, c. 1.5 mm. *Calyx* glabrous, yellow-brown, c. 4.5 mm, lobes ovate-acuminate,

subacute, glandular-ciliate, 2.5-3 mm. *Corolla* broadly cylindric or subcampanulate, contracted at the base, glabrous, greenish, 7-8 by 3-4 mm, lobes recurved, c. 2 mm. *Filaments* linear, somewhat dilated above the base, glabrous, S-curved, c. 3 mm; anther-cells oblong-ovate, granular, c. 1.7 mm; tubules slender, c. 1.7 mm. *Ovary* glabrous, or rarely with some scattered hairs on the top; style 6 mm. *Fruit* \pm obovoid, up to 11 by 9 mm, first green, then grey-bluish to lead-coloured, finally blue-blackish, the proper capsule green.

Distr. *Malesia*: W. Java (from Banten to the Praanger Mts).

Ecol. In rain-forest and mossy forest, locally common, 1200-2200 m. *Fl.* Sept.-Dec.

Vern. *Kilai gèdai bulu*, S.

72. *Diplycosia caudatifolia* SLEUM. Bot. Jahrb. 71 (1940) 150; Reinwardtia 4 (1957) 149. — *D. heterophylla* (non BL.) STAFF, Trans. Linn. Soc. II, Bot. 4 (1894) 192; MERR. En. Born. (1921) 464.

Small epiphytic shrub, 1.2-1.5(-2) m. Branches \pm pendent, subterete, glabrous. Branchlets very slender, angular, brownish when dry, densely covered with a fine, spreading puberulence, more-over whether or not provided with scattered short bristles at the tips. *Leaves* lanceolate-ovate, apex caudate-acuminate, often somewhat falcate, acute, the terminal gland very small, base broadly attenuate to rounded, firmly chartaceous to subcoriaceous, margin slightly revolute, entire or nearly so, sometimes with a few \pm persistent marginal bristles, (2.5-)3-5(-6) by (1-)1.2-1.7 (-2.1) cm, midrib impressed above, prominent beneath, nerves 1-2 pairs from and somewhat from above the base of the lamina, i.e. 3-5-plinerved to the top, nerves slightly sunken above or raised beneath, often \pm inconspicuous as are other higher nerves or veins, raising straight from the upper half of the midrib; petiole glabrous, grooved, 2-3 mm. *Flowers* axillary, mostly solitary, rarely in twos. Pedicel slender, rufescent-papillose or nearly glabrous, c. 2 mm at anthesis. Bracteoles ovate, glandular-ciliolate, 1 mm. *Calyx* attenuate at the base, c. 3.5 mm, glabrous or very slightly puberulous, lobes ovate, glandular-ciliolate, 2 mm. *Corolla* urceolate, cream to whitish, sometimes purpurascens especially at the limb, 4 by 2.5 mm, lobes short, 0.5 mm. *Filaments* linear, glabrous, 2.5 mm; anthers ovate-oblong, granular, 1.5-2 mm including the very short tubules. *Ovary* glabrous; style 2 mm. *Fruit* reported both as cream or white and dark purple, c. 4 mm σ , fruit-pedicel c. 4 mm.

Distr. *Malesia*: North Borneo (Mt Kinabalu).

Ecol. In low mossy jungle, 2100-3050 m. *Fl.* April-June.

73. *Diplycosia memecyloides* STAFF, Trans. Linn. Soc. II, Bot. 4 (1894) 194; MERR. En. Born. (1921) 464 *p.p.*; HEINE in Fedde, Rep. 54 (1951) 245; SLEUM. Reinwardtia 4 (1957) 149; Blumea 12 (1963) 122.

Shrub, 1-3 m, rarely treelet up to 5 m, generally a large epiphyte. Branches greyish brownish

corticate, striate. Branchlets terete, pale brown, with shedding thin bark in the older parts, angular and papillose-puberulous in the young shoots. *Leaves* ovate-elliptic, apex rather abruptly or shortly acutely subcaudate-acuminate, not rarely somewhat falcate, the terminal gland small, base attenuate into the petiole or sometimes nearly rounded, rather fleshy-subcoriaceous to coriaceous, glabrous and \pm shining above, rather dull and laxly mostly \pm obscurely punctulate beneath, finally completely glabrous, margin sometimes slightly revolute, entire, (4-)5-8 by (1.5-)2.5-4 cm, 5-7-plinerved from and somewhat from above the base, midrib impressed above, manifestly prominent beneath, 2-3 outer pairs of nerves curved-ascending to the top of the lamina, slightly impressed above, \pm raised beneath, other nerves less distinct, shorter and pinnate from the upper part of the midrib; petiole stoutish, grooved, 4-6(-8) mm. *Flowers* axillary, mostly 3-4(-6) per fascicle, occasionally only 2 or 1 in other axils of the same specimen. Pedicels stoutish, rather densely clothed with fine, yellowish hairs and some short thicker, \pm crisped, brownish ones, at anthesis (3-)4-6 mm, glabrescent and a little accrescent in fruit, basal bracts few, small. Bracteoles ovate, obtuse, keeled, short-hairy along the midrib or glabrescent, ciliate and shortly glandular-fimbriate, 1.5-2 mm. *Calyx* c. 4 mm, glabrous, rugulose, lobes ovate, glandular-ciliolate and -fimbriate, c. 2.5 mm. *Corolla* campanulate, green to whitish green or cream, glabrous, 6 mm, lobes ovate, obtuse, reflexed, 1.5-2 mm. *Filaments* linear, slightly dilated towards the base, glabrous, curved in the upper half, 3 mm; anther-cells ovate-oblong, granular, 1.5 mm; tubules slender, 1.5 mm. *Ovary* mostly laxly hairy on top, sometimes glabrous; style 4-5 mm. *Fruit* 4-5 mm ϕ , blue-blackish.

Distr. *Malesia*: North Borneo (Mt Kinabalu).

Ecol. In mossy (*Tristania*-) forest, 915-2900 m. *Fl. fr.* Febr.-Aug.

74. *Diplycosia gracilipes* J. J. S. Bull. Jard. Bot. Btzg III, 1 (1920) 407, t. 54; SLEUM. Reinwardtia 4 (1957) 150.

Shrub. Branchlets often elongate, the young red-brown shoots angular, papillose-puberulous, occasionally with some short gland-tipped bristle-like hairs. *Leaves* subspathulate-obovate, apex rounded, sometimes slightly retuse, the terminal gland thick, protruding, base cuneate into the petiole, coriaceous, sparsely minutely blackish punctulate on both faces especially beneath, obscurely crenulate towards the apex, or nearly entire, flat, 1.4-3 by 0.6-1.5 cm, midrib impressed above, prominent beneath, obscurely impressedly triplinerved, nerves sometimes hardly visible above, mostly slightly raised beneath; petiole grooved, muriculate, 2-4 mm. *Flowers* mostly solitary, sometimes in twos, rarely in threes. Pedicels subfiliform, minutely laxly clavate-muriculate, 1.2-2.6 cm. Bracteoles broadly triangular to semi-orbicular, obtuse, puberulous and glandular-muriculate dorsally, ciliolate, c. 1 mm. *Calyx* c. 3 mm, puberulous, lobes triangular, subacute, margin

glandular-muriculate and ciliolate, 1.8 mm. *Corolla* campanulate, white, glabrous, c. 1 cm, lobes obtuse, c. 3 mm. *Filaments* linear, somewhat dilated at the base, papillose, 3 mm; anther-cells oblong, inflexed at the base, 2 mm; tubules rather broad, nearly 1 mm. *Ovary* glabrous; style c. 7 mm.

Distr. *Malesia*: SW. Central Celebes (Mt Sinadji, N of Makale and Rantepao). *Fl.* Nov.

75. *Diplycosia celebensis* J. J. S. Bull. Jard. Bot. Btzg III, 1 (1920) 406, t. 53; Bot Jahrb. 68 (1937) 205; SLEUM. Reinwardtia 4 (1957) 150.

Shrub or treelet, up to 3 m. Branches virgate. Branchlets trigonous, greyish corticate, younger parts brownish reddish, tips densely patently papillose-puberulous, sometimes with some \pm scattered bristle-like short hairs, which are slightly clavate or gland-tipped, no true bristles present. *Leaves* various in shape (also in the same specimen), lanceolate-elliptic or obovate-elliptic to obovate, apex broad-acuminate to rounded, the terminal gland thickish, distinctly prominent, base \pm cuneate, subcoriaceous or coriaceous, glabrous and mostly a little shining above, laxly blackish punctulate and \pm dull beneath, very slightly revolute at the somewhat cartilaginous margin, minutely glandular-crenulate, with some marginal \pm caducous bristles, practically entire, (1.5-)2-5.3 by 0.7-2.5 cm, midrib slightly impressed above, \pm flat beneath, nerves 2-3 pairs ascendent, very slightly sunken above, \pm raised beneath; petiole grooved, glabrescent, 2-4(-6) mm. *Flowers* 2-3 (-5) per fascicle, occasionally also solitary in the same specimen. Pedicels rather stoutish, laxly puberulous and with some short crisped glandular hairs, 1.5-3 mm at anthesis, glabrescent and up to 6 mm in fruit. Bracteoles ovate, obtuse, muriculate-fimbriate and ciliolate, c. 1 mm. *Calyx* contracted at the base, c. 2.5 mm, glabrous or nearly so, lobes ovate, subacute, glandular-muriculate or fimbriate, 1.5 mm. *Corolla* subcampanulate or broad-tubular, white, glabrous, 6-7 mm, lobes ovate, obtuse, reflexed, 1.5 mm. *Filaments* linear, slightly curved, papillose, 3.5 mm; anther-cells oblong, granular, 1.5 mm; tubules rather narrow, 1.5 mm. *Ovary* glabrous; style c. 4 mm.

Distr. *Malesia*: SW. Central Celebes (Latimodjong Ra.: Mt Sinadji; Mt Batuding; Mt Tinábang; Mt Pokapindjang).

Ecol. In low bush on ridge, 2400-3000 m. *Fl.* June, Nov.

Note. The leaves are said to smell strongly of anise after bruising.

76. *Diplycosia haemantha* SLEUM. Reinwardtia 4 (1957) 150.

Small shrub, whether or not epiphytic. Branches greyish corticate. Branchlets slender, red-brown, laxly clothed with \pm appressed slender bristles and more densely with fine, spreading short hairs. *Leaves* elliptic or obovate-elliptic, sometimes obovate or oblong-elliptic, apex broad-acuminate to rounded, the terminal gland rather thick and prominent, base cuneate into the petiole, subcoriaceous to coriaceous, firm, margin paler and cartila-

ginous, crenulate in the upper part of the lamina, the teeth initially ciliate, or subentire, or entire, glabrous above, laxly blackish punctulate beneath by the remaining bases of early caducous bristles, 1.4-2.5 (-3.5) by (0.8-)-1-1.5 cm, midrib impressed above, nearly flat beneath, nerves obscure; petiole thickish, rugulose, laxly setulose, 2(-3) mm. *Flowers* axillary, solitary, or rarely in twos, occasionally also in threes. Pedicels slender, nodding, subglabrous, 6-8(-10) mm. Bracteoles ovate, obtuse, \pm connate, ciliolate, 1 mm. *Calyx* c. 3 mm, glabrous, lobes ovate, obtuse, very shortly glandular-muriculate or -fimbriate, c. 2 mm. *Corolla* urceolate, glabrous, blood red, 6.5 mm, shortly 5-lobed. *Filaments* linear, glabrous, 4 mm; anthers ovate-oblong, echinulate, 1.8 mm, the broad and short tubules included. *Ovary* glabrous; style 3 mm. *Fruit* blackish, c. 4 mm ϕ .

Distr. *Malesia*: Celebes (E. Peninsula: N. spur of Mt Lumut; SE. Peninsula: Mt Watuwila).

Ecol. In rain-forest, c. 1500 m. *Fl.* March, Sept.

77. *Diplycosia minutiflora* SLEUM. Reinwardtia 4 (1957) 151.

Shrub, 2 m. Branches subangular, much branched distally. Branchlets erect, angular, stiff, greyish corticate in the older, brown-red and densely papillose-puberulous in the younger parts. *Leaves* obovate-elliptic or obovate, apex very shortly and broadly attenuate to rounded, the terminal gland thick and prominent, base broad-cuneate into the petiole, subcoriaceous, glabrous and shining above, dull and rather densely minutely blackish punctate beneath, margin slightly revolute and minutely impressed-crenulate, seemingly entire, 1.5-3 by 0.9-1.7 cm, midrib slightly immersed above, prominent beneath only in its lower half, nerves in 2-3 pairs, the suprabasal pair high curved-ascendent to the top, the upper ones shorter and less curved, all faintly impressed above, \pm inconspicuous beneath. Petiole stoutish, 2-3 mm. *Flowers* 3-6 per fascicle. Pedicels rather slender, \pm densely shortly crisped-yellowish hairy, 3-5 mm. Bracteoles ovate, subacute, hairy in the middle externally, ciliolate, 0.8 mm. *Calyx* contracted at the base, glabrous, 2 mm, lobes ovate, subacute, glandular-fimbriate, 1 mm. *Corolla* tubular, white, glabrous, 3.5 by c. 1.8 mm, lobes erect, 0.6 mm. *Filaments* linear, glabrous, 1.5 mm; anther-cells oblong, echinulate, 1 mm, gradually passing into the tubules; tubules narrow, 1 mm. *Ovary* rather densely yellowish hairy; style 2-2.5 mm. *Fruit* red.

Distr. *Malesia*: N. Central Celebes (near Poso), 1800 m, in open forest, on flat, peaty-swampy quartzite ground, scattered, but rather common there. One collection. *Fl.* June.

78. *Diplycosia kemulensis* J. J. S. Bull. Jard. Bot. Btzg III, 13 (1935) 459; SLEUM. Reinwardtia 4 (1957) 151.

Epiphytic shrub. Branches stoutish, terete. Branchlets rather short, angular, reddish when dry, covered with a fine papillose puberulence in the youngest parts, elsewhere glabrescent. *Leaves*

oblong-cuneate or obovate, apex broadly obtusely attenuate or mostly rounded, sometimes retuse, the terminal gland rather thick and \pm protruding, base cuneate into the petiole, stiff-coriaceous, glabrous above, laxly minutely punctate beneath, margin distinctly cartilaginous, \pm revolute, entire or obsoletely crenulate especially towards the apex of the lamina, (1.8-)-2.5-4.5 by (0.7-)-1-2.5(-2.8) cm, \pm triplinerved, midrib narrowly sunken above, shallowly and more broadly so beneath, nerves faintly impressed above; petiole grooved, glabrous, reddish when dry, 2-3 mm. *Flowers* 2 or 3, rarely up to 5 per fascicle, occasionally solitary. Pedicels rather slender, puberulous, c. 4 mm. Bracteoles ovate, subacuminate, \pm puberulous dorsally, muriculate-ciliate, 1 mm. *Calyx* turbinate-contracted at the base, glabrous, c. 2 mm, 4-lobed halfway, lobes triangular, obtuse, muriculate- or clavate-ciliate. *Corolla* subglobose-urceolate, glabrous, light rose to nearly white, 3 by 2.5 mm, the 4 short lobes recurved. *Stamens* 8; filaments S-curved, linear, glabrous, 2 mm; anther-cells ovate-oblong, echinulate, c. 1.5 mm, the broad and short tubules included. *Ovary* glabrous; style c. 1 mm. *Fruit* depressed-globose, c. 3.5 mm ϕ , first whitish, finally light blue.

Distr. *Malesia*: Central East Borneo (top of Mt Kemul), once found..

Ecol. In primary forest, 1850 m. *Fl.* Oct.

79. *Diplycosia rosmarinifolia* SLEUM. Bot. Jahrb. 71 (1940) 156; Reinwardtia 4 (1957) 151. — Fig. 77d.

Shrub, 3-5 m. Branches terete; bark dark, peeling off. Branchlets verruculose by the thickened, cushion-like leaf-scars, tips brown when dry, completely glabrous. *Leaves* linear, elongate, apex obtuse, with a distinct blackish and protruding terminal gland, base attenuate into the petiole, coriaceous, glabrous, entire, shining above, (3-)-5-7.5 cm by 1.5-3 mm, midrib impressed above the entire length, nerves indistinct; petiole rugose, 1-2 mm, nearly as thick as the lamina. *Flowers* 3-5(-6) per fascicle. Pedicels only seen in the immature fruit, then 4-6(-7) mm, laxly shortly patent-hairy, basal bracts 2 or 3, minute, scarious. Bracteoles broad-ovate, ciliolate, 1 mm. *Calyx* 3 mm in immature fruit, minutely verruculose dorsally, lobes ovate, obtuse, ciliolate, c. 1.5 mm. Developed *ovary* glabrous; style 2 mm. Immature *fruit* green or with purplish tinge, c. 3.5 mm ϕ . Mature fruit said to be finally dark blue.

Distr. *Malesia*: North Borneo (Mt Kinabalu), once found.

Ecol. On rock crest or ridge, c. 1980 m. *Fr.* July.

80. *Diplycosia apiculifera* J. J. S. in Fedde, Rep. 35 (1934) 296; SLEUM. Reinwardtia 4 (1957) 151.

Shrub or small tree. Branchlets angular, brownish when young, glabrous. *Leaves* obovate, apex obtuse or mostly rounded, the terminal gland thick and protruding, base cuneate into the petiole, coriaceous, rather shining above, \pm dull beneath, glabrous, but laxly minutely punctate beneath, impressed-punctulate in the \pm revolute margin, practically entire, 2.5-6 by (1.1-)-2-3 cm, midrib

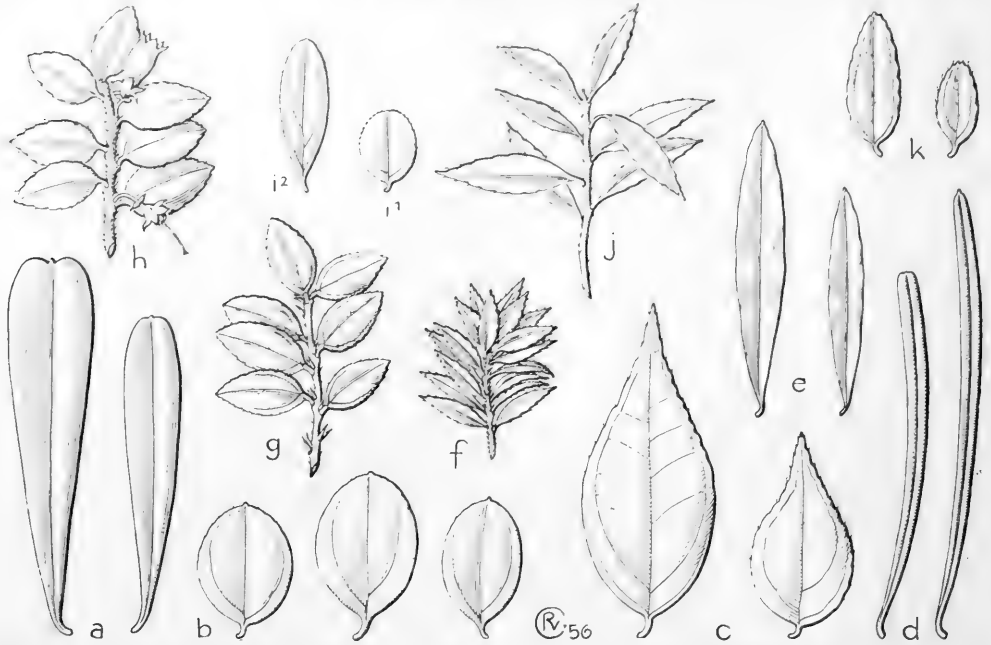


Fig. 77. Leaves or shoots of *Diplycosia* spp., all nat. size. — a. *D. sphenophylla* SLEUM., two leaves. — b. *D. amboinensis* BECC., three leaves. — c. *D. acuminata* BECC., two leaves. — d. *D. rosmarinifolia* SLEUM., two leaves. — e. *D. stenophylla* SLEUM., two leaves. — f. *D. ciliolata* HOOK. f. — g. *D. elliptica* RIDL. — h. *D. rupicola* SLEUM. — i. *D. microphylla* BECC., i'-i'' two different leaves. — j. *D. filipes* SLEUM. — k. *D. cinnabarina* SLEUM., two leaves (a CLEMENS 40007, b BECCARI herb. nr. 5766, c BECCARI P. B. 3941, d CLEMENS 34205, e STEUP 10, f CLEMENS 32376, g BANGHAM 976, h NGF 5188 WOMERSLEY, i'-i'' BECCARI P. B. 2931, j EYMA 1409, k VAN STEENIS 8428).

impressed above, strongly raised beneath, 3-5-plinerved, nerves slightly impressed above, \pm inconspicuous beneath; petiole semiterete, grooved, stout, glabrous, 3-4(-5) mm. *Flowers* 1 or 2 per axil. Pedicels rather stoutish, sparsely muriculate, (7-9)-13 mm, basal bracts few, small. Bracteoles ovate-acuminate, glabrous, muriculate-ciliate, c. 2 mm. *Calyx* rather abruptly attenuate at the base, c. 6 mm, lobes erect, subovate, acuminate, muriculate-verruculose dorsally, with an apical tuft of very short hairs, c. 4 mm. *Corolla* \pm tubular, somewhat contracted at the base and slightly widened towards the mouth, glabrous, rose or white, 9-11 by c. 5 mm (in the middle), lobes recurved, c. 2 mm. *Filaments* linear, glabrous, c. 8 mm; anther-cells oblong, c. 2 mm; tubules narrow, 1.8 mm. *Ovary* sparsely brownish hairy; style 9 mm. *Fruit* said to be dull purplish blue.

Distr. Malesia: Central W. Sumatra (once on Mt Singalang; otherwise from Mt Kerintji and Mt Talakmau = Mt Ophir).

Ecol. In forest, 'rèsam' (= *Gleichenia*) zone, occasionally epiphytic, 2000-2950 m. *Fl.* April-June, *fr.* Aug.

81. *Diplycosia pittosporifolia* J. J. S. Bull. Jard. Bot. Btzg III, 13 (1935) 460; SLEUM. Reinwardtia 4 (1957) 152.

var. pittosporifolia.

Shrub. Branchlets obtusangular, dilutely brown corticate, bark shedding early in thin brown flakes, younger parts laxly set with small, darker, wart-like lenticels but no hairs or bristles, young shoots not seen. *Leaves* elliptic, apex broad-attenuate, subacuminate to obtuse, the terminal gland thick, protruding, base cuneate into the petiole, coriaceous, shining above, dull beneath, mature ones glabrous, but sparsely blackish punctate beneath, very young ones laxly short-setose beneath, minutely impressed-crenulate along the entire, \pm revolute margin, (5.5)-8-11 by (2)-3-5 cm, midrib slightly grooved above, strongly raised beneath, nerves in 4-6 pairs rather steeply ascending, curved and anastomosing, somewhat prominent in both faces, reticulation rather coarse, slightly raised on both faces especially above; petiole stout, rugose, grooved above, glabrous, 1-2.2 cm. *Flowers* (2-)-3-4 per fascicle. Pedicels stout, laxly to subdensely longish (1-1.3 mm) \pm patently glandular-setulose, 8-11 mm, basal bracts numerous, ovate-acuminate, c. 2 mm. Bracteoles orbicular-ovate, glabrous dorsally, glandular-ciliate, 2-2.5 mm. *Calyx* c. 4 mm, glabrous, lobes ovate-triangular, obtuse, glandular-ciliate, 3 mm. *Corolla* narrow-campanulate, glabrous, greenish or greenish white, with brownish

spots on both surfaces, rather fleshy, *c.* 8 mm, lobes ovate-triangular, obtuse, *c.* 2.5 mm. *Filaments* linear, slightly wavy, glabrous, *c.* 3 mm; anther-cells oblong, base cordate, echinulate, *c.* 2 mm; tubules straight, rather abruptly attenuate, 1 mm. *Ovary* glabrous; style 4.5 mm. *Fruit* purplish to blackish.

Distr. *Malesia*: Central East Borneo (top of Mt Kemul), once found.

Ecol. In primary forest on steep slope and humus, 1800 m. *Fl.* Oct.

var. punctiloba SLEUM. Reinwardtia 4 (1957) 152; Blumea 11 (1961) 8.

Differs by densely setose branchlets, nerves which are slightly impressed above, and pedicels more densely patent-glandular-setulose, 1.2–1.5 cm. *Corolla* greenish white or pink tinged, dotted dark red inside except near margin.

Distr. *Malesia*: North Borneo (Mt Kinabalu).

Ecol. In low jungle, also epiphytic, 2100–2745 m. apparently rare. *Fl.* March, June.

82. *Diplycosia retusa* SLEUM. Bot. Jahrb. 71 (1940) 156; Reinwardtia 4 (1957) 152.

Shrub, apparently epiphytic. Branchlets slender, laxly foliate, glabrous. *Leaves* obovate, apex rounded, the terminal gland thick and \pm prominent, base cuneate, subcoriaceous, glabrous, entire or with some minute impressed glandular crenations on the subcartilaginous margin, 3–4 by 1.5–2 cm, midrib slightly impressed above, somewhat raised beneath, nerves in 1–2 pairs ascendent from and from above the base of the lamina, high-curved, anastomosing, rather obscure or very little sunken above, faintly raised beneath; petiole 4–5 mm. *Flowers* solitary. Pedicels very slender, glabrous, 1.5 cm. Bracteoles ovate, glabrous, 1 mm. *Calyx* glabrous, 5-lobed to nearly the base, lobes deltoid, acutish, 2.5 mm, glandular-ciliate. *Corolla* elongate-campanulate, 10 mm, apparently white, glabrous, lobes 3 mm. *Filaments* wavy, linear, glabrous, 2 mm; anther-cells 1.5 mm; tubules 1 mm. *Ovary* glabrous; style 5 mm.

Distr. *Malesia*: Central Celebes (Topapu Mts), once found, 1300–1700 m. *Fl.* Sept.

83. *Diplycosia sanguinolenta* SLEUM. Bot. Jahrb. 71 (1940) 157; Reinwardtia 4 (1957) 152.

Epiphytic shrub, 1–2 m. Branches 6–8 mm σ , nodose. Branchlets stoutish, obtusangular, reddish brownish, glabrous, rather shining. *Leaves* elliptic, apex broadly acuminate to rounded, obtuse, sometimes emarginate, the terminal gland thick, protruding as a distinct apiculus, base broad-attenuate into the petiole, very coriaceous and rigid, glabrous above, laxly punctate beneath, entire, margin \pm revolute especially towards the base of the lamina, 9–14(–17) by 5–8(–9.5) cm, midrib \pm distinctly grooved above, robust and prominent beneath, nerves one pair from the base, another from the lower third of the midrib, all steeply curved-ascending to the top, impressed above, very prominent beneath, 2–3 pairs of other nerves or transverse veins from the upper half of the midrib

mostly faintly visible, or entirely obscure; petiole 1.2–1.5 by 0.3–0.4 cm. *Flowers* 3–5 per axil. Pedicels stoutish, shortly subpatently and densely brownish hirtellous, 5–7(–9) mm, basal bracts narrow-ovate, pubescent, up to 2 mm. Bracteoles broad-ovate, keeled, obtuse, pubescent dorsally, glandular-ciliate, 2 by 2–2.5 mm. *Calyx* 5 mm, rugulose, glabrous or with some scattered very short glandular hairs, 5-lobed halfway, lobes ovate, subacute, glandular-ciliate. *Corolla* nearly tubular, or narrow-campanulate, somewhat dilated towards the limb, bright red to blood red, fleshy, glabrous, 13–15 by *c.* 4.5 mm. *Filaments* linear, somewhat dilate at the base, S-curved in the upper part, 8 mm; anther-cells oblong, base curved, granular, *c.* 4 mm; tubules *c.* 2 mm. *Ovary* glabrous; style exerted, 12 mm.

Distr. *Malesia*: North Borneo (Mt Kinabalu).

Ecol. In steep forest or jungle ridge, 1525–1830 m. *Fl.* March–June.

84. *Diplycosia sphenophylla* SLEUM. Bot. Jahrb. 71 (1940) 158; Reinwardtia 4 (1957) 152; Blumea 12 (1964) 343. — Fig. 77a.

Shrub, 0.6–2.5 m, rarely a treelet, sometimes epiphytic. Branches dark, provided with the remnants of the thick leaf-cushions. Branchlets brownish and entirely glabrous. *Leaves* elongate-spathulate, widest in the upper third, apex rounded-obtuse or mostly slightly retuse, with a markedly protracted dark and thick terminal gland, base gradually attenuate into a thick, rugulose, 2–3 mm long petiole, coriaceous, stiff, margin subcartilaginous and revolute, (1.8–)4–6.5 by (0.3–)0.8–1.2 (–1.6) cm, midrib grooved above over the entire length, broadened and rather flat beneath, one pair of basal nerves running along the edge, very slightly impressed above, obsolete beneath, other upper nerves 1–2 on each side, faintly impressed or mostly inconspicuous. *Flowers* axillary, (2–)3 (–5) per fascicle. Pedicels rather slender, laxly to subdensely very shortly and patently hairy, 5–6 mm, basal bracts minute. Bracteoles broad-ovate, all over very shortly hairy, ciliolate, 1 mm. *Calyx* *c.* 4 mm, glabrous, minutely verruculose, lobes ovate, obtuse, ciliolate, 2 mm. *Corolla* subglobose-urceolate, 4 by 3 mm, rather fleshy, pink, glabrous, very shortly 5-lobed. *Filaments* linear, glabrous, 2 mm; anther-cells 1 mm; tubules 0.6 mm. *Ovary* glabrous; style 1.5 mm.

Distr. *Malesia*: North Borneo (Mt Kinabalu).

Ecol. In mossy ridge forest, \pm open places, 1220–2230 m. *Fl.* April–Aug.

85. *Diplycosia rubidiflora* J. J. S. in Fedde, Rep. 30 (1932) 172; SLEUM. Reinwardtia 4 (1957) 154.

Epiphytic or terrestrial shrub. Branchlets robust, angular, older parts greyish corticate, younger ones brownish, glabrous. *Leaves* broadly elliptic to obovate-elliptic, or suborbicular, sometimes obovate, apex broad-attenuate, obtuse to rounded, rarely subemarginate, the terminal gland thick and prominent, base shortly cuneate into the petiole, coriaceous, glabrous, but laxly punctulate beneath, shining above, rather dull beneath, entire, margin

revolute, 5-7(-8) by (3-)3.5-5(-5.8) cm, midrib grooved above, manifestly prominent beneath, nerves 3-4(-5) pairs, slightly curved towards the edge, \pm anastomosing, mostly somewhat impressed above, raised beneath, reticulation rather inconspicuous above; petiole canaliculate, rugulose, 3-5 by 2 mm. *Flowers* 3-8(-15) per fascicle. Pedicels stoutish, rusty-tomentulose, 5-8 mm, basal bracts numerous, ovate acute, pubescent, c. 1.5 mm. Bracteoles suborbicular-ovate, obtuse, rusty-pubescent dorsally, 1.5 by 2 mm. *Calyx* 3.5-4 mm, glabrous, lobes ovate-acuminate, subacute, ciliate and glandular-muriculate, c. 2 mm. *Corolla* campanulate, light brown to fallow red, glabrous, 7-8 mm, lobes c. 2 mm. *Filaments* linear, somewhat dilated in the middle only, papillose in the upper half, c. 3 mm; anthers oblong, echinulate, 2.8 mm, the very short tubules included. *Ovary* glabrous; style 6 mm.

Distr. *Malesia*: SW. Celebes (Peak of Bonthain).

Ecol. In forest or scrub forest, 1900-2600 m. *Fl.* June, July.

86. *Diplycosia urceolata* STAPP, Trans. Linn. Soc. II, Bot. 4 (1894) 194; MERR. En. Born. (1921) 465; SLEUM. Reinwardtia 4 (1957) 153; Blumea 12 (1963) 122. — *D. coriifolia* SLEUM. Bot. Jahrb. 71 (1940) 152; — Fig. 78d.

Epiphytic or terrestrial subscandent shrub, 1-5 m. Branchlets thick, nodose, subterete, with large scars of the fallen leaves, tips obtusangular, reddish brown, completely glabrous. *Leaves* elliptic or mostly oblong-obovate to elliptic-obovate, apex subacuminate to rounded, sometimes emarginate, apiculate by a thickish gland, base cuneate into the petiole, stiff-coriaceous, thick, dark glossy green and glabrous above, rather dull and minutely blackish punctate beneath, margin slightly recurved and impressed-crenulate, each crenulation provided with a short, \pm early caducous bristle-like hair, (5-)6-10(-11) by (2.5-)3.5-5(-7.5) cm, 5(-7)-plinerved, midrib and nerves sunken above, markedly raised beneath, the lowest 1-2 pairs of nerves from, the following upper 1-2 pairs a little from above the base of the lamina, all high curved-ascending and anastomosing at the top, other higher nerves or transversal veins from the upper half of the midrib, rather obscure; petiole glabrous, 1-1.3 cm by 2-3 mm. *Flowers* (3-)5-7 per axil. Pedicels rather stoutish, densely shortly \pm patently rufescent-hairy, with a few glandular muriculate hairs between, 4-6 mm at anthesis, up to 1 cm in fruit, basal bracts ovate-acuminate, hairy, 1-1.5 mm. Bracteoles semi-orbicular-ovate, obtuse, densely short-hairy dorsally, ciliate, c. 1.5 by 2 mm. *Calyx* greenish, c. 2.5 mm, glabrous, lobes ovate, obtuse, short-fimbriate and ciliate, c. 1.5 mm, \pm spreading. *Corolla* subglobose-urceolate, limb and base contracted, the middle ventricose, fleshy, of a translucent white to pinkish, sometimes purplish, glabrous, (4-)5-6.5(-8) mm high and \emptyset , lobes spreading, 1 mm. *Filaments* linear, glabrous, inflexed below the anthers, c. 2 mm; anther-cells oblong, very granular, c. 2.8 mm, the very short tubules included. *Ovary* glabrous; style 3-4 mm.

Fruit light purple when ripe, c. 3 mm \emptyset .

Distr. *Malesia*: North Borneo (Mt Kinabalu).

Ecol. In mossy forest and on open exposed crest, even creeping on rocks, 2135-3350 m. *Fl. fr.* March-Aug.

87. *Diplycosia lysolepis* SLEUM. Bot. Jahrb. 72 (1942) 209; Reinwardtia 4 (1957) 152.

Epiphytic shrub. Branchlets angular, older parts decorticate in thin longish flakes, very young ones red-brown, glabrous, *Leaves* elliptic to obovate-elliptic, apex very broadly attenuate to nearly rounded, the terminal gland thick and prominent, base cuneate into the petiole, rigidly chartaceous to coriaceous, glabrous and somewhat shining above, rather dull and minutely laxly punctulate beneath, entire, 4-5.5 by (2-)2.2-3 cm, 5-plinerved, midrib impressed above, a little raised beneath, nerves mostly somewhat sunken above, not or only very slightly raised beneath; petiole thick, 3-4 mm. *Flowers* mostly solitary, rarely in twos. Pedicels only seen after anthesis, very shortly and laxly subglandular-hairy, glabrescent, 2-3(-4) mm. Bracteoles broad-ovate, glabrous, glandular-ciliate, 1 mm. *Calyx* glabrous, deeply 5-lobed, lobes deltoid, ciliate. *Ovary* glabrous. *Fruit* finally purplish blackish.

Distr. *Malesia*: E. New Guinea (Morobe Distr.: Sattelberg vicinity; Central Distr.: N of Port Moresby).

Ecol. In forest, 1150-1980 m. *Fl.* Sept., Dec.

88. *Diplycosia commutata* SLEUM. Reinwardtia 4 (1957) 153. — *D. urceolata* (non STAPP) SLEUM. Bot. Jahrb. 71 (1940) 153, *in text*.

Low terrestrial or epiphytic shrub, rarely treelet. Branchlets subterete, older parts greyish corticate, tips reddish brown when dry, completely glabrous. *Leaves* oblong to obovate-oblong, apex obtuse or rarely shortly broad-attenuate or slightly emarginate, the terminal gland thick and prominent, base rather shortly cuneate into the petiole, \pm coriaceous, rigid, dark glossy green and glabrous above, dull and laxly blackish punctulate all over the undersurface, entire, margin somewhat cartilaginous and pale, indistinctly impressed-crenulate, the crenulations provided with early caducous bristles in the very young leaf, slightly or not revolute, (3.5-)4-6(-7) by (0.8-)1-1.8 (-2.5) cm, 3-5-plinerved, midrib distinctly impressed above, or prominent beneath, the lowest pairs of plinerves somewhat from above the base of the lamina, high curved-ascending to the top, other nerves pinnately from the midrib and \pm curved, all \pm manifestly impressed above, but sometimes only faintly so, nearly inconspicuous beneath; petiole glabrous, 2-4 by 0.6-1 mm. *Flowers* solitary or in twos in the upper axils, 3(-4) per fascicle in the lower ones. Pedicels laxly clad with short, glandular hairs or fine bristles, otherwise very short pubescent, or rather glabrous, at anthesis 2-3 mm, a little accrescent in fruit, basal bracts few, minute. Bracteoles ovate, obtuse, glabrous, subglandular-ciliate, 1 mm. *Calyx* 2 mm, deeply 5-lobed, lobes ovate, obtuse, shortly subglandular-fimbriate. *Corolla* subglo-

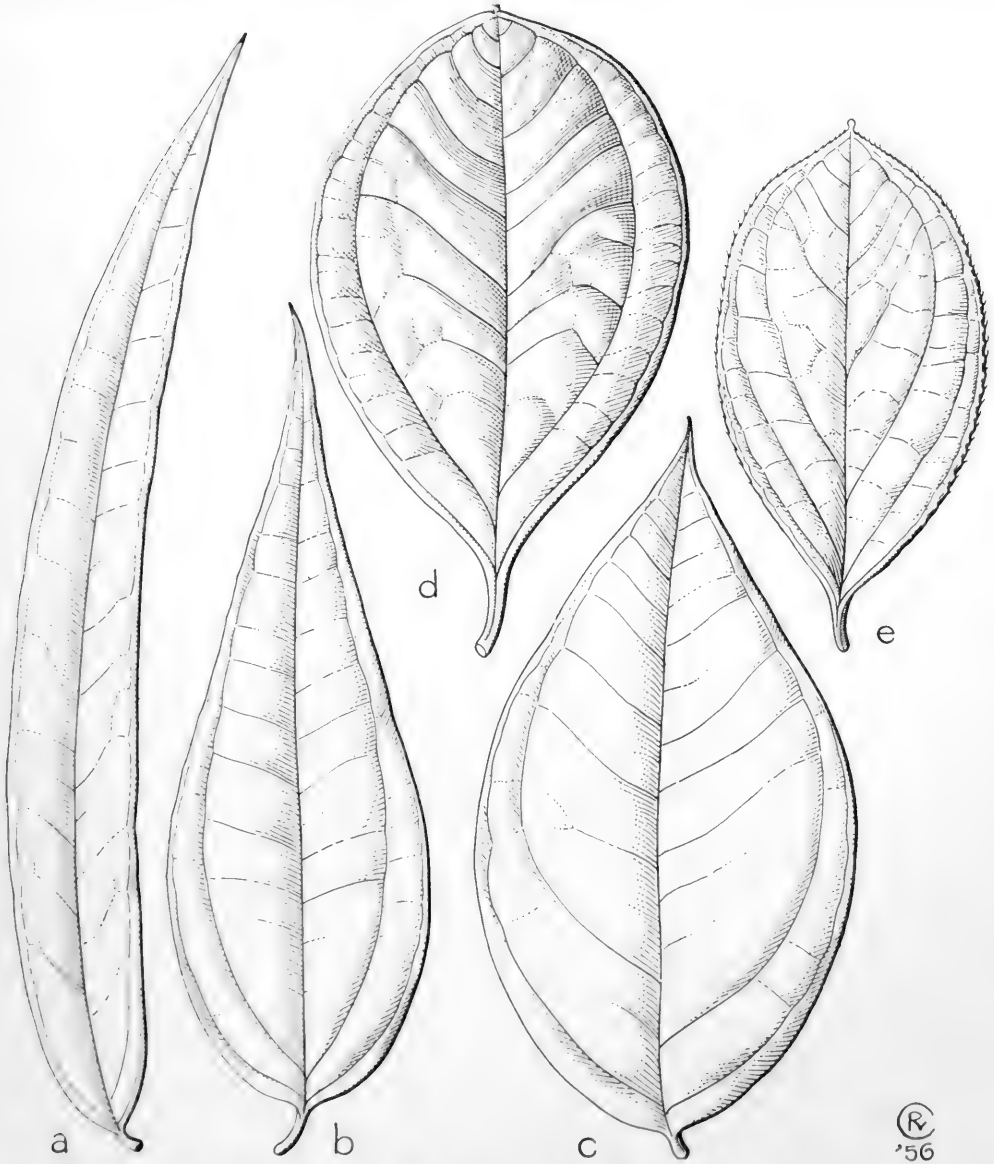


Fig. 78. Leaf types of *Diplycosia* spp., all $\times \frac{1}{3}$. — a. *D. ensifolia* MERR. — b. *D. cinnamomifolia* STAPF. — c. *D. penduliflora* STAPF. — d. *D. urceolata* STAPF. — e. *D. kinabaluensis* STAPF. (a CLEMENS 32239, b CLEMENS 33131a, c CLEMENS s.n., d CLEMENS 33189, e CLEMENS 33765).

bose-urceolate, rather fleshy, 3–4.5 by 2.5 mm, white (pinkish in bud), lobes 0.5 mm. Filaments linear, glabrous, slightly inflexed below, c. 3 mm; anthers oblong, \pm granular, c. 1.8 mm, the short tubules included. Ovary glabrous; style 2.5 mm. Fruit subglobose, purplish, c. 3 mm ϕ when nearly ripe.

Distr. *Malesia*: North Borneo (Mt Kinabalu). Ecol. In rain-forest, 1300–1525 m. Fl. Jan.–Dec.

89. *Diplycosia edulis* SCHLTR, Bot. Jahrb. 55 (1918) 163, f. 7 H–M; SLEUM. *ibid.* 72 (1942) 209; Reinwardtia 4 (1957) 152; Blumea 12 (1963) 122.

Epiphytic or terrestrial shrub, up to 1.5 m. Branchlets subangular, greyish corticate below, tips reddish to brown red, completely glabrous. Leaves generally obovate-elliptic to obovate, apex broadly attenuate to rounded, in alpine forms more elliptic, the terminal gland thick and promi-

ment, base cuneate into the petiole, coriaceous, somewhat shining above, \pm dull beneath, glabrous, or sometimes laxly punctate beneath, margin slightly to distinctly recurved, the glandular-impressed crenations minute, more visible in alpine forms, generally (2.5-)3-5(-7) by 1.5-2.5(-4) cm, alpine forms smaller, 2-3(-4.5) by 1-2 cm, midrib and 1-2 pairs of nerves slightly impressed above, \pm raised beneath, nerves from and from above the base of the lamina, curved-ascendent to the top; petiole thick, 3-5 mm. *Flowers* solitary, or mostly 2 or 3 per fascicle. Pedicel rather slender, laxly and \pm coarsely muriculate, (5-)7-12 mm. Bracteoles broad-ovate, glabrous, ciliolate, 1 mm. *Calyx* turbinate, purplish, glabrous, 3 mm, lobes ovate, obtuse, ciliolate, 1.5 mm. *Corolla* cylindric, white or greenish or pink with whitish lobes, glabrous, 5-6 by c. 3 mm, lobes erect or somewhat spreading, 1 mm. *Filaments* filiform, glabrous, 3 mm; anther-cells ovate-oblong, echinulate, 2 mm; tubules broad, 0.5 mm. *Ovary* glabrous; style 4-5 mm. *Fruit* subglobose, reddish or finally purplish blackish, fleshy, 5-7(-12) mm ϕ .

Distr. *Malesia*: New Guinea (Bismarck Mts; Mt Wilhelmina; Vogelkop Peninsula).

Ecol. Epiphytic in forest, or terrestrial in more open mossy forest or in thickets, on peat ridges, (1550-)1900-3225 m, gregarious locally. *Fl.* Aug.-Jan.

Note. Dry material often with fine aromatic smell.

90. *Diplycosia lorentzii* KOORD. Nova Guinea 8 (1912) 881, t. 54, f. 3 a-e; J. J. S. *ibid.* 12 (1917) 514; SLEUM. Bot. Jahrb. 72 (1942) 209; Reinwardtia 4 (1957) 153; Blumea 11 (1961) 7. — *Dimorphantha obovata* J. J. S. Med. Rijksherb. n. 25 (1915) 8, *quoad folia*; Nova Guinea 12 (1917) 514; *ibid.* (1918) t. 208, *quoad folia*, *nom. illeg.* (Code § 70).

Shrub, 1-3 m. Branchlets early corticate, bark peeling off, glabrous or with very short glandular hairs or stalked glands. *Leaves* subrotundate-elliptic or \pm broadly obovate, apex rounded to slightly retuse, apiculate by a thick protruding gland, base nearly rounded to rather abruptly attenuate into the petiole, dark green, dull on both faces, coriaceous, glabrous except some scattered glandular points underneath, margin strongly revolute in dry specimens, 3-5 by 1.5-3(-4) cm, 3-5-plinerved, midrib and nerves impressed above, slightly or not raised beneath; petiole rather thick, 0.5-1 cm. *Flowers* mostly 3-4 per fascicle, occasionally only 2 or 1 in other axils of the same specimen. Pedicels slender, laxly and shortly hairy initially, early glabrescent, 0.7-1.3 cm. Bracteoles ovate, acute, ciliate, 1 mm. *Calyx* turbinate, glabrous, 2.5 mm, lobes ovate, obtuse, ciliolate, 1.5 mm. *Corolla* urceolate, slightly contracted at the limb, c. 6 mm, white, glabrous, lobes reflexed, 1 mm. *Filaments* filiform, glabrous, 3 mm; anthers oblong, echinulate, 0.9 mm; tubules rather slender, 0.9 mm. *Ovary* glabrous; style 5 mm. *Fruit* first red, finally nearly blackish, c. 5 mm ϕ .

Distr. *Malesia*: S. New Guinea (Hellwig and Perameles Mts).

Ecol. In rain-forest, 1350-1520 m. *Fl.* Nov.-Dec.

91. *Diplycosia punctulata* STAFF, Trans. Linn. Soc. II, Bot. 4 (1894) 193; MERR. En. Born. (1921) 465; SLEUM. Reinwardtia 4 (1957) 154; Blumea 12 (1963) 122.

Shrub or small tree, occasionally epiphytic, up to 6 m; stem up to 12 cm ϕ . Branches in open stand spread up to 4.5 m. Branchlets thick, provided with the thick cushions of the fallen leaves, young parts covered with light brown cork, tips obtusangular, glabrous, blackish punctulate. *Leaves* elliptic, or sometimes oblong-elliptic, apex gradually acuminate, subacute to obtuse, the terminal gland thickish, found on the underside of the blade within the margin, base attenuate into the petiole, coriaceous, dark green and but a little glossy above, dull below, subdensely blackish punctulate on both faces, more manifestly or exclusively so underneath, otherwise glabrous, entire, margin rather distinctly revolute, 6-10(-12) by (2-)2.5-5(-7) cm, midrib impressed above, strongly raised beneath, nerves pinnate, 8-10 pairs, the inferior 1-3 pairs slightly curved especially in the broader leaves, other pairs rather straight and \pm parallel, manifestly inarching, \pm distinctly impressed above, sharply prominent beneath, veins rather obscure; petiole violet, semiterete, grooved, 6-8(-12) by 1.5-2 mm. *Flowers* 4-6 per fascicle, both in the foliate and/or defoliate axils. Pedicels rather stout, laxly to subdensely clad with short substellate, fine yellowish, and some thickish glandular hairs, 4-5 mm, basal bracts ovate-acuminate, 1-1.5 mm. Bracteoles broad-ovate, apiculate, hirtellous dorsally, ciliolate and glandular-ciliate, 1.5 mm. *Calyx* 4 mm, glabrous or laxly muriculate, lobes ovate, thick-glandular-ciliate and ciliolate, 2.5 mm. *Corolla* campanulate, greenish to white or cream, glabrous, 5 by 4 mm, lobes reflexed, 2.5 mm. *Filaments* linear, slightly dilated towards the base, papillose, nearly 3 mm; anther-cells ovate-oblong, echinulate, 2.5 mm, the short tubules included. *Ovary* glabrous; style c. 5 mm, slightly exerted as are the stamens. *Fruit* cream-green initially, finally purplish blue, 3-4 mm ϕ .

Distr. *Malesia*: North Borneo (Crocker Ra.; Mt Kinabalu; Mt Tambuyokon).

Ecol. In mossy forest, (1220-)1680-2750 m. *Fl.* March-Oct.

92. *Diplycosia cinnamomifolia* STAFF, Trans. Linn. Soc. II, Bot. 4 (1894) 195; GIBBS, J. Linn. Soc. Bot. 42 (1914) 102; MERR. En. Born. (1921) 464; COX, Am. Midl. Nat. 40 (1948) 499 (*anat.*); SLEUM. Reinwardtia 4 (1957) 154; Blumea 12 (1963) 122. — Fig. 78b.

Shrub, sometimes climber, whether or not epiphytic, 0.6-1.5 (-5) m. Branchlets subterete, greyish to dark brown-corticate, tips somewhat flattened or angular, brownish, completely glabrous. *Leaves* ovate to oblong-ovate, apex \pm subcaudate-acuminate, acute, the terminal gland small, base rounded to subcordate, stiff, leathery and

fleshy, dark green, glabrous and somewhat above, less shining or dull and subdensely to laxly blackish punctate beneath, entire, margin narrowly cartilaginous, flat, (7-)8-18(-20) by (3.5-)4-7 (-10.5) cm, 5-plinerved from or from a little above the base, midrib impressed above, strongly raised beneath, principal nerves curved-ascending to the top, the outer pair less visible than the inner one, which is more impressed above and raised beneath, other nerves or transverse veins several from the upper part of the midrib, \pm transverse to the principal nerves, mostly rather faint; petiole thick, grooved, (6-)8-12 by 1.5-3 mm. *Flowers* (3-)4-6 per fascicle, mostly in the defoliate axils. Pedicels rather slender, subdensely clothed with short, fine, yellowish hairs, and laxly so with thick, rather short glandular ones, (4-)5-7 mm, basal bracts small. Bracteoles broad-ovate, subacute, dorsally short-hairy, glandular-fimbriate, c. 1.5 mm. *Calyx* c. 3 mm, greenish, glabrous or very laxly muriculate dorsally, lobes ovate, subacute, glandular-fimbriate, 1.5 mm. *Corolla* urceolate, 5 mm, white to pink, waxy, glabrous, lobes reflexed, 1 mm. *Filaments* linear, glabrous, 2.5 mm; anthers ovate-oblong, granular, c. 1.8 mm, the very short and broad tubules included. *Ovary* glabrous; style 4 mm. *Fruit* finally purple-black, c. 4 mm ϕ .

Distr. *Malesia*: North Borneo (Mt Kinabalu).

Ecol. In mossy low forest, also on open serpentine ridge, locally not rare, 2440-3440(-3600) m. *Fl.* Jan.-Dec.

93. *Diplycosia ensifolia* MERR. J. Str. Br. R. As. Soc. n. 76 (1917) 107; En. Born. (1921) 465; SLEUM. Reinwardtia 4 (1957) 154. — Fig. 78a.

Shrub, epiphytic, 60 cm. Branchlets drooping, slender, terete, smooth, early covered with cork which peels off, tips dark brown-purplish when dry, completely glabrous. *Leaves* elongate-lanceolate, ensiform, slightly inequilateral, apex long-acuminate to caudate, sometimes falcate, the terminal gland small but distinct, base short-attenuate to nearly rounded, rather stiff, coriaceous, glabrous, the undersurface punctate by scattered blackish glands, 13-20(-24) by 1.1-1.8(-3.2) cm, widest below the middle, midrib impressed above the entire length, prominent beneath, 1 pair of nerves on each side from somewhat above the base of the lamina, high ascending along the edge nearly to the top, slightly impressed above, sometimes hardly visible, other nerves obsolete; petiole stout, blackish when dry, rugulose, 3-7 mm. *Flowers* axillary, solitary or in twos, sometimes also 3 or 4 in other axils of the same specimen. Pedicels slender, laxly papillose-puberulous, 4-5 mm, basal bracts minute, scarious. Bracteoles broad-ovate to reniform, ciliolate, 1-1.5 mm. *Calyx* 3.5 mm, glabrous, lobes ovate, erect, obtuse, glandular-ciliolate, 2 mm. *Corolla* ventricose-urceolate, contracted towards the base, glabrous, white, tinged with dull lavender or purple, or cream-green, 5 by c. 2 mm, lobes short. *Filaments* glabrous, linear, 2 mm; anther-cells oblong-ovate, 1.5 mm, the short tubules included. *Ovary* glabrous; style 2.5 mm. *Fruit* blackish when ripe, 4-5 mm ϕ .

Distr. *Malesia*: North Borneo (Mt Kinabalu). Ecol. In forest, 1370-2440 m. *Fl.* Dec.-March, fr. June-Aug.

94. *Diplycosia salicifolia* SLEUM. Blumea 12 (1963) 122.

Scrambling shrub. Branchlets subterete, striate longitudinally, glabrous. *Leaves* lanceolate, long to caudately attenuate towards the apex, acute, base cuneate to the petiole, subcoriaceous, laxly punctulate beneath, glabrous otherwise, slightly revolute at the margin which is remotely and finely subserrate-crenulate, 7-12 by 1.2-2 cm, midrib impressed over the entire length above, bluntly prominent beneath, one pair of nerves a little from above the base and high curved-ascending along the edge, slightly impressed above at least in the lower $\frac{2}{3}$, not much prominent beneath, other nerves or veins \pm obscure; petiole grooved above, 0.6-1 cm by c. 1.5 mm. *Fascicles* (2-)3-6-flowered. Pedicels rather slender, very shortly hairy besides a few thicker longer subglandular hairs found below the calyx, 7-10 mm. Bracteoles carinate, shortly hairy dorsally. *Calyx* tube obconical, 2 mm, the lower half hidden by the bracteoles, lobes triangular, blunt, 2 mm, shortly subglandular-fimbriate. *Corolla* campanulate, broadly opened, thin, greenish white, c. 7 mm long, 5-6 mm ϕ at the limb, lobes reflexed, 1 mm. *Filaments* linear, glabrous, c. 3 mm; anthers elongate-ovate, much attenuate-acuminate distally, base subcordate, 2.5 mm. *Ovary* glabrous or with a few hairs around the style, the latter glabrous, slender, 5.5 mm, exserted for c. 2 mm at anthesis.

Distr. *Malesia*: Borneo (Sarawak: summit area of Mt Mulu), once found.

Ecol. In montane forest on exposed ridge, at 2010 m, said to occur up to 2200 m, rather rare. *Fl.* July.

95. *Diplycosia viridiflora* SLEUM. Bot. Jahrb. 71 (1940) 159; Reinwardtia 4 (1957) 154.

var. viridiflora.

Shrub, whether or not epiphytic, or small tree, occasionally up to 10 m. Branchlets dark, 5-6 mm ϕ , terete, striate in the older, obtusangular in the younger parts, the thin bark shedding off in flakes, tips completely glabrous. *Leaves* lanceolate to subovate-oblong-lanceolate, gradually acuminate towards the subacute apex, the terminal gland rather small and not prominent, base broad-attenuate into the petiole, very coriaceous and stiff, glabrous and glossy above, dull and rather laxly blackish punctulate beneath, entire, margin cartilaginous, \pm strongly revolute in dry specimens especially in the lower half of the blade, 9-14(-17) by 2.5-4 cm, midrib deeply grooved above, very robust and prominent beneath, triplinerved, nerves running along the edge from base to top, slightly impressed above, not visible beneath, other nerves or veins numerous and \pm straight from the midrib to the marginal nerve, inarching with it, parallel, faintly impressed on both faces, or mostly hardly visible; petiole rugose, 1-1.5 cm by 2-3 mm. *Flowers* 4-8 per fascicle,

rarely 3 or 2 on the same specimen, in whether or not defoliate axils. Pedicels rather slender, densely clothed with short, yellowish fine hairs and with short thickened glandular hairs laxly between them, 4–6 mm at anthesis, up to 8 mm in fruit, basal bracts several, subulate, *c.* 1 mm. Bracteoles broad-ovate, acuminate, markedly apiculate by the protruding keel, pubescent dorsally, glandular-ciliate, *c.* 2 mm. *Calyx* 5 mm, generally glabrous, occasionally with some very short hairs at the tips of the lobes outside, lobes ovate-acuminate, acute, glandular-ciliate, *c.* 4 mm. *Corolla* urceolate, rather fleshy, green, or greenish white outside, purplish inside, glabrous, 6–7 by 3 mm, lobes reflexed, narrow, *c.* 2 mm. *Filaments* linear, slightly wavy, glabrous, 3 mm; anther-cells ovate-oblong, granular, 2 mm; tubules very slender, 2 mm. *Ovary* glabrous; style *c.* 5 mm. *Fruit* deep purplish, not seen in mature state.

Distr. *Malesia*: North Borneo (Mt Kinabalu).

Ecol. In mossy forest or scrub-forest, 1220–1675 m. *Fl.* March–April.

var. megalantha SLEUM. Reinwardtia 4 (1957) 155.

Differs by solitary larger flowers. *Calyx* 7–8 mm. *Corolla* 11 mm; style 10 mm. Pedicels 1.5–2 cm.

Distr. *Malesia*: North Borneo (Mt Kinabalu), once found. *Fl.* Aug.

96. *Diplycosia heterophylla* BL. Bijdr. (1826) 858, *incl. var.*; DC. Prod. 7 (1839) 591; MIQ. Fl. Ind. Bat. 2 (1859) 1055; KOORD. Nat. Tijd. N.I. 62 (1902) 255; Exk. Fl. Java 3 (1912) 8; HALL. f. Med. Rijksherb. n. 12 (1912) 28; KOORD.-SCHUM. Syst. Verz. 1 (1912) fam. 233, p. 107; J. J. S. in K. & V. Bijdr. 13 (1914) 131, *incl. var. obovata* J. J. S. l.c. 135; KOORD. Fl. Tjib. 3 (1918) fam. 233, p. 4; HOCHR. Candollea 2 (1925) 494; SP. MOORE, J. Bot. 63 (1925) Suppl. 57; MALME in Fedde, Rep. 34 (1934) 284; AMSH. in Back. Bekn. Fl. Java (em. ed.) 7 (1948) fam. 162, p. 6, *excl. syn. D. latifolia* BL.; SLEUM. Reinwardtia 4 (1957) 155. — *Gaultheria heterophylla* (BL.) ENDL. ex HASSK. Cat. Hort. Bog. (1844) 160; ZOLL. & MOR. Nat. Geneesk. Arch. N.I. 2 (1845) 9; ZOLL. Syst. Verz. 2 (1854) 138; MIQ. Ann. Mus. Bot. Lugd.-Bat. 1 (1863) 40. — *Amphicalyx heterophyllus* (BL.) HASSK. Cat. Hort. Bog. (1844) 160, *in syn.*; BL. ex HASSK. Pl. Jav. Rar. (1848) 470. — *Gaultheria latifolia* ENDL. ex ZOLL. Syst. Verz. 2 (1854) 138. — *D. latifolia* (non BL.) HALL. f. Med. Rijksherb. n. 12 (1912) 28. — *D. bartlettii* MERR. Pap. Mich. Ac. Sc. 19 (1933) 182. — **Fig. 79–80.**

var. heterophylla.

Shrub or treelet up to 7 m, mostly epiphytic, rarely terrestrial. Branchlets greyish corticate, obtusangular, the young red shoots sometimes with some very short glandular hairs, practically glabrous, mostly a little shining. *Leaves* heteromorphic, not rarely variously shaped in the same specimen, oblong to oblong-elliptic, sometimes nearly ovate or obovate, apex mostly rather short-attenuate, acute or somewhat obtuse, very rarely rounded, the terminal gland small, not protruding,

base acute or obtuse, glossy dark green above, dilutely green and less shining beneath, subcoriaceous to rather coriaceous, very young ones sparsely set with short stoutish hairs, mature ones glabrous above, ± laxly punctulate beneath by the persistent hair-bases, entire, margin flat or slightly revolute, especially towards the base of dry leaves, 3–7(–10) by (1–)1.5–3.5 cm, midrib said to be pale and shining as glass in fresh leaves, impressed above, obtusely raised beneath, nerves in 3–6 pairs (1–2 basal pairs ± high-ascending), curved and anastomosing, faintly impressed above, slightly raised beneath, not rarely almost invisible; petiole said to be often red when fresh, grooved above, 3–7 by 1–1.5 mm. *Flowers* 4–8(–15) per fascicle, from foliate or defoliate axils. Pedicels rather slender, laxly to (rarely) subdensely clothed with short, fine, ± spreading yellowish hairs as well as with some scattered thicker glandular hairs, rarely at anthesis clothed with the latter only, glabrescent, though the bases of the glandular hairs are ± persistent, (4–)5–7 mm, basal bracts broad-triangular, obtuse, fimbriate. Bracteoles suborbicular-ovate, obtuse, keeled, with some very short hairs on the keel, glabrous elsewhere, glandular-fimbriate, *c.* 1.5 mm. *Calyx* contracted at the base, often purplish suffused, glabrous, 2.5–3 mm, lobes ovate, obtuse, often thinner at the margin and ± reflexed at anthesis, densely glandular-fimbriate, 1.5–2 mm. *Corolla* narrow-campanulate, contracted at the very base, sordid or pinkish white to greenish or greenish pinkish, or green with purplish brownish lobes, glabrous, 4–5(–6) by (2–)2.5–3.5 mm, lobes recurved, 1.5 mm. *Filaments* linear, curved, glabrous, 2.5–3 mm; anther-cells ovate-oblong, very granular, 2–2.5 mm, the rather short tubules included. *Ovary* glabrous; style 4–5 mm. *Fruit* 4–5 mm ø, first greenish white, then dull lead-coloured, finally purplish blue or blackish and shining.

Distr. *Malesia*: Sumatra, Java, Lesser Sunda Is. (Bali, Lombok), ? Borneo.

Ecol. In mountain forest, locally common, (800–)1000–2400(–2700) m. *Fl.* fr. Jan.–Dec.

Vern. *Areuj hideung*, *areuj tjantigi*, *tjantigi bulu*, S, or mostly simply *tjantigi*, S, a common Sundanese name for *Ericaceae*.

var. latifolia (BL.) SLEUM. Reinwardtia 4 (1957) 156; Blumea 12 (1963) 123. — *D. latifolia* BL. Bijdr. (1826) 858; DC. Prod. 7 (1839) 591; MIQ. Fl. Ind. Bat. 2 (1859) 1055; BOERL. Handl. 2, 1 (1891) 270; KOORD. Nat. Tijd. N.I. 62 (1902) 255; K. & G. J. As. Soc. Beng. 74, ii (1905) 71; KOORD. Exk. Fl. Java 3 (1912) 8; J. J. S. in K. & V. Bijdr. 13 (1914) 130; RIDL. J. Fed. Mal. St. Mus. 8 (1917) 57; MERR. En. Born. (1921) 464; RIDL. Fl. Mal. Pen. 2 (1923) 214; BURK. & HOLTZ. Gard. Bull. S. S. 3 (1923) 57; HENDERS. J. Mal. Br. R. As. Soc. 5 (1927) 256; FLETCHER, Fl. Siam. En. 2 (1938) 315; HENDERS. Mal. Nat. 6, 1 (1950) 264, f. 247. — *Gaultheria latifolia* (BL.) ENDL. ex HASSK. Cat. Hort. Bog. (1844) 160; ZOLL. & MOR. Nat. Geneesk. Arch. N.I. 2 (1845) 9; MIQ. Ann. Mus. Bot. Lugd.-Bat. 1 (1863) 41. — *Amphicalyx latifolius*



Fig. 79. *Diplycosia heterophylla* BL. var. *latifolia* (BL.) SLEUM. a. Habit, $\times \frac{1}{2}$, b. flower, $\times 3\frac{1}{2}$, c. flower after anthesis, $\times 3\frac{1}{2}$, d. stamens in front and back view, $\times 5$, e. immature fruit, $\times 3\frac{1}{2}$, f. \downarrow schematized longitudinal section of young fruit, $\times 5$, g. seeds, $\times 7\frac{1}{2}$ (a-d after an unpublished coloured plate of BLUME, Fl. Javac, in the Rijksherbarium at Leyden, e-g FORBES 2049, from Sumatra).

BL. *ex* HASSK. Pl. Jav. Rar. (1848) 469. — *D. macrophylla* BECC. Malesia 1 (1878) 212; MERR. En. Born. (1921) 464. — *D. urceolata* (non STAPF) RIDL. *var.*, J. Str. Br. R. As. Soc. n. 39 (1903) 15. — *D. heterophylla* (non BL. *s. str.*) K. & G. J. As. Soc. Beng. 74, ii (1905) 71; RIDL. Fl. Mal. Pen. 2 (1923) 214. — *D. baclayensis* ELM. Leafl. Philip. Bot. 3 (1911) 1100; MERR. En. Philip. 3 (1923) 246; COPEL. f. Philip. J. Sc. 47 (1932) 78. — *D. endertii* J. J. S. Bull. Jard. Bot. Btzg III, 13 (1935) 458. — *D. kerintjensis* J. J. S. l.c. 456, *incl. var. elliptica* J. J. S. l.c. 457. — Fig. 79–80.

Differs by larger, ovate- to oblong-elliptic leaves, 8–14(–16, rarely up to 20) by (3–)3.5–8(–10, rarely up to 12) cm, which are often dark brown when dry, more coriaceous, variable also in shape.

Distr. S. Siam, in *Malesia*: Sumatra, Malay Peninsula, Banka, Java, Borneo, Philippines (Mindanao).

Ecol. Reported from the Malay Peninsula to occur both epiphytic in dense jungle and terrestrial in open, swampy or peaty places, also as a woody climber on quartzite ridge, common locally in the Cameron Highlands. In Sumatra, Java, Banka, Borneo and the Philippines a treelet or shrub up to 6 m, or mostly an epiphyte in montane forest, especially in mossy forest, in Sumatra also terrestrial in ridge-forest and in ericoid ridge scrub. Rarely found between 700–1000 m (Java and Borneo), 1000–2500 m, sometimes, as in Sumatra, reaching 3315 m. *Fl.* Jan.–Dec.

Vern. *Sigbut-ta-kayo*, Bag.

Note. I have united under *var. latifolia* several forms treated by other authors as species, which, at least with the material at hand, cannot be distinguished properly.

Fig. 80. *Diplycosia heterophylla* BL. *var. latifolia* (BL.) SLEUM. Summit of Mt Jasar, Cameron Highlands, 1700 m, Malaya (SLEUMER 4672) (SLEUMER, 1963).



9. COSTERA

J. J. S. Ic. Bog. 4 (1910) 77, t. 324; COPEL. f. Philip. J. Sc. 47 (1932) 102, *in text*; AIRY SHAW, Kew Bull. (1935) 152; J. J. S. Bull. Jard. Bot. Btzg III, 13 (1935) 419; SLEUM. Bot. Jahrb. 71 (1941) 397; Blumea 11 (1961) 3. — *Iaera* COPEL. f. Philip. J. Sc. 47 (1932) 82; AIRY SHAW, Kew Bull. (1935) 152. — *Cymothoe* AIRY SHAW, l.c. 150. — Fig. 81–83.

Small shrubs, climbing or mostly epiphytic, sometimes with thickened roots. *Leaves* spiral, entire, with a pair of glands on the margin near to the petiole, or on the foot of the constricted (or decurrent) proper base of the blade, or on the petiole itself, 5–7-plinerved, coriaceous, glabrous, bearing no trace of glands or

glandular hairs on the undersurface but often with scattered prominent epidermal warts or elevated points on both faces. *Inflorescences* axillary or not rarely slightly extra- (supra-)axillary. *Flowers* small, solitary or in few-flowered fascicles. Pedicels continuous with the calyx, bracteolate at the base. *Calyx* tube connate with the ovary, \pm cup-shaped; calyx limb \pm deeply 4-5-partite. *Corolla* cylindrical, urceolate or subcampanulate, shortly 5-lobed to deeply 5-partite. *Stamens* 5, 8 or 10, equal or almost so; filaments linear, much shorter than the anthers; cells elongate, dorsifix, ecalcarate, each extending upwards into an erect, free, elongate tubule, which opens by an introrse pore or slit. *Disk* annular. *Ovary* inferior, 4-5-celled; loculi many-ovuled; style filiform; stigma truncate. *Fruit* baccate, crowned by the disk and the persistent calyx lobes, subglobose, 4-5-celled, with 1-15 seeds per loculus. *Seeds* minute; testa reticulate.

Distr. In all 9 spp., all in *Malesia*: Sumatra, Borneo, Philippines (Luzon, Negros, Panay, Mindanao), the northern Moluccas (Morotai and Talaud Is.). Fig. 81.

Ecol. Mostly epiphytic, more rarely terrestrial, in primary forest and mossy forest, from sealevel up to 1800 m.

Note. The genus is very close to *Vaccinium* and kept here apart from it merely on account of the characteristic shape and nervation of the leaves, absence of glandular hairs on undersurface (which are significant for most or perhaps all species of *Vaccinium*), in combination with the fasciculate inflorescences and the pedicel which is continuous with the calyx (articulate with the calyx, as it seems, in all species of *Vaccinium* as far as Malesia is concerned).

KEY TO THE SPECIES

- 1. Leaves 1.4-2.2 by 0.6-1.1 cm 1. *C. loheri*
- 1. Leaves (2.5-)4.5-12(-15) cm long.
- 2. Leaves with a pair of glands strictly inserted on the margin at the base of the lamina, the latter not contracted nor decurrent on the petiole.
- 3. Corolla c. 3 mm, shortly 5-lobed. (Leaves elliptic, apex obtuse or rounded, base attenuate.) 2. *C. lucida*
- 3. Corolla 5-7 mm, deeply 4-lobed.
- 4. Corolla lobed to c. 1/3. Leaves suborbicular or rarely broadly ovate or elliptic-ovate, apex generally rounded, base auriculate-cordate, or rarely rounded. 3. *C. cyclophylla*
- 4. Corolla lobed in full anthesis \pm halfway. Leaves elliptic to subobovate-elliptic, rounded at the apex, broadly attenuate towards the base, subtruncate-obtuse at the very base 4. *C. tetramera*
- 2. Leaves with a pair of glands inserted at the very base of the abruptly contracted or decurrent basal part of the lamina, or not rarely even lower, i.e. on the petiole itself.
- 5. Leaves with a pair of glands inserted at the abruptly contracted or decurrent very basal part of the lamina.
- 6. Flowers tetramerous. Corolla 2.5 mm 5. *C. sumatrana*
- 6. Flowers pentamerous. Corolla 6 mm 6. *C. borneensis*
- 5. Leaves with a pair of glands found at or slightly above the middle of the petiole.
- 7. Corolla 2.5 mm.
- 8. Stamens 10. Leaves ovate or oblong-, rarely lanceolate-ovate, apex rather markedly acuminate 7. *C. lanaensis*
- 8. Stamens 5. Leaves lanceolate to elliptic-lanceolate or narrow-elliptic, apex generally rounded-obtuse 8. *C. endertii*
- 7. Corolla 3.5 mm 9. *C. ovalifolia*

1. *Costera loheri* (MERR.) AIRY SHAW & J. J. S. Bull. Jard. Bot. Btzg III, 13 (1935) 421; SLEUM. Blumea 11 (1961) 3. — *Vaccinium loheri* MERR. Philip. J. Sc. 7 (1912) Bot. 323; En. Philip. 3 (1923) 250. — *laera loheri* (MERR.) COPEL. f. Philip. J. Sc. 47 (1932) 85, t. 7, f. 1-5. Fig. 83c.

Small epiphytic glabrous shrub. Branches terete, the greyish cork fissured longitudinally. Branchlets reddish brown, angular, wrinkled, minutely puberulous under a lens, densely foliate. *Leaves*

elliptic to slightly obovate-elliptic, apex rounded, base broadly attenuate or subcuneate, a little decurrent on the petiole with the contracted very base of the blade, the pair of glands found there or at the apex of the petiole, coriaceous, shining, edge hardly recurved, 1.4-2.2 by 0.6-1.1 cm, distinctly 3- or faintly 5-plinerved, the pair of main nerves curved-ascending and anastomosing with the midrib a little below the very apex, \pm raised on both faces especially underneath, veins numerous, \pm trans-

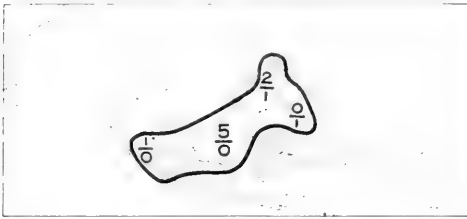


Fig. 81. Distribution of *Costera*. The number above the hyphen indicates the number of endemic species, that below the hyphen the number of non-endemic species in each island or district.

verse from the midrib, often hardly visible, reticulation rather obscure; petiole \pm flattened, 1–2 mm. *Flowers* solitary. Pedicels rather slender, glabrous, 2–6 mm, with several minute ovate bracteoles. *Calyx* tube cup-shaped or short-cylindric, base rounded, *c.* 1 mm, limb erect and deeply 5-partite, lobes deltoid, 0.5 mm. *Corolla* known in bud only, white. *Stamens* apparently 10; filaments linear, laxly hairy, 0.7 mm; cells oblong, 0.5 mm; tubules *c.* $\frac{1}{3}$ as narrow as are the cells, obliquely cut distally, 0.6 mm. *Style* *c.* 2 mm (or perhaps longer?). *Fruit* shining, *c.* 3 mm ϕ . *Seeds* pitted, *c.* 1.2 mm.

Distr. *Malesia*: Philippines (Luzon: Montalban; Panay: Ilo-Ilo).

Ecol. In mossy forest, probably above 1000 m.

Note. The leaves of *C. loheri* are similar to those of *Vaccinium microphyllum* BL.

2. *Costera lucida* (MERR.) AIRY SHAW & J. J. S. Bull. Jard. Bot. Btzig III, 13 (1935) 421. — *Diplycosia lucida* MERR. Philip. J. Sc. 11 (1916) Bot. 28. — *Vaccinium costeroides* MERR. En. Philip. 3 (1923) 248. — *Iaera lucida* (MERR.) COPEL. f. Philip. J. Sc. 47 (1932) 85, t. 6, f. 7–9.

Scandent or epiphytic shrub, entirely glabrous. Branchlets slender, terete, smooth, laxly foliate. *Leaves* elliptic, apex rounded or obtuse, base attenuate, with a pair of strictly basal marginal glands, coriaceous, shining, edge revolute, 5–7 by 2.5–3.5 cm, nerves 1–2 basal or slightly supra-basal, and 1–2 upper pairs, all curved-ascending and anastomosing, rather prominent; reticulation lax; petiole 5–7 by 1 mm. *Flowers* in pairs. Pedicels slender, *c.* 1.5 cm, with 2 minute bracteoles. *Calyx* tube cylindrical, base obtuse, *c.* 1.5 mm, limb broadly 5-dentate, *c.* 0.5 mm. *Corolla* cylindric, *c.* 3 mm, lobes broadly ovate, 0.5 mm. *Stamens* 10; filaments linear, laxly patently hairy, 1.7 mm; cells broad-oblong, *c.* 0.6 mm; tubules narrow-cylindric, 0.4 mm, obliquely cut apically, the pore small. *Style* with a club-shaped apex, *c.* 2.5 mm. *Fruit* *c.* 5 mm ϕ , black when dry, the calyx lobes broad, short, apiculate. *Seeds* *c.* 25 per fruit, brownish, pitted, *c.* 1.5 mm.

Distr. *Malesia*: Philippines (Luzon: Prov. Sorsogon, summit of Mt Kilibong), once found in mossy forest at *c.* 1000 m. *Fl. fr.* Aug.

Vern. *Dusóng-sikát*.

3. *Costera cyclophylla* (AIRY SHAW) J. J. S. & AIRY SHAW in Airy Shaw, Hook. Ic. (Dec. 1935) t. 3281; J. J. S. Bull. Jard. Bot. Btzig III, 13 (Dec. 1935) 424; SLEUM. Blumea 11 (1961) 3. — *Cymothoe cyclophylla* AIRY SHAW, Kew Bull. (May 1935) 151. — Fig. 82.

Straggling shrub or woody climber, whether or not epiphytic, 2–3 m, irregularly branched, glabrous in all outer parts. Branchlets terete, firm, up to 4 mm ϕ , red brown when dry, laxly foliate. *Leaves* suborbicular or sometimes broadly ovate or elliptic-ovate, apex generally rounded or somewhat truncate-retuse, rarely broadly obtusely subacuminate, base rounded to cordate and often auriculate or even amplexicaul, the auriculae large, \pm rounded and overlapping, with a pair of strictly basal marginal not much conspicuous glands, sessile or shortly (up to 7 mm) petioled, coriaceous, often with verruculose prominent points on each face, 5–12 by 4–6 cm, nerves 4–6 pairs, all from the very base, high curved-ascending and regularly anastomosing, prominent on both sides as is the midrib, connected by conspicuously raised, \pm transversal veins which form a rather lax network with the less prominent veinlets. *Flowers* 1–2(–5). Pedicels very slender, 1–2.7 cm, with 2 minute bracteoles. *Calyx* cup-shaped, *c.* 1.5 mm, limb suberect, 1–1.5 mm, halfway 5-lobed, lobes broadly triangular, acutish. *Corolla* narrow-campanulate, thin, pink or mauvish pink, or a very light violet at the top and nearly red at the base, 6–7 mm, 4-lobed, lobes deltoid-ovate, rather bluntish, erect, 2–3 mm. *Stamens* 8; filaments ascendently short-hairy, *c.* 2 mm; cells narrow-oblong, papillose, 1.5 mm; tubules erect, gradually attenuate upwards, *c.* 2 mm, the slits 0.5 mm. *Disk* inconspicuous. *Style* 5–6 mm, glabrous. *Fruit* baccate, 4–5 mm ϕ , obsoletely 4-locular. *Seeds* obtusely angular, 1–1.5 mm; testa foveolate-reticulate.

Distr. *Malesia*: Borneo (Sarawak: Mt Dulit; Merurong Plateau; Brunei: Mt Pagon; Central East Borneo: Mt Kemul).

Ecol. In primary heath forest or mossy forest, in shady places and on open ridge, 900–1800 m.

4. *Costera tetramera* SLEUM. Blumea 11 (1961) 4. — Fig. 83a-d.

Climbing shrub, apparently small, the slender, terete branchlets 1.5–3 mm ϕ , glabrous, laxly foliate. *Leaves* broad-elliptic to subobovate-elliptic, rounded, or rarely slightly retuse at the apex, broadly attenuate towards the base, the very base subtruncate-obtuse, bearing a pair of rather thickish, not much prominent marginal glands, coriaceous, laxly set with epidermal tubercles beneath, revolute particularly towards the base in dry specimens, (4.5–)6.5–9.5 by 3–5 cm, 5–7-plinerved from and a little from above the base, midrib broadened for the lowest *c.* 5 mm, abruptly narrowed upwards, prominent on both sides as are the nerves, the inner pair of nerves high ascending and anastomosing a little below the top of the lamina, veins lax, irregularly transverse, rather numerous, somewhat prominent above, less

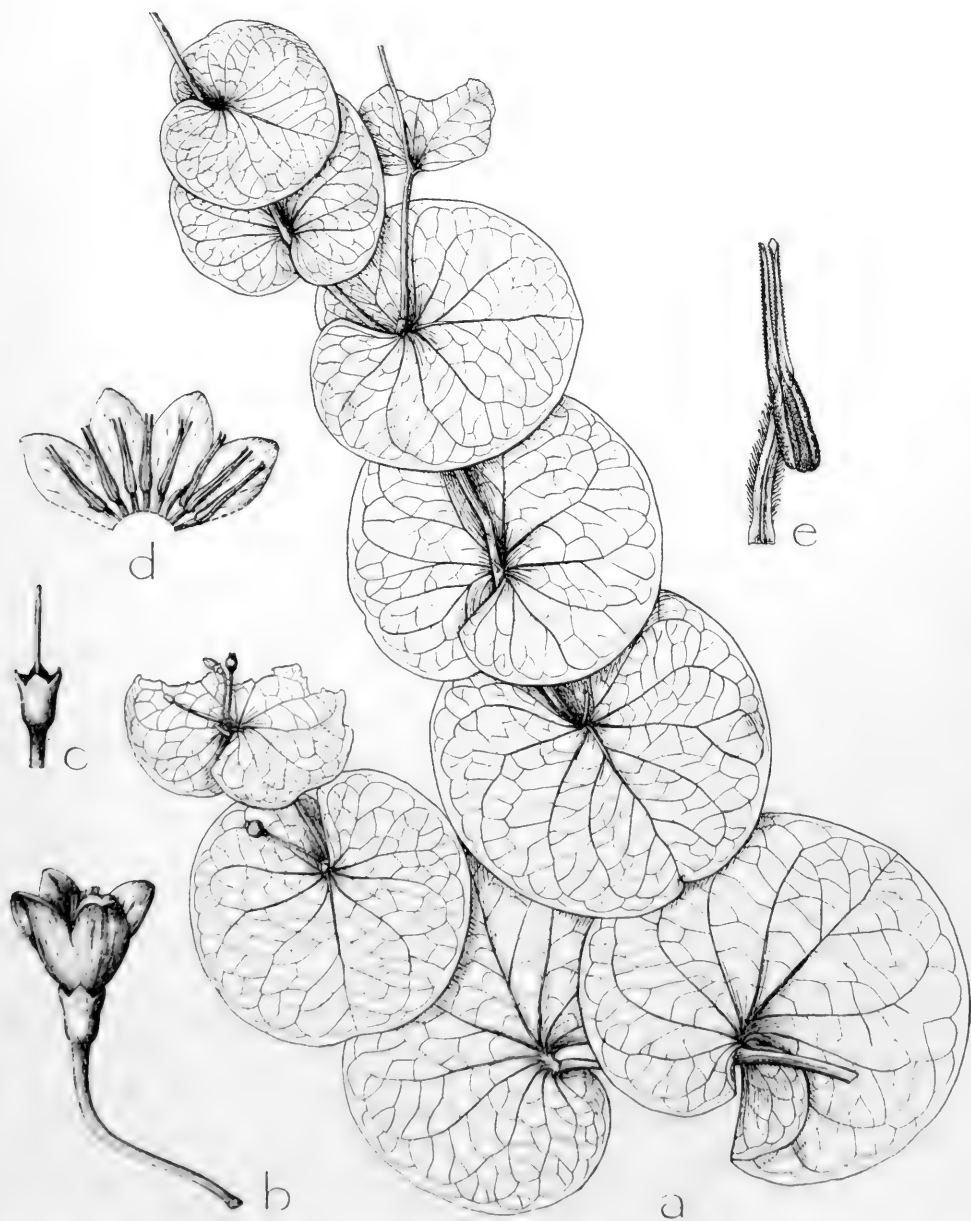


Fig. 82. *Costera cyclophylla* (AIRY SHAW) AIRY SHAW & J. J. S. a. Habit, $\times \frac{1}{2}$, b. flower, $\times 2$, c. ovary and style, $\times 2$, d. corolla and stamens, $\times 2$, e. stamen, $\times 6$ (a-e ENDERT 4258).

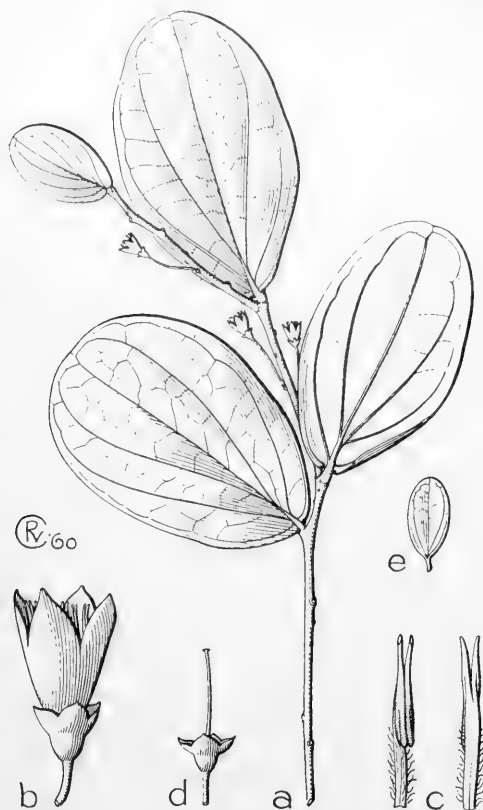


Fig. 83. *Costera tetramera* SLEUM. *a*, Habit, $\times \frac{1}{2}$, *b*, flower, $\times 2\frac{1}{2}$, *c*, stamen, front and back view, $\times 5$, *d*, ovary and style, $\times 2\frac{1}{2}$. — *C. loheri* (MERR.) AIRY SHAW & J. J. S., *e*, leaf, $\times \frac{1}{2}$ (*a-d* KOSTERMANS 12945, *e* VIDAL 3146).

distinct beneath; petiole transversely rugose, 2–4 by 1.5–2 mm. *Flowers* from the upper axils, solitary or more rarely in twos, glabrous in all outer parts. Pedicels slender, 0.9–1.5 cm, with 2 or 3 bracteoles (1 mm). *Calyx* tube subcylindric-obconical, 1 mm; limb campanulate, 1.5 mm, 4-lobed halfway, lobes depressed-ovate, apiculate. *Corolla* narrow-campanulate, thin, pink, 5 mm long, 4-partite \pm halfway in full anthesis. *Stamens* 8; filaments laxly ciliate, hardly 2 mm; cells narrow-oblong, 1.5 mm; tubules slender, slightly divergent, 1.5 mm. *Disk* glabrous. *Style* glabrous, 4.5 mm. *Immature fruit* with 4 inflexed calyx lobes; fruit-pedicel 1.5 cm.

Distr. Malesia: Borneo (W. Kutei: Mt Palimasan near Tabang on Belajan R.), in mossy forest on acid, waterlogged sandy soil, 800 m. Two collections. *Fl.* Sept.

5. *Costera sumatrana* J. J. S. Bull. Jard. Bot. Btzg III, 13 (1935) 421; SLEUM. Blumea 11 (1961) 3.

Terrestrial or epiphytic, glabrous shrub. Branchlets angular at the tips, terete below, slender, laxly foliate, internodes unequal and sometimes not longer than 3 mm. *Leaves* ovate or elliptic-

ovate, gradually obtusely attenuate or subacuminate towards the apex, base broadly attenuate to rounded in general, the very base suddenly contracted (2–4 mm) and bearing a thick prominent gland on each side or at the top of the petiole, stiffly fleshy when fresh, coriaceous when dry, minutely and rather laxly verruculose on both faces, (4.5–) 5–8.5(–10) by (2.5–) 3–4.5(–7) cm, midrib prominent on both sides, nerves in 2 basal and high curved-ascending, and 2–3 upper shorter pairs, all anastomosing and slightly raised on both faces, reticulation lax, not much conspicuous, sometimes obscure beneath; petiole subterete, 2.5–5(–6) by *c.* 1 mm. *Fascicles* 2–4-flowered. Pedicels rather slender, (3–) 5–6 mm, with several minute bracteoles. *Calyx* tube short-cylindric, base obtuse, 1 mm, limb 4-partite, lobes ovate-triangular, 0.6 mm. *Corolla* subcylindric-campanulate, thin, red (possibly also white), glabrous, 2.5 mm long, 1.5–1.8 mm ϕ , lobes broad-triangular, obtuse, erect, 0.5–0.6 mm. *Stamens* 8; filaments linear, laxly hairy in front and at the margin, glabrous dorsally, nearly 1 mm; cells ovate-oblong, granular, 0.4 mm; tubules much narrower than the cells, 0.6 mm, with a large introrse pore. *Disk* glabrous. *Style c.* 2 mm, glabrous. *Submature fruit* 3–4 in ϕ , crowned by the glabrous disk and 4 suberect calyx lobes (1 mm), pale green or white. *Seeds* numerous, subtrigonal, 1 mm, testa reticulate.

Distr. Malesia: Sumatra (Westcoast Res., Bencoolen).

Ecol. Once found on stony mud-flow of the Beriti volcano (S. Sumatra), said to be common there at *c.* 1000 m.

6. *Costera borneensis* J. J. S. Bull. Jard. Bot. Btzg III, 13 (1935) 423, f. 1; SLEUM. Blumea 11 (1961) 3.

Epiphytic or terrestrial creeping shrub, small, the slender not branched stems coming from a woody stock, glabrous in all outer parts, laxly foliate. *Leaves* elliptic to ovate-elliptic, apex obtuse or rounded, never retuse, base very broadly attenuate or mostly \pm rounded in general, the very base suddenly contracted for 2 mm and bearing there or almost at the apex of the petiole a conspicuous somewhat prominent gland on each side, light green and rather thickly coriaceous when fresh, thinly so when dry, flat, 6–7.8 by 3–4 cm, 5–7-plinerved from and a little from above the base, sometimes with 1 or 2 similarly curved-ascending nerves inserted higher on the midrib, all anastomosing and slightly prominent on both faces, veins \pm transverse, forming with the veinlets a rather dense, not much raised reticulation; petiole rugulose, 4–5 by 1 mm. *Flowers* solitary. Pedicels slender, 0.8–1 cm, the 2 bracteoles ovate-acuminate, *c.* 1 mm. *Calyx* tube narrowly cup-shaped, *c.* 1.5 mm, limb suberect, broadly acutely 5-dented, 0.7 mm. *Corolla* subcampanulate, 5-partite to almost the base, thin, *c.* 6 mm, lobes erecto-patent, ovate-oblong, subacute, nerved. *Stamens* 10; filaments ciliate, 2.5 mm; cells elongate-oblong, minutely granular or papillose, 3 mm; tubules elongate-cylindric, minutely verruculose below, *c.* 2 mm. *Style* glabrous, 5 mm. *Fruit* purplish pink, *c.* 4

mm σ , with 5 one-seeded cells. *Seeds* oblong, excavate-punctate, 2.5 mm.

Distr. *Malesia*: W. Borneo (Karimata Is.: P. Madjang (Maja) and another not precisely given locality).

Vern. *Pëlumpur badi*, P. Maja.

7. *Costera lanaensis* (MERR.) AIRY SHAW & J. J. S. Bull. Jard. Bot. Btzg III, 13 (1935) 421; SLEUM. *Blumea* 11 (1961) 3. — *Vaccinium lanaense* MERR. Philip. J. Sc. 3 (1908) Bot. 161, 372; En. Philip. 3 (1923) 250. — *Vaccinium medinilloides* ELM. Leaf. Philip. Bot. 3 (1911) 1097. — *Iaera lanaensis* (MERR.) COPEL. f. Philip. J. Sc. 47 (1932) 83, t. 6, f. 1-6; H. J. LAM & HOLTH. *Blumea* 5 (1942) 222.

Mostly epiphytic shrub, or small tree up to 1.5 m, stems often several in a clump up to 2 cm σ , with smooth grey bark. Branchlets slender to rather robust, glabrous throughout, or not rarely with a fine patent puberulence on the youngest parts, laxly foliate. *Leaves* ovate or oblong-ovate, rarely lanceolate-ovate, apex rather markedly acuminate, base rounded to broadly cuneately attenuate, \pm fleshy when fresh, coriaceous and brittle when dry, laxly set with small prominent warts on both faces, edge slightly revolute, (5-) 10-15 by (2-) 2.5-4.5(-6) cm, 5-7- plinerved from and from somewhat (up to 5 mm) above the base, with another similarly curved-ascending pair leaving the midrib at 1-2 cm distance from the base, all nerves extending to almost the top of the lamina and anastomosing there, prominent on both faces especially beneath, veins \pm transverse, numerous, forming a rather lax and slightly raised network with the less distinct veinlets; petiole rugulose, 3-6(-7) by 1.5-2 mm, with a pair of large lateral glands a little above the middle. *Fascicles* 2-5-flowered, glabrous. Pedicels slender, 3-4(-5) mm, each with a pair of small bracteoles. *Calyx* tube cylindrical, shining, base obtuse, 2 mm, limb suberect, 5-partite to almost the base, lobes ovate-acuminate, c. 1 mm. *Corolla* broad- or subcampanulate-urceolate, white, c. 2.5 mm, lobes broadly ovate, c. 1 mm. *Stamens* 10; filaments laxly hairy, c. 0.8 mm; cells oblong, 0.7 mm; tubules gradually narrowed upwards, 0.5 mm, with oblique, rather narrow slits. *Style* glabrous, 1.5-2 mm. *Fruit* 4-5 mm σ , crowned by the calyx lobes and a small, annular disk. *Seeds* obscurely trigonous, dark brown, 1.5 mm, minutely pitted.

Distr. *Malesia*: Philippines (Mindanao, Negros, Panay), Moluccas (Morotai: Mt Pare; Talaud Is.: Karakelong, Mt Duata).

Ecol. In forest, 700-1300 m.

Vern. *Lumus*, Bag.

8. *Costera endertii* J. J. S. Bull. Jard. Bot. Btzg III, 13 (1935) 420; SLEUM. *Blumea* 11 (1961) 3.

Epiphytic shrub, low, with several generally not branched slender stems from a woody clump. Upper parts of the stems or branchlets often crooked, with short internodes, laxly to subdensely foliate, glabrous except the finely puberulent tips. *Leaves* lanceolate to elliptic-lanceolate or narrow-elliptic, apex gradually narrowed, mostly obtuse

or rounded, base obtuse, coriaceous, glabrous, edge slightly thickened, (2.5-) 4-6(-7) by (0.5-) 1-1.5 (-2) cm, 5-plinerved, nerves erect-ascending to nearly the top of the lamina and anastomosing there, slightly raised on both sides, transversal veins and reticulation faint; petiole 2-4 by 1-1.5 mm, with a conspicuous gland on each side at or a little above the middle. *Flowers* 1-2(-4), glabrous, the filaments excepted. Pedicels rather robust, thickened upwards, 4-5 mm in anthesis, with a few minute bracteoles. *Calyx* tube cup-shaped, base subtruncate, 1-1.5 mm, limb deeply 5-lobed, lobes erect, triangular, acute, 0.7 mm. *Corolla* cylindrical, white or pink, c. 2.5 mm, 5-partite half-way, lobes blunt. *Stamens* 5; filaments patently hirtellous distally, 1.5 mm; cells elongate, 0.8 mm; tubules erect, 0.7 mm. *Disk* small. *Style* 1.5-2 mm. *Fruit* white, c. 4 mm σ , constricted below the suberect or incurved calyx lobes; fruit-pedicel 0.6-0.8 cm.

Distr. *Malesia*: Central Borneo (W. Kutei: Mt Kemul; Mt Palimasan near Tabang on Belajan R.).

Ecol. In forest, also in *Agathis*-forest on water-logged, sandy and acid soil, 300-1200 m.

9. *Costera ovalifolia* J. J. S. Ic. Bog. 4 (1910) 77, t. 324; MERR. En Born. (1921) 465; AIRY SHAW, Kew Bull. (1935) 155; J. J. S. Bull. Jard. Bot. Btzg III, 13 (1935) 420; SLEUM. *Blumea* 11 (1961) 3. — *C. elegans* J. J. S. ex DUNSELMAN, Trop. Natuur 28 (1939) 81, in text, nom. nud.

Epiphytic low shrub with thick roots, glabrous in all outer parts. Branchlets dark red, rather slender, often crooked and the nodes approximate up to 1 cm, subdensely leaved. *Leaves* erect, elliptic, apex rounded or slightly retuse, base very broadly attenuate to rounded, coriaceous though easily breakable in fresh state, pale green and glossy above, paler and dull beneath, edge somewhat thickened, (2.6-) 4-7 by 2.5-4.5(-5.5) cm, 5- (sub 7-) plinerved from and a little from above the base, nerves curved-ascending, anastomosing near the top of the lamina, with sometimes one additional upper pair of nerves from the lower half of the midrib, all slightly raised on both faces as is the midrib, veins \pm transverse, forming a rather lax network with the even less visible veinlets; petiole (2-) 3-6(-7) by 1.5-2 mm, bearing a conspicuous little flattish or excavate gland on each side at about the middle. *Fascicles* (2-) 4-flowered, arising from a kind of low cushion (1 mm), which consists of numerous minute ovate-acuminate imbricate perulæ. Pedicel rather slender, red, 9-12 mm, with a pair of bracteoles. *Calyx* tube cup-shaped, 1.5 mm, limb low, 5-lobed, lobes erect, triangular, acute, gland-apiculate, 0.5 mm. *Corolla* subcampanulate, 5-partite to almost $\frac{2}{3}$, thin, white, c. 3.5 mm, lobes erect, narrow oblong-triangular, \pm recurved. *Stamens* 5, alternating with the corolla lobes; filaments very laxly hairy upwards, c. 0.7 mm; cells oblong, 1.5 mm; tubules erect, gradually tapering to the apex, set with subclavate papillae below, 1.5 mm, dehiscent with a minute pore. *Disk* small. *Style* c. 3.5 mm. *Fruit* c. 4 mm σ , crowned by the \pm inflexed calyx lobes, apparently

4-5-celled, white or pale green, possibly red at full maturity, on pedicel up to 2.3 cm. *Seeds* few, oblongoid, 1.5-2 mm; testa reticulate.

Distr. Malesia: Borneo, Karimata I. (type), apparently also in Sarawak, Brunei, and West and East Borneo.

Ecol. In forest or forest edges, from low altitude up to c. 1500 m.

Vern. *Tjapien djantèn*, Karimata.

Note. The one specimen from Sarawak with flowers has the vegetative characters of *C. ovalifolia*, but 5-6 mm long corollas and 10 stamens, the other specimens from Borneo are in fruit or sterile. The Bornean material may be kept specifically apart when more material is at hand.

10. VACCINIUM

LINNÉ, Gen. Pl. ed. 5 (1754) 166; Sp. Pl. (1753) 349; SLEUM. Bot. Jahrb. 71 (1941) 413; Blumea 11 (1961) 10-112; *ibid.* 12 (1963) 123; *ibid.* 12 (1964) 343. — **Fig. 84-115.**

Shrubs or small, rarely medium-sized trees, terrestrial or epiphytic; stems of epiphytic ones not rarely with a (hypocotylar) basal swelling, and roots sometimes considerably enlarged. *Leaves* spirally arranged (Mal.), coriaceous to subcoriaceous, rarely thin, evergreen (Mal.), usually with a distinct, \pm basal, marginal gland on each side, entire or crenulate, whether or not clad with simple, gland-capitellate or glandular-muriculate hairs, rarely with stalked or sessile glands, sessile or mostly petioled. *Racemes* axillary, sometimes reduced to a solitary flower, caducously perulate, or more rarely eperulate. Pedicels subtended by a (sometimes very early) caducous or \pm persistent (foliaceous) bract and provided with 2, sometimes very early caducous bracteoles. *Calyx* tube cup-shaped, turbinate or rarely almost patellar, limb (4-)5-partite to various degree. *Corolla* tubular, urceolate or subglobose, the (4-)5 lobes imbricate in bud. *Stamens* 8 or 10 (rarely 12), inserted at the outer margin of the disk or near the base of the corolla tube; anthers dorsifix, whether or not 2-spurred dorsally, ending with tubules of various length, the pore strictly terminal and round, or introrse as an elliptical opening or narrow slit. *Disk* annular. *Ovary* inferior, (4-)5 (or falsely 8-10)-celled, placentas bifid, with ∞ (rarely few) ovules. *Style* \pm as long as the corolla; stigma obtuse. *Fruit* a juicy and soft, or a more dry and rather hard berry with few to numerous seeds, crowned by the disk and the persistent calyx lobes. *Seeds* small, ellipsoid, irregularly compressed, albuminous; testa firm, smooth.

Distr. Approximately 450 *spp.*, of which 6 in Europe (4 *spp.* circumboreal, 1 *sp.* in Madeira, 1 *sp.* in the nearby Orient), c. 65 *spp.* in temperate North America (4 of which circumboreal), c. 30 *spp.* in tropical America, c. 5 *spp.* in SE. Africa and Madagascar, c. 76 *spp.* in tropical S. and SE. Asia (1 of which also in Japan), c. 22 *spp.* in Japan (5 of which also in temperate and subtropical E. Asia, 3 circumboreal), 11 *spp.* in the Pacific area (1 of which also in East Malesia), in *Malesia* c. 240 *spp.*, more than half of which are limited to New Guinea.

Ecol. Both epiphytic and terrestrial in primary and secondary montane rain-forest, terrestrial at the rim of craters, in alpine scrub vegetation and grasslands, reported from elevations up to 4400 m in New Guinea, rarely found in coastal vegetation at sea-level, generally on acid, sandy or peaty soil, occasionally reported from limestone. Species which are epiphytic at lower elevation, apparently may become terrestrial at higher altitudes. Some species (*V. laurifolium*, *V. myrtooides*, *V. lucidum*, *V. varingiaefolium* in W. Malesia) may form pure stands or even vegetation-belts in the upper montane zone or in summit vegetation.

The roots, especially in epiphytic specimens, are often swollen, possibly due to a mycorrhizal hyper trophy; a comparable structure is found in tropical American species of the genus, in the Northamerican vine-like *V. crassifolium* ANDR. (SE. Virginia to S. Carolina), and in the related genera *Costera*, *Agapetes*, and *Dimorphanthera*.

Galls. The flowers of certain species in Java are liable to attacks by the caterpillar of a *Microlepidopteron* (DOCTERS VAN LEEUWEN, Zoocecidia, 1926, 440, f. 830; Pangrango, 1933, 212); in that case the corolla does not open and changes into a bulging or fusiform gall. Quite the same has been found in the herbarium specimens of certain Sumatran and Bornean species. Another anomaly, probably due to a

fungus, are witchesbroom-like inflorescences with tubular corollas and the stamens much reduced in size (observed in *V. bracteatum*, *V. megalophyes*, *V. dubiosum* a.o.). In the Cameron Highlands I found normal urceolate pinkish and possibly galled, cylindrical and greenish corollas in the same inflorescence of *V. bancanum* var. *tenuinervium*; in these anomalous flowers the anthers were reduced to half their normal size. *Vaccinium* can also be attacked by a fungus disease (*Exobasidium*) which results in a deformation of the young shoots and of the fruits into galls (RACIBORSKI, Bull. Intern. Ac. Cracovie, Cl. Math. & Nat. 3, 1909, 367).

Uses. The fruits of some species are said to be juicy and palatable, of other to be rather hard and/or insipid. No regular use by men is known of the Malesian species as this is the case with several holarctic ones, *V. littoreum* and *V. myrtilloides* excepted; animals, however, such as fruit-eating birds and rats are known to feed partially from *Vaccinium* fruits all over Malesia, and this may add to the dispersal.

The wood is very hard and from several species it is used for utensils.

KEY TO THE SECTIONS

1. Corolla (campanulate, thick-fleshy, deeply 5-partite) seemingly consisting of 2 layers, the outer one thick, split at the lobes to nearly the base of the corolla, the inner one thinner, less deeply split, forming a kind of decurrent membranous marginal zone towards the sinuses. (Tubules opening by introrse rather long slits.) *Spp.* 1-5 1. *sect. Pachyanthum*
1. Corolla (of various form, thin to fleshy, 5-partite to various degree) consisting of one homogenous layer, showing no membranous wing at the sinuses.
 2. Tubules opening by elongate introrse slits, which attain $\frac{1}{3}$ to $\frac{1}{2}$ of the length of the tubules.
 3. Corolla campanulate, 5-partite \pm halfway. Anthers with long dorsal spurs (1-1.5) mm, the tubules \pm twice as long as the cells. *Spp.* 6 2. *sect. Galeopetalum*
 3. Corolla urceolate to subglobular, shortly 5-lobed. Anthers with short or rather inconspicuous dorsal spurs, the tubules \pm as long as the cells. *Spp.* 7-29 3. *sect. Rigiolepis*
 2. Tubules opening by proportionally short introrse slits or (sometimes terminal) pores.
 4. Flowers solitary. Peduncle, if any, very short ¹⁾. *Spp.* 30-73 4. *sect. Oarienthe*
 4. Flowers in distinct few- to many-flowered racemes, which may be reduced partially to a 2-, or even 1-flowered inflorescence (which then bears a distinct peduncle ¹⁾).
 5. Calyx lobes elongate-subulate, 2-4 times as long as the calyx tube. *Spp.* 74-86 5. *sect. Neojunghunia*
 5. Calyx lobes usually as long as or shorter than the calyx tube (if subulate, never exceeding the latter). *Spp.* 87-239 6. *sect. Bracteata*

1. Section Pachyanthum

SLEUM. Bot. Jahrb. 71 (1941) 417; *ibid.* 72 (1942) 217; Blumea 11 (1961) 11. — Fig. 84-86.

Corolla campanulate, thick-fleshy, deeply 5-partite, seemingly consisting of two layers, the outer one thick, split at the lobes to nearly the base of the corolla, the inner one thinner, less deeply split, forming a kind of decurrent membranous marginal zone towards the sinuses. Tubules opening by introrse rather long slits. Berry apparently strictly 5-locular.

Distr. *Malesia*: 5 *spp.* confined to the eastern part of New Guinea. Fig. 84.

KEY TO THE SPECIES

1. Calyx relatively large at anthesis, (5-)6-7 mm long (including the lobes, which are 1.5-2.5 mm); calyx tube subcampanulate to broadly cylindrical.
 2. Leaves very coriaceous and stiff, minutely but well visibly denticulate or crenulate, ovate or ovate-oblong, rarely oblong or suborbicular, 2-4(-4.5) by (1.3-)1.5-2(-2.5) cm. 1. *V. macbainii*
 2. Leaves coriaceous, but less stiff, entire or practically so, obovate to broad-elliptic or \pm rounded, (5.5-)7-10(-15) by (3.5-)4-5.5(-8.5, sometimes -11) cm 2. *V. ingens*
1. Calyx relatively small at anthesis, (2-)3-4(-5) mm long (including the lobes which are 0.5-1(-1.5) mm); calyx tube generally semiglobose to subsemiglobose-cylindrical, or sometimes subcylindrical, 2-3 mm ϕ at anthesis.
 3. Leaves ovate, acuminate, 7-12(-14) by 3.5-5.5(-7.5) cm. Pedicels without a collarete of glands at the very apex. 3. *V. fissiflorum*
 3. Leaves of other shape, mostly smaller. Pedicels with a collarete of numerous, \pm spreading glands or glandular hairs at the very apex.

¹⁾ The peduncle can always be discriminated from the pedicel by the articulation.

4. Collarete consisting of thick and \pm flattish, subulate glands which rarely occur also on the calyx and the pedicels 4. *V. keysseri*
4. Collarete consisting of slender (not flattened), less thickish glandular hairs, which not rarely occur also on the calyx and the pedicels 5. *V. amplifolium*

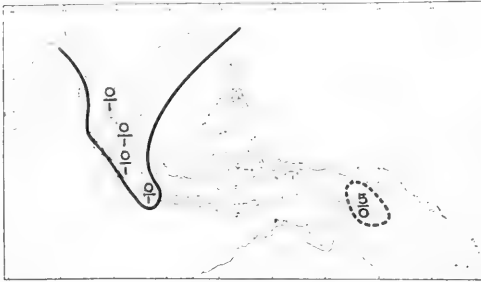


Fig. 84. Distribution of *Vaccinium sect. Galeopetalum* (—) in Malesia and of *sect. Pachyanthum* (---). The number above the hyphen indicates the number of endemic species, that below the hyphen the number of non-endemic species in each island or district.

1. *Vaccinium machainii* F. v. M. Trans. R. Soc. Vict. n.s. 1, 2 (1889) 17; WRIGHT, Kew Bull. (1899) 103; SLEUM. Bot. Jahrb. 72 (1942) 220; Blumea 11 (1961) 11.

Rather large, often stunted tree with short, crooked trunk, or compact, erect, branched bush, 2–8(–12) m. Branchlets robust, a little angular. Leaves densely arranged, ovate or ovate-oblong, or rarely (but sometimes partly in the same specimen) oblong or almost orbicular, apex very broadly attenuate, obtuse or rounded, base rounded to subcordate, very coriaceous, stiff and \pm lustrous on both faces, flat, the slightly cartilaginous margin faintly and rather distantly crenulate or denticulate by short and early caducous bristle-like glands or their impressed marks, glabrous, except very short scattered glandular bristles or their point-like rests beneath, 2–4(–4.5) by (1.3–)1.5–2(–2.5) cm, 5-plinerved from the base and with several higher, more sharply ascending nerves, all slightly impressed above, bluntly raised beneath, reticulation very lax and but little conspicuous; petiole (4–)5–7 by 1.5–2 mm. Racemes from the upper axils, mostly many-, rarely few-flowered, mostly glabrous in all parts, but occasionally with some very short glandular bristles or hairs on the pedicels, \pm blackish in dry specimens; rachis 0.5–3(–4) cm. Pedicels stoutish, with 2 subulate bracteoles in the lower third, thickened distally, \pm recurved downwards, (1–)1.5–2 cm. Calyx tube subcampanulate, c. 5 by 4 mm, broadly attenuate below, subcylindrical upwards, smooth, limb \pm spreading, c. 2 mm high, its lobes or teeth subacute, c. 1.5 mm. Corolla campanulate, 5-lobed \pm halfway, fleshy, pink or reddish pink, or pinkish white with darker tips, paler inside, (7–)8(–9) mm. Stamens nearly as long as the corolla; filaments broadly linear, 2.5–3.5 mm, glabrous below, densely to laxly set with long substrigose hair in the upper

part or along the margin of the connective, much less so or almost glabrous dorsally; cells including tubules 4–5 mm, base much attenuate; tubules 2–2.5 mm, pores 1–1.5 mm. Disk glabrous. Style stoutish, green, 10–12 mm. Fruit subglobose, c. 5 mm ϕ , purple and fleshy.

Distr. Malesia: SE. New Guinea (Main Range between Mt Albert Edward and Mt Scratchley-Mt Knutsford).

Ecol. In high mountain forest patches near the timberline, locally common, 3050–3960 m. Fl. May–July.

2. *Vaccinium ingens* SLEUM. Bot. Jahrb. 72 (1942) 220; Blumea 11 (1961) 11; *ibid* 12 (1963) 123. — Fig. 85.

Large stiff, sparsely branched, erect, scandent or epiphytic shrub, up to 2 m. Branchlets robust, subterete, glabrous, laxly foliate. Leaves obovate to broad-elliptic or nearly orbicular, apex and base very broadly attenuate or \pm rounded, coriaceous, slightly convex above, glabrous, but laxly glandular-punctulate beneath, (very) sparsely so above, entire, or faintly denticulate, margin somewhat revolute in dry specimens, (5.5–)7–10(–15) by (3.5–)4–5.5(–8.5, sometimes –11) cm, midrib broadened towards the base, nerves 2–3 pairs from and from above the base, with several less distinct higher ones from the upper half of the midrib, all like the midrib impressed above and prominent beneath to various degree, reticulation rather lax and mostly subinconspicuous; petiole (0.7–)1–1.5 cm by c. 2 mm. Racemes 12–15-flowered, glabrous in all parts, becoming blackish in dry specimens; rachis rather robust, (1.5–)2.5–3.5 cm. Pedicels stoutish, 7–8 mm, bibracteolate somewhat above the base. Calyx subcampanulate to broadly cylindrical, base obtuse or almost truncate, dark green, tube 4–5 by (3–)4(–5) mm, limb suberect, 2–2.5 mm, 5-lobed to nearly the base. Corolla campanulate, fleshy, pale green or green, sometimes pinkish, (6–)7 mm, 5-lobed halfway. Stamens nearly as long as the corolla; filaments linear, glabrous, or ciliate only in the uppermost part or on the connective, 2.5–3 by c. 1 mm; cells elliptic, c. 1.5 mm; tubules as wide as the cells, 1.5 mm. Disk glabrous. Style c. 8 mm. Immature fruit bluish green, subglobose, 6–7 mm ϕ , crowned by the accrescent subinflexed lobes of the calyx limb (3 mm).

Distr. Malesia: SE. New Guinea (Morobe and Central Distr.).

Ecol. In ridge forest, or occasionally on open landslips on clayey soil, locally common, 1890–2440 m. Fl. May–Dec., fr. May–Sept.

3. *Vaccinium fissiflorum* SLEUM. Bot. Jahrb. 72 (1942) 219; Blumea 11 (1961) 11; *ibid*. 12 (1963) 123.

High climbing liana, with pendent branches.



Fig. 85. *Vaccinium ingens* SLEUM. Edie Creek, 1900 m, E. New Guinea (NGF 13942 WOMERSLEY & SLEUMER) (SLEUMER, 1961).

Branchlets angular, quite glabrous, laxly foliate. *Leaves* ovate, apex \pm gradually acuminate, subobtuse at the very tip, base very broadly attenuate or mostly rounded, sometimes slightly cordate, coriaceous, glabrous, laxly punctate beneath only, 7-12(-14) by 3.5-5.5(-7.5) cm, margin remotely minutely dented or crenulate by impressed, very short and thickish glandular hairs, the two basal crenulations or glands on each side of the petiole more distinct than the upper ones, midrib strong,

prominent at the base above and all over beneath, \pm impressed distally above, the two pairs of basal and 2(-3) higher nerves curved-ascending to the top of the lamina, slightly impressed above, raised beneath, reticulation lax and visibly outstanding beneath only; petiole \pm flattened, (0.8-) 1-1.5 cm by 2-3 mm. *Racemes* or fascicles laxly (4-)10-15(-20)-flowered, with a slender rachis rarely up to 2 cm, both from foliate and defoliate axils, sometimes from older parts of the stem,



Fig. 86. *Vaccinium keysseri* SCHLTR ex DIELS. a. Habit, $\times \frac{2}{3}$, b. flower, $\times 2$, c. stamens, back and front view, $\times \frac{3}{13}$, d. submature fruit, $\times \frac{3}{13}$ (a-d HOOGLAND & PULLEN 5566).

glabrous and pink or rose red to purplish in all parts, still reddish in dry specimens. Pedicels slender, 1.5–2.5(–3.5) cm, minutely bibracteolate at or sometimes above the base. *Calyx* (2–)3 mm long in all, tube semiglobose or subcylindrical, base rounded, 2–2.5 mm ϕ , limb very low and a little contracted, the teeth minute. *Corolla* subcampanulate when fully open, c. 7 mm long, then 5-lobed \pm halfway, somewhat fleshy. *Stamens* 7 mm, red; filaments broadly linear, 1.5–2 mm, very laxly ciliate distally, glabrous dorsally; cells oblong, 3 mm, base of each cell extended into an acute appendage (1 mm); tubules slightly divergent, slender, 4 mm. *Disk* glabrous. *Style* 10–11 mm. *Fruit* subglobose, apex truncate, first rather dry, becoming more fleshy and blackish at maturity, 3–4 mm ϕ .

Distr. Malesia: E. and NE. New Guinea (Eastern and Western Highlands, Mt Saruwaged area).

Ecol. Locally common climber in tall mountain (*Nothofagus*-) forest, sometimes near river, 1700–2500 m. *Fl. fr.* May–Dec.

Vern. Porrh, Hagen: Wankl.

4. *Vaccinium keysseri* SCHLTR ex DIELS, Bot. Jahrb. 62 (1929) 488; SLEUM. *ibid.* 72 (1942) 219;

Blumea 11 (1961) 12; *ibid.* 12 (1963) 123. — Fig. 86.

var. keysseri.

Erect, stiff shrub or straggling tree, up to 6 m; bole up to 1.5 by 0.12 m; outer bark c. 4 mm, pale brown, flaky, inner bark straw; wood pale brown. Branchlets robust, up to 1 cm ϕ , subterete, glabrous, rather densely foliate, early corticate. *Leaves* oblong- to elliptic-obovate, rarely more elliptic-oblong or elliptic, apex obtuse or mostly \pm rounded, base broadly cuneate or sometimes rounded, coriaceous, a little convex in dry specimens, glabrous, but laxly punctate beneath only, shining above, mostly crenulate or denticulate by \pm early caducous, thick glands or glandular bristles which are a little impressed at the sometimes revolute edge, more rarely entire, (3–)5–8 (–11) by (1.6–)2.5–3.5(–5.5, rarely in part up to 8) cm, midrib strong, sunken above, much prominent beneath, nerves 2 \pm basal pairs and c. 2 upper ones higher from the midrib, all curved-ascending and rather distinctly anastomosing, moreover 2–3 less distinct and much shorter nerves spreading from the upper half of the midrib, all \pm slightly impressed above, raised beneath, veins forming a very lax network which is a little prominent

beneath; petiole rugose, 6–10 by c. 2 mm. *Racemes* from numerous upper axils, rather dense, 10–15-flowered, glabrous in general and pink when fresh, brownish red to blackish in dry specimens in all parts; rachis rather robust, (1.5–)2–3(4.5) cm. Pedicels rather stoutish, recurved, (1–)1.5–2 cm at anthesis, possibly accrescent up to 3 cm, laxly set with subsessile glands over the whole length, moreover with a collarette of numerous thick and flattened, subsulate and patent or reflexed glands (which occasionally are found also on the pedicel and/or on the calyx tube) immediately below the calyx, bibracteolate (2–3 mm) at or somewhat above the base. *Calyx* subcylindric in anthesis, c. 4 by 3 mm in all, base blunt, limb suberect or a little spreading, 1–1.5 mm, acutely 5-lobed to the base. *Corolla* campanulate, (6–)7 (–8) mm long when fully developed, fleshy, pink, 5-split halfway. *Stamens* \pm as long as the corolla, yellow-brown; filaments linear, c. 3 mm, long hairy in the upper part and the connective both marginally and dorsally; cells narrow, acutely attenuate at the base, c. 3 mm; tubules 3 mm. *Disk* glabrous. *Style* 8–10(–11) mm. *Fruit* subglobose, c. 6 mm σ when nearly ripe, crowned by the not accrescent calyx lobes, becoming blackish at full maturity.

Distr. Malesia: NE. New Guinea (Southern, Eastern and Western Highlands; Mt Saruwaged area).

Ecol. Mostly terrestrial, rarely epiphytic, locally common in montane *Podocarpus* forest, in edges of subalpine (mossy) forest, summit growth, (2300–)3000–3600(–3800?) m. *Fl.* March–Sept.

Vern. Koil gagump, kwaldaggan, Wahgi: Minj, *deggenba*, Chimbu: Masul, *kuldeguk*, Hagen: Towopa, *poro*, Hagen, *rambau*, Enga, *walyari*, Mendi.

var. acutatum SLEUM. *Blumea* 11 (1961) 12.

Differs by narrower, \pm oblong leaves, which are shortly subacutely acuminate at the apex and bear glandular points on both faces, 4–7 by 1.8–3 cm.

Distr. Malesia: New Guinea (Eastern Highlands: Mt Wilhelm), 3500 m, among specimens of the type variety.

5. *Vaccinium amplifolium* F. v. M. *Trans. R. Soc. Vict.* n.s. 1, 2 (1889) 18; SLEUM. *Bot. Jahrb.* 72 (1942) 219; *Blumea* 11 (1961) 12.

See for further synonyms under the varieties.

KEY TO THE VARIETIES

1. Leaves large, (5–)6–9.5 by 3–5.5 cm (obovate or obovate-elliptic) **2. *var. giganteum***
1. Leaves smaller, of various form.
2. Leaves subovate-elliptic, broad-elliptic or suborbicular or, if elliptic-oblong, surpassing 4 cm in length **1. *var. amplifolium***
2. Leaves obovate-elliptic, oblong-obovate or oblong.
3. Leaves obovate-elliptic or oblong-obovate.
3. *var. stabilipes*
3. Leaves oblong or elliptic-oblong and rather

small, (1.5–3(–4) by (0.8–)1–1.5 cm).

4. *var. oblongum*

1. *var. amplifolium*.

Terrestrial as a weak, spreading tree or bush up to 6(–10) m, or a climber up to 8 m, with a stout stem and bushy crown, not rarely epiphytic as a shrub (1–2 m) with stout roots descending to the ground along the supporting tree trunk. Branchlets rather robust, subangular, glabrous or finely pubescent at the tips, laxly to subdensely leaved. *Leaves* subovate-elliptic, broad-elliptic or sub-orbicular, sometimes elliptic-oblong, apex very broadly and obtusely attenuate to rounded, base broadly narrowed into the petiole, with a basal marginal gland on each side, coriaceous, flat or somewhat convex above and darkening in dry specimens, a little shining on both faces, entire or minutely glandular-denticulate, edge subrevolute, (3–)3.5–6.5 by (2–)2.5–4(–5) cm, glabrous besides sparse glandular points or hairs beneath, sometimes with short apparently early caducous eglandular hairs beneath, with 5(–7) nerves curved-ascending from and from above the base and several shorter, more spreading ones from the upper part of the midrib, midrib and nerves slightly impressed above, not much raised beneath, outer nerves sometimes less conspicuous, reticulation lax and faint, or obscure in general; petiole 4–7(–8) by 1.5(–2) mm. *Racemes* from the upper 2–4(–6) axils, generally shining red all over when fresh, becoming blackish during the drying process, abbreviated, laxly 5–8(–12)-flowered; rachis rather slender, 1–2 cm, glabrous or laxly short-pubescent and/or with short club-shaped glandular hairs or glands as may be found on pedicels and calyces. Pedicels rather slender, (1–)1.5–2 cm, bibracteolate at or mostly somewhat above the base, moreover with a distal collarette of numerous spreading, blackish, subfiliform glands or gland-hairs immediately below the calyx. *Calyx* tube subsemiglobular to nearly cylindric, often somewhat constricted at the base of the limb, c. 2.5 by 2–2.5 mm, limb \pm spreading, 1–1.5 mm, deeply 5-lobed or -dented. *Corolla* campanulate, fleshy or a little waxy, pale to dark pink, or more rarely greenish white, deeply 5-lobed, 5–6(–7) mm long in all. *Stamens* as long or slightly longer than the corolla; filaments linear, c. 3 mm, glabrous below, subdensely set with longish substrigose hairs in the uppermost part and at the connective dorsally and especially at the margin; cells oblong, base obtuse, sometimes with some hairs there, 2–2.5 mm; tubules 2–2.5 mm. *Disk* glabrous. *Style* stoutish, 6–7 mm at the start of the anthesis, accrescent and much exerted in later stages. *Fruit* subovate-globular, c. 5 by 4 mm, crowned by the inflexed, hardly accrescent calyx lobes.

Distr. Malesia: SE. New Guinea (Main Range of the Central and Milne Bay Distr.).

Ecol. In mossy forest, climbing in subcanopy layer, or in ridge crest vegetation, or even as an isolated compact shrub in alpine grassland, locally common, 2050–3050(–3960?) m. *Fl.* Jan.–Dec.



Fig. 87. *Vaccinium dialypetalum* J. J. S. *a.* Habit, $\times \frac{2}{3}$, *b.* flower, $\times \frac{8}{3}$, *c.* ovary and style, $\times \frac{8}{3}$, *d.* stamens, front and back view, $\times 5$ (*a-d* MEIJER 3452).

Note. Rather variable both in leaf-shape and -size, and indument. The following \pm extremes may be distinguished as varieties.

2. *var. giganteum* SLEUM. *Blumea* 11 (1961) 12.
Leaves large, obovate or obovate-elliptic, (5-) 6-9.5 by 3-5.5 cm. As to the leaves similar to 2. *V. ingens* SLEUM. but calyces much smaller.

Distr. *Malesia*: NE. New Guinea (Wau-Salamaua road and Mt Shungol, SW. of Wagau, Morobe Distr.), 1645-2252 m, in two forms, one with a roundish blunt, the other with a more acuminate-attenuate apex in the same locality.

3. *var. stabilipes* (SLEUM.) SLEUM. *Blumea* 11 (1961) 12; *ibid.* 12 (1963) 123. — *V. stabilipes* SLEUM. *Bot. Jahrb.* 72 (1942) 218.

Leaves obovate-elliptic or oblong-obovate, *c.* 3-5 by (1.5-)2-3 cm.

Distr. *Malesia*: NE. and SE. New Guinea (Eastern Highlands: Mt Saruwaged area to Mt Victoria in the Central Distr.; Goodenough I. in Milne Bay Distr.).

Ecol. As in *var. amplifolium*, 1220-2680 m.

4. *var. oblongum* SLEUM. *Blumea* 11 (1961) 13; *ibid.* 12 (1963) 123. — *V. oblongum* WRIGHT, *Kew*

Bull. (1899) 103, non GREENE, 1897. — *V. atrescens* SLEUM. Bot. Jahrb. 72 (1942) 218.

Leaves oblong or elliptic-oblong and rather small, 1.5–3(–4) by (0.8–)1–1.5 cm. Corolla light to dark red.

Distr. *Malesia*: Eastern New Guinea (Eastern Highlands to the Central Distr.), 2840–3460 (–3960?) m.

Ecol. As in var. *amplifolium*, also known as epiphyte.

2. Section Galeopetalum

(J. J. S.) SLEUM. Notizbl. Berl.-Dahl. 13 (1936) 115; Bot. Jahrb. 71 (1941) 418, 441; Blumea 11 (1961) 13. — *Vaccinium subg. Galeopetalum* J. J. S. Ic. Bog. 4 (1912) 101; in K. & V. Bijdr. 13 (1914) 141 ('*Galeipetalum*'). — Fig. 84, 87.

Corolla campanulate, 5-partite \pm halfway; anthers with a pair of long dorsal spurs, the tubules \pm double as long as the cells, opening by elongate introrse slits which attain $\frac{1}{3}$ – $\frac{1}{2}$ of the total length of the tubules.

Distr. About 20 spp. in SE. Asia (SE. Tibet, Sikkim, Bhutan, Assam, Upper Burma, SW. China, Indo-China, Siam, and Formosa), 1 sp. extending from S. Siam into *Malesia* (Sumatra, Malay Peninsula, W. Java). Fig. 84.

6. *Vaccinium dialypetalum* J. J. S. Ic. Bog. 4 (1912) 99, t. 331; in K. & V. Bijdr. 13 (1914) 140; COSTERUS & J. J. S. Ann. Jard. Bot. Btzg II, 29 (1916) 91; SLEUM. Bot. Jahrb. 71 (1941) 424; Blumea 11 (1961) 13. — *Agapetes griffithii* (non CLARKE in Hook.) K. & G. J. As. Soc. Beng. 74, ii (1905) 59; RIDL. J. Fed. Mal. St. Mus. 8 (1917) 56; BURK. & HOLT. Gard. Bull. S. S. 3 (1923) 56. — *Agapetes parviflora* RIDL. J. Str. Br. R. As. Soc. n. 61 (1912) 26. — *Agapetes micrantha* RIDL. Fl. Mal. Pen. 2 (1923) 205; BURK. & HOLT. Gard. Bull. S. S. 3 (1923) 57. — *Agapetes perakensis* RIDL. Fl. Mal. Pen. 2 (1923) 205; BURK. & HENDERS. Gard. Bull. S. S. 3 (1925) 390; HENDERS. J. Mal. Br. R. As. Soc. 5 (1927) 255. — *Agapetes wrayi* RIDL. Fl. Mal. Pen. 2 (1923) 205. — *Agapetes pubescens* RIDL. J. Bot. 62 (1924) 298; Fl. Mal. Pen. 5 (1925) 318; HENDERS. Gard. Bull. S. S. 4 (1926) 98. — *V. urophyllum* MERR. Pap. Mich. Ac. Sc. 19 (1934) 184; AMSH. in Back. Bekn. Fl. Java (em. ed.) 7 (1948) fam. 123, p. 2. — *V. pauciflorum* FLETCHER, Kew Bull. (1936) 37; Fl. Siam. En. 2 (1938) 313; SLEUM. Bot. Jahrb. 71 (1941) 446. — *V. longilingua* SLEUM. l.c. 424. — *V. ridleyi* SLEUM. l.c. — *V. longipes* SLEUM. l.c. — Fig. 87.

Slender, woody, generally epiphytic climber, up to 5 m, with a tuberous stem or a swollen tap root. Branchlets subterete, flexuous, elongate, short-pubescent or glabrescent, early covered with greyish cork. Leaves ovate-acuminate or mostly ovate-lanceolate, sometimes lanceolate, apex shorter or mostly longish caudate, sometimes subfalcate, acute, base \pm rounded with a marked gland on each side near the petiole, generally thinly coriaceous, lustrous on both faces, glabrous or pubescent beneath at the lower part of the midrib, rarely so on the nerves or veins, entire, edge mostly slightly revolute in dry specimens, (5–)8–14(–17) by (1.5–)2.5–4(–6.5) cm, midrib rather flat above, prominent beneath, nerves pinnate in (5–)7–8(–10) pairs, the lowest more curved-ascending than the upper ones, all anastomosing, slightly raised on both faces, reticulation fine and dense; petiole (2–)3–4 by 1 mm. Stipule-like perulae subulate, c. 1.5 mm,

erect, somewhat above the axils of the youngest parts, rather early caducous. Racemes lax, 1–6 (–10) cm including the short peduncle, (3–)4–8 (–10)-flowered, or rarely reduced to a 2–3-flowered fascicle; rachis very slender, \pm pubescent or glabrescent. Pedicels (1–)1.5–2.5(–3) cm, laxly short-pubescent or glabrescent, reddish when fresh, with a small subtending bract, and two minute bracteoles above the base. Calyx tube obconical, 1 mm, limb 5-partite to nearly the base, lobes ovate-lanceolate, suberect, acute, 2–3 by 1–1.5 mm, whether or not whitish pubescent. Corolla campanulate, a little 5-angled, thin, waxy, greenish or whitish to cream, often with a reddish tinge, laxly hairy at the angles or all over the lobes outside, mostly glabrous, 5 mm, rather obtusely 4-lobed almost halfway. Filaments linear, 3(–4) mm, densely set with spreading, rather coarse and longish hairs at the margin; cells broad-oblong, c. 1.5

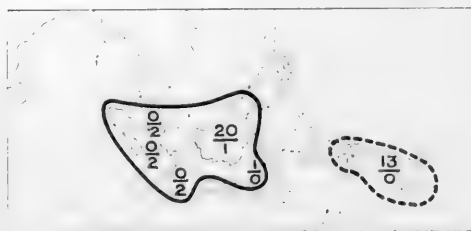


Fig. 88. Distribution of *Vaccinium sect. Rigiolepis* (—) and *sect. Neojunghuhnia* (---). The number above the hyphen indicates the number of endemic species, that below the hyphen the number of non-endemic species in each island or district.

by 1 mm, with 2 dorsal spreading and ultimately upwards curved, echinulate spurs (1.3–1.5 mm); tubules slender, erect, c. 3 mm, opening by elongate introrse slits of c. $\frac{1}{3}$ their length or more. Style slenderly columnar, glabrous, 6(–7) mm. Disk glabrous. Berry subglobose, greenish with red tinge, c. 5 mm ϕ in dry, reported to attain c. 1 cm ϕ in

fresh specimens, crowned by the ± inflexed calyx lobes, 10-celled. *Seeds* c. 20, minute, ellipsoid or compressed, reticulate, blackish.

Distr. S. Siam, in *Malesia*: Sumatra, Malay Peninsula, and W. Java.

Ecol. In mountain forest, scrub or heath, by river side, in open marshy places, (600-)1000-2500 m. *Fl. fr.* Jan.-Dec.

Vern. *Andor-andor*, Tapanuli.

Note. Reported to be poisonous from Malaya.

3. Section *Rigiolepis*

(HOOK. *f.*) J. J. S. Ic. Bog. 4 (1910) 69, in text; SLEUM. Bot. Jahrb. 71 (1941) 419; Blumea 11 (1961) 14. — *Rigiolepis* HOOK. *f.* Ic. Pl. (1876) 54, t. 1160; BENTH. & HOOK. *f.* Gen. Pl. 2 (1876) 572; NIEDENZU, Bot. Jahrb. 11 (1889) 246; DRUDE in E. & P. Nat. Pfl. Fam. 4, 1 (1889) 49; RIDL. Kew Bull. (1922) 106; COPEL. *f.* Philip. J. Sc. 47 (1932) 103; J. J. S. Blumea 1 (1935) 323. — Fig. 88-89.

Racemes (very) slender, few- to many-flowered, rarely reduced to a single axillary flower. *Corolla* small, urceolate or rarely almost tubular, membranous, shortly 5-lobed. Anthers with a pair of short, sometimes rather inconspicuous dorsal spurs; tubules ± as long as the cells, opening with introrse longitudinal slits for ± half their total length.

Distr. About 23 *spp.* in *W. Malesia*, part of which is not sufficiently known and difficult to distinguish. Fig. 88.

KEY TO THE SPECIES

- 1. Bracts, bracteoles and calyx lobes strongly ribbed parallel to the edge.
- 2. Racemes much reduced in length and number of flowers (occasionally to a solitary flower); rachis 0-1 cm.
- 3. Leaves (narrow-)lanceolate, (3-)4-6(-8) by (0.5-)0.7-1(-1.2) cm 7. *V. lanceifolium*
- 3. Leaves ovate to (broadly) lanceolate-ovate, (2-)2.5-5 by 1-1.5(-2.5) cm 8. *V. lobbii*
- 2. Racemes generally well developed and ± many-flowered; rachis normally exceeding 1 cm 9. *V. borneense*
- 1. Bracts, bracteoles and calyx lobes not or but indistinctly ribbed.
- 4. Flowers solitary (or rarely 2 in a fascicle), no rachis present.
- 5. Corolla and calyx glabrous or nearly so 10. *V. monanthum*
- 5. Corolla and calyx ± densely and patently hirsutulous 11. *V. uniflorum*
- 4. Flowers in distinct, mostly elongate racemes.
- 6. Nervation predominantly pinnate, *i.e.* the basal plinerves not or not much conspicuous, the upper pinnate ones, coming from the upper ¼ part of the midrib, generally much more distinct.
- 7. Leaves large, (12-)14-30 by (4-)6.5-9 cm 12. *V. megaphyllum*
- 7. Leaves up to 16 by 4 cm.
- 8. Leaves (4.8-)6-10 by (0.8-)1.6-2.3 cm. (Pedicels filiform, 5(-6) mm at anthesis. Corolla 4 mm). 13. *V. capillipes*
- 8. Leaves 8.5-16 by 2-4 cm.
- 9. Pedicels rather stoutish and 1.5-3(-5) mm long at anthesis. Corolla 4 mm 14. *V. kemulense*
- 9. Pedicels filiform and 6-8 mm long at anthesis. Corolla c. 2.5 mm 15. *V. filiforme*
- 6. Nervation predominantly palmate, *i.e.* the proper main nerves starting from and from somewhat above the base and high curved-ascending to more or less the top of the lamina, other nerves or veins ± transverse from the upper part of the midrib short and much less conspicuous, or ± inconspicuous.
- 10. Leaves ± bullate, with eglandular hairs all over the undersurface, 9-17(-21) by 4-7(-10) cm 16. *V. sulcatum*
- 10. Leaves not properly bullate; non-glandular hairs, if any, limited to the midrib and nerves.
- 11. Leaves relatively small, 3-5 (sometimes in part in the same specimen up to 6.5) by 1-2(-2.2) cm.
- 12. Pedicels 1.5-2 mm. (Leaves reticulate beneath.) Corolla c. 3 mm 17. *V. minimiflorum*
- 12. Pedicels (2-)3-4 mm. Corolla 4-4.5 mm.
- 13. Disk glabrous. Leaves not reticulate beneath 18. *V. henrici*
- 13. Disk pubescent. Leaves reticulate beneath.
- 14. Calyx densely hairy 19. *V. uroglossum*
- 14. Calyx sparsely glandular, pilose 20. *V. tenerellum*
- 11. Leaves medium-sized to large, (4.2-)6-20(-27) by (1-)2-9 cm.
- 15. Leaves abruptly protracted at the very base, *i.e.* distinctly decurrent in the upper part of the petiole for c. 2 mm and instructed there with a thick, protruding gland on each side (the glands seemingly on the petiole!) 21. *V. bigibbum*

- 15. Leaves not protracted at the base or not decurrent on the petiole, the two (whether or not protruding) glands found on the very margin of the lamina (and mostly in some distance from the petiole).
- 16. Basal glands thick, ± projecting from the edge of the lamina in the way of small auricles.
 - 22. *V. acuminatissimum*
- 16. Basal glands minute, or, if larger (*i.e.* well visible), not or hardly projecting beyond the edge of the lamina, or mostly impressed.
- 17. Leaves 6–9 cm wide (20–27 cm long) 23. *V. piperifolium*
- 17. Leaves 1–6(–6.5) cm wide (up to 18 cm long).
- 18. Corolla (3–)4 mm. Style *c.* 3.5 mm.
- 19. Leaves caudate-acuminate for 2–4 cm.
- 20. Leaves densely prominently reticulate on both faces. Pedicels 2–3(–4) mm
 - 24. *V. moultonii*
- 20. Leaves reticulate beneath only. Pedicels 4–7 mm 25. *V. dipladenium*
- 19. Leaves ± broadly acuminate for *c.* 1 cm 26. *V. andersonii*
- 18. Corolla 2–2.5 mm. Style up to 2.5 mm.
- 21. Leaves practically not reticulate at full age 27. *V. leptanthum*
- 21. Leaves densely reticulate on both faces or at least underneath.
- 22. Rachis (very) slender. Pedicels (sub)filiform. Corolla ovate- or subglobular-urceolate.
 - 28. *V. flagellatiformis*
- 22. Rachis stoutish. Pedicels more robust. Corolla subcylindric-urceolate 29. *V. adenopodium*

7. *Vaccinium lanceifolium* (RIDL.) SLEUM. Bot. Jahrb. 71 (1940) 168 (*'lancifolium'*); MASAM. En. Phan. Born. (1943) 575; SLEUM. Blumea 11 (1961) 16. — *Rigiolepis lanceifolia* RIDL. Kew Bull. (1922) 106 (*'lancifolia'*); J. J. S. Blumea 1 (1935) 330.

Epiphytic (?) shrub, with slender virgate branches. Branchlets densely covered with a tomentum of short, ± spreading, non-glandular hairs in the younger, glabrescent in the older parts. *Leaves* (narrow-)lanceolate, apex gradually and rather long acuminate, subacute, base broadly attenuate to nearly rounded, the 2 basal glands strictly marginal, 1–2 mm distant from the petiole, subcoriaceous, glabrous on both faces except some hairs which may occur on the midrib beneath, other glandular hairs practically absent, entire, somewhat recurved at the edge in dry specimens, (3–)4–6(–8) by (0.5–)0.7–1(–1.2) cm, midrib much depressed above, sharply prominent beneath, one pair of intramarginal nerves hardly visible, other pinnate nerves from the midrib irregular and numerous, anastomosing with the intramarginal ones, slightly raised on both faces and forming a fine network with the veins and veinlets, or sometimes rather indistinct; petiole 1–2 mm, pubescent. Stipule-like perulae of the axillary buds acicular, 2–3 mm, persistent for a while at the upper leaves. *Inflorescence* in axillary short and dense (3–)5–8-flowered racemes or in few-flowered fascicles, ± densely clad with short brownish non-glandular hairs in all parts, especially on the calyx tube; rachis slender, 0–1 cm; perulae several, small. Pedicels 0.5 mm in anthesis, *c.* 1 mm in fruit, with one basal bract and 2 similar bracteoles, the latter immediately below the calyx, ovate to ovate-lanceolate, 2 mm, ribbed lengthwise. *Calyx* tube turbinate, 1 mm, lobes ovate-lanceolate or subdeltoid-lanceolate, subacute, with several ribs parallel to the edge, 1.8 mm, including 2/3 of the corolla. *Corolla* subglobose-urceolate, manifestly 5-angled, subdensely very shortly pubescent, *c.* 2.5 mm, lobes 0.5 mm. *Filaments* linear, subgla-

brous, 0.5 mm; anther-cells broadly oblong, 0.5 mm, with 2 distinct (0.2 mm) dorsal spurs; tubules rather broad, 0.5 mm, cleft introrsely to nearly the base. *Style* 1.8 mm, papillose. *Disk* pubescent. *Fruit* in nearly mature state a dry globose berry, *c.* 3 mm ♂, crowned by the upright, not or but little accrescent calyx lobes.

Distr. *Malesia*: Borneo (Sarawak).

Ecol. On limestone, at *c.* 450 m.

8. *Vaccinium lobbii* (RIDL.) SLEUM. Bot. Jahrb. 71 (1940) 168; MASAM. En. Phan. Born. (1943) 575; SLEUM. Blumea 11 (1961) 16. — *Rigiolepis lobbii* RIDL. Kew Bull. (1922) 107; J. J. S. Blumea 1 (1935) 330.

Straggling or scandent, sometimes epiphytic shrub, up to 1.5 m, with a bulb-like base. Branchlets slender, tips or new shoots covered with a short spreading pubescence, older parts glabrous and corticate, bark early peeling in flakes. *Leaves* ovate to (broadly) lanceolate-ovate, apex shorter or longer acuminate, bluntish, base very broadly attenuate or mostly rounded, the 2 basal glands marginal and a little remote from the petiole, not much distinct, coriaceous to subcoriaceous, glabrous on both faces excepted some hairs, which may occur on the midrib, laxly set with setular very short, finally ± caducous glands beneath, somewhat glossy on both sides, entire, slightly convex above in dry specimens, (2–)2.5–5 by 1–1.5(–2.5) cm, midrib strongly impressed above, or prominent beneath, faintly 3(–5)-plinerved, other nerves from the midrib irregular and numerous, forming a fine ± dense network with the veins and veinlets, which is a little sunken in old, and slightly prominent in younger leaves; petiole pubescent initially, 1–1.5(–2) by 0.5 mm. Stipule-like perulae of the axillary buds subulate, 1 mm, persistent for some time. *Flowers* in (2–)3–5-flowered short racemes or clusters in the upper axils, short-pubescent in all outer parts; rachis 0–5 mm. Pedicels very short, up to 1 mm, the basal

bracts and the 2 bracteoles ovate-lanceolate or lanceolate, c. 2 mm, ribbed lengthwise. *Calyx* tube obconical, 1 mm, lobes lanceolate, c. 1.8 by 0.5 mm at anthesis; developed calyx tube subsemiglobose, 2–3 mm σ , smooth, the erect lobes then distinctly ribbed lengthwise, 2–3 mm. *Corolla* urceolate, slightly 5-angled, white, 2.5 by 2 mm, short-pubescent outside. *Filaments* linear, hairy, 0.7 mm; anthers c. 1.2 mm in all, with 2 very short dorsal spurs. *Disk* hairy. *Style* papillate, 2 mm. *Berry* rather dry, ovoid-subglobose, 6–7 mm σ , pubescent, crowned by the suberect calyx lobes, said to be orange.

Distr. *Malesia*: Borneo (Sarawak).

Ecol. On limestone ridge, 550–900 m. *Fl.* Aug.

9. *Vaccinium borneense* W. W. SM. Not. R. Bot. Gard. Edinb. 8 (1915) 329; MERR. En. Born. (1921) 466; SLEUM. *Blumea* 11 (1961) 16. — *Rigiolepis borneensis* HOOK. f. Ic. Pl. (1876) t. 1160; RIDL. Kew Bull. (1922) 106; COPEL. f. Philip. J. Sc. 47 (1932) 103; J. J. S. *Blumea* 1 (1935) 325. — *V. acuminatissimum* (non MIQ.) MERR. En. Born. (1921) 465.

See for further synonyms under the variety.

var. *borneense*.

Climbing or twining, not rarely epiphytic shrub, up to 4 m, with swollen tap root. Branchlets stout, tips or younger parts \pm laxly set with elliptic verrucose lenticels; new shoots with several triangular-subulate \pm foliaceous appressed perulae, which are strongly veined or costulate lengthwise, at and somewhat above the base, 0.2–1 cm. *Leaves* elliptic to lanceolate-elliptic, rarely subovate-elliptic, apex acuminate to subcaudate-acuminate, rather acute, the acumen (1–)1.5–2 cm long, base acute or mostly obtuse, the basal marginal glands in c. 5 mm distance from the petiole, rather distinct, \pm coriaceous and glossy, glabrescent on both faces, the midrib and nerves excepted, the latter laxly set with very short glandular hairs beneath, finally becoming glabrous, entire, slightly revolute at the very margin, (6–)7.5–15 (–16) by (1.8–)3–5.5 (–6) cm, 5-plinerved, midrib and inner pair of the nerves \pm deeply impressed above, or prominent beneath, other transverse nerves or veins numerous from the midrib, anastomosing, forming a dense, not much prominent reticulation on both faces; petiole blackish when dry, pubescent, 3–5 by 1–1.5 mm. Stipule-like perulae of the axillary buds subulate, 3 (–5) mm, rather long persistent. *Racemes* in the upper axils, rather many-flowered, brownish short-pubescent and \pm laxly glandular in all outer parts, more densely hairy or nearly villous on the calyx tube; rachis stoutish, 1–2.5 cm, with several subsubulate perulae. Pedicels slender, c. 2.5 mm, the basal bract ovate-acuminate, prominently many-nerved lengthwise at the back, 2.5–3 by 1.5–2 mm; bracteoles inserted \pm in the middle of the pedicel, lanceolate, prominently ribbed, 1.5–2 by 1 mm. *Calyx* deeply 5-partite, tube becoming early subglobose, lobes ovate-triangular to oblong-ovate, very prominently parallel-ribbed dorsally, 1.7–2.5

by c. 1 mm. *Corolla* subovoid-urceolate, much contracted at both ends, white, sometimes greenish white or cream, rarely pinkish, 5-angled, laxly pubescent outside, 2.5–3.5 by 1.5–2 mm, lobes 0.5 mm. *Filaments* linear, papillose, 0.7–1.2 mm; anther-cells ovate-oblong, echinulate, 0.4–0.6 mm, with 2 dorsal subulate spurs (0.3 mm); tubules cylindrical, erect, 0.4–0.6 mm. *Disk* pubescent. *Style* glabrous, 2–3 mm. *Fruit* baccate, subglobose, orange or yellow, c. 4.5 mm σ , crowned by the suberect triangular lobes (3 mm). *Seeds* 1–2 per cell, triangular-oblong, compressed, sometimes curved, reticulate, c. 1.5 mm.

Distr. *Malesia*: Borneo (Sarawak, W. Borneo).

Ecol. In low wet forest, or k rangas forest, on ridge top, 300–1065 m.

var. *poianum* (J. J. S.) SLEUM. *Blumea* 11 (1961) 16. — *V. poianum* (J. J. S.) SLEUM. Bot. Jahrb. 71 (1940) 168; MASAM. En. Phan. Born. (1943) 576. — *Rigiolepis poiana* J. J. S. *Blumea* 1 (1935) 327, f. 1, a-f.

Young branchlets and leaves rather densely soft-hairy initially, as is the inflorescence. *Leaves* ovate-lanceolate, apex caudate-acuminate, 5.5–10 (–12) by 1.3–2.1 (–3.2) cm. *Inflorescences* more slender; rachis 1.5–4 (–6) cm.

Distr. *Malesia*: Borneo (Sarawak).

Ecol. In low forest, at rocky summits, not rarely epiphytic, 1065–1700 m.

10. *Vaccinium monanthum* RIDL. Kew Bull. (1922) 108; SLEUM. *Blumea* 11 (1961) 17; *ibid.* 12 (1963) 124.

Long branched, twiggy shrub, 1–3 m, coming from small tuber. Branchlets slender, virgate, younger parts clad with a tomentum of very short brownish non-glandular hairs, older ones glabrescent. *Leaves* lanceolate or ovate-lanceolate, apex gradually subcaudate-acuminate, not rarely slightly curved, tip bluntish, base broadly attenuate to almost rounded, the basal gland on each side impressed on the margin, rather small but well visible, c. 2 mm spaced from the petiole, subcoriaceous, flat, glabrous except the sparsely hairy midrib beneath, moreover very laxly set with subappressed short glandular hairs over the whole undersurface, entire, (3–)3.5–5 (–5.5) by (0.8–) 1–1.5 cm, triplinerved, midrib impressed above, prominent beneath, one pair of intramarginal nerves ascending to the top of the lamina, another submarginal pair much shorter and less conspicuous, several (up to 10) other upper nerves short and pinnately from the midrib, all minutely raised on both faces as is the dense fine reticulation; petiole 1–2 by 0.5 mm, pubescent. Stipule-like perulae of the axillary buds acicular, 2–3 mm, persistent at least in the upper axils. *Flowers* solitary (rarely 2) per axil, coming from a tuft of minute perulae or basal bracteoles. Pedicels slender, slightly and very shortly pubescent, c. 3 mm. *Calyx* campanulate, glabrous, 5-lobed halfway, the lobes deltoid, subacute, c. 0.7 mm. *Corolla* urceolate-subglobose, white, turning pink before falling off, 2 mm, shortly 5-lobed, very sparsely set with

substipitate glands, no hairs. *Filaments* linear, pubescent, 0.7 mm; anthers oblong, 0.7 mm, with two short dorsal spurs. *Style* glabrous, c. 2 mm. *Fruit* subglobose, bright orange-yellow, glabrous, c. 4 mm ϕ , crowned by the very short, not accrescent calyx lobes.

Distr. *Malesia*: Borneo (Sarawak).

Ecol. Epiphyte in submontane heath forest, or terrestrial on limestone, 600–900 m.

11. *Vaccinium uniflorum* J. J. S. Ic. Bog. 4 (1910) 67, t. 320; MERR. En. Born. (1921) 467; SLEUM. *Blumea* 11 (1961) 17. — *Rigiolepis uniflora* (J. J. S.) J. J. S. *Blumea* 1 (1935) 330.

Small epiphytic shrub. Branchlets slender, patently pubescent. *Leaves* lanceolate-ovate, apex rather long subcaudate-acuminate, tip blunt, base broadly attenuate to nearly rounded, subcoriaceous, glabrous above, sparsely appressed-puberulous on the intervenium, hairy on the midrib beneath and initially at the margin, entire, edge \pm recurved, 2–5.8 by 0.8–1.7 cm, midrib sunken above, prominent beneath, 1(–2) pair(s) of basal nerves curved-ascending along the edge to the top of the lamina, several other shorter ones \pm pinnately from the midrib, all finely prominent on both faces as is the reticulation; petiole almost villous, c. 2 mm. Stipule-like perulae of the axillary buds acicular to filiform, persistent for some time. *Flowers* solitary (rarely in pairs) in the upper axils, raising from a tuft of minute triangular pubescent perulae. Pedicels patently long-hairy, c. 2.7 mm, with 2 basal ciliate bracteoles and another one below the calyx. *Calyx* campanulate, 5-lobed halfway, densely hirsutulous, lobes triangular, acute, c. 1.3 mm. *Corolla* urceolate-globose, very shortly 5-lobed (0.5 mm) at the contracted mouth, hirsutulous by \pm dense longish patent hairs outside, pubescent inside, c. 3.2 mm. *Filaments* sigmoid, linear, pubescent, c. 1.2 mm; anther-cells broad-oblong, granular, base retuse, with 2 distinct curved papillose dorsal spurs; tubules 0.7 mm, with wide introrse slits to almost their base. *Disk* hirsute. *Style* glabrous, 2.5 mm.

Distr. *Malesia*: Central Borneo (Amait Ambit) and Sarawak (Ulu Mayeng, Sg. Kakus), twice found.

12. *Vaccinium megaphyllum* SLEUM. *Blumea* 11 (1961) 17. — *V. macrophyllum* (J. J. S.) SLEUM. Bot. Jahrb. 71 (1940) 168; MASAM. En. Phan. Born. (1943) 575, non PIPER, 1908. — *Rigiolepis macrophylla* J. J. S. *Blumea* 1 (1935) 335.

var. megaphyllum.

Shrub. Branchlets subangular, short-pubescent, 3–4 mm ϕ . *Leaves* oblong-ovate, apex long-acuminate, the rather narrow acumen (3–5 cm) bluntish, base rounded, the 2 basal glands impressed on the margin in some distance from the petiole, coriaceous, not hairy except the midrib and nerves, which are short-pubescent in their basal part, laxly set with glandular hairs or points underneath, shining, entire, 20–30 by (6–)6.5–9 cm, 5–7-plinerved, with more distinct pinnate nerves from

the midrib, in total 7–8 on each side, which are somewhat decurrent along the midrib, midrib and nerves prominent in a \pm pronounced depression above, strongly raised beneath, all high curved-ascending and anastomosing before the edge, reticulation conspicuous and rather dense, slightly raised on both faces; petiole semiterete, grooved above, pubescent, 4–8 by c. 2 mm. *Flowers* not known. Immature infructescences axillary, a few in a fascicle or solitary, shortly peduncled, each bearing c. 15 young fruits; rachis angular, rather stoutish (1 mm), brownish puberulous, 3–3.5 cm. Bracts ovate, concave, 1.5 mm. Fruit-pediceal puberulous, 4–5 mm long, with 2 minute bracteoles in the middle or nearer to the calyx. *Fruit* baccate, subglobose, c. 3 mm ϕ , laxly pubescent, calyx lobes inflexed, 1.5 mm. *Disk* glabrous.

Distr. *Malesia*: Central Borneo (Mt Batu Lesong), once found.

var. adenophorum SLEUM. *Blumea* 11 (1961) 17.

Leaves ovate-oblong to lanceolate, very similar to *var. megaphyllum* in nervation and infructescence, but smaller and narrower, (12–)14–19 by 4–6 cm, longer and more acutish (subcaudate-) acuminate, the pair of basal glands inserted very near or seemingly on the apex of the petiole and distinctly prominent or even protracted (as in *V. bigibbum*). *Flowers* not known.

Distr. *Malesia*: Borneo (upper course of the Kapuas R.), once found.

13. *Vaccinium capillipes* SLEUM. Bot. Jahrb. 71 (1940) 168; *Blumea* 11 (1961) 17. — *Rigiolepis salicifolia* J. J. S. *Blumea* 1 (1935) 336, f. 6, a-k. — *V. salicifolium* (J. J. S.) MASAM. En. Phan. Born. (1943) 576, non STEUD. 1841.

Epiphytic shrub, apparently laxly branched. Branchlets elongate, slender or flexuous, densely puberulous as are the petioles, laxly foliate. *Leaves* ovate-lanceolate to narrow ovate-lanceolate, apex long or very long and \pm gradually and narrowly acuminate, subacute, base broad-attenuate to almost rounded, the small basal glands inserted on the very edge of the lamina in some distance from the petiole, glabrescent at full age, some hairs in the lower part of the midrib excepted, laxly glandular-punctulate over the undersurface, rather glossy on both sides, thin-coriaceous, (4.8–)6–10 by (0.8–)1.6–2.3 cm, entire, 5-plinerved, with 2–3 other distinct pinnate nerves from the lower half of the midrib, all high-ascending and anastomosing near the edge, slightly prominent in shallow impressions above, well prominent beneath, reticulation fine and dense, raised on both faces; petiole finally glabrescent, 1.5–3 by 1 mm. *Racemes* solitary or rarely in twos in the upper axils, 7–12 (–15)-flowered, finely pubescent and set with minute glandular hairs (or stipitate subclavate glands) in all parts, the corolla excepted; rachis slender, 2.3–4.8 cm. Bracts small, \pm oblong, acuminate, c. 1.5 mm. Pedicels filiform, 5(–6) mm, with 2 minute subulate bracteoles in their lower half. *Calyx* tube obconical, 0.6 mm, lobes broadly subovate-triangular, subacute, 0.8 mm, glabrescent. *Corolla*

ovoid-urceolate, slightly 5-angled, very laxly glandular-muriculate or practically glabrous outside, first yellow, afterwards red, membranous, *c.* 4 by 3 mm, lobes *c.* 0.5 mm. *Filaments* linear, wavy, patently hairy, 1.5 mm; anther-cells ovate-oblong, 0.6 mm, minutely echinulate, with 2 dorsal spurs curved upwards (0.5 mm); tubules erect, 0.7 mm. *Disk* puberulous. *Style* glabrous, 3 mm. *Fruit* baccate, rather dry, subglobose, pubescent and muriculate, first yellow, afterwards orange-red, *c.* 4.5 mm σ , apex truncate, crowned by the inflexed calyx lobes; fruit-pedicle 9 mm. *Seeds* 2-3 in each of the ten cells, triangular-oblong, *c.* 2.5 mm.

Distr. *Malesia*: Central Borneo (summit of Mt Kemul), in primary forest, 1800 m. *Fl.* Oct.

14. *Vaccinium kemulense* SLEUM. Bot. Jahrb. 71 (1940) 168; *Blumea* 11 (1961) 17; *ibid.* 12 (1963) 124. — *Rigiolepis endertii* J. J. S. *Blumea* 1 (1935) 339, f. 7, a-f. — *V. endertii* (J. J. S.) MASAM. En. Phan. Born. (1943) 574, non J. J. S. 1935.

Shrub up to 4 m, occasionally epiphytic. Branchlets rather slender, tips angular and short-pubescent, older parts laxly set with verruculose lenticels. *Leaves* ovate-lanceolate, apex long-acuminate or subcaudate, acute or nearly so, base broad-attenuate to rounded, slightly decurrent in the upper part of the petiole, the 2 basal glands strictly marginal in some distance from the petiole and well visible, \pm coriaceous, glabrous except the laxly pubescent basal part of the midrib and the petiole, very laxly set with appressed glandular hairs on the undersurface, \pm glossy on both faces, entire, 8.5-16 by 2-4.5 cm, 5-7-plinerved, furthermore with 3-4 pairs of higher pinnate nerves from the midrib, which are as distinct as or even more so than the basal ones, somewhat decurrent along the midrib, rather steeply high-ascending, anastomosing, slightly raised within a shallow depression above as is the midrib, \pm sharply prominent beneath, reticulation dense, finely prominent on both faces; petiole somewhat flattened, grooved above, 3-5 by 1.5(-2) mm. *Racemes* solitary or a few in a fascicle, axillary, drooping, rather laxly 10-15 (-18)-flowered, very shortly peduncled, finely pubescent and glandular-muriculate in all outer parts except the corolla; rachis rather slender, 2.5-5 cm. Bracts oblong, ciliolate, *c.* 2.5 by 1 mm. Pedicels rather stoutish, 1.5-3(-5) mm in anthesis, up to 5 mm in fruit, with 2 lanceolate bracteoles (1 mm) in the middle or in the upper half. *Calyx* tube *c.* 1 mm, first turbinate, early becoming subglobose (*c.* 2 mm), lobes triangular, acute, 1 mm. *Corolla* subglobose-urceolate, 5-angular, light green (W. Kutei) or pinkish red (Mt Mulu), *c.* 4 by 3 mm, glabrous or laxly muriculate, lobes *c.* 0.6 mm. *Filaments* linear, wavy, patently hairy, 2 mm; anthers *c.* 1.1 mm long in all, with 2 dorsal straight spurs (0.3 mm); tubules *c.* 0.6 mm. *Disk* minutely muriculate or nearly glabrous. *Style* glabrous, 3.5 mm. *Fruit* baccate, globose, said to be yellow to orange.

Distr. *Malesia*: Borneo (Sarawak: Mt Mulu; W. Kutei: Mt Kemul and Mt Palimasan), in submontane or in mossy forest, on white acid sands

or on rocky mountain ridge, 800-1800 m.

15. *Vaccinium filiforme* (J. J. S.) SLEUM. Bot. Jahrb. 71 (1940) 168; *ibid.* 71 (1941) 419, *in text*; MASAM. En. Phan. Born. (1943) 574; SLEUM. *Blumea* 11 (1961) 17. — *Rigiolepis filiformis* J. J. S. *Blumea* 1 (1935) 340, f. 8, a-e.

Epiphytic shrub, 4 m, hanging downward, with elongate branches. Branchlets subangular, younger parts puberulent. *Leaves* lanceolate, apex mostly subcaudate-acuminate, subacute, base attenuate, the basal glands in *c.* 2 mm distance from the petiole on the margin, thin-coriaceous, early glabrescent on both faces, sparsely glandular beneath, entire, slightly revolute at the edge, 9.5-15.5 by 2.5-4 cm, sub-5-plinerved, other distinct pinnate \pm irregular nerves in 4-6 pairs from the midrib, suberect and ascending, anastomosing, but slightly prominent on both sides, midrib strong, raised within a rather deep impression above, much prominent beneath, reticulation fine and dense on both faces; petiole initially minutely pubescent, (2-)-3-4 by 1-1.5 mm. *Racemes* both from the upper foliate and lower defoliate axils, solitary or 2-3 in a fascicle, subsessile, laxly 10-15-flowered, covered by a fine puberulence and sparse very shortly stalked glands in all outer parts; rachis filiform, 3-5 cm. Bracts oblong-acuminate, ciliolate, 1.5 mm. Pedicels filiform, 6-8 mm, with 2 minute bracteoles at or above the middle. *Calyx* turbinate to semiglobose, 0.5 mm, lobes triangular, acute, *c.* 0.6 mm. *Corolla* ovoid-urceolate, much constricted distally, light yellow, \pm glabrescent, *c.* 2.5 mm, very shortly 5-lobed. *Filaments* linear, wavy, short-pubescent except the very base, 1.2 mm; anther-cells echinulate, *c.* 0.6 mm, the 2 dorsal spurs *c.* 0.2 mm; tubules linear, 0.7 mm. *Disk* with a few hairs in the central excavation. *Style* glabrous, 1.8 mm.

Distr. *Malesia*: Borneo (W. Kutei: Bolset), once found.

Ecol. In primary forest along riverbank, 400 m.

16. *Vaccinium sulcatum* RIDL. Kew Bull. (1922) 107; SLEUM. *Blumea* 11 (1961) 17; *ibid.* 12 (1963) 124. — *Rigiolepis sulcata* (RIDL.) J. J. S. *Blumea* 1 (1935) 336.

Epiphytic shrub up to 5 m. Branchlets rather robust, subterete, tips pubescent, older parts early glabrescent and covered with cork, 3-6 mm σ . *Leaves* ovate- to oblong-elliptic, apex rather shortly (2-3 cm by 2-10 mm) caudate-acuminate or cuspidate, acute, base \pm rounded, not rarely lightly contracted or decurrent into the petiole, with a very thick and \pm protruding basal gland on the margin very near to or practically on each side of the petiole, coriaceous, rather densely short-pubescent all over on both faces initially especially on the nerves, remaining laxly hairy on the intervenium beneath, but glabrescent and lustrous above, the midrib and nerves excepted, 9-17(-21) by 4-7(-10) cm, entire, \pm revolute at the very edge, 7-9-plinerved from and from somewhat above the base, other less conspicuous nerves in several irregular pairs from the upper half of the

midrib short and spreading, anastomosing, midrib and all main nerves deeply, the reticulate veins less, but still markedly impressed above, or prominent beneath, the lamina thus becoming \pm bullate; petiole thick, pubescent, 5–8 by 2–3 mm. *Racemes* 2–4 together in axillary fascicles, slender, subdensely covered with very short hairs and sparse minute slenderly stalked glands in all outer parts, more densely so on the calyx tube, laxly so on the corolla; rachis nearly filiform, bearing laxly arranged 10–20 flowers, 4–6 cm long, with numerous subulate stipule-like perulae, 3–4 mm. Pedicels filiform, (5–)6–7 mm, basal bract ovate-acuminate, 2 mm, the 2 subulate bracteoles (1.5 mm) fixed in the middle. *Calyx* 5-partite to nearly the base, the broad obconical tube 0.5 mm, lobes deltoid, 1–1.5 mm. *Corolla* urceolate, but slightly contracted apically, membranous, pale yellow, laxly puberulous along 5 faintly visible longitudinal angles, glabrous otherwise, 4–4.5 by 2.5–3 mm, lobes 0.5 mm. *Filaments* linear, almost villous, 2.5 mm; anther-cells ovate-oblong, echinulate, 1 mm, the pair of dorsal spurs 0.5 mm; tubules 1 mm. *Disk* hirsutulous. *Style* glabrous, 4 mm. *Fruit* subglobose, c. 4 mm ϕ , hirtellous, 10-locular. *Seeds* linear, compressed and curved.

Distr. *Malesia*: Borneo (Sarawak).

Ecol. In primary and secondary forest, at low elevation, also on limestone. *Fl.* June.

17. *Vaccinium minimiflorum* SLEUM. Bot. Jahrb. 17 (1940) 162; Blumea 11 (1961) 18.

Shrub, c. 1.5 m. Branchlets very shortly pubescent in the younger, glabrescent and greyish corticate in the older parts. *Leaves* ovate, apex subcaudate-acuminate, the very tip blunt, base rounded, the basal pair of small glands distant from the petiole, subcoriaceous, puberulous at the midrib and ciliate initially, glabrescent with age except some puberulence at the very base and on the petiole, very laxly glandular-punctate beneath, rather glossy on both faces, entire, 3–4 by 1–1.5 cm, (5–)7-plinerved, with several other shorter and less conspicuous nerves from the upper part of the midrib, all nerves anastomosing, \pm inconspicuous above except the midrib and the lowest pair, slightly raised as is the rather dense reticulation beneath; petiole 1–2 mm. *Racemes* axillary, lax, solitary, 2.5–3 cm, several-flowered; rachis slender, very shortly pubescent as are pedicel and calyx, furthermore with minute stalked glands or glandular hairs sparsely among the predominant simple hairs. Pedicels 1.5–2 mm; subtending bract subulate, 0.7 mm; bracteoles subulate, inserted below the calyx. *Calyx* tube campanulate, 0.8 mm, lobes deltoid, acutish, 1.2 mm. *Corolla* urceolate, contracted distally, whitish greenish, laxly clothed with very short, rufescent, glandular hairs at the base, glabrous for the rest, c. 3 mm. *Filaments* hairy, c. 1 mm; anther-cells c. 1 mm, with 2 long dorsal spurs; tubules 1 mm. *Disk* short-hairy. *Style* glabrous, 3 mm.

Distr. *Malesia*: Borneo (Sarawak: Ulu Koyan, Mt Dulit area), at c. 1000 m. Once found. *Fl.* March.

18. *Vaccinium henrici* SLEUM. Bot. Jahrb. 71 (1940) 161; Blumea 11 (1961) 18.

Epiphytic or subscandent shrub. Older parts of the branchlets red brown and glabrous, most recent ones covered with a whitish greyish, nearly villous tomentum. *Leaves* elongate-ovate, apex subcaudate-acuminate (2 cm), slightly curved, acute, base \pm rounded, the basal pair of glands conspicuous, \pm impressed on the margin in a short distance from the petiole, firmly subcoriaceous, entire, edge slightly revolute, 4.5–5 by 1.5–2 cm, immature ones laxly hairy all over the under-surface, mature ones glabrescent except some pubescence at the base beneath and on the midrib on both sides, moreover minutely glandular-punctate beneath, (3–)5-plinerved, midrib and the inner pair of basal nerves much impressed above, or distinctly raised beneath, the outer pair(s) of basal nerves and other \pm pinnate shorter ones from the midrib much less or not impressed above, or indistinct beneath, veins laxly reticulate, visible above only; petiole pubescent, c. 2 by 1 mm. *Racemes* axillary, solitary, lax, very densely greyish hirtellous and shortly glandular-hairy in all outer parts except the corolla; rachis very slender, 3–4.5 cm, perulae narrow to subulate. Pedicels filiform, c. 4 mm; subtending bract subulate, 1 mm; bracteoles linear, inserted in the middle or nearer to the calyx. *Calyx* tube campanulate, c. 0.3 mm, lobes deltoid, c. 1 mm. *Corolla* subglobose-urceolate, membranous, 4 by 3.5 mm, contracted distally, whitish to cream, laxly and exclusively set with substellate, whitish, eglandular, very short hairs outside, hairy inside. *Filaments* linear or subsubulate, densely pubescent, 1.2 mm; anther-cells inflated, with 2 dorsal spurs (0.5 mm); tubules 1 mm. *Disk* glabrous. *Style* glabrous, c. 4 mm.

Distr. *Malesia*: SW. Celebes (Mt Lombasang), once found, 1100 m. *Fl.* Sept.

19. *Vaccinium uroglossum* SLEUM. Bot. Jahrb. 71 (1940) 166; Blumea 11 (1961) 18; *ibid.* 12 (1963) 124. — **Fig. 89.**

Epiphytic or subscandent shrub or treelet, (1–)2–3(–5) m, with a globose swelling size of an orange between root and stem, and pendent branches. Branchlets slender and densely grey-hirtellous in the younger, glabrescent or early corticate in the older, \pm defoliate parts. *Leaves* rather densely arranged, ovate or mostly oblong-ovate, apex acuminate to subcaudate, the very tip bluntish, base \pm rounded, the basal pair of glands small and strictly marginal, each gland c. 2 mm distant from the petiole, subcoriaceous, pubescent and ciliate initially, becoming glabrous above with age except the base and the lower part of midrib and nerves, subdensely to laxly set with fine appressed, clavate, glandular hairs on both faces or beneath only for a long time, finally \pm glabrescent, flat, 3–4.5(–6.5) by 1.4–2.2 cm, 5–7-plinerved from and somewhat from above the base, several other upper nerves irregular, \pm pinnate and spreading, less distinctly raised than midrib and basal nerves, reticulation dense and minutely

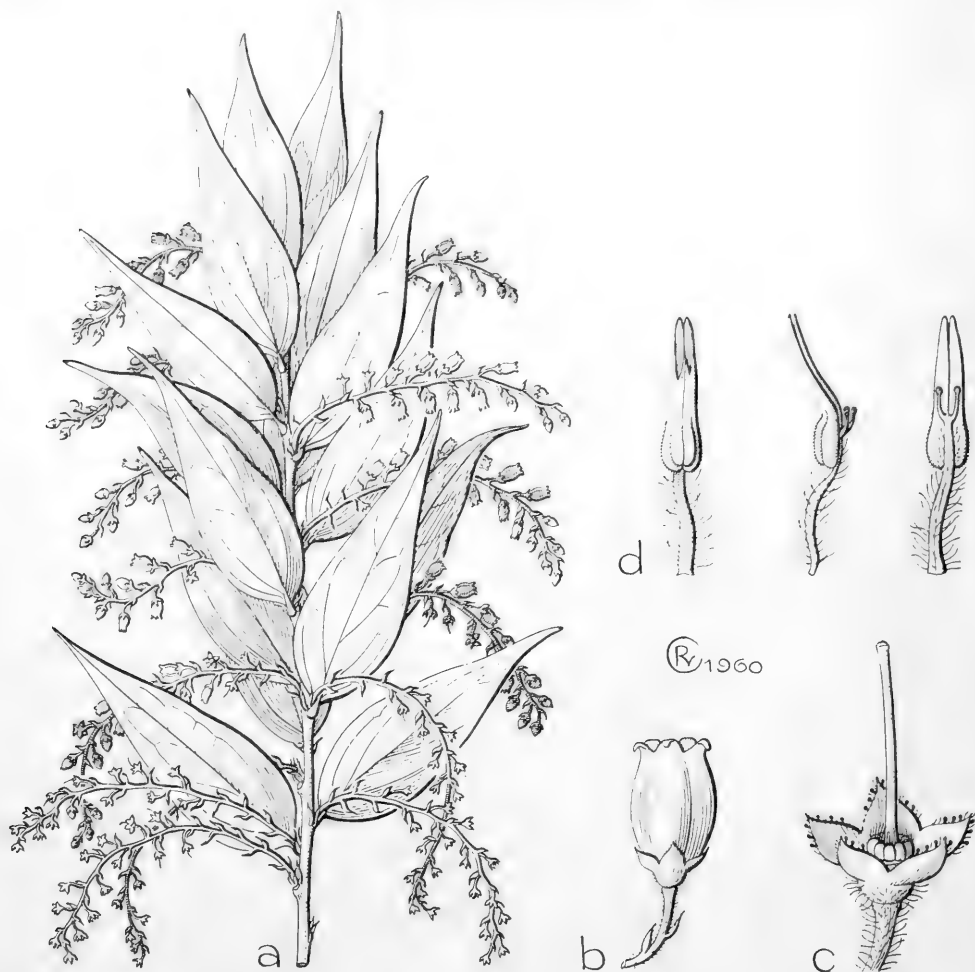


Fig. 89. *Vaccinium uroglossum* SLEUM. *a.* Habit, $\times \frac{2}{3}$, *b.* flower, $\times 4$, *c.* calyx, disk and style, $\times 8$, *d.* stamens, $\times 10$ (*a* CLEMENS 40802, *b-d* CLEMENS 29013).

prominent on both sides; petiole 1.5–2.5 by 1 mm, \pm densely hirtellous. *Racemes* axillary, solitary and \pm secund, rather densely 10–20-flowered, subdensely covered with a fine indument of whitish short hairs mixed with slender glandular hairs in all outer parts except the corolla, more densely so on the calyx tube; rachis rather slender, 4–6 cm, with several subulate stipule-like perulae, similar to those found in the sterile axils, 2–4 mm. Pedicels slender, 2–3(–4) mm; subtending bract ovate-subulate, nearly equalling the pedicel; bracteoles subulate, inserted near the base or in the lower half of the pedicel, 1–1.5 mm. *Calyx* tube campanulate, *c.* 1 mm, lobes ovate-deltoid, more sparsely hairy than the tube, 0.8 mm. *Corolla* urceolate, slightly 5-angular, rather fleshy, greenish to cream or yellowish, 4(–4.5) mm, laxly clad with subclavate, glandular, but no eglanular

hairs, or glabrescent especially towards the apex, lobes 0.5 mm. *Filaments* slightly wavy, linear, densely hairy, 1.5 mm; anther-cells granular, 0.8 mm, the 2 dorsal spurs *c.* 0.4 mm; tubules *c.* 1.5 mm. *Disk* densely pubescent. *Style* glabrous, 3.5 mm. *Berry* globose, *c.* 3 mm \varnothing , yellow, base reddish, laxly pubescent.

Distr. Malesia: Borneo (Mt Kinabalu).

Ecol. In mountain forest, 1525–1830 m. *Fl.* Jan.–Dec.

20. *Vaccinium tenerellum* SLEUM. Blumea 11 (1961) 18.

Low scandent shrub. Branchlets very slender, young parts subterete, densely short-pubescent. *Leaves* lax, ovate-lanceolate, apex for 1.5–2.5 cm rather narrowly caudate-acuminate and a little curved, subacute, base \pm rounded, subcoriaceous,

laxly appressedly glandular-muriculate beneath, otherwise glabrous except some hairs in the lower part of the midrib above, somewhat shining on both faces, \pm convex above when dry, entire, not much revolute at the margin in the lower part of the lamina, 4–6 by 1.5–2.3 cm, midrib prominent within a shallow depression above, raised beneath, nerves in 2(–3) basal and slightly suprabasal pairs, curved-ascending, slightly raised above, less so beneath, several other shorter nerves or veins \pm pinnately and irregularly from the midrib, slightly raised on both sides as is the dense fine reticulation; petiole *c.* 2 mm, pubescent; stipule-like perulae of sterile axillary buds subulate, 2–3 mm. *Racemes* solitary from a few upper axils, laxly 8–12-flowered; rachis very slender in flowering time, clothed with fine short, whitish, patent hairs and scattered slenderly stalked brownish glands as are the pedicels, 3–5 cm. Pedicels very slender, 3–4 mm, subtending bract oblong-acuminate, *c.* 1.5 mm; bracteoles inserted in the upper half of the pedicel. *Calyx* tube shortly cylindrical, slightly 5-angular, *c.* 0.8 mm, laxly glandular-muriculate, not hairy at all, lobes ovate-triangular, *c.* 1 mm, subglabrous dorsally, ciliolate and set with a few, thickish, substipitate, brownish marginal glands. *Corolla* urceolate, much contracted distally, thin, colour not known, *c.* 4 by 2.5 mm, lobes reflexed, obtuse, *c.* 0.4 mm. *Filaments* linear, hairy, 1.8 mm; cells subovate-oblong, 0.8 mm, with a pair of upward spreading dorsal spurs (0.8 mm); tubules narrow, *c.* 1 mm. *Disk* hairy. *Style* slender, glabrous, *c.* 3.8 mm. Immature *fruit* subglobose, apex truncate, *c.* 3 mm ϕ .

Distr. *Malesia*: Borneo (Brunei: Mt Pagon ridge).

Ecol. In mossy forest, on rugged exposed knife edge of sandstone and shale ridge, 1525–1860 m. *Fl.* April.

21. *Vaccinium bigibbum* J. J. S. Bull. Jard. Bot. Btzg III, 1 (1918) 408, t. 55; SLEUM. *Blumea* 11 (1961) 18; *ibid.* 12 (1963) 124. — *Rigiolepis bigibba* (J. J. S.) J. S. S. *Blumea* 1 (1935) 336.

Epiphytic or terrestrial shrub. Branchlets robust, puberulous at the tips, glabrescent at the lower parts which are laxly set with elliptic, not much raised warty lenticels. *Leaves* ovate to ovate-lanceolate, apex longer (*c.* 3 cm) or shorter subcaudate-acuminate, subacute, base obtuse to rounded in general, but the very base contracted or decurrent in the upper third of the petiole for *c.* 2 mm and indurated there with a thick, protruding gland on each side, coriaceous, glabrous except some puberulence at the base and on the petiole and rather dense minute early caducous glands beneath, \pm shining above, less so or dull beneath, entire, slightly recurved at the margin, convex between the main nerves beneath, 7.5–21 by 3–7(–8) cm, 5(–7)-plinerved from and somewhat from above the base (the outer pair of nerves less distinct), these nerves high ascending and anastomosing, \pm impressed as is the midrib, though raised within a shallow depression above, sharply prominent beneath, other shorter nerves

from the upper part of the midrib in several pairs, irregular and much less distinct on both sides, reticulation rather lax, sometimes slightly sunken, but mostly a little prominent on both faces, occasionally less visible beneath; petiole rugose, 6–8 by *c.* 2 mm. *Racemes* 2(–3) together in axillary fascicles, or rarely solitary, lax, rather densely short-pubescent and finely glandular-hairy in all outer parts, less so at the angles of the corolla; rachis slender, 2–5(–7) cm, with several triangular to subulate stipule-like perulae. Pedicels slender, (2–)4–6 mm, with an ovate-acuminate subtending bract (*c.* 2 mm) and 2 subulate minute bracteoles in the middle. *Calyx* tube very short, lobes narrow-triangular, tips red, *c.* 1 mm. *Corolla* urceolate, cream or yellow, 5-angular, slightly puberulous outside, glabrous inside, *c.* 4 by 2.5 mm when fully developed. *Filaments* wavy, linear, hairy, 2 mm; anther-cells papillose, *c.* 1 mm; spurs subulate, 0.5 mm; tubules slender, erect, intorsely slit almost their entire length, *c.* 1 mm. *Disk* densely hairy. *Style* slender, glabrous, 4 mm.

Distr. *Malesia*: Borneo.

Ecol. In West and Central Borneo and in Sarawak on boulders in forested ravine or epiphytic in peat-swamp- or *Dipterocarpus*-forest, 5–200 m, in Brunei on clay ridge at 550 m. *Fl.* May–Aug.

22. *Vaccinium acuminatissimum* MIQ. Ann. Mus. Bot. Lugd.-Bat. 1 (1863) 36; RIDL. J. Str. Br. R. As. Soc. n. 33 (1900) 103; K. & G. J. As. Soc. Beng. 74, ii (1905) 66; RIDL. Fl. Mal. Pen. 2 (1923) 210; BURK. & HENDERS. Gard. Bull. S. S. 3 (1925) 390; AMSH. in Back. Bekn. Fl. Java (em. ed.) 7 (1948) fam. 163, p. 2; SLEUM. *Blumea* 11 (1961) 19. — *Gaylussacia lanceolata* BL. Bijdr. (1826) 861 ('*Gay*)*Lussacia*'); DUNAL in DC. Prod. 7 (1839) 557; HASSK. Cat. Hort. Bog. (1844) 160; MIQ. Fl. Ind. Bat. 2 (1859) 1063. — *Agapetes lanceolata* (BL.) NIEDENZU, Bot. Jahrb. 11 (1889) 201, in *clavi*, 246. — *Agapetes acuminatissima* (MIQ.) NIEDENZU, *l.c.* 201, 224, 247. — *Adnaria lanceolata* (BL.) O. KTZE, Rev. Gen. Pl. 2 (1891) 383. — *V. lanceolatum* (BL.) J. J. S. Ic. Bog. 3 (1910) 68; KOORD.-SCHUM. Syst. Verz. (1912) fam. 233, p. 109; J. J. S. in K. & V. Bijdr. 13 (1914) 144; KOORD. Exk. Fl. Java 3 (1912) 12; DE VOOGD, Trop. Natuur 23 (1934) 83, in text, non DUNAL, 1839. — *Rigiolepis lanceolata* (BL.) J. J. S. *Blumea* 1 (1935) 330.

See for further synonyms under the forms.

KEY TO THE FORMS

1. Leaves (sub)ovate-oblong or mostly ovate-lanceolate or -elliptic.
 2. Leaves (1.8–)2.5–4(–4.7) cm wide
 1. *f. acuminatissimum*
 2. Leaves 1.1–2 cm wide . . . 2. *f. marapiense*
 1. Leaves more elliptic or oblong-elliptic
 3. *f. ellipticum*
1. *f. acuminatissimum*. — *V. acuminatissimum* MIQ.

f. javanicum MIQ. & *f. sumatranum* MIQ. Ann. Mus. Bot. Lugd.-Bat. 1 (1863) 36. — *Thibaudia singalensis* KORTH. ex BOERL. Handl. 2, 1 (1891) 263, in syn. — *V. acuminatissimum* MIQ. var. *singalense* J. J. S. in K. & V. Bijdr. 13 (1914) 145, in text. — *Rigiolepis lanceolata* (BL.) J. J. S. *f. sumatrana* (MIQ.) J. J. S. Blumea 1 (1935) 331, f. 2, a-f. — *V. lanceolatum* (BL.) J. J. S. *f. sumatranum* (MIQ.) SLEUM. Bot. Jahrb. 71 (1940) 168.

Epiphytic or climbing shrub, up to 25(-30) m, trunk c. 8 cm ϕ then. Branchlets slender, flexuous, distally clothed with a short, cinereous, \pm spreading pubescence, foliate in the younger, glabrescent and with verruculose lenticels in the older, defoliate parts. *Leaves* (sub)ovate-oblong or mostly ovate- or -elliptic-lanceolate, or lanceolate, \pm long and gradually, or more subcaudately acuminate, acute, base broadly attenuate to almost rounded, the two basal glands \pm thick, excavate and much protruding, inserted on the edge in a short distance from the petiole, coriaceous to subcoriaceous, recent ones pubescent on both faces, \pm glabrescent especially above with age except the midrib, nerves and leaf-base, moreover laxly clad with short glandular (muriculate) \pm appressed subpersistent hairs beneath, shining especially above, entire, margin very slightly revolute, 9-14 by (1.8-)2.5-4(-4.7) cm, 5-7(-9)-plinerved, main nerves and midrib slightly raised within a rather shallow groove above, more or less sharply prominent beneath, high ascending and anastomosing, other much shorter and \pm pinnate nerves from the midrib much less conspicuous, reticulation mostly dense and slightly raised on both faces, occasionally rather obscure beneath; petiole semiterete, persistently and densely pubescent, (2-)3-5 by 1.5-2 mm. *Racemes* axillary, solitary, almost spreading, lax, 8-15-flowered, \pm densely clad in all parts with short glandular and thicker glandular hairs (the latter less numerous, often in form of fine stalked glands, more densely found on the calyx tube), with several subulate stipule-like perulae; rachis slender, (2.5-)3-5(-6.5) cm. *Pedicels* rather stoutish, 2-(3) mm, the subtending bract ovate-acuminate, \pm as long as the pedicel, the 2 bracteoles inserted above the base up to the middle, subulate, 1-1.5 mm. *Calyx* tube obconical, 0.6-0.8 mm, lobes subdeltoïd, ciliate, 0.7-1 mm. *Corolla* short-urceolate, puberulous outside especially along the 5 slightly pronounced angles, glabrous otherwise, white or cream, 2.5-3 by 2-2.5 mm, lobes 0.5-0.7 mm. *Filaments* linear, rather sparsely hairy, c. 1 mm; anther-cells oblong, papillose, 0.5 mm, dorsal spurs c. 0.3 mm; tubules 0.5 mm. *Disk* hairy. *Style* glabrous, 2.5(-3) mm. *Fruit* baccate, subglobose, \pm densely pubescent, first yellow, changing to orange and cherry red in later stages, crowned by the inflexed calyx lobes, c. 4 mm ϕ . *Seeds* linear, compressed, blackish, pitted.

Distr. *Malesia*: Sumatra, Malay Peninsula, West Java.

Ecol. In rain-forest, also in marshy forest, once found on stony mud-flow of Beriti volcano in S. Sumatra, 360-1400 m. *Fl.* Jan.-Dec.

2. *f. marapiense* (J. J. S.) SLEUM. Blumea 11 (1961) 19. — *Rigiolepis lanceolata* (BL.) J. J. S. *f. marapiensis* J. J. S. Blumea 1 (1935) 332, f. 3, a-g. — *V. lanceolatum* (BL.) J. J. S. *f. marapiense* (J. J. S.) SLEUM. Bot. Jahrb. 71 (1940) 168.

Differs by smaller (4.2-8.5 by 1.1-2 cm), more coriaceous leaves, with the midrib more pronouncedly sunken in dry specimens.

Distr. *Malesia*: Central West Sumatra (Mt Marapi), 1100-1200 m.

3. *f. ellipticum* (J. J. S.) SLEUM. Blumea 11 (1961) 19. — *V. acuminatissimum* (non MIQ. s. str.) RIDL. Kew Bull. (1926) 71. — *Rigiolepis lanceolata* (BL.) J. J. S. *f. elliptica* J. J. S. Blumea 1 (1935) 333, f. 4, a-k. — *V. lanceolatum* (BL.) J. J. S. *f. ellipticum* (J. J. S.) SLEUM. Bot. Jahrb. 71 (1940) 168.

Leaves distinctly \pm obliquely elliptic or oblong-elliptic, apex rather abruptly narrow-acuminate, subacute, base \pm obtuse, 7-13 by 2.5-4.7 cm.

Distr. *Malesia*: Islands W of Sumatra: Simalur and Mentawai Is. (Sipora).

Ecol. Epiphytic in forest.

Vern. *Lingkih datan*, Simalur.

23. *Vaccinium piperifolium* SLEUM. Blumea 11 (1961) 20.

Epiphytic shrub, c. 3 m. Branchlets obtusangular, tips minutely puberulous and gland-haired, older parts glabrescent, 4-5 mm ϕ , laxly covered with verruculose, elliptic-subrotundate lenticels, finally whitish greyish corticate. *Leaves* sparse, large, elliptic-oblong, apex shortly (2-3) cm subcaudate- or subcuspidate-acuminate, acutish, base broadly attenuate, the two basal glands rather large, not protruding beyond the leaf margin and inserted near the end of the petiole, coriaceous, puberulous in the basal part of the midrib, otherwise quite glabrous except some very sparse glandular points which may occur on the undersurface, \pm glossy on both faces, entire, 20-27 by 6-9 cm, shortly revolute at the very edge, 7-plinerved from and a little from above the base, midrib and inner two pairs of nerves equally prominent above within a shallow depression, much prominent beneath, outer pair of nerves much less distinct on both sides, numerous other shorter nerves pinnately from the upper part of the midrib and \pm irregular, slightly impressed above, but little raised beneath, veins and veinlets forming a rather dense and an equally finely prominent network on both faces; petiole somewhat rugose, glabrous, 5-6 by c. 2 mm. *Racemes* axillary, solitary, laxly c. 10-flowered, with several subulate, very acute perulae (4-6 mm) which occur also in the sterile axis; whole inflorescence puberulous and very minutely gland-hairy except the corolla; rachis slender, 4-6 cm. *Pedicels* rather slender, 2-3 mm, the subtending bract ovate-acuminate, 1.5-2 mm, the 2 minute bracteoles inserted \pm in the middle. *Calyx* laxly glandular-hairy, even less puberulous, tube semi-globose, c. 0.5 mm, lobes ovate-acuminate, subacute, c. 1 mm. *Corolla* ovoid-urceolate, thin, white?, c. 3 mm, laxly clothed with short muriculate

glandular, but no eglandular hairs. *Filaments* long hairy, 0.5 mm; anther-cells broad-oblong, papillose, *c.* 0.7 mm, the dorsal pair of spurs 0.3 mm; tubules 0.7 mm. *Disk* laxly pubescent. *Style* glabrous, 2.5 mm.

Distr. *Malesia*: Borneo (Sarawak: Gat, Upper Rejang R.).

Ecol. On large forest tree along river margin.

24. *Vaccinium moultonii* MERR. J. Str. Br. R. As. Soc. n. 87 (1923) 22; SLEUM. *Blumea* 11 (1961) 20; *ibid.* 12 (1963) 124. — *Rigiolepis moultonii* (MERR.) J. J. S. *Blumea* 1 (1935) 336. — *V. borneense* (non W. W. SMITH) ANDERSON, Gard. Bull. Sing. 20 (1963) 184.

Shrub or small tree. Branchlets slender, terete, tips or young shoots smooth, finely puberulous, laxly leaved, older parts early glabrescent or corticate. *Leaves* ovate- or oblong-lanceolate, apex caudate-acuminate for 3–4 cm, subacute, base broadly attenuate to nearly rounded, the very base a little contracted or decurrent, bearing a conspicuous not protruding marginal gland at each side of the petiole, subcoriaceous, \pm glossy, dark brown in dry specimens, glabrous, though laxly glandular-punctate underneath, entire, flat, 10–15 by 4–6(–6.5) cm, 5(to sub-7)-plinerved from and from somewhat above the base, inner pair of main nerves and midrib slightly raised within a marked depression above, much prominent beneath, outer pair (or pairs) less so, or both pairs slightly raised on both faces, other shorter nerves (or veins) higher from the midrib, numerous and irregular, \pm spreading, more distinctly raised beneath than above, reticulation very dense and sharply prominent on both faces; petiole rugulose, (2–)3–5 by 1.5 mm; stipule-like perulae of the axillary buds acicular, *c.* 3 mm, rather long persistent at the upper axils. *Racemes* solitary or in pairs, axillary, laxly 8(–12)-flowered, sparingly puberulous and very shortly gland-haired in all outer parts except the corolla; rachis slender, 4–5 cm. Pedicels slender, 2–3(–4) mm, the subtending bract ovate-acuminate, 1 mm, the two bracteoles inserted a little below the middle. *Calyx* tube obconical, 1 mm, lobes ovate-acuminate, acute, obscurely costulate lengthwise, \pm spreading, 1.5 mm. *Corolla* ovoid-urceolate, much contracted at the opening, thin, pale cream or greenish white, also said to be dark red (on Bukit Raja), glabrous or nearly so outside, (3–)4 by 2.5 mm, lobes hardly 0.5 mm. *Filaments* linear, subdensely hairy, 1 mm; anther-cells oblong, granular, 0.6 mm, dorsal spurs 0.5 mm; tubules 0.8 mm. *Disk* glabrous. *Style* glabrous, slender, *c.* 3.5 mm.

Distr. *Malesia*: Borneo (Sarawak, North Borneo).

Ecol. In submontane and in moss forest, 600–1250 m, also in low country: in shrub layer of *Shorea albid*a padang on peat swamp.

Vern. *Akar manumpang kayu*, Tawau.

25. *Vaccinium dipladenium* SLEUM. Bot. Jahrb. 71 (1940) 168; *Blumea* 11 (1961) 20. — *V. acuminatissimum* MIQ. *f. borneense* MIQ. Ann. Mus. Bot.

Lugd.-Bat. 1 (1863) 36. — *Rigiolepis korthalsii* J. J. S. *Blumea* 1 (1935) 334, f. 5, a-f. — *V. korthalsii* (J. J. S.) MASAM. En. Phan. Born. (1943) 575, non MIQ. 1863.

Shrub. Branchlets rather slender, tips or new shoots shortly subpatent-pubescent, older parts early striate-corticate and laxly set with warty, rounded-elliptic lenticels. *Leaves* lanceolate to broadly ovate, apex caudate-acuminate (2–3 cm), acute, base \pm rounded, the 2 basal, not protruding glands on the leaf margin in some distance from the petiole, coriaceous, glabrous except some short pubescence on the lower part of the midrib, laxly appressed glandular-setulose or -hairy, finally laxly punctate beneath, entire, edge very slightly or not revolute, 4–11 by (1.7–)4–6 cm, 5- to sub-7-plinerved, midrib and nerves strongly impressed above, or prominent beneath, main nerves ascending to the top of the lamina and \pm anastomosing, other upper nerves from the midrib or veins numerous, faintly raised above, even less so beneath, reticulation fine and dense, restricted practically to the undersurface; petiole pubescent, (2–)3–5 by 1–1.5 mm, on a much thickened base or cushion, which runs very shortly into the branchlet; stipule-like perulae of the axillary buds subular, pubescent, (4–)5–7 mm, long-persistent. *Racemes* axillary, solitary, rather laxly set with numerous flowers, shortly and patently non-glandular-pubescent in all outer parts, the corolla excepted; rachis rather slender, angular, (1–)3–6 cm, with 4–6 subulate stipule-like perulae, 5–7 mm long, *c.* 1 mm wide at the base. Pedicels slender, 4–7 mm, the subtending bract ovate, subacuminate, *c.* 2.5 mm, the 2–3 bracteoles inserted in the middle or sometimes 2 near to the calyx, narrow-subulate, 1–1.5 mm. *Calyx* tube short-campanulate, 0.8 mm, lobes narrow ovate-acuminate, 1.2–1.5 mm. *Corolla* (described from rests adhering to a young fruit) urceolate, glabrous outside, 4 by 2.7 mm. *Filaments* almost filiform, very laxly pubescent, 1.2–1.5 mm; anther-cells ovate-oblong, 0.5 mm, dorsal spurs *c.* 0.4 mm; tubules slender, 0.6 mm. *Disk* glabrous. *Style* filiform, glabrous, 3.5 mm. *Fruit* baccate, subglobose, slightly pubescent, *c.* 5 mm ϕ , crowned by the inflexed calyx lobes. *Seeds* elliptic, compressed, *c.* 2 mm.

Distr. *Malesia*: SE. Borneo (Mt Sakumbang, SE of Banjarmasin), once collected by KORTHALS in 1836.

26. *Vaccinium andersonii* SLEUM. *Blumea* 12 (1963) 124.

Epiphytic shrub. Branchlets subterete, greyish or reddish corticate, glabrous, lenticels almost rounded. *Leaves* subovate- to oblong-elliptic, apex for *c.* 1 cm obtusely acuminate, base subtruncate-rounded, rarely subcordate, the pair of basal glands impressed next to the petiole, coriaceous, firm, glossy above, glabrous except fine, hardly visible setular hairs beneath, entire, (5–) 6–10 by 3–4.5 cm, 7- to sub-9-plinerved, midrib depressed for the whole length above in dry specimens, prominent beneath, nerves in 3(–4) pairs from and from up to 2 cm above the base,

slightly prominent above, more distinctly so beneath, veins and veinlets rather densely prominent-reticulate, especially beneath; petiole 4–5 by 1.5–2 mm. *Racemes* axillary, laxly many-flowered, basal perulae few, subulate; rachis slender, set with fine spreading hairs and brownish muriculate glands as are all other outer parts of the inflorescence. Pedicels slender, 2–4 mm, bibracteolate at or above the middle. *Calyx* cup-shaped, tube subtruncate at base, hardly 1 mm, lobes acutely triangular, glandular-fimbriate and ciliolate. *Corolla* urceolate, pale yellow, pubescent and glandular-muriculate especially at the angles outside, quite glabrous inside, c. 4 by 2.5 mm, lobes hardly 1 mm. *Filaments* linear, glabrous at the base, subvillous above, c. 4 mm; anther-cells ovate, echinulate, c. 0.4 mm, with 2 distinct dorsal spurs; tubules narrow, 1 mm. *Disk* subdensely short-hairy. *Style* slender, laxly short-hairy for the lower $\frac{3}{4}$ part. *Berry* globose, apex crowned by the hairy disk, c. 5 mm ϕ .

Distr. *Malesia*: Borneo (Sarawak: summit area of Mt Api).

Ecol. In submontane forest on limestone hill, 915–1220 m. *Fl. fr.* July.

27. *Vaccinium leptanthum* MIQ. Ann. Mus. Bot. Lugd.-Bat. 1 (1863) 37; KOORD. Exk. Fl. Java 3 (1912) 12; J. J. S. in K. & V. Bijdr. 13 (1914) 146; SP. MOORE, J. Bot. 63 (1925) Suppl. 55; AMSH. in Back. Bekn. Fl. Java (em. ed.) 7 (1948) fam. 163, p. 2; SLEUM. *Blumea* 11 (1961) 20; *ibid.* 12 (1963) 125. — *Agapetes leptantha* (MIQ.) NIEDENZU, Bot. Jahrb. 11 (1889) 201, *in clavi*. — *V. acuminatissimum* MIQ. *f. leptanthum* (MIQ.) VUÏCK in Boerl. Handl. 2, 1 (1891) 263 ('*leptantha*'). — *Rigirolepis leptantha* (MIQ.) J. J. S. *Blumea* 1 (1935) 338.

See for further synonyms under the forms.

KEY TO THE FORMS

1. Leaves \pm lanceolate, the base cuneate. Pedicels very slender, (4–)5–6 mm long at anthesis

1. *f. leptanthum*

1. Leaves ovate-elliptic or elliptic, the base broadly attenuate. Pedicels stouter, (2–)3–4 mm long at anthesis.

2. Leaves 4.5–7.5 by 1.6–2.6 cm 2. *f. ellipticum*

2. Leaves 6–11 by (2.5–)3–4 cm 3. *f. malayanum*

1. *f. leptanthum*.

Small, usually epiphytic, much branched shrub; stem c. 50 cm long, up to 1.5 cm ϕ , base with a subglobular swelling c. 5 cm ϕ . Branchlets pendent, rather slender, \pm densely puberulous in the youngest, glabrescent, corticate and verrucose-lenticellate in the older parts. *Leaves* lax, lanceolate or oblong-lanceolate, apex rather abruptly acuminate or subcaudate (1–2 cm), often subfalcate, acute, base cuneate, the basal glands (one, or mostly two on each side) small, impressed on the edge in some distance from the petiole, thin-coriaceous, light green, somewhat shining above, mostly rather dull beneath, glabrous with age except some puberulence at the base or on the lower part of the midrib and the sparse appressed

short glandular hairs on both faces, entire, edge subrevolute in dry specimens, 4.5–9(–11) by 1.3–2.5 cm, 3(or faintly 5)-plinerved from the very base, midrib \pm deeply impressed, but prominent within the depression above, obtusely raised beneath, main nerves high ascending and slightly raised above, hardly so or often quite obscure beneath, other shorter nerves or veins rather numerous from the midrib, irregularly pinnate, forming a subdense, slightly prominent network above in young leaves, which becomes less visible in older, \pm dull leaves, reticulation in general \pm inconspicuous beneath, the whole undersurface practically smooth; petiole puberulous, (2–)3–5 by c. 1 mm. *Racemes* mostly solitary, rarely in twos, axillary, laxly 10–15-flowered, rather densely covered with a minute puberulence of very short eglandular and glandular hairs; rachis slender, 4–5.5 cm, with several subulate acuminate perulae, 3–4 mm. Pedicels slender to filiform, (4–)5–6 mm at anthesis, slightly accrescent in fruit; subtending bract ovate-acuminate, concave, ciliate, c. 1.5 mm; bracteoles subulate, c. 1 mm, inserted in the lower part of the pedicel. *Calyx* tube campanulate, in general more densely puberulous or glandular than the calyx lobes, 0.5 mm, lobes deltoid, acute, ciliate, 0.6 mm. *Corolla* urceolate or more ovoid-subglobose, yellow or cream, puberulous in the lower, \pm glabrescent in the upper half outside, 2–2.5 mm, lobes hardly 0.5 mm. *Filaments* linear, long-hairy, 0.7 mm; anther-cells broad-oblong, granular or papillose, 0.5 mm, with 2 distinct dorsal spurs; tubules narrow, almost 1 mm. *Disk* pubescent. *Style* glabrous, 2 mm. *Fruit* baccate, subovoid-globose, apex truncate, crowned by the persistent calyx lobes, puberulous, c. 3 mm ϕ , yellow to yellow-orange.

Distr. *Malesia*: S. Sumatra (possibly also in Central Sumatra), Malay Peninsula (Johore), Lingga Arch. (P. Lingga, P. Sebangka), West Java, Borneo (Sarawak, Brunei).

Ecol. Generally epiphytic on tall trees, occasionally also terrestrial (in Sarawak on limestone), apparently rare, 10–700 m. *Fl.* Jan.–Dec.

2. *f. ellipticum* (J. J. S.) SLEUM. Bot. Jahrb. 71 (1940) 168; *Blumea* 11 (1961) 21. — *Rigirolepis leptantha* (MIQ.) J. J. S. *f. elliptica* J. J. S. *Blumea* 1 (1935) 338. — *V. leptanthum* MIQ. *var. ellipticum* (J. J. S.) MASAM. En. Phan. Born. (1943) 575.

Leaves elliptic or ovate-elliptic, apex long and \pm abruptly acuminate, base broadly attenuate, 4.5–7.5 by 1.6–2.6 cm.

Distr. *Malesia*: Borneo (W. Borneo, Sarawak).

Ecol. Reported to grow epiphytically on mangrove near Kuching (Sarawak).

3. *f. malayanum* SLEUM. *Blumea* 11 (1961) 21. Leaves ovate-elliptic to elliptic, 6–11 by (2.5–) 3–4 cm. Pedicels rather robust, (2–)3–4 mm long at anthesis.

Distr. *Malesia*: Malay Peninsula (Pahang, Kelantan, Trengganu).

Ecol. Epiphytic at low altitude, occasionally on *Dipterocarpus oblongifolius*.

28. *Vaccinium flagellatifolium* COPEL. f. Philip. J. Sc. 42 (1930) 567; SLEUM. Blumea 11 (1961) 21. — *V. caudatifolium* MERR. J. Str. Br. R. As. Soc. n. 76 (1917) 103; En. Born. (1921) 466, non HAYATA, 1913. — *Rigiolepis caudatifolia* (MERR.) J. J. S. Blumea 1 (1935) 340. — *V. myrianthum* SLEUM. Bot. Jahrb. 71 (1940) 162.

Shrub or small tree, up to 5 m, epiphytic on tall trees, or woody liana climbing up to 20 m. Branchlets short-pubescent at the tips, early glabrescent and covered with greyish reddish, thin cork, lenticels sparse to rather numerous, elliptic, slightly raised. *Leaves* elongate-oblong to oblong-lanceolate, apex gradually or mostly subcaudate-acuminate (2–3 cm), subacute, base cuneate, slightly decurrent into the petiole, the 2 basal marginal glands in a short distance from the petiole, firmly subcoriaceous, glabrous besides sparse appressed glandular hairs underneath, shining above, entire, but very slightly or not revolute at the very margin, (9–)12–16 by (2–)2.5–3(–4) cm, 5–7-plinerved from and from a little above the base, midrib raised within a conspicuous depression above, much prominent beneath, main nerves slightly prominent above, faintly raised beneath, high ascending and anastomosing, several other much less distinct and shorter nerves in an acute angle from the midrib, equally steeply ascending, reticulation fine and dense, prominent on both faces in young, at least so beneath in older leaves; petiole somewhat flattened, 2–3(–4) by c. 1.5 mm, glabrous. *Racemes* axillary, mostly 2 or 3 in a fascicle, rarely solitary, laxly 8–15-flowered, covered with a fine brownish puberulence of non-glandular and less numerous glandular hairs in all parts except the corolla; rachis (very) slender, 3.5–5 cm, with several subulate perulae, 2–3 mm. *Pedicels* (sub)filiform, 4–6 mm at anthesis, accrescent up to 8 mm in fruit, subtending bracts narrowly ovate-acuminate, 2(–3) mm, bracteoles subulate, borne on the lower half of the pedicel, c. 1.5 mm. *Calyx* tube broadly campanulate, hardly 0.5 mm, lobes a little spreading, triangular, subacute, 0.7–1 mm. *Corolla* ovoid- or subglobular-urceolate, c. 2 mm, glabrous, (pale) yellow, lobes 0.5 mm. *Filaments* linear, hairy, 0.6 mm; anther-cells inflated, granular, 0.5 mm, minutely 2-spurred dorsally; tubules slender, 0.8 mm. *Disk* glabrous or very shortly pubescent. *Style* glabrous, c. 2 mm. *Fruit* baccate, subglobose, apex \pm truncate, c. 3 mm σ , glabrous except the top, said to be bright yellow.

Distr. Malesia: Borneo (W. and E. Borneo, Sarawak).

Ecol. In forest, along river bank, from low elevation up to 400 m.

29. *Vaccinium adenopodum* SLEUM. Blumea 11 (1961) 21.

Shrub. Branchlets terete, with numerous sub-

orbicular lenticels in the older, pubescent in the younger parts. *Leaves* lanceolate, caudate-acuminate at the apex for 1.5–2 cm, acute, base more broadly or narrowly cuneate into the petiole, not decurrent, the pair of basal glands distinct, though generally not properly prominent, found very near the end of the petiole, coriaceous, glossy on both sides, glabrous, with minute sparse blackish glandular points on the undersurface, entire, edge a little recurved in dry specimens, 10–15 by 3–4 cm, 5(–7)-plinerved, main nerves from and up to 1.5 cm above the base, much impressed above as is the midrib, rather prominent beneath, other lateral nerves or veins pinnately from the upper $\frac{2}{3}$ of the midrib, but slightly conspicuous, reticulation rather lax above, more dense beneath, raised on both sides; petiole transversely rugulose, 5–6(–7) by c. 1 mm; stipule-like perulae in the upper sterile axils subulate, 2–3 mm. *Racemes* both from the foliate and lower defoliate axils, suberect, all over densely 12–15 (–20)-flowered, 2–3.5 cm long, subdensely very shortly brownish-pubescent and -glandular in all parts, the corolla excepted; rachis rather robust, almost 1 mm across the base, which bears several subulate, 2–3 mm long perulae. *Pedicels* rather stoutish, (2–)3–4 mm, basal bract ovate-acuminate, c. 2 mm, subulate bracteoles 1–1.5 mm, inserted \pm in the middle of the pedicel, rather early caducous. *Calyx* tube campanulate, 0.7 mm, lobes narrowly ovate-acuminate, c. 1 mm, with a minute apical gland. *Corolla* subcylindric-urceolate, slightly 5-angular, faintly pubescent at the angles outside, otherwise glabrous, yellow, 2 by 1.5 mm, shortly 5-lobed. *Stamens* 8; filaments linear, subdensely hairy, 1 mm; anther-cells 0.3–0.4 mm, dorsal spurs short; tubules c. 0.5 mm. *Disk* glabrous, though the cavity bears some hairs within. *Style* slender, glabrous, c. 2.5 mm.

Distr. Malesia: Central Borneo (P. Sepandan near Kapuas Lakes), once found.

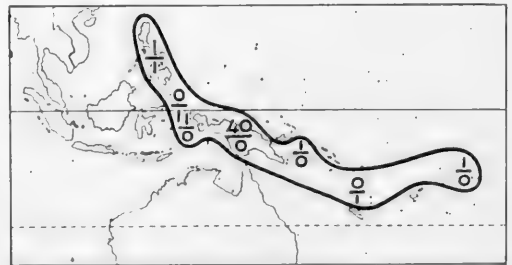


Fig. 90. Distribution of *Vaccinium* sect. *Oarianthe*. The number above the hyphen indicates the number of endemic species, that below the hyphen the number of non-endemic species in each island or district.

4. Section *Oarianthe*

SCHLTR, Bot. Jahrb. 55 (1918) 169; COPEL. f. Philip. J. Sc. 42 (1930) 599; SLEUM. Bot. Jahrb. 71 (1941) 418; *ibid.* 72 (1942) 221; Blumea 11 (1961) 22. — Fig. 90–93.

Inflorescence reduced to a single axillary flower. Peduncle, if any, very short, articulated with the pedicel which bears two or several small bracts (bracteoles) at the base. *Corolla* of various shape. Anthers whether or not 2-spurred dorsally; tubules short in general, transversely or obliquely cut at the apex. *Leaves* generally small to very small.

Distr. In all 46 *spp.*, of which 1 *sp.* in Samoa, and 1 *sp.* in the Solomon Is.; in *Malesia* (Philippines, Moluccas and New Guinea) 44 *spp.*, one of which extends to the New Hebrides. Fig. 90.

KEY TO THE SPECIES

1. Leaves entire, or with 1 (rarely 2 or 3, very rarely 4) depressed marginal glands irregularly set on each side, not properly regularly crenate or crenulate.
 2. Corolla villous all over outside 30. *V. villosiflorum*
 2. Corolla laxly (and only partly) hispidulous- or glandular-hairy, or muriculate, or mostly glabrous outside (the lobes sometimes ciliate).
 3. Anthers (cells plus tubules) markedly longer than the filaments (which are glabrous).
 4. Leaves ovate to ovate-elliptic, base subtruncate-rounded, 4-7(-9) by 3-5 mm. Corolla 6-7 mm. 31. *V. densifolium*
 4. Leaves elliptic, base attenuate into the petiole, 5-8 by 3-4 mm. Corolla 4 mm 32. *V. sparsicapillum*
 3. Anthers (cells plus tubules) rarely as long as, mostly shorter than the filaments (which are hairy or at least sparsely so at the base, except in 59. *V. microphyllum*).
 5. Flowers sessile or nearly so, *i.e.* pedicel plus peduncle, if any, rarely up to 2 (very rarely 3) mm at anthesis.
 6. Calyx epilose dorsally, glabrous or may be provided with some muriculate glands.
 7. Leaves elliptic to ovate- or oblong-elliptic, base broadly attenuate to rounded.
 8. Leaves 0.8-1.5(-2) by 0.5-0.8(-1) cm 33. *V. finisterrae*
 8. Leaves 0.4-0.8(-0.9) by 0.3-0.5 cm.
 9. Filaments glabrous.
 10. Disk and style glabrous. A form with subtire leaves of 69. *V. amblyandrum* var. *amblyandrum*
 10. Disk and style hairy 49. *V. bodenii*
 9. Filaments hairy 34. *V. haematochrom*
7. Leaves ± obovate, base short- or long-cuneate.
 11. Leaves 0.6-1.4 cm wide.
 12. Leaves 1.4-3 by 0.7-1.4 cm. Corolla depressedly subglobose-urceolate, *i.e.* much constricted apically, *c.* 5 by 4-5 mm 67. *V. pullei*
 12. Leaves 1-1.5 by 0.6-0.9(-1) cm. Corolla subcylindric-urceolate, *c.* 7 by 3 mm 35. *V. brachycladum*
 11. Leaves 0.3-0.6(-0.7) cm wide.
 13. Leaves narrow-obovate, base ± long-cuneate, 1-1.5(-1.7) by 0.4-0.5(-0.7) cm 36. *V. hatamense*
 13. Leaves obovate, sometimes suborbicular-obovate, base short-cuneate, (0.4-)0.5-1 by 0.3-0.6(-0.7) cm.
 14. Style glabrous. Filaments glabrous or very sparsely hairy. Calyx rugulose 37. *V. parvulifolium*
 14. Style densely subappressedly hairy to the lower 2/3. Filaments subdensely hairy below. Calyx smooth 38. *V. scyphocalyx*
6. Calyx ± densely hairy or hirsutulous dorsally.
 15. Corolla depressedly ovoid- or subglobose-urceolate.
 16. Corolla 3.5 by 3 mm. Leaves elliptic or oblong-obovate to obovate, (0.7-)1-2.3 by (0.6-)0.8-1 cm 39. *V. versteegii*
 16. Corolla *c.* 8 by 6 mm. Leaves ovate to elliptic-ovate, (0.8-)0.9-1.2(-1.3) by (0.5-)0.6-0.8 cm. 46. *V. culminicolum*
 15. Corolla narrowly ovoid- or subconical-urceolate (at least 5 mm).
 17. Corolla narrowly ovoid-urceolate, 5-6 mm. Leaves obovate to elliptic-obovate, 0.8-1.3 by (0.3-)0.4-0.7 cm 40. *V. myrsinoides*
 17. Corolla narrowly ovoid-conical, 7-8(-9) mm. Leaves obovate, 0.7-1 by 0.5-0.7 cm 41. *V. convexifolium*
5. Flowers distinctly stalked (pedicel plus peduncle generally at least 3 mm).
 18. Leaves widest at or below the middle, *i.e.* never distinctly obovate.
 19. Calyx (tube and lobes) dorsally puberulous or mostly ± densely hairy or almost hispidulous at least at anthesis (sometimes ± glabrescent in fruit).
 20. Leaves narrow-oblong (0.9-1.8 by 0.2-0.4 cm). 42. *V. taxifolium*

20. Leaves ovate to elliptic, or sometimes oblong, subobovate-oblong or subobovate-elliptic.
21. Leaves 2.5–4.3 by 0.8–1.8 cm.
22. Leaves oblong-elliptic, 2.5–3 by 0.8–1 cm. Corolla ovoid-urceolate, 5(–6) by c. 3 mm. **43. *V. wondiwoiense***
22. Leaves elliptic or ovate-lanceolate, 2.5–4.3 by 1–1.8 cm. Corolla subglobular-urceolate, c. 7 by 5 mm **44. *V. schultzei***
21. Leaves up to 2 by 1 cm.
23. Leaves prominently veined beneath (ovate to ovate-elliptic, rarely elliptic, (0.7–)1–2 by (0.4–)0.5–0.9(–1) cm). **45. *V. cyclopense* f. *cyclopense***
23. Leaves not or hardly veined beneath.
24. Leaves ovate to elliptic-ovate, base rounded to subcordate, 0.8–1.3 by (0.5–)0.6–0.8 cm. Pedicels 2–3 mm **46. *V. culmicolum***
24. Leaves elliptic or subovate- or subobovate-elliptic, base rounded to broadly attenuate or cuneate. Pedicels 5–8(–9) mm.
25. Leaves 1–1.5(–2) by 0.6–0.8(–1) cm, edge thickened and much revolute. **58. *V. oranjenae* var. *marginellum***
25. Leaves 0.5–1.2(–1.4) by (0.3)0.4–0.5(–0.6) cm, edge not thickened, slightly revolute below, or mostly quite flat **61. *V. leptospermoides* f. *leptospermoides***
19. Calyx (tube and lobes) dorsally epilose (lobes sometimes ciliate or fimbriate, or with an apical tuft of hairs), or may be provided with some muriculate glands, or quite glabrous.
26. Leaves (narrow-)lanceolate to subelliptic- or oblong-lanceolate, or narrow-oblong, up to c. 3 mm wide.
27. Leaves obtuse at the apex, (0.7–)1(–1.2) by 0.2–0.3 cm **47. *V. piceifolium***
27. Leaves subacute at the apex.
28. Leaves 0.7–1 by c. 0.3 cm. Pedicel 3–4 mm. A form with subentire leaves of **72. *V. prostratum***
28. Leaves 0.6–1.1 by c. 0.2 cm. Pedicel 5–6(–7) mm **48. *V. pugionifolium***
26. Leaves ovate to elliptic, sometimes oblong-elliptic or oblong-ovate. Leaves generally (at least partly) wider than 3 mm in the same specimen.
29. Disk \pm densely, rarely more laxly set with long \pm erect hairs.
30. Pedicels (2–)3 mm. (Leaves ovate-elliptic to elliptic, 0.6–1 by (0.3–)0.4–0.5 cm). **49. *V. bodenii***
30. Pedicels at least 4 mm.
31. Leaves 4–6.3 by 1.5–2.5 cm (ovate-elliptic or elliptic-oblong) **50. *V. absconditum***
31. Leaves up to 1.8 by 0.8 cm (elliptic or oblong-elliptic).
32. Leaves 0.7–1 by 0.4(–0.5) cm. Corolla c. 5 mm **51. *V. ceramense***
32. Leaves 0.8–1.5(–1.8) by 0.4–0.6(–0.8) cm. Corolla 6–7 mm.
33. Branchlets angular. Corolla urceolate, 6–7 by 3–4 mm **52. *V. whiteanum***
33. Branchlets terete. Corolla ovoid-urceolate, 7–8 by c. 7 mm **53. *V. igneum***
29. Disk quite glabrous.
34. Style hairy at least in the lower half. (Leaves elliptic to narrow- or oblong-elliptic, 0.7–1.3(–1.4) by (0.3–)0.4–0.6(–0.7) cm. Corolla 6–7 mm) **54. *V. sororium***
34. Style quite glabrous.
35. Leaves 2.5–4.3 by 1–1.8 cm (elliptic or ovate-lanceolate) **44. *V. schultzei***
35. Leaves up to 2 by 1.2 cm.
36. Leaves 4–6(–7) by 3–4 mm (ovate to elliptic, sometimes oblong-ovate or -elliptic).
37. Corolla 6–8 by 4–6 mm. Pedicel 6–9 mm. **55. *V. decumbens***
37. Corolla 5 by 2.5–3 mm. Pedicel 2–3 mm **34. *V. haematochroum***
36. Leaves all or at least partly exceeding 6 by 4 mm in the same specimen.
38. Leaves (0.6–)0.7–1 (rarely and but partly –1.4) by (0.3–)0.4–0.5 cm.
39. Leaves thick-coriaceous. Corolla and calyx laxly glandular-muriculate outside. **56. *V. crassiflorum***
39. Leaves coriaceous to subcoriaceous, less stiff. Corolla and calyx practically glabrous outside.
40. Leaves subovate- or elliptic-oblong, base broadly attenuate to rounded. **57. *V. oreomyrtus***
40. Leaves subobovate-elliptic, base cuneate **61. *V. leptospermoides* f. *glabrum***
38. Leaves larger in general or at least for their greater number in the same specimen, (0.6–)0.8–2.2 by (0.4–)0.6–1(–1.2) cm.
41. Leaves coriaceous and \pm stiff, edge markedly revolute, veins and veinlets obscure. (Corolla ventricose-urceolate, (6–)7–9 by 5–6 mm below, 3–4 mm distally; filaments laxly long-hairy below) **48. *V. oranjenae* var. *oranjenae***
41. Leaves chartaceous to subcoriaceous, edge flat or but slightly revolute, veins and veinlets generally visibly raised beneath.

42. Pedicels slender. Corolla subglobose-urceolate, apex much contracted, 4-5(-6) by 3-4 mm below, or 1.5-2 mm distally; filaments glabrous or practically so.
59. *V. microphyllum*
42. Pedicels rather stoutish. Corolla subglobose-urceolate, 6-8(-9) by 5 (sometimes -7) mm; filaments (very) laxly hairy below. 45. *V. cyclopense f. glabrum*
18. Leaves widest above the middle, *i.e.* properly obovate or at least oblong-obovate.
43. Leaves with 1(-2)-3(-4) \pm deeply sunken marginal glands on each side, and thus seemingly remotely crenulate, the glands distributed over \pm whole length of the margin (if one gland only, then found \pm in the middle of the margin, not near the petiole), (0.4-)-0.6-1.2 by 0.2-0.4(-0.5) cm. Calyx and disk glabrous. Pedicels glabrous or laxly hairy 60. *V. globosum*
43. Leaves with 1(-2) pairs of \pm basal, much less or not impressed marginal glands (which occur generally within the section, but are sometimes minute and hardly visible), found near to or in a (rather) short distance from the petiole (never in the middle or upper half of the margin).
44. Calyx \pm densely short-hairy or subhirsute dorsally.
45. Disk glabrous. Pedicels hairy 66. *V. lorentzii f. puberulum*
45. Disk hairy, Pedicels glabrous or practically so.
46. Leaves 0.8-1.5(-1.8) by (0.2-)-0.3-0.5(-0.6) cm 61. *V. leptospermoides f. leptospermoides*
46. Leaves 1-2 by 0.7-1(-1.3) cm 62. *V. vonroemeri*
44. Calyx (and disk) glabrous.
47. Pedicels hairy. (Filaments barbate or nearly villous in the middle. Corolla glabrous inside, *c.* 4 by 3 mm) 63. *V. barbatum*
47. Pedicels glabrous (or very laxly glandular-muriculate. Corolla pubescent inside).
48. Filaments quite glabrous. (Peduncle plus pedicel 8-10 mm) 64. *V. inconspicuum*
48. Filaments laxly to densely hairy.
49. Leaves 0.8-1.5(-1.8) by (0.2-)-0.3-0.5(-0.6) cm.
50. Branchlets puberulous. Pedicels slender, 6-8 mm 61. *V. leptospermoides f. glabrum*
50. Branchlets quite glabrous. Pedicels rather stoutish, 3.5-5 mm 65. *V. sanguineum*
49. Leaves (1.2-)-1.4-3(-3.8) by 0.7-1.3(-1.6) cm.
51. Peduncle plus pedicel 3-4(-5) mm. Flowers 6-7-merous. Style bottle-shaped.
66. *V. lorentzii f. lorentzii*
51. Peduncle plus pedicel 1(-2) mm. Flowers 5-merous. Style columnar 67. *V. pullei*
1. Leaves distinctly and regularly (equidistantly) crenate or subserrate-crenulate over the whole margin or at least in its upper half.
52. Flowers subsessile. Peduncle plus pedicel up to 2(-2.5) mm, \pm stoutish (not or hardly elongate in fruit).
53. Corolla subcylindric-urceolate, (6-)-7(-8) by 2.5-3(-4) mm. (Leaves narrowly obovate or elliptic-, or more rarely oblong-obovate, apex obtuse to rounded, base \pm cuneate.) 68. *V. whitfordii*
53. Corolla broad-urceolate, (4-)-5 by 3(-3.5) mm 69. *V. amblyandrum*
52. Peduncle plus pedicel (3-)-4-6 mm, rather stoutish or mostly slender.
54. Style laxly hairy in the lower part. Filaments *c.* 4.5 mm. Leaves oblong-elliptic, (0.9-)-1-1.5 by 0.5-0.7 cm. 70. *V. evanidinervium*
54. Style quite glabrous. Filaments up to 3 mm. Leaves 0.4-1 by 0.2-0.4 cm.
55. Leaves elliptic or ovate-elliptic, apex \pm obtuse, 4-6(-7) by 2.5-4 mm, nerves practically obsolete.
71. *V. coelorum*
55. Leaves \pm lanceolate, apex subacute, 5-7(-10) by 2-3(-3.5) mm, nerves generally raised beneath.
56. Pedicel 3-4 mm. Corolla white or pink 72. *V. prostratum*
56. Pedicel 5-6 mm. Corolla red 73. *V. wollastonii*
30. *Vaccinium villosiflorum* J.J.S. in Gibbs, Arfak (1917) 171; SLEUM. Bot. Jahrb. 72 (1942) 228; KANEH. & HATUS. Bot. Mag. Tokyo 56 (1942) 482; SLEUM. Blumea 11 (1961) 26; *ibid.* 12 (1963) 125. — *V. pilosiflorum* J. J. S. in Gibbs, Arfak (1917) 172; Nova Guinea 18 (1936) 110; KANEH. & HATUS. Bot. Mag. Tokyo 56 (1942) 482; SLEUM. Bot. Jahrb. 72 (1942) 228; Blumea 11 (1961) 26.
- Shrub, generally terrestrial, rather many-stemmed and dense, on wind-swept summits even compact, with numerous \pm erect branches, or few-stemmed with overhanging elongate branches, sometimes epiphytic with long pendent branches, (0.3-)-0.5-1.5 (as epiphyte up to 3) m. Branches much ramified distally. Branchlets subvillous in the younger, glabrescent in the older parts. Leaves rather densely arranged, elliptic or mostly ovate-
- elliptic with a short blunt acumen in the terrestrial forms, elliptic-ovate to ovate, rarely elongate-ovate and often with more elongate, sometimes even subcaudate acumen in the epiphytic state, base \pm rounded, the pair of marginal glands in a short distance from the petiole, distinct, dark, slightly impressed, green to glaucous-green above, paler beneath, flush pink, coriaceous and \pm convex above in the terrestrial, subcoriaceous and flattish in the epiphytic form, subdensely to laxly hairy on both faces initially, glabrescent to various degree with age, tardily so at the base and on the petiole, furthermore laxly set with short brownish glandular hairs beneath, entire, edge \pm revolute, 1-2.5(-4) by 0.6-1.5(-2) cm, midrib slightly raised above, prominent beneath, nerves 1-2(-3) pairs, curved-ascending, slightly prominent on both faces

as are the upper shorter nerves or veins, reticulation lax, rather coarse, sometimes subobscure especially beneath; petiole 1.5–3 by 1 mm, on a rather thick leaf-cushion. *Flowers* axillary, generally solitary or rarely in twos, very rarely forming a short terminal 3–4-flowered raceme when the upper flowerbearing leaves are much reduced. Peduncle generally very short or none. Pedicels villous, slender, 1–2(–3) mm, with several imbricate, oblong, brownish, ciliate, otherwise glabrous perulae, 1–2(–3) mm. *Calyx* green, villous, tube broadly subobconical, 1.5–2 mm, limb spreading, 1 mm, cut into 5 triangular lobes to almost the base. *Corolla* ovoid-urceolate, fleshy, carmine to pink, deeper coloured at the lobes, villous all over outside, laxly hairy especially in the upper part inside, (6–)7–9 by 3–4 mm, lobes ovate, finally recurved, 1–1.5 mm. *Filaments* dilated and laxly to subdensely hairy above the base, gradually narrower and glabrescent upwards, 3–4 mm; anther-cells oblong, echinulate, 1.5–1.7 mm; tubules almost as wide as the cells, 0.7–0.8 mm, subobliquely cut distally. *Disk* laxly to densely set with longish erect hairs, rarely glabrous. *Style* columnar, glabrous, 5–5.5 mm. *Fruit* a subglobose, apically truncate, soft, pale violet berry, c. 6 mm ϕ . *Seeds* brownish, densely finely striate, 1 mm.

Distr. *Malesia*: New Guinea (Arfak Mts).

Ecol. Terrestrial with erect or overhanging branches and elliptic to ovate-elliptic, \pm coriaceous leaves in edge of forest and in summit scrub, \pm open places, epiphytic with longer, pendent branches, softer, more ovate and subcaudate leaves in mossy forest, 1200–2600 m, locally plentiful. *Fl. fr.* Jan.–Dec.

31. *Vaccinium densifolium* J. J. S. Med. Rijksherb. n. 25 (1915) 9; Nova Guinea 12 (1917) 525; *ibid.* (1918) t. 214; SLEUM. Bot. Jahrb. 72 (1942) 228; Blumea 11 (1961) 28.

Low, erect, much branched shrub, up to 1.2 m. Branchlets abbreviate, densely short-hairy or almost hirsutulous at the young and densely foliate, glabrescent and dark-corticate at the older, \pm defoliate parts. *Leaves* subpatent, ovate to ovate-elliptic, gradually attenuate towards the blunt apex, base subtruncate-rounded, the two marginal basal glands thick, blackish and at some distance from the petiole, coriaceous and firm, \pm convex above in dry specimens, entire, somewhat recurved at the edge, glabrous above, laxly set with dark, appressed, glandular hairs or bristles beneath initially, finally laxly punctate, 4–7(–9) by 3–5(–7) mm, midrib and often 2–3 pairs of curved-ascending nerves faintly sunken above, rather or quite obsolete beneath; petiole 1–2 mm, pubescent. *Flowers* axillary, solitary, nodding. Peduncle 0. Pedicel rather robust, laxly to subdensely short-pubescent, moreover at the base laxly, towards the apex more densely set with short, thickish, glandular hairs, 3–4 mm at anthesis, basal bracts several, glabrous, 1–2 mm. *Calyx* subcampanulate, glabrous, or mostly slightly hairy at the very base, rugulose, a little shining, tube 5-angular, 2 mm, limb spreading,

lobes triangular, subacute, ciliate, c. 1 mm. *Corolla* subovoid-urceolate, slightly 5-angular initially, contracted distally, glabrous outside, laxly long-hairy in the upper $\frac{3}{4}$ inside, fleshy, red, 6–7 by 2.5–3 mm, lobes a little recurved, obtuse, pale yellow or white, 1 mm. *Filaments* linear-subulate, \pm wavy, glabrous, c. 2 mm; anther-cells oblong, base incurved and very shortly 4-lobed, echinulate, 1.5 mm; tubules cylindrical, erect, a little divergent, slightly widened and recurved at the opening, obliquely truncate, 1.5 mm. *Disk* glabrous. *Style* glabrous, 4.5 mm. *Berry* said to be blue.

Distr. *Malesia*: New Guinea (Oranje and Hubrecht Mts, Mt Wilhelmina).

Ecol. Locally abundant in marginal shrubberies of subalpine forest, 3100–3800 m. *Fl.* Febr., Aug.–Sept.

32. *Vaccinium sparsicapillum* SLEUM. Blumea 11 (1961) 28.

Small shrub. Branchlets dense, tips angular, patent-puberulous and laxly minutely verrucose, older parts glabrescent. *Leaves* dense, elliptic, apex obtusely attenuate or rounded, base narrowed into the petiole, the 2 basal marginal glands a little impressed and distant from the petiole, coriaceous, glabrous above, laxly set with appressed glandular hairs beneath, entire, flat, margin slightly or not revolute, 5–8 by 3–4 mm, midrib \pm impressed above, hardly prominent beneath, nerves in 2–3 pairs, obsolete above, minutely raised or sometimes scarcely visible beneath; petiole rather slender, early glabrescent, (1–)2 mm. *Flowers* solitary, remote in the upper axils. Pedicels rather slender, glabrous or muriculate especially below the calyx, (2–)3–4 mm, base hidden by several ovate-oblong, concave bracts, 1.5 mm. *Calyx* glabrous, tube obconical, 2 mm, limb spreading, 1.3 mm high, deeply partite into 5 broad-triangular, subacute, not ciliate lobes. *Corolla* urceolate, rather fleshy, probably red, glabrous outside, laxly long-hairy in the upper $\frac{2}{3}$ inside, 4 by c. 2.5 mm. *Filaments* linear, glabrous, 1.3 mm; anther-cells oblong, echinulate, c. 1.3 mm; tubules much narrower than the cells, erect, 0.8 mm, the pore oblique, rather small, not dilated distally. *Disk* glabrous. *Style* subclavate, glabrous, 2.5 mm.

Distr. *Malesia*: West New Guinea (Wissel Lakes region), once found, 1800–2900 m. *Fl.* Aug.

33. *Vaccinium finisterrae* SCHLTR, Bot. Jahrb. 55 (1918) 169, f. 9; SLEUM. *ibid.* 72 (1942) 226; Blumea 11 (1961) 26; *ibid.* 12 (1963) 125. — *V. sessiliflorum* SCHLTR, Bot. Jahrb. 55 (1918) 170. — *V. parvulifolium* (non F. v. M.) DIELS, *ibid.* 62 (1929) 488. — *V. haemanthum* SLEUM. *ibid.* 72 (1942) 226.

Low epiphytic (0.4 m) or erect terrestrial, 0.6–1.5(–2.5) m, much branched shrub. Branchlets slender, tips subterete and \pm densely clad with short spreading hairs and some sparse club-shaped glandular hairs, early glabrescent, older parts greyish corticate. *Leaves* rather dense, elliptic to

ovate- or oblong-elliptic, apex obtuse to rounded, base \pm broadly attenuate to rounded, with a pair of minute marginal glands in a rather long distance from the petiole, subcoriaceous and quite glabrous with age besides some glandular hairs or points on the undersurface, entire, edge subrevolute, 0.8–1.5(–2) by 0.5–0.8(–1) cm, nerves and reticulation slightly raised on both sides, or not rarely \pm obsolete; petiole 0.5–1(–2) mm, pubescent initially. *Flowers* solitary and remote in the upper axils, sessile or almost so. Peduncle 0. Pedicel stoutish, glabrous, up to 1.5 mm, \pm hidden by several ovate, obtuse, ciliate bracts. *Calyx* glabrous, tube obconical-campanulate, 2–2.5 mm, lobes broadly ovate-subacuminate, ciliate, *c.* 1 mm. *Corolla* broadly ovoid-urceolate, contracted apically, rather fleshy, pale pink to blood-red, (4–)5–6(–7) by (2.5–)3–4 mm, glabrous outside, hairy within the upper third inside, lobes 1–1.5 mm. *Filaments* narrow-linear, laxly hairy in the lower part to almost glabrous, 2–3 mm; anther-cells oblong, *c.* 1 mm, with 2 very short or obscure dorsal spurs; tubules nearly as wide as cells, hardly 0.5 mm, \pm obliquely cut apically. *Disk* glabrous. *Style* rather thick, glabrous or laxly subpatently hairy, 3–4(–5) mm. *Fruit* subglobose, truncate at the apex and crowned by the \pm inflexed short calyx lobes, 3–4 mm ϕ .

Distr. Malesia: East New Guinea (Star Mts: Mt Sirius; Hunstein, Finisterre and Saruwaged-Rawlinson Mts, Mt Amungwiwa S. of Wau, Wharton Ra., Southern Highlands Distr. and Mt Victoria region).

Ecol. Mostly epiphytic in moss forest or alpine scrub, or terrestrial on forest borders, in *Miscanthus* grass swamp or in open hill side, (1050–) 2000–3500(–3600?) m. *Fl. fr.* Jan.–Dec.

Vern. Ant, walakamp, Mendi.

34. *Vaccinium haematochrom* SLEUM. Blumea 12 (1963) 126.

Semiprostrate or decumbent, few-branched shrublet, up to 35 cm. Branchlets slender, densely leaved youngest parts and petioles set with a few long white hairs, older ones quite glabrous. *Leaves* elliptic, apex and base broadly attenuate to almost rounded, the basal pair of marginal glands small and impressed above the base, 5–7 by 3–4 mm, glabrous except scattered minute glandular hairs beneath, entire, nerves and one pair of basal and one pair of upper curved-ascending nerves rather obscure above, slightly prominent beneath; petiole 1–1.5 mm. *Flowers* solitary. Peduncle 0. Pedicel nodding, slender, glabrous or with a few glandular subpatent hairs distally, 2–3 mm. *Calyx* glabrous, tube subcylindric, base truncate, 0.6 mm, lobes deltoid, 0.8 mm, the apical gland small. *Corolla* ovoid-urceolate, much attenuate upwards, glabrous outside, laxly hairy in the upper half inside, blood red, fleshy, *c.* 5 by 2.5–3 mm below, lobes hardly 1 mm. *Filaments* linear, laxly subpatently longish white-hairy in the lower third, 2.5 mm; anther-cells broad-oblong, echinulate, *c.* 1.4 mm including the equally wide, very short tubules. *Disk* thick, glabrous. *Style*

slenderly columnar, glabrous, 3.5 mm.

Distr. Malesia: West New Guinea (Wissel Lakes), once found.

Ecol. In apparently secondary forest on stony sand derived from white sandstone, at 1820 m, locally common. *Fl.* May.

Vern. Ukwa-piepa, Kapauku.

35. *Vaccinium brachycladum* SLEUM. Blumea 11 (1961) 26.

Terrestrial shrub, 1–1.5 m, densely branched distally. Branches 4–5 mm ϕ . Branchlets brown, angular, 1–1.5 mm ϕ , subdensely shortly patent-hairy. *Leaves* dense, obovate or elliptic-obovate, apex almost rounded and not rarely a little retuse, \pm broadly cuneate into the petiole, the 2 basal marginal glands small, found in 1–2 mm distance from the petiole, coriaceous, laxly appressedly glandular-muriculate beneath, glabrous otherwise, entire, submarginate, 1–1.5 by 0.6–0.9(–1) cm, edge flat, midrib slightly impressed above, or prominent beneath, nerves in 2–3 basal and suprabasal pairs, obscure above, not much conspicuous beneath, no reticulation; petiole thickish, pubescent initially, *c.* 2 mm. *Flowers* solitary in the upper axils, sessile, nodding, surrounded at the base by several narrow-deltoid, glabrous, ciliate bracts, *c.* 2 mm. *Calyx* glabrous, tube campanulate, *c.* 2 mm, lobes triangular, bluntish, ciliate especially distally, 1.5 mm. *Corolla* subcylindric-urceolate, *c.* 7 mm long, 3 mm ϕ at the base, 2 mm ϕ at the opening, red, fleshy, glabrous outside, laxly hairy at the mouth inside, lobes erecto-patent, 1.3 mm. *Filaments* linear, laxly hairy below, glabrous upwards, wavy, 1.2–1.5 mm; anther-cells oblong, 1 mm; tubules nearly as wide as the cells, 0.5 mm, obliquely cut distally. *Disk* glabrous. *Style* columnar, glabrous, *c.* 7 mm.

Distr. Malesia: Central New Guinea (Star Mts: on Mt Antares), 3000 m. *Fl.* July.

36. *Vaccinium hatamense* BECC. Malesia 1 (1878) 210; SLEUM. Bot. Jahrb. 72 (1942) 226; Blumea 11 (1961) 27; *ibid.* 12 (1963) 125.

Epiphytic or terrestrial, often trailing shrublet, 30–50 cm. Branchlets angular at the slightly puberulous or almost glabrous tips. *Leaves* narrow-obovate, apex rounded or not rarely sub-emarginate, base \pm long cuneate and somewhat decurrent into the petiole, with a minute depressed marginal gland on each side a little above the very base, coriaceous, glabrous, entire, marginate, edge faintly recurved, 1–1.5(–1.7) by 0.4–0.5(–0.7) cm, midrib and nerves obsolete above, hardly visible beneath; petiole *c.* 1 mm. *Flowers* sparse, solitary in the upper axils, quite glabrous in all outer parts. Peduncle 0. Pedicel 1–1.5 mm, with several scarios, ovate, subacuminate basal bracts, 0.8 mm. *Calyx* tube obconical, 1.5 mm, lobes triangular, subacute, not ciliate, 1.5 mm. *Corolla* ventricose, much attenuate distally, *c.* 4 by 3.5 mm, sparsely glandular outside, hairy in the upper third inside, pinkish red, lobes whitish. *Stamens* 8; filaments filiform, rather villous, 2 mm; cells oblong, not spurred, *c.* 1 mm; tubules nearly as

wide as the cells, 0.5 mm, opening by wide sub-oblique slits. *Disk* glabrous. *Style* glabrous, equaling the corolla.

Distr. *Malesia*: New Guinea, known from the Vogelkop Peninsula (Arfak Mts, Nettoti Ra.) and the Wissel Lakes region; sterile specimens with similar leaves found in the Gauttier and Cycloop Mts.

Ecol. In heath or summit vegetation, also epiphytic in moss forest, locally common, 1525–2150 m. *Fl.* Jan.–Dec.

37. *Vaccinium parvulifolium* F. v. M. Trans. R. Soc. Vict. 1, 2 (1889) 20; SLEUM. Bot. Jahrb. 72 (1942) 235; Blumea 11 (1961) 27.

Epiphytic, small, dense shrub. Branchlets in the youngest parts subangular, puberulous and minutely verruculose. *Leaves* dense, obovate, sometimes suborbicular-obovate, apex rounded or faintly emarginate, base \pm cuneate, the 2 basal marginal glands distant from the petiole, coriaceous, pale, \pm shiny, convex above in dry specimens, glabrous, entire, margin slightly cartilaginous, but little or not revolute, (0.4–)0.5–0.7(–0.8) by 0.3–0.5 cm, midrib rather obscurely sunken above, or raised beneath, nerves subinconspicuous; petiole puberulous, slender, *c.* 2 mm. *Flowers* solitary, axillary, nodding. Peduncle 0. Pedicels *c.* 2 mm in anthesis, sometimes up to 3 mm in fruit, rather stoutish, glabrous, basal bracts several, minute. *Calyx* subcampanulate, quite glabrous, shining, rugulose in dry specimens, tube 2.5 mm, lobes suberect, deltoid, subacute, slightly inflexed, not ciliate, *c.* 1 mm. *Corolla* urceolate, rather thin, cream, *c.* 4 by 2.5 mm, very laxly muriculate outside, laxly hairy inside, lobes suberect, *c.* 1 mm. *Filaments* linear, glabrous or but very sparsely hairy, 1.5 mm; anther-cells broad-oblong, *c.* 0.7 mm, slightly granular, distinctly 2-spurred dorsally (0.2–0.3 mm); tubules slightly curved, narrower than the cells, \pm transversely cut apically, 0.5 mm. *Disk* glabrous. *Style* columnar, glabrous, 3 mm. *Fruit* ovoid-subglobose, apex truncate, seen up to 3 mm ϕ , said to be yellowish.

Distr. *Malesia*: New Guinea, only known from the Owen Stanley Ra. (Mt Musgrave, Mt Tafa).

Ecol. Epiphyte in ridge forest trees, 2135–2440 m. *Fl.* May–Sept.

38. *Vaccinium scyphocalyx* SLEUM. Blumea 11 (1961) 27.

Epiphytic shrublet. Branches much divided distally, terete, laxly pubescent, glabrescent, 2–3 mm ϕ . Branchlets subangular, patently hairy, slender. *Leaves* subdense, obovate, similar to those of *V. convexifolium*, apex rounded-obtuse, cuneate towards the base, the pair of basal marginal glands minute, blackish, slightly impressed and in 1–2 mm distance from the petiole, subcoriaceous, brown when dry, a little convex above in dry specimens, glabrous at full age, sparsely glandular-punctate beneath, sometimes with a tuft of hairs at the very apex in young leaves, entire, edge revolute, 0.7–1 by 0.4–0.6(–0.7) cm, minutely corrugate above when dry, smooth beneath, midrib and two pairs of nerves not much conspicuous above, hardly or

not visible beneath, no reticulation; petiole slender, pubescent, *c.* 1 m. *Flowers* solitary and sessile in the upper axils, remote, with several minute basal bracts. *Calyx* tube campanulate, glabrous, 1.2 mm, lobes triangular, subacute, smooth, ciliate, 0.8 mm. *Corolla* urceolate, pink, rather thin, laxly muriculate outside, hairy inside, *c.* 4 by 2 mm, lobes suberect, 0.7 mm, paler in colour than the corolla tube. *Filaments* subulate-linear, subdensely hairy below, narrower and glabrous upwards, 1.5 mm; anther-cells oblong, granular, 0.7 mm, shortly 2-spurred dorsally; tubules erect, *c.* half as wide as the cells, 0.5 mm, almost transversely cut apically. *Disk* glabrous. *Style* columnar, *c.* 3 mm, densely subappressedly pubescent in the lower $\frac{2}{3}$. *Berry* subglobose, *c.* 5 mm ϕ and violaceous-blackish at maturity.

Distr. *Malesia*: Central New Guinea (Star Mts), 1500 m, once found.

39. *Vaccinium versteegii* KOORD. Nova Guinea 8 (1909) 190; J. J. S. *ibid.* 12 (1917) 520; *ibid.* (1918) t. 210; SLEUM. Bot. Jahrb. 72 (1942) 227; KANEH. & HATUS. Bot. Mag. Tokyo 56 (1942) 482; SLEUM. Blumea 11 (1961) 28; *ibid.* 12 (1963) 125.

Epiphytic or terrestrial and semiscandent, much branched shrub, 0.5–2(–3) m. Branchlets slender, clothed with short, \pm spreading hairs in the younger subangular, glabrescent and dark-corticate in the older terete parts. *Leaves* subdense, elliptic or oblong-obovate to obovate, apex \pm rounded, base cuneate to various degree, with a minute impressed marginal gland in some distance from the petiole on each side, rather fleshy when fresh, coriaceous and not rarely rugose above in dry specimens, glabrous besides some hairs at the base of the midrib beneath, often glabrous all over epunctate, entire, margin manifestly revolute, (0.7–)1–2.3 by (0.6–)0.8–1.1 cm, midrib slightly sunken above, prominent beneath, nerves in *c.* 3 erect-patent pairs, anastomosing, often \pm obsolete, reticulation rather inconspicuous; petiole pubescent, *c.* 2 mm. *Flowers* solitary, axillary, subsessile. Peduncle 0. Pedicel hardly 1 mm, \pm included by several minute ovate subacuminate, obtuse, glabrous, thin bracts. *Calyx* subdensely short-hairy, tube obconical, somewhat 5-angular, *c.* 1.5 mm, limb expanded, 1 mm, very shortly 5-lobed or -denticulate. *Corolla* depressedly ovoid-urceolate, much contracted distally, \pm laxly short-glandular-hairy or muriculate all over or only in the upper half outside, fleshy, dark to brownish red, *c.* 3.5 by 3 mm, lobes recurved, *c.* 1 mm. *Filaments* subulate, wavy, densely pubescent or almost villous, 1–1.5 mm; anther-cells oblong-ovate, 0.8 mm; tubules broad, 0.5 mm. *Disk* glabrous. *Style* stout, glabrous, *c.* 2.8 mm. *Fruit* subsemiglobose, apex much truncate, pubescent, purplish blackish, 5–7 mm ϕ at full maturity.

Distr. *Malesia*: New Guinea (Tohkiri and Tamrau Mts, southern part of the Oranje Mts, the Sibill Valley, and from the Palmer R. in the Western Distr.).

Ecol. In forest, often as an epiphyte in canopy trees, 80–1520 m. *Fl.* Jan.–Dec.

Note. Specimens with similar, but larger and thinner, conspicuously reticulate leaves have been found at the Rouffaer R. and near Dalman (Geelvink Bay), at 175–500 m.

40. *Vaccinium myrsinoides* SCHLTR, Bot. Jahrb. 55 (1918) 173; SLEUM. *ibid.* 72 (1942) 227; Blumea 11 (1961) 28. — *V. collivagum* SLEUM. Bot. Jahrb. 72 (1942) 227.

Epiphytic or terrestrial, much branched shrub, up to 1.2 m. Branchlets rather stout, densely leaved, tips angular and laxly hairy or subvillous, older parts subterete, early covered with an ashy cork. *Leaves* obovate to elliptic-obovate, apex shortly obtusely attenuate to rounded, base cuneate into the petiole, the 2 small basal marginal glands markedly distant from the petiole, coriaceous or nearly so, entire, the very edge slightly revolute (the whole lamina not rarely a little convex above in dry specimens), first puberulous at the midrib and petiole, quite glabrous with age, with scattered, dark, very short, appressed glandular hairs or points beneath, 0.8–1.3 by (0.3–)0.4–0.7 cm, midrib and 1(–2) pairs of ascending nerves faintly raised on both faces, not rarely \pm inconspicuous, no reticulation; petiole 1–2 mm. *Flowers* axillary, solitary, sessile or almost so, basal bracts rather numerous, ovate, subacute, stiffly membranous, glabrous, ciliate, 1–2.5 mm, covering the lower part of the calyx. *Calyx* campanulate, all over laxly short-hairy, tube 2 mm, lobes erecto-patent, ovate-deltoid, subacute, ciliate, with blackish points dorsally, c. 1 mm. *Corolla* narrow-ovoid-urceolate, contracted at both ends, fleshy, dark red or crimson, sparsely set with very short glandular hairs, but no proper pubescence outside, or nearly glabrous, c. 5–6 by c. 2.5 mm, lobes paler, recurved, 1.5 mm. *Stamens* 10 or 8; filaments subulate, very laxly hairy, c. 1.3 mm; cells ovate-oblong, c. 1 mm, no spurs; tubules as long and wide as the cells, obliquely cut apically. *Disk* glabrous. *Style* columnar, glabrous or papillose, c. 5 mm.

Distr. *Malesia*: New Guinea (Schrader Mts, Upper Minj R. valley in the Western Highlands, and Mt Victoria).

Ecol. In mountain thickets or open hill side, 2070–3410 m.

41. *Vaccinium convexifolium* J. J. S. Med. Rijks-herb. n. 25 (1915) 10; Nova Guinea 12 (1917) 527; *ibid.* (1918) t. 216; SLEUM. Bot. Jahrb. 72 (1942) 228; Blumea 11 (1961) 28.

Much branched shrub, 2–5 m. Branchlets slender, densely patently hairy or almost tomentose in the new shoots, gradually glabrescent with age, older parts grey-corticate. *Leaves* subdense, obovate, apex obtuse or rounded, rarely slightly emarginate, base cuneate, the 2 basal marginal glands in some distance from the petiole, coriaceous, glabrous besides the shortly barbate extreme apex, \pm convex above in dry specimens, entire, edge slightly revolute, 0.7–1 by 0.5–0.7 cm, midrib impressed above, a little raised beneath, nerves and veins \pm obsolete above, faintly prominent

beneath; petiole pubescent, 1.5–2 mm. *Flowers* axillary, solitary, subsessile. Peduncle 0. Pedicels up to 1.5 mm, \pm included by several concave, oblong-ovate, glabrous bracts, 1.5 mm. *Calyx* turbinate, \pm densely short-pubescent, tube 1–1.5 mm, lobes triangular, acute, c. 0.8 mm. *Corolla* narrowly ovoid-conical, shortly subtubular-contracted at the base, gradually narrowed distally, fleshy, red, laxly glandular-muriculate, but not properly hairy outside, 7–8(–9) by (2.5–)3(–3.5) mm, lobes ovate-orbicular, paler, suberect, c. 0.8 mm. *Filaments* linear, laxly hairy at the base, glabrous above, c. 1 mm; anther-cells broad-oblong, c. 1 mm; tubules as wide as the cells, very short, obliquely cut distally. *Disk* glabrous. *Style* somewhat thickened in the middle, papillose, c. 7 mm.

Distr. *Malesia*: West New Guinea (Hellwig Mts), in ridge forest at 2600 m. Once found.

42. *Vaccinium taxifolium* SLEUM. Blumea 11 (1961) 29.

Small epiphytic shrub, laxly thin-branched. Branchlets slender, densely shortly subhispidulous-pubescent in the youngest, glabrescent in the older parts. *Leaves* subdense, narrow-oblong, apex obtuse or rounded, base subtruncate-obtuse, the basal marginal glands rather inconspicuous, found almost on the petiole, subcoriaceous, rather firm, glabrous except the very base and the petiole which are subhispidulous-pubescent, laxly glandular-punctate beneath, entire, marginate, edge not rarely a little revolute, 0.9–1.8 by 0.2–0.4 cm, midrib and nerves rather inconspicuous above, slightly raised beneath, nerves in 3–4 pairs coming in an acute angle from the midrib, high-ascending and subparallel to the margin, reticulation fine and visible beneath only; petiole 1–1.5(–2) mm. *Flowers* axillary, solitary, nodding. Pedicels rather slender, glabrous, (5–)6–9(–10) mm, base involucrate by several minute bracts, 0.5–1 mm. *Calyx* mostly all over \pm densely shortly hispidulous-pubescent or almost villous, rarely glabrescent at the lobes, tube turbinate, 1–1.5 mm, limb spreading, 5-partite to nearly the base, lobes deltoid, subacute, 1–1.3 mm. *Corolla* urceolate, thin, fiery red, glabrous outside, laxly long-hairy in the upper part inside, 6–8 by 3–5 mm, lobes obtuse, suberect, 1 mm. *Filaments* filiform, a little dilated at the base, laxly pubescent in the lower $\frac{1}{3}$, 3–3.5 mm; anther-cells broad-oblong, echinulate, 0.8–0.9 mm; tubules nearly as wide and long as the cells, apex obliquely truncate. *Disk* laxly long-hairy. *Style* thickish, glabrous, 4–5 mm.

Distr. *Malesia*: West New Guinea (Wissel Lakes region), at 1800–2900 m. Twice found. *Fl.* Aug., Oct.

43. *Vaccinium wondiwoiense* J. J. S. Nova Guinea 18 (1936) 114, t. 29, f. 1; SLEUM. Bot. Jahrb. 72 (1942) 228; Blumea 11 (1961) 29.

Small, apparently epiphytic shrub. Branchlets very slender, shortly patently pubescent. *Leaves* lax, oblong-elliptic, apex and base equally gradually attenuate and \pm obtuse, the basal marginal

glands hardly visible, subcoriaceous, glabrous, entire, edge subrevolute, 2.5–3 by 0.8–1 cm, 3(–5)-plinerved, other pinnate nerves in 3–4 pairs higher from the midrib, irregular, anastomosing, midrib and nerves slightly prominent on both faces; reticulation dense, equally raised and well visible; petiole slender, 1–1.5 mm, pubescent. *Flowers* axillary, solitary. Peduncle extremely short or none, with several vaginular small bracts. Pedicel slender, glabrous below, gradually dense patently hairy upwards, *c.* 4 mm. *Calyx* all over densely shortly hispid-hairy, tube obconical, slightly 5-angular, 2 mm, lobes broad-triangular, 0.5 mm. *Corolla* ovoid-urceolate, glabrous, membranous, red, *c.* 5(–6) by *c.* 3 mm. *Filaments* subulate, laxly hairy in the lower half, glabrous and more filiform above, 3.5 mm; anther-cells oblong, echinulate, 1 mm; tubules \pm as wide and long as the cells, obliquely cut apically. *Disk* sparsely long-hairy. *Style* glabrous, 5 mm.

Distr. *Malesia*: New Guinea (Wondiwoi Mts on Wandammen Peninsula, Geelvink Bay), at 1800 m. One collection.

44. *Vaccinium schultzei* SCHLTR, Bot. Jahrb. 55 (1918) 173; SLEUM. *ibid.* 72 (1942) 228; Blumea 11 (1961) 29.

Erect, branched, apparently small shrub. Branchlets erecto-patent, subvillous initially, tardily glabrescent. *Leaves* lax, elliptic or ovate-lanceolate, bluntly acuminate, coriaceous, glabrous, slightly recurved at the edge, 2.5–4.3 by 1–1.8 cm. *Flowers* axillary, solitary, nodding. Peduncle apparently 0. Pedicel slender, glabrous, 8–10 mm, with a few small basal bracts. *Calyx* patelliform, puberulous, *c.* 3.7 mm long in all, lobes triangular, subacute, ciliate. *Corolla* subglobose-urceolate, glabrous and rugulose outside, sparsely hairy inside, apparently light pink, 7 by *c.* 5 mm, lobes broadly ovate, subacute, erecto-patent. *Filaments* subulate, hairy, shortly longer than the anthers, the latter oblong; tubules with oblique oblong pores. *Disk* glabrous. *Style* cylindrical, glabrous, 6 mm.

Distr. *Malesia*: NE. New Guinea (Sepik R., bivouac 48 at *c.* 4°45'–141°10'), once found.

Note. Translated from the original Latin description, as the type material is lost and the species not yet recollected.

45. *Vaccinium cyclopense* J. J. S. Nova Guinea 12 (1914) 156, t. 44; *ibid.* 18 (1936) 112, *p.p.*; SLEUM. Bot. Jahrb. 72 (1942) 228; Blumea 11 (1961) 29; *ibid.* 12 (1963) 125. — *V. cyclopense* J. J. S. var. *arfakense* J. J. S. in Gibbs, Arfak (1917) 171. — *V. rariflorum* SCHLTR, Bot. Jahrb. 55 (1918) 171. — *V. ledermannii* SCHLTR, l. c. 172.

f. cyclopense.

Terrestrial or epiphytic, laxly branched, \pm trailing or pendent shrub, up to 0.6 m high. Branchlets up to 1 m long, slender, rooting, tips or new shoots subangular, densely short-pubescent, older parts more terete and glabrescent, laxly to

subdensely leaved. *Leaves* dark green above, much paler beneath, varying in shape and size, ovate to ovate-elliptic, sometimes elliptic, rarely lanceolate-elliptic, apex blunt to rounded, base \pm rounded or subcordate, the basal pair of marginal glands found near the petiole and often hardly noticeable, subcoriaceous, rather firm, ciliate when young, quite glabrous with age, laxly gland-hairy or punctate beneath, entire, the very margin \pm distinctly recurved, the proper lamina flat or but slightly convex above in dry specimens, (0.7–)1–1.7(–3) by (0.4–)0.5–0.9(–1.4) cm, triplinerved, midrib and one basal pair of curved-ascending nerves more conspicuous than the other higher and shorter lateral, equally anastomosing ones, reticulation rather lax, nerves and veins very slightly sunken or a little raised above, prominent beneath; petiole pubescent, 1–2 mm. *Flowers* axillary, solitary, very rarely in twos, nodding, or rarely also from defoliate axils. Peduncle, if any, very short, rarely up to 2 mm. Pedicel rather stoutish, thickened upwards, laxly hairy distally, glabrous below, (4–)5–8 mm, with several oblong-spathulate glabrous basal bracts, 1 mm. *Calyx* green or pinkish, all over \pm densely subhispid-hairy, tube turbinate and 5-angular, 2 mm, limb expanded, 2 mm, its deltoid subobtuse lobes ciliate, 1.3 mm. *Corolla* subglobose-urceolate, \pm fleshy, generally light to deep pink or light carmine and lobes whitish or greenish, rarely white or greenish white and lobes white or green, 6–8(–9) by 5(–7) mm, glabrous or very sparsely glandular-muriculate outside, mostly long-hairy inside, lobes spreading, 1 mm. *Filaments* subulate, *c.* 3 mm, (very) laxly pubescent at and somewhat above the base; anther-cells oblong, echinulate, 1 mm; tubules as long and wide as the cells, obliquely cut apically. *Disk* laxly long-hairy. *Style* red, columnar to club-shaped, glabrous or sometimes with a few hairs at the base, *c.* 5 mm. *Fruit* a soft, purplish or pale violet, or sometimes whitish berry, subglobose, apex truncate, *c.* 5 mm σ when fresh.

Distr. *Malesia*: New Guinea (from the Vogelkop Peninsula to the Cycloop, Torricelli and Finisterre Mts, Mt Saruwaged area, in the Main Range from the Star Mts to Mt Victoria), apparently widespread, though local.

Ecol. In mossy mountain (Nothofagus) forest, 800–2900(–3300?) m. *Fl.* Jan.–Dec.

Vern. *Midjimserei*, *mungat*, Hattam, *foyo*, Wapi.

Note. Flowers not rarely galled, altered into whitish or greenish or reddish hairy globules.

***f. glabrum* SLEUM. Blumea 11 (1961) 30; *ibid.* 12 (1963) 125.**

Calyx glabrous dorsally, lobes long ciliate or fimbriate. Pedicels glabrous, (4–)5–6 mm. *Corolla* pale to deep pink, lobes cream or green.

Distr. *Malesia*: New Guinea (Vogelkop Peninsula: Tamrau, Nettoti and Arfak Mts; central part: Sibil Valley).

Ecol. In dense mossy forest, sometimes together with *f. cyclopense*, 1260–2100 m. *Fl.* Jan.–Dec.

46. *Vaccinium culminicolum* WERNH. Trans. Linn. Soc. II, Bot. 9 (1916) 91; SLEUM. Bot. Jahrb. 72 (1942) 229; Blumea 11 (1961) 30.

Low shrublet, apparently epiphytic. Branchlets very slender, youngest parts \pm densely hispidulous-hairy. *Leaves* lax, ovate to elliptic-ovate, apex \pm rounded or at least obtuse, if narrowed, base rounded or mostly slightly cordate, the basal pair of marginal glands invisible, coriaceous, rather firm, glabrous except some long hispid hairs which may be found at the margin and the base initially, laxly glandular-punctate beneath, (0.8-)0.9-1.2 (-1.3) by (0.5-)0.6-0.8 cm, entire, marginate, i.e. the edge a little thickened, quite flat, midrib faintly impressed above, hardly raised beneath, nerves obscure; petiole 1 mm, hispid-hairy. *Flowers* solitary, axillary. Pedicels 2-3 mm, subdensely white-hispid-hairy as is the whole calyx to a lesser degree, basal bracts minute. *Calyx* tube campanulate, base rounded, c. 2 mm, limb spreading, lobes deltoid, subobtuse, 1.5 mm. *Corolla* subglobose-urceolate, thin, colour not known, glabrous outside, hairy in the upper part inside, c. 8 by 6 mm, lobes suberect, c. 2 mm. *Filaments* filiform, laxly hairy but immediately above the base, glabrous otherwise, 4 mm; anther-cells oblong, echinulate, c. 1 mm; tubules as wide as the cells, 0.7 mm, obliquely cut apically. *Disk* laxly hairy. *Style* columnar, papillose, 4 mm.

Distr. *Malesia*: New Guinea (ascent from Utakwa R. to Mt Carstensz), 3200-3800 m, once found.

47. *Vaccinium piceifolium* WERNH. Trans. Linn. Soc. II, Bot. 9 (1916) 92; SLEUM. Bot. Jahrb. 72 (1942) 231; Blumea 11 (1961) 31. — *V. crassiflorum* (non J. J. S. 1912 & 1914) J. J. S. Nova Guinea 12 (1917) 526; SLEUM. Bot. Jahrb. 72 (1942) 231, p.p. — *V. sp.* KOORD. Nova Guinea 8 (1912) 884.

Small shrub, up to 0.5 m. Branchlets rather stiff, young parts angular, very laxly hairy or glabrous. *Leaves* dense, with thick, decurrent leaf-cushions, narrow-oblong, apex short-attenuate, obtuse, often with a minute gland, base subcuneate into the petiole, the basal pair of marginal glands hardly visible, coriaceous, glabrous, \pm shining, very laxly glandular-muriculate or practically glabrous beneath, flat, 0.7-1 (-1.2) by 0.2-0.3 cm, entire, midrib faintly impressed above, prominent beneath as are the 1-2 pairs of basal or a little suprabasal, steeply high-ascending nerves, these not rarely rather obscure above, no reticulation; petiole 0.5-1 mm. *Flowers* axillary, solitary, nodding, quite glabrous in all outer parts. Pedicels 5-7 mm at anthesis, rather stoutish, with a few shortly stalked glands at the articulation with the calyx, basal bracteoles ovate-oblong, c. 1 mm. *Calyx* tube turbinate, slightly 5-angled, 2 mm, limb much spreading, lobes triangular, 1.5 mm. *Corolla* ovoid-urceolate, glabrous outside, very laxly hairy inside, c. 6 by 4 mm, fleshy, red, lobes 1 mm. *Filaments* linear, laxly hairy in the lower part, 2 mm; anther-cells oblong, echinulate, 1.3 mm; tubules cylindric, erect, narrowed upwards,

0.7 mm, obliquely cut distally. *Disk* glabrous. *Style* columnar, glabrous, 3-4 mm.

Distr. *Malesia*: West New Guinea (Main Range from Mt Carstensz to Hellwig Mts and Mt Goliath).

Ecol. In ridge forest or in summit vegetation, 2000-2600 m. *Fl.* Nov.-Dec.

48. *Vaccinium pugionifolium* SLEUM. Bot. Jahrb. 72 (1942) 230; Blumea 11 (1961) 31.

Suberect shrub, 20-30 cm. Branchlets pubescent at the tips, glabrescent below. *Leaves* dense and almost distichous, narrow-lanceolate, apex gradually acuminate, subacute, base cuneate, subcoriaceous, glabrous, 0.6-1.1 by c. 0.2 cm, midrib slightly sunken above, nerves inconspicuous on both faces; petiole hardly 1 mm. *Flowers* axillary, solitary, nodding, glabrous in all outer parts. Peduncle 0. Pedicel rather slender, 5-6(-7) mm, with a few acicular basal bracts. *Calyx* turbinate, contracted at the base, c. 3 mm including the lobes, the latter broadly triangular, subacute, 1.5 mm. *Corolla* ventricose-urceolate, \pm fleshy, glabrous outside, laxly hairy inside, 6 by 4 mm, contracted immediately below the lobes, intensely rose coloured. *Filaments* subulate, slightly dilated and laxly hairy at the base, glabrous upwards, c. 2.5 mm; anther-cells oblong, 1 mm; tubules very short, nearly as wide as the cells, obliquely cut apically, the back wall thus ending in a short acumen. *Disk* glabrous. *Style* columnar, a little thickened towards the apex, glabrous.

Distr. *Malesia*: East New Guinea (Sambanga, Mt Saruwaged area), at 2000 m, once found.

Note. Copied from the original description, as the type material is lost.

49. *Vaccinium bodenii* WERNH. Trans. Linn. Soc. II, Bot. 9 (1916) 91; SLEUM. Bot. Jahrb. 72 (1942) 231; Blumea 11 (1961) 31.

Small shrub. Branchlets rather slender, but firm, the youngest parts angular, sparsely pubescent. *Leaves* subdensely arranged, ovate-elliptic to elliptic, apex obtuse to rounded, base very broadly attenuate to almost rounded, the pair of basal marginal glands minute, impressed, distant from the petiole, coriaceous, glabrous, laxly glandular-punctate beneath, entire, marginate, flat, 0.6-0.8 (-1) by (0.3-)0.4-0.5 cm, midrib faintly sunken above, distinctly raised beneath, nerves in 1-2 basal and suprabasal, curved-ascending pairs, slightly prominent beneath, other 1-2 pairs of higher and shorter nerves mostly less visible; petiole puberulous, 1 mm. *Flowers* solitary in the upper axils, nodding, glabrous in all outer parts. Peduncle very short (1 mm) or none, hidden in the membranous, rather numerous bracts which are oblong-ovate, ciliolate, up to 2.5 mm. Pedicel stoutish, (1-)2-3 mm. *Calyx* tube obconical, c. 2 mm, limb much expanded, deeply lobed, lobes ovate-deltoid, subacute, veined, c. 1.5 mm. *Corolla* ovoid-urceolate, laxly muriculate in the lower part or all over glabrous outside, densely hairy in the upper part inside, c. 5 by 3-4 mm, lobes suberect, blunt, 1 mm. *Filaments* linear,

densely pubescent, almost 3 mm; anther-cells broad-oblong, echinulate, 1.2 mm; tubules cylindrical, slightly curved, narrowed upwards, 1.2 mm. *Disk* set with erect whitish hairs at the inner margin. *Style* columnar, laxly hairy, 3.5 mm. *Distr. Malesia*: New Guinea (ascent from Utakwa R. to Mt Carstensz), 3350–3800 m, once found.

50. *Vaccinium absconditum* J. J. S. Nova Guinea 18 (1936) 113, t. 28, f. 2; SLEUM. Bot. Jahrb. 72 (1942) 228; Blumea 11 (1961) 31.

Small shrub, with elongate slender, rooting, c. 50 cm long branches. Branchlets laxly short-hairy. *Leaves* lax, ovate-elliptic or elliptic, rarely oblong-elliptic, apex \pm gradually acuminate, subacute, base broadly attenuate or obtuse, more rarely nearly rounded, no basal marginal glands visible, coriaceous, hairy at the very base and on the petiole, laxly set with brownish, appressed, very short setular gland-hairs beneath, entire, margin recurved, 4–6.3 by 1.5–2.5 cm, triplinerved, midrib and nerves slightly sunken or \pm obscure above, but little raised beneath, other 1–2 pairs rather indistinct; petiole 3–4 by c. 0.5 mm. *Flowers* solitary from defoliate axils, nodding. Peduncle glabrous, 2(–3.5) mm, with several minute basal glabrous bracts. Pedicel rather slender, glabrous or practically so, c. 9 mm, with 1–2 minute basal bracteoles. *Calyx* glabrous or sparsely hairy, tube campanulate-turbinate, 5-angular, 3(–4) mm, lobes broad-triangular, subacute, ciliate, c. 1.3 mm. *Corolla* subglobose-urceolate, much contracted distally, shortly 6-lobed, sparsely muriculate, not properly hairy outside, laxly long-hairy inside, fleshy, bright or pale red, c. 9 by 6–7 mm, lobes obtuse, 1 mm. *Stamens* 12, c. 7.5 mm; filaments linear, patently long-hairy at the base, glabrous otherwise, c. 5 mm; anthers bifid in the upper $\frac{2}{5}$; cells oblong, minutely echinulate, 1.5 mm; tubules nearly as long and wide as the cells, opening by oblique terminal pores. *Disk* hairy. *Style* columnar, glabrous, c. 6.5 mm.

Distr. Malesia: West New Guinea (West Nassau Mts), on moss in moss forest, 2500–2600 m, twice found.

51. *Vaccinium ceramense* SLEUM. Blumea 11 (1961) 31. — *V. microphyllum* (non BL.) J. J. S. in Fedde, Rep. 30 (1932) 177.

Apparently terrestrial shrublet, with slender, elongate branches, again branched distally. Branchlets very slender, patently puberulous. *Leaves* lax, elliptic or oblong-elliptic, apex rounded or mostly a little emarginate, base broadly attenuate into the petiole, the pair of marginal glands very small and found at the very base of the lamina, subcoriaceous, glabrous, sparsely glandular-punctate beneath, entire, margin slightly revolute especially towards the base, 0.7–1 by 0.4(–0.5) cm, midrib and 2 pairs of nerves sometimes a little raised beneath, often all obscure; petiole slender, pubescent, c. 1.5 mm. *Flowers* solitary, sparse, in one or the other axil. Pedicels rather robust, with a few glandular, but no eglandular hairs in the

upper part, c. 5 mm, the base surrounded by several minute bracts. *Calyx* broadly campanulate, glabrous, tube turbinate, hardly 1 mm, limb spreading, 5-partite to nearly the base, lobes deltoid, acute, 1.5 mm. *Corolla* urceolate, rather fleshy, red, laxly glandular-muriculate, not properly hairy outside, laxly pubescent inside, c. 5 by 2.5 mm, lobes 1 mm. *Filaments* subulate, subvillous at and a little above the base, glabrous for the rest, 2.5 mm; anther-cells oblong, echinulate, 0.9 mm; tubules nearly as long and wide as the cells. *Disk* subdensely set with longish erect hairs. *Style* glabrous, 3.5 mm.

Distr. Malesia: Moluccas (Central Ceram: Mt Murkele).

Ecol. In primeval forest on limestone, locally abundant, at 1900–2500 m. One collection. *Fl.* July.

52. *Vaccinium whiteanum* SLEUM. Notizbl. Berl.-Dahl. 12 (1935) 486; Bot. Jahrb. 72 (1942) 234; Blumea 11 (1961) 32; *ibid.* 12 (1963) 126.

Epiphytic or scandent shrublet. Branchlets slender, angular at the shortly patent-pubescent tips, older parts glabrous. *Leaves* subdense, elliptic, apex rounded, base broadly cuneate to nearly rounded, the basal marginal glands very small and near the petiole, practically absent, subcoriaceous, bright pink when young, glabrous except some hairs at the base beneath, which disappear with age, laxly glandular-muriculate beneath, entire, 1.1–1.5(–1.8) by 0.4–0.6(–0.8) cm, midrib slightly impressed above, prominent beneath, nerves in c. 3 pairs, slightly raised on both faces, reticulation rather inconspicuous or none; petiole 0.5–1 mm. *Flowers* solitary in the axils of the upper leaves, each with 2–3 basal subulate bracteoles (c. 2 mm). Pedicel slender, glabrous, c. 1 cm at anthesis. *Calyx* glabrous, tube turbinate, 1.5 mm, limb expanded, lobes deltoid, ciliate at the apex only in early stages, 1.5 mm. *Corolla* urceolate, 6–7 by 3–4 mm, bright red, glabrous outside, pubescent inside, lobes 1 mm. *Filaments* linear, broadened at the base, pubescent below, gradually narrowed and glabrous upwards, 2 mm; anther-cells oblong, subgranular, 1 mm; tubules as long as and slightly narrower than the cells, 0.9 mm. *Disk* slightly to subdensely set with erect hairs. *Style* columnar, glabrous, 5 mm.

Distr. Melanesia: Solomon Is., in rain-forest, on Bougainville at 1500 m, locally common. *Fl.* Aug.

53. *Vaccinium igneum* J. J. S. Nova Guinea 18 (1936) 112, t. 28, f. 1; SLEUM. Bot. Jahrb. 72 (1942) 231; Blumea 11 (1961) 32.

Epiphytic shrub, c. 0.8 m, with numerous divergent branches. Branchlets terete, puberulous in the younger, glabrescent in the older parts. *Leaves* subdensely arranged, elliptic or oblong-elliptic, apex \pm obtuse or very slightly emarginate, not rarely with an apical tuft of short hairs initially, base broadly attenuate to obtuse, the 2 basal marginal glands minute, impressed in some distance from the petiole, \pm coriaceous, glabrous, entire, edge mostly a little revolute, 0.8–1.5 by 0.4–0.7 cm, midrib faintly sunken above, obtusely

raised beneath, nerves in 2–3 pairs, \pm spreading, minutely though visibly prominent beneath only, reticulation none; petiole puberulous, 1–1.5 mm. *Flowers* axillary, solitary, nodding, glabrous in all outer parts. Peduncle hardly perceptible, occasionally up to 1.5 mm, surrounded by several minute scarious bracts (0.5–1 mm). Pedicel slender, 6–8 mm. *Calyx* tube short-conical, 1 mm, limb much expanded, almost disk-like, obscurely lobed, ciliolate, c. 4 mm ϕ . *Corolla* ovoid-urceolate, much contracted at the opening, fleshy, fiery red, glabrous outside, sparsely patently long-haired inside, 7–8 mm long, c. 7 mm ϕ below, lobes recurved, 1 mm. *Filaments* linear, dilated at the base, laxly patently long-hairy over their whole length, c. 3 mm; anther-cells oblong, echinulate, c. 0.9 mm; tubules more or less as long and nearly as wide as the cells, obliquely cut distally. *Disk* densely clothed with erect hairs. *Style* lageniform, glabrous, c. 4.5 mm.

Distr. Malesia: West New Guinea (Doormantop), in mossy forest, 1420–2480 m. *Fl.* Oct.

54. *Vaccinium sororium* J. J. S. Med. Rijksherbr. n. 25 (1915) 10; Nova Guinea 12 (1917) 526; *ibid.* (1918) t. 215; SLEUM. Bot. Jahrb. 72 (1942) 232; Blumea 11 (1961) 32. — *V. cryptodon* SLEUM. Bot. Jahrb. 72 (1942) 236.

Low, ascending shrub, 10–40 cm, laxly branched from the base. Branchlets angular and puberulous at the tips, densely leaved, glabrescent below. *Leaves* elliptic to narrow- or oblong-elliptic, apex shortly apiculate-acuminate, subacute, rarely more bluntish, base broadly attenuate, the 2 (or sometimes 4) basal marginal glands minute, blackish, much distant from the petiole, coriaceous, rather stiff, ciliate when very young or immature, quite glabrous with age, margin distinctly cartilaginous, entire or with 3–4(–5) minute prominent teeth-like glands on both sides, but not properly crenate, very slightly or not revolute, 0.7–1.3(–1.4) by (0.3–)0.4–0.6(–0.7) cm, midrib a little sunken above, slightly raised beneath, nerves 2–3 \pm steeply ascending pairs, faintly impressed or obsolete above, minutely prominent beneath, or \pm obscure on both faces; petiole puberulous initially, 2–3 mm. *Flowers* solitary in the upper axils, glabrous in all outer parts. Peduncle generally very short (rarely up to 3 mm), with several basal, appressed, ovate to oblong-ovate, ciliolate bracts (c. 2 mm). Pedicel rather stoutish, 1.5–2.5 mm. *Calyx* tube cup-shaped, obtuse at the base, glaucous-purple when fresh, 2(–2.5) mm, limb \pm spreading, lobes subovate-deltoid, ciliolate, 1.2–1.5 mm. *Corolla* subglobose-urceolate, much contracted at the lobes, base rounded, glabrous outside, laxly hairy in the upper third inside, fleshy, light red, darker at the base, or pink, 6–7 by 5 mm, lobes ciliolate, c. 1.5 mm. *Filaments* dilated above the base, linear towards the apex, papillose or mostly laxly long-hairy below, 2.5–2.7 mm; anther-cells broad-oblong, echinulate, 1.5(–2) mm; tubules nearly as long as, but a little narrower than the cells, \pm transversely cut distally, pore undulate. *Disk* glabrous. *Style* thick-columnar to

elongate-conical, with scattered long hairs in the lower $\frac{3}{5}$, 5.5–7 mm. *Fruit* soft and black, subglobose, c. 3 mm ϕ in dry specimens.

Distr. Malesia: West New Guinea (Wissel Lakes region and the Oranje Mts: Lake Habbema area, Wichmann Mts).

Ecol. In wet, peaty opening of forest, open shores of lake, or in long grass in open marsh, also on sandy or clayey soil, locally plentiful, 1800–3225 m. *Fl.* Aug.–Nov., Febr.–March.

55. *Vaccinium decumbens* J. J. S. Nova Guinea 18 (1936) 110, t. 26, f. 2; SLEUM. Bot. Jahrb. 72 (1942) 231; Blumea 11 (1961) 32. — *V. chionostomum* SLEUM. Bot. Jahrb. 72 (1942) 231.

Small shrub, sometimes with decumbent stem, 20–90 cm. Branchlets slender, subangular, tips puberulous and minutely verrucose. *Leaves* dense, ovate, ovate-elliptic or elliptic, sometimes oblong-ovate or -elliptic, apex gradually obtusely attenuate to almost rounded, base broadly attenuate to rounded, the pair of basal marginal glands minute, impressed at some distance from the petiole, stiff coriaceous, slightly convex above in dry specimens, glabrous, very laxly glandular-punctate beneath, whether or not provided with 1 or 2 shallow crenations on each side, i.e. entire or practically so, marginate, edge very slightly revolute or flat, 4–6(–7) by 3–4 mm, midrib a little sunken above, or prominent beneath, nerves \pm obsolete; petiole early glabrescent, 1.5–2 mm. *Flowers* axillary, solitary, nodding, glabrous in all outer parts. Peduncle very short or none in general, sometimes up to 2 mm. Pedicel rather slender, 6–9 mm, with 2 subulate bracteoles (2 mm), or with several basal and slightly suprabasal lanceolate bracts, if a peduncle is not present. *Calyx* tube almost cupular, 1.5–2 mm, limb spreading, lobes triangular, bluntish at least at the tip, ciliate, 2 mm. *Corolla* broad-urceolate, rather fleshy, fiery red, 6–8(–10)? by 4–6(–8)? mm, glabrous outside, laxly hairy in the upper part inside, lobes paler in colour, \pm recurved, 1.5–2(–2.5?) mm. *Filaments* linear, dilated at the base, long and \pm patently hairy in the lower half, glabrous above, 2.5–3.5(–5?) mm; anther-cells oblong, very granular, 1.2–1.6 mm; tubules nearly as wide as the cells, 0.5–0.7 mm, obliquely cut apically. *Disk* glabrous. *Style* thick-columnar, glabrous, 4.5–5.5 mm.

Distr. Malesia: West New Guinea (Doormantop and Oranje Mts: Lake Habbema, Mt Wilhelm area).

Ecol. On Doormantop on steep open slopes at 3200 m, in the Oranje Mts in mossy glades between tree thickets on peat ridges, locally abundant, 3225–3400 m.

Note. There are slight differences in the form of the leaves between *V. decumbens* and *V. chionostomum*, the former having ovate-elliptic or mostly elliptic, the latter more ovate to oblong- or elliptic-ovate leaves. Differences in the flowering parts, however, are very slight, and it seems reasonable, to unite these species at least preliminarily.

56. *Vaccinium crassiflorum* J. J. S. Bull. Jard. Bot. Btzg II, 8 (1912) 52; Nova Guinea 12 (1914) 157, t. 45 A; SLEUM. Bot. Jahrb. 72 (1942) 231, p.p.; Blumea 11 (1961) 32, non J. J. S. Nova Guinea 12 (1917) 526. — *V. ciliatipetalum* J. J. S. Nova Guinea 18 (1936) 108, t. 25, f. 2; SLEUM. Bot. Jahrb. 72 (1942) 232.

Small shrub, stem mostly creeping or prostrate for the greater part, covered with a grey bark. Branches erect. Branchlets densely leaved, often reddish, youngest parts subangular and \pm densely short-hairy, older ones more terete and early glabrescent. *Leaves* ovate-elliptic, apex shortly attenuate or acuminate, the very tip subacute or more bluntish, base broadly attenuate to almost rounded, the pair (or sometimes two pairs) of basal marginal glands impressed at a marked distance from the petiole, thick-coriaceous, stiff, not rarely a little convex above in dry specimens, base and petiole laxly pubescent initially, blade quite glabrous with age, very laxly blackish gland-pointed beneath, entire, edge thickened, faintly or not revolute, 0.7–0.8 by (0.3–)0.4–0.5 cm, midrib grooved above at least in its lower part, obtusely prominent beneath, nerves in c. 2 curved-ascending pairs, very slightly or not sunken above, somewhat raised beneath, not rarely \pm inconspicuous on both faces; petiole (1–)1.5–2(–2.5) mm. *Flowers* axillary, solitary, nodding, glabrous except the calyx and the corolla which are laxly muriculate. Peduncle 0–1 mm, surrounded by several oblong ciliolate bracts (1–2 mm). Pedicel rather stoutish, (5–)6–9 mm. *Calyx* cup-shaped, tube 2 mm, limb erect, 2 mm, lobed nearly to the base, lobes deltoid, rather obtuse, ciliolate except the base. *Corolla* broad-urceolate, much contracted apically, fleshy, red or pink except the cream or whitish lobes, laxly muriculate outside, laxly long-hairy all over inside, 6–8 by 4–5 mm in dry, c. 1.2 by 1 cm in fresh specimens, lobes erect, ciliolate, 1.5 mm. *Filaments* subulate-linear, \pm densely patent-hairy in the lower half, glabrous for the rest, 4–4.5 mm; anther-cells oblong, echinulate, c. 1.5 mm; tubules a little narrower than the cells, c. 0.8 mm, obliquely cut terminally. *Disk* glabrous. *Style* thick-cylindric, glabrous, nearly as long as the corolla.

Distr. *Malesia*: New Guinea (Doormantop and Oranje Mts including Mt Goliath).

Ecol. In open, sometimes marshy flat places or slopes with rocks, or on bogs or wet flats in alpine grassland, locally abundant, 2500–3800 m. *Fl.* Aug.–Oct.

57. *Vaccinium oreomyrtus* SLEUM. Bot. Jahrb. 72 (1942) 233; Blumea 11 (1961) 32. — *V. luridum* SLEUM. Bot. Jahrb. 72 (1942) 233.

Straggling, small, epiphytic shrub, loosely branched, up to 1 m. Branchlets rather densely puberulous and glandular-muriculate at the tips, finely verruculose or tubercled by the remnants of the glands at the older, glabrescent parts, subdensely leaved. *Leaves* subovate- or elliptic-oblong, apex broadly subacuminately attenuate to obtuse or almost rounded, base broadly attenuate to

rounded, the pair of basal marginal glands near to the petiole, \pm coriaceous, ciliate especially at the apex when very young or immature, quite glabrous (epilose) at maturity, undersurface laxly set with appressed short glandular hairs or points, entire, edge narrowly cartilagineous, flat or slightly revolute, (0.6–)0.7–1.2 by (0.3–)0.4–0.5 cm, midrib and c. 2 pairs of \pm steeply ascending nerves faintly impressed above, or raised beneath, not rarely \pm inconspicuous on both faces; petiole rather slender, puberulous initially, c. 2 mm. *Flowers* axillary, solitary, practically glabrous in all outer parts. Peduncle 0–1 mm. Pedicel rather slender, 6–8 mm, basal bracts subovate-oblong, ciliate, 1–2 mm. *Calyx* tube subobconical, slightly 5-angular, 1.5–2 mm, limb spreading, lobes broadly subovate-triangular, obtuse, ciliolate, 1.5–2(–2.5) mm. *Corolla* urceolate, narrowed apically, fleshy, red, 7–8 by 4–5 mm, glabrous outside, laxly hairy in the upper part inside, lobes \pm reflexed, not ciliate, c. 1.5 mm. *Filaments* subulate to subfiliform, except the dilated base, (very) laxly long-hairy in the lower half, 2.5–3 mm; anther-cells oblong, granular, 1–1.5 mm; tubules as wide as the cells, very obliquely cut distally, 1 mm. *Disk* glabrous. *Style* columnar, glabrous, c. 5 mm.

Distr. *Malesia*: New Guinea (Idenburg R. and Lake Habbema vicinity).

Ecol. In mossy forest, 1800–3000 m. *Fl.* Febr., Oct.

58. *Vaccinium oranjense* J. J. S. Med. Rijksherb. n. 25 (1915) 9; Nova Guinea 12 (1917) 524; *ibid.* (1918) t. 213; SLEUM. Bot. Jahrb. 72 (1942) 234; Blumea 11 (1961) 32. — *V. buxoides* J. J. S. Nova Guinea 18 (1936) 111, t. 27, f. 1; SLEUM. Bot. Jahrb. 72 (1942) 234. — *V. disterigmoides* SLEUM. l.c. 232.

See further synonym under the variety.

var. *oranjense*.

Small epiphytic shrub, up to 0.3(–?) m, sometimes terrestrial, creeping and ascending to 10 cm. Branchlets slender, sometimes rooting, loosely short-hairy to subvillous (hairs \pm spreading, c. 0.5 mm), subdensely leaved. *Leaves* elliptic, sometimes subovate-elliptic, apex \pm rounded or slightly emarginate, base very broadly attenuate to rounded, the pair of basal marginal glands hardly visible, coriaceous and \pm stiff, glabrous with age, laxly glandular-muriculate beneath, entire, the \pm thickened edge distinctly revolute, (0.8–)1–1.7(–2.2) by (0.5–)0.6–1(–1.2) cm, midrib and c. 2 pairs of basal or somewhat suprabasal high curved-ascending nerves minutely impressed above, sometimes obtusely raised beneath, or not rarely rather indistinct on both faces, veins and veinlets obsolete; petiole 1.5–2.5 (–3) mm, pubescent initially. *Flowers* axillary, solitary, nodding, glabrous in all outer parts. Peduncle c. 1 (occasionally up to 3) mm, with several ovate-triangular basal bracts, c. 1.5 mm. Pedicel stoutish, muriculate at apex, 6–8(–9) mm. *Calyx* tube subcampanulate, 2–3 mm, limb ex-

panded, *c.* 2 mm, obtusely or subacutely 5-lobed to nearly its base, lobes deltoid, ciliate at least at apex. *Corolla* ventricose-urceolate, base rounded, fleshy, red to light rose, occasionally greenish, glabrous outside, sparsely hairy in the upper half inside, (6)–7–9(–10) mm long, 5–6 mm ϕ below, 3–4 mm ϕ at the opening in dry, *c.* 1.1 by 0.8 mm in fresh specimens, lobes 5 (or 6) ovate, pale, not ciliate, *c.* 1.5 mm. *Stamens* 10(–12); filaments subsubulate-linear, laxly long-hairy in the lower half, 3–4(–5) mm; cells oblong, echinulate, 1.6–2 mm; tubules slightly narrower than the cells, 0.6–0.8 mm, \pm transversely cut apically. *Disk* glabrous. *Style* columnar, glabrous, 4–6(–7) mm. *Fruit* subglobose, apex truncate, *c.* 4 mm ϕ when dry, soft and blue when fresh.

Distr. *Malesia*: New Guinea (Doormantop and Oranje Mts).

Ecol. Epiphytic in subalpine forest, also terrestrial in thin open forest, or sometimes massed on open ground with rocks, locally abundant, 3000–3600 m.

var. marginellum (SLEUM.) SLEUM. *Blumea* 11 (1961) 33. — *V. marginellum* SLEUM. *Bot. Jahrb.* 72 (1942) 229.

Differs from *var. oranjense* by the laxly or mostly subdensely hispid-hairy calyx and the rather densely long-hairy disk. *Leaves* 1–1.5(–2) by 0.6–0.8(–1) cm.

Distr. *Malesia*: West New Guinea (Doormantop and Oranje Mts), together with *var. oranjense*, at 3250–3800 m.

59. *Vaccinium microphyllum* REINW. ex BL. *Bijdr.* (1826) 851; G. DON, *Gen. Syst.* 3 (1834) 857; DUNAL in DC. *Prod.* 7 (1839) 576; MIQ. *Fl. Ind. Bat.* 2 (1859) 1063; *Ann. Mus. Bot. Lugd.-Bat.* 1 (1863) 38; *ibid.* (1864) 221; F.-VILL. *Nov. App.* (1880) 121; MERR. *Philip. J. Sc.* 1 (1906) *Suppl.* 221; *ibid.* 3 (1908) *Bot.* 371; *ELM. Leaflet.* *Philip. Bot.* 3 (1911) 1092; KOORD.-SCHUM. *Syst. Verz.* 3 (1914) 100; MERR. *En. Philip.* 3 (1923) 250; COPEL. *f. Philip. J. Sc.* 42 (1930) 600, t. 7, f. 3–7; SLEUM. *Blumea* 11 (1961) 33, *non* K. & G. *J. As. Soc. Beng.* 74, ii (1905) 62; MERR. *En. Born.* (1921) 464; BURK. & HOLTT. *Gard. Bull. S. S.* 3 (1923) 57 (= *Diplycosia elliptica* RIDL.). — *Gaultheria blumei* F. v. M. *Trans. R. Soc. Vict.* n. s. 1, 2 (1889) 21, *in text*, *sub G. mundula*, *nom. superfl. pro V. microphyllum* BL., *cf.* SLEUM. *Reinwardtia* 4 (1957) 184. — *V. mindorense* RENDLE, *J. Bot.* 34 (1896) 355; MERR. *Philip. J. Sc.* 2 (1907) *Bot.* 293.

Dwarfed, generally epiphytic, rather rigid shrub, often with elongate, slender branches, up to 50 cm. Branchlets subterete, puberulous, subdensely or mostly rather laxly leaved. *Leaves* elliptic, \pm obtuse-rounded at both ends, apex not rarely a little emarginate, the 2 basal marginal glands minute, found in a marked distance from the petiole, subcoriaceous, or sometimes almost chartaceous, glabrous except some hairs at the very base and on the petiole, laxly glandular pointed on the undersurface, entire, edge slightly

revolute or flat, hardly marginate, (0.6–)0.7–1.5 (–2) by (0.4–)0.6–0.8(–0.9, rarely up to 1.2) cm, midrib and 2 pairs of basal or a little suprabasal nerves high curved-ascending, faintly impressed above or raised beneath, other higher nerves 1–2 pairs, anastomosing with the basal ones, and often less visible, veins generally forming a faint reticulation on both faces especially beneath, but sometimes (Philippines) rather inconspicuous; petiole 1–2 mm. *Flowers* in few of the upper axils, solitary, subpendulous, glabrous (epilose) in all parts. Peduncle 0–1 mm, surrounded by minute bracts, 1–1.5 mm. Pedicel slender, 5–7 mm, with some stalked glands distally. *Calyx* tube obconical, very laxly muriculate, *c.* 2 mm, limb suberect, lobes deltoid, subacute, keeled, 1–1.5(–2) mm. *Corolla* subglobose-urceolate, contracted distally or subapiculate, rather thin, red, greenish yellow, cream or white, 4–5(–6) mm long, 3–4 mm ϕ below, 1.5–2 mm ϕ distally, glabrous or very laxly muriculate outside, sparsely hairy in the upper part inside, lobes suberect, 1 mm. *Filaments* linear, base dilated, glabrous or practically so, *c.* 2.5 mm; anther-cells broadly oblong, echinulate, 0.8–1 mm; tubules as wide as, but a little shorter than the cells, very obliquely cut apically, the back wall in form of a tooth. *Disk* glabrous. *Style* columnar, glabrous, \pm equalling the corolla in length. *Berry* ovoid- or obconical-subglobose, apex truncate, crowned by the calyx lobes, 3–4 mm ϕ in dry specimens, said to be purple to steel-blue when ripe, covered with a thin skin, very juicy when fresh, with a fine sweet flavour, insipid. *Seeds* oval, laterally flattened, yellow, *c.* 1 mm.

Distr. New Hebrides (Espiritu Santo), in *Malesia*: Philippines (Luzon, Mindoro, Negros, Panay, Mindanao), Moluccas (Ternate, Tidore, Halmahera).

Ecol. On mossy exposed ridges and also epiphytic in moss-forest, locally common, 1400–3200 m.

Vern. Philippines: *likoplikop*, C. Bis., *manalali*, Bag.; *dëlima*, Halmahera; *dëlima gumi*, Ternate.

Notes. MERRILL said that in the Philippines the terrestrial form at higher altitudes and exposed situations has smaller and more densely crowded leaves (the whole plant more congested) than the epiphytic form.

The specimen from Espiritu Santo has a distinct tuft of hairs at the apex of the calyx lobes (as is often found in *V. oranjense* and other *spp.*), whilst the material from the Philippines and the Moluccas has quite glabrous calyces. *V. microphyllum* is not yet known to occur in New Guinea. Its nearest allies are *V. oranjense* (New Guinea) and *V. whiteanum* (Bougainville), the first discernable from *V. microphyllum* by the obscure venation of the leaves, larger corollas and laxly hairy filaments, the latter by a hairy disk and some minor differences.

60. *Vaccinium globosum* J. J. S. *Nova Guinea* 12 (1914) 155, t. 43; KANEH. & HATUS. *Bot. Mag.* Tokyo 56 (1942) 481; SLEUM. *Bot. Jahrb.* 72 (1942) 235; *Blumea* 11 (1961) 33; *ibid.* 12 (1963) 126. —

V. globosum J. J. S. var. *latifolium* J. J. S. in Gibbs, Arfak (1917) 171.

Erect, much branched, compact, terrestrial shrub, up to 3 m. Branchlets angular and crisped-puberulous in the new shoots, subterete and glabrescent, finally covered with dark cork in the older parts, very densely leaved. *Leaves* dark green above, paler beneath, (narrow-)obovate, apex rounded or mostly slightly retuse, base cuneate into the petiole, with no proper basal, but (1-)2-3 (-4) deeply impressed distant dark glands on each side along the entire margin, which thus becomes a more or less remotely crenate appearance, but is not properly crenate (if one gland, then this found \pm in the middle on each side), glabrous except the very base and the petiole which bear some short pubescence, laxly set with very short caducous glandular hairs or points beneath, margin a little thickened, paler than the lamina and revolute, (0.4-)0.6-1.2 by 0.2-0.4(-0.5) cm, midrib faintly sunken or mostly obsolete above, slightly raised beneath as are the 2-3 pairs of rather inconspicuous, sharply ascending and anastomosing nerves, no reticulation; flush greenish or reddish; petiole slender, (1-)1.5-2 mm. *Flowers* axillary, solitary, nodding, glabrous in all parts outside. Peduncle mostly 0, rarely up to 3 mm, surrounded by several minute, mostly early caducous bracts. Pedicel rather slender, mostly glabrous, sometimes very laxly or even more rarely subdensely puberulous, 6-8 mm. *Calyx* tube cup-shaped, 1.5-2 mm, limb suberect, c. 1.5 mm, lobes deltoid, bluntish, not rarely with an apical tuft of short hairs (otherwise quite glabrous as is the tube). *Corolla* subglobular-urceolate, much contracted apically, c. 4 by 3.5 mm, waxy, of an almost transparent white, glabrous at both sides, lobes subacute, 1 mm. *Filaments* subulate-linear, laxly long-hairy to the lower $\frac{3}{4}$, c. 1 mm; anther-cells oblong, distinctly echinulate, c. 0.6 mm; tubules much narrower and a little longer than the cells, subcylindric, \pm transversely cut apically. *Disk* glabrous. *Style* cylindric, glabrous, c. 3 mm. *Berry* subglobose, c. 3 mm ϕ in dry specimens, purplish black when ripe.

Distr. *Malesia*: New Guinea (Arfak Mts, Wandammen Peninsula: Wondiwoi Mts, and Wissel Lakes region).

Ecol. In low (moss) forest edge, in heath vegetation or summit scrub, locally common, 1800-2500 m. *Fl.* Jan.-Dec.

Vern. *Kieta*, Kapauku.

Note. A specimen with similar leaves, but shorter pedicels (flowers absent) was found on Mt Antares (Star Mts), at 3000 m.

61. *Vaccinium leptospermoides* J. J. S. Nova Guinea 12 (1914) 154, t. 42; KANEH. & HATUS. Bot. Mag. Tokyo 56 (1942) 481; SLEUM. Bot. Jahrb. 72 (1942) 234; Blumea 11 (1961) 34; *ibid.* 12 (1963) 126. — *V. urnigerum* SLEUM. Blumea 11 (1961) 30. — Fig. 91-92.

f. leptospermoides. — Fig. 91-92.

Much branched shrub, generally low and with

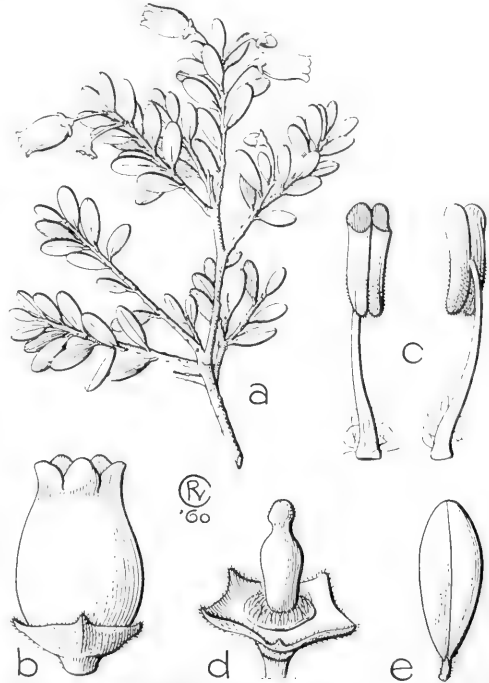


Fig. 91. *Vaccinium leptospermoides* J. J. S. *f. leptospermoides*. a. Habit, $\times \frac{2}{3}$, b. flower, $\times 3\frac{1}{3}$, c. stamens, front and back view, $\times 6\frac{1}{2}$, d. ovary, hairy disk and style, $\times 3\frac{1}{3}$, e. leaf, $\times 1$ (a-e VAN ROYEN 3860).

trailing branches, rarely erect, 0.2-1(-2) m. Branchlets slender, tips puberulous to shortly hispid-hairy and glandular-verruculose, \pm densely leaved. *Leaves* broadly to narrowly obovate, sometimes obovate-elliptic or even in part elliptic, apex rounded-obtuse, base cuneate, with 1(-2) pairs of minute basal marginal glands near to or not much remote from the petiole, coriaceous, somewhat convex above in dry specimens, glabrous except the short pubescence at the base and the petiole, laxly dark brownish punctate beneath, entire, edge marginate, slightly or not recurved, (0.5-)0.8-1.4(-1.8) by (0.2-)0.3-0.5 (-0.6) cm, midrib faintly impressed above or raised beneath, nerves in 2-3 steeply ascending pairs, hardly or not prominent beneath, or mostly \pm obsolete on both faces, no reticulation; petiole slender, 1-1.5 mm. *Flowers* axillary, generally solitary, sometimes also in twos on the same specimen. Peduncle very short, almost imperceptible, with several ovate-oblong to lanceolate, ciliolate, basal bracts (1-2 mm). Pedicels slender, glabrous, 6-8(-10) mm. *Calyx* green or with reddish tinge, all over densely shortly hispid-hairy, tube broadly conical or turbinate, 2 mm, lobes spreading, deltoid, subacute, 1.5-2 mm. *Corolla* broadly or depressedly urceolate, much contracted apically, waxy or fleshy, deep pink to rose-red, glabrous outside,

laxly hairy inside, 5-6(-7) by 4-5 mm, suberect, 1.3(-2) mm. *Filaments* subulate-linear, laxly long-hairy in the basal part only, 2.5-3 mm; anther-cells oblong, echinulate, *c.* 1 mm; tubules nearly as long and wide as the cells, very obliquely cut apically. *Disk* \pm densely hairy or shortly hirsute, especially at the inner margin, sometimes more laxly so, or rarely even glabrous. *Style* thick-cylindric, glabrous, 3.5-4 (in fresh specimens up to 5 by 1 mm) mm. *Fruit* globular, red, 5-6 mm ϕ .

Distr. Malesia: West New Guinea (Arfak Mts, Tamrau and Nettoti Ra.).

Ecol. In low moss forest edge or in open summit heath vegetation on sandy or swampy soil, 1800-2450 m. *Fl.* Jan.-Dec.

Vern. Derau, Kebar.

f. glabrum J. J. S. in Gibbs, Arfak (1917) 171; SLEUM. Blumea 11 (1961) 34; *ibid.* 12 (1963) 126.

Differs from *f. leptospermoides* by the calyx which is glabrous dorsally; lobes ciliate. *Disk* glabrous.

Distr. Malesia: New Guinea, together with the typical form, 1900-2430 m.

62. *Vaccinium vonroemeri* KOORD. Nova Guinea 8 (1912) 883; J. J. S. *ibid.* 12 (1914) 154, *nota sub V. leptospermoides*; *ibid.* 12 (1917) 523; SLEUM. Bot. Jahrb. 72 (1942) 236; Blumea 11 (1961) 34.

Epiphytic or terrestrial shrub, 0.5-1 m. Branchlets slender, young parts subdensely clad with short \pm crisp or nearly woollen hairs, older ones glabrescent, rather densely leaved. *Leaves* obovate, apex rounded or minutely emarginate, base broadly truncate into the petiole, the basal pair of marginal glands minute or hardly visible, distant from the petiole, \pm coriaceous, laxly pubescent all over initially, glabrescent, practically glabrous with full age except the very base and the petiole, laxly dark impressed-pointed beneath, entire, the very edge \pm distinctly revolute, 1-2 by 0.7-1(-1.3) cm, midrib and 1 or 2 pairs of basal, high curved-ascending nerves faintly impressed or sometimes obsolete above, very slightly raised beneath, other



Fig. 92. *Vaccinium leptospermoides* J. J. S. *f. leptospermoides*. Mt Nettoti, 1850 m, NW. New Guinea (VAN ROYEN & SLEUMER 7441) (SLEUMER, 1961).

upper nerves shorter, forming a lax network with the veins, sometimes visible beneath only; petiole rather slender, *c.* 2 mm. *Flowers* axillary, solitary. Peduncle *c.* 1 mm, surrounded by several oblong bracts (1–2 mm). Pedicels slender, 5–8(–10) mm, glabrous except some hairs in the uppermost part. *Calyx* all over laxly hirsutulous, tube narrow-obconical, base nearly funnelshape-contracted, 1.5–2 mm, lobes \pm spreading, triangular, subacute, 1.5 mm. *Corolla* urceolate, laxly muriculate outside, pubescent inside, 6–7 by 2.5–3 mm, red or pink at the tube, green at the lobes, the latter suberect or reflexed, obtuse, 1 mm. *Filaments* linear, slightly dilated at the base, laxly long-hairy, 3–3.5 mm; anther-cells oblong, echinulate, 1.5–1.8 mm; tubules as wide and nearly as long as the cells, obliquely cut distally, the back wall ending in a kind of tooth. *Disk* laxly long-hairy. *Style* slenderly columnar, glabrous, 4.5 mm. *Berry* said to be blackish bluish.

Distr. *Malesia*: West New Guinea (Oranje Mts: Mt Hellwig, Erica top, Mt Dromedaris).

Ecol. In shrub vegetation on summits, 1250–1900 m. *Fl.* Dec.

63. *Vaccinium barbatum* J. J. S. Nova Guinea 18 (1936) 109, t. 26, f. 1; SLEUM. Bot. Jahrb. 72 (1942) 235; Blumea 11 (1961) 34.

Much branched shrub. Branchlets rather stiff and short, densely short-pubescent and set with minute warts. *Leaves* dense, obovate, apex obtuse or mostly rounded, base cuneate, the 2 basal marginal glands manifestly impressed in a large distance from the petiole, coriaceous, immature ones puberulous at the base and ciliolate at the apex, mature ones quite glabrous, entire, margin paler than the rest of the lamina, flat or but very slightly revolute, 0.4–0.7 by 0.3–0.4 cm, midrib and *c.* 2 pairs of curved nerves and some veins a little sunken above in fully mature leaves, \pm obsolete beneath; petiole pubescent, 1(–2) mm. *Flowers* axillary, solitary, nodding, 4–5-merous. Peduncle *c.* 1 mm, with several basal vaginate minute bracts. Pedicels rather slender, short-hairy, laxly muriculate distally, 4–6 mm, minutely bibracteolate at the base. *Calyx* turbinate, glabrous, tube 1.5 mm, lobes ovate-triangular, obtuse, ciliolate, 1–1.5 mm. *Corolla* subovoid-urceolate, glabrous at both sides, membranous, *c.* 4 by 3 mm, rose, lobes recurved, obtuse, 0.5 mm. *Stamens* 8 or 10; filaments linear, base dilated and glabrous, barbate or villous in the middle, again glabrous upwards, 1 mm; cells broad-oblong, echinulate, curved inwards, 0.5 mm; tubules \pm divergent, cylindrical, recurved, more slender than the cells, 0.6 mm, transversely cut apically, the edge of the round pore slightly dilated. *Disk* glabrous. *Style* thickish, glabrous, 3 mm.

Distr. *Malesia*: West New Guinea (Nassau Mts), in moss forest, 2600 m. *Fl.* Oct.

64. *Vaccinium inconspicuum* J. J. S. Nova Guinea 18 (1936) 109, t. 26, f. 1; SLEUM. Bot. Jahrb. 72 (1942) 235; Blumea 11 (1961) 34.

Much branched, slender shrub, 2–3 m. Branch-

lets angular and puberulous in the young shoots, otherwise early glabrescent, becoming quite glabrous with age, laxly to subdensely leaved. *Leaves* obovate to elliptic-obovate, apex rounded or mostly markedly emarginate, base broadly cuneate, the basal pair of marginal glands minute, slightly impressed in a large distance from the petiole, coriaceous, not rarely rather stiff, ciliate at the apex initially, quite glabrous when full grown, entire, marginate, edge mostly \pm distinctly recurved, rarely flattish, 0.9–2.2(–3) by 0.7–1.2 cm, midrib \pm sunken above, prominent beneath, nerves in 1–2 steeply curved-ascending basal and 2–3 shorter and upper pairs, anastomosing, slightly raised beneath, less so above, veins laxly reticulated; petiole rugulose, glabrous, 2(–3) mm. *Flowers* axillary, solitary, epilose in all outer parts. Peduncle *c.* 1 mm, basal bracts minute. Pedicels rather slender, glabrous or muriculate, 8–9(–10) mm, base minutely bibracteolate. *Calyx* subcampanulate, laxly muriculate, tube obtuse at the base, 2 mm, lobes triangular-acuminate, apex \pm ciliolate, *c.* 2 mm. *Corolla* depressed-urceolate, apex contracted, glabrous outside, very shortly hairy in the upper half inside, thick-membranous, red, 6 by *c.* 4 mm, lobes ovate, obtuse, purple, 1 mm. *Filaments* linear, base dilated, quite glabrous, nearly 2 mm; anther-cells broad-oblong, echinulate, 1.5–2 mm; tubules nearly as wide as the cells below, narrowed upwards, 1 mm, transversely cut apically or with a more introrse roundish pore. *Disk* glabrous. *Style* cylindrical, glabrous, 4 mm.

Distr. *Malesia*: New Guinea (Nassau Mts (West), and the Idenburg R. near Bernhard camp).

Ecol. In mossy forest and in low scrub on exposed summits, locally common, 2100–2500 m. *Fl.* Febr., Oct.

65. *Vaccinium sanguineum* SCHLTR, Bot. Jahrb. 55 (1918) 172; SLEUM. *ibid.* 72 (1942) 235, as *syn. of V. globosum*; Blumea 11 (1961) 34.

Epiphytic, erect, much branched shrub, 0.4–0.6 m. Branchlets angular, quite glabrous, densely leaved. *Leaves* oblanceolate-spathulate or narrow-obovate, apex obtuse, base cuneate into the petiole, the pair of basal marginal glands small, impressed in a short distance from the petiole, coriaceous, glabrous, edge recurved, 0.9–1.4 by 0.4–0.6 cm, midrib and 1–2 steeply ascending pairs of nerves faintly impressed above or raised beneath, nerves not rarely \pm obscure; petiole *c.* 1.5 mm, on a thick, decurrent leaf-cushion. *Flowers* axillary, solitary, remote, nodding, glabrous in all outer parts. Peduncle 0. Pedicel rather stoutish, reddish, 3.5–5 mm at anthesis, with several basal ovate-oblong bracts, 2 mm. *Calyx* tube short-obconical, 1.5 mm, limb erecto-patent, lobes triangular, subacuminate, ciliolate at apex, 2 mm. *Corolla* broadly ovoid-urceolate, rather fleshy, blood red, with white lobes, *c.* 5 by 3.5–4 mm, glabrous outside, laxly hairy inside, lobes suberect, ovate-triangular, subacute, 1 mm. *Filaments* linear, laxly hairy below, 1.8–2 mm; anther-cells oblong, echinulate, 1.3–1.5 mm; tubules suddenly narrowed, 0.4 mm

long, obliquely cut apically. *Disk* glabrous. *Style* cylindrical, glabrous, 3.5 mm.

Distr. Malesia: New Guinea (Sepik Distr.: Schrader Mts, and from Star Mts: Mt Antares).

Ecol. In moss forest, 2070–2360 m. *Fl.* May, July.

Note. The above description of *V. sanguineum*, of which the type material is lost, is based on the original diagnosis and the material recently collected on Mt Antares, which in no single character contradicts the original description.

66. *Vaccinium lorentzii* KOORD. Nova Guinea 8 (1912) 883; J. J. S. *ibid.* 12 (1914) 157; *ibid.* 12 (1917) 521; *ibid.* (1918) t. 211; SLEUM. Bot. Jahrb. 72 (1942) 235; Blumea 11 (1961) 34.

f. lorentzii.

Shrub, often epiphytic, 1–3 m. Branchlets rather robust, angular, even the youngest immature shoots quite glabrous. *Leaves* rather lax, obovate, more rarely oblong-obovate, apex rounded or obtuse, sometimes minutely notched, base cuneate into the petiole, the basal pair of marginal glands minute, much distant from the petiole, coriaceous, minutely ciliate or barbate at the apex initially, very laxly gland-pointed beneath, quite glabrous on both faces with age, entire, edge mostly rather strongly revolute, 1.2–3(–3.8) by 0.8–1.3(–1.6) cm, midrib and 2 pairs of basal, high curved-ascending and anastomosing nerves faintly sunken or not rarely subinconspicuous above, slightly raised beneath, veins laxly reticulate and mostly visibly prominent beneath; petiole glabrous, 2–3 mm. *Flowers* axillary, solitary, 6–7-merous, glabrous (epilose) in all external parts. Peduncle 1–2(–3) mm, rounded by several basal, ovate-acuminate bracts, 1–2 mm. Pedicel rather stoutish, mostly bent downwards, laxly minutely glandular-muriculate, (2–)3–4(–5) mm. *Calyx* minutely glandular-muriculate, tube broadly turbinate, 2 mm, lobes spreading, triangular, subacute, ciliate especially at apex, *c.* 2 mm. *Corolla* broadly ovoid-urceolate, contracted distally, laxly glandular-muriculate outside, patently hairy inside, fleshy, (dark) red, (7–)8–9 by 5(–6) mm, lobes ovate, obtuse, 1–1.5 mm. *Stamens* 12–14; filaments linear, subdensely to laxly long-hairy, *c.* 3 mm; cells broad-oblong, echinulate, *c.* 1.8 mm; tubules nearly as wide as the cells, 1.2 mm, obliquely cut apically. *Disk* glabrous. *Style* thick-columnar, bottle-shaped, *i.e.* much swollen below, glabrous, *c.* 4 mm. Immature *fruit* almost globose, apex truncate, *c.* 3 mm σ .

Distr. Malesia: New Guinea (Oranje Mts and vicinity: Hellwig and Johannes Keys Mts, Mt Goliath).

Ecol. In moss forest, swampy shrub vegetation, open places with moss covered rocks, locally common, 1350–2500(–3000) m.

f. puberulum J. J. S. Nova Guinea 12 (1917) 522; SLEUM. Bot. Jahrb. 72 (1942) 236; Blumea 11 (1961) 35.

Differs from the typical form by \pm densely puberulous pedicels and calyces.

Distr. Malesia: New Guinea, together with the typical form in the Hellwig Mts.

67. *Vaccinium pullei* J. J. S. Med. Rijksherb. n. 25 (1915) 9; Nova Guinea 12 (1917) 522; *ibid.* (1918) t. 212; *ibid.* 18 (1936) 108; SLEUM. Bot. Jahrb. 72 (1942) 235; Blumea 11 (1961) 35; *ibid.* 12 (1963) 127. — *V. hatamense* (non BECC.) KOORD. Nova Guinea 8 (1912) 883.

Much branched, apparently exclusively terrestrial shrub, (0.5–)1–2(–3) m. Branchlets clad with a rather lax, fine puberulence, mixed with sparse muriculate glands in the new reddish shoots or younger parts, early glabrescent below, subdensely to more laxly foliate. *Leaves* much resembling those of *V. lorentzii* in shape, size and nervation, *i.e.* obovate, or more rarely oblong-obovate, apex rounded, often slightly emarginate, base cuneate into the petiole, coriaceous, glabrous, laxly shortly glandular-muriculate or punctate beneath, entire, the very edge slightly recurved in dry specimens, 1.4–3 by 0.7–1.4 cm, 5(–7)-plinerved from and from above the base, midrib and nerves faintly sunken or almost obscure above, prominent beneath, the laxly reticulate veins but slightly so or subinconspicuous; petiole rugulose, glabrous, 2–3(–4) mm. *Flowers* axillary, often subsessile, glabrous in all outer parts. Peduncle 0–1 mm, surrounded by several ovate-subacuminate bracts, 1–2 mm. Pedicel stoutish, curved, sparsely appressed-muriculate, (1–)2 mm. *Calyx* subcampanulate, base obtuse to rounded, minutely muriculate, tube 2 mm, lobes \pm spreading, triangular, ciliate at apex only, *c.* 1.5 mm. *Corolla* depressedly subglobose-urceolate, much constricted apically, glabrous outside, laxly hairy inside, thick-fleshy, (dark) red to pinkish or almost white, *c.* 5 by 4–5 mm, lobes recurved, *c.* 1.2 mm. *Filaments* linear, laxly longish patent-hairy except the uppermost part, *c.* 1.8 mm; anther-cells oblong, echinulate, *c.* 1.2 mm; tubules nearly as wide as the cells, 0.7 mm, obliquely cut apically. *Disk* glabrous. *Style* columnar, glabrous, 3.5 mm. *Fruit* blue-blackish when ripe.

Distr. Malesia: New Guinea (Oranje Mts, Mt Hellwig, Nassau Mts, around the Wissel Lakes, and Arfak Mts).

Ecol. In moss forest, swampy *Dacrydium* forest or shrub vegetation, 1700–2500 m, on peaty soil. *Fl.* Dec., May.

Vern. *Kieta*, *piepa*, Kapauku, *tembies*, Hattam.

Note. Specimens similar in leaves, but sterile or bearing no corollas, seen from the Weyland Mts, Mt Carstensz and Cycloop Mts.

68. *Vaccinium whitfordii* MERR. Philip. J. Sc. 2 (1907) Bot. 295; *ibid.* 3 (1908) Bot. 372; BROWN, Min. Prod. Philip. For. 2 (1921) 362; MERR. En. Philip. 3 (1923) 252; COPEL. *f.* Philip. J. Sc. 42 (1930) 594, t. 6, f. 6–8; SLEUM. Blumea 11 (1961) 35. — *Gaultheria sp.*, VIDAL, Rev. Pl. Vasc. Filip. (1886) 170.

Terrestrial or sometimes epiphytic, erect shrub

or small tree, 0.7-3(-5) m. Branchlets slender, younger parts angular and puberulous, early glabrescent. *Leaves* dense, narrowly obovate or elliptic-, or more rarely oblong-obovate, apex obtuse to rounded, base \pm cuneate into the petiole, coriaceous, glabrous, laxly set beneath with minute glandular dark points, rather regularly and distantly crenulate especially in the upper part by 3-4 deeply impressed glands on each side, (0.9-) 1.2-1.5(-1.8) by 0.4-0.6(-0.8) cm, midrib slightly sunken above, somewhat prominent beneath, one basal and 1-2 suprabasal pairs of steep and high-ascending nerves sometimes faintly impressed above, or raised on both faces, but often \pm obsolete, veins still less distinct, visible beneath only; petiole \pm flattened, 1-2 mm, puberulous initially. *Flowers* axillary, solitary, subsessile. Peduncle hardly 1 mm, clasped by several minute ovate bracts. Pedicel stoutish, sparsely to more densely puberulent, 1-2 mm. *Calyx* glabrous, tube broadly obconical, base \pm truncate, 1.5-2(-2.5) mm, lobes deltoid, obtuse by a thick dark gland, suberect, 1-1.5 mm, ciliate. *Corolla* narrow- or subcylindric-urceolate, membranous, red, glabrous at both sides, 6-7(-8) mm long, 2.5(-3, rarely -4) mm ϕ below, c. 2 mm ϕ at the upper third, lobes ovate, much reflexed, 1 mm. *Filaments* subulate, dilated below, glabrous at the very base, subdensely and rather longish white-hairy otherwise, alternately 3 and 4 mm; anther-cells obovoid-oblong, 1.5 mm, slightly granular; tubules almost as wide as the cells, 1.3 mm, very obliquely cut apically, the pore widely flaring. *Disk* glabrous. *Style* slenderly cylindric, glabrous, 6-7(-8) mm, distinctly exerted when the corolla lobes are reflexed in full anthesis. *Berry* subglobose-ovoid, glabrous, c. 5 mm ϕ , purple or blackish at maturity. *Seeds* red brown, fusiform, 1 mm.

Distr. *Malesia*: Philippines (Luzon, particularly in the Mountain Prov.; Mindoro, Leyte, Negros).

Ecol. In forests, open heaths and thickets, 1000-2500 m. *Fl. fr.* Jan.-Dec.

Vern. *Fafalong*, Bon., *gutmu*, If., Ig., *katmo*, *lusong*, Ig., *parukapol*, Neg.

Uses. The berries are small, black, juicy, subacid, sweet, and of good quality; collected locally for food, not cultivated.

69. *Vaccinium amblyandrum* F. v. M. Trans. R. Soc. Vict. 1, 2 (1889) 19 (*sphalm.* 'amblyandrum'); SLEUM. Bot. Jahrb. 72 (1942) 237; Blumea 11 (1961) 35; *ibid.* 12 (1963) 127; *ibid.* 12 (1964) 343. — Fig. 93.

KEY TO THE VARIETIES

- 1. Leaves oblong-elliptic, more rarely oblong or elliptic (apex \pm obtuse to subacute), 0.4-0.7 (-0.9) by c. 0.3 cm. 1. *var. amblyandrum*
- 1. Leaves larger, elliptic, elliptic-oblong or more rarely lanceolate-elliptic, 0.8-1(-1.4) by (0.4-) 0.5-0.6 cm.
 - 2. Leaves subacute or obtuse at apex
 - 2. *var. maluseculum*
 - 2. Leaves acute, or mostly rather pungent at apex. 3. *var. pungens*

var. amblyandrum.

Dwarf or low shrub, erect or often decumbent, prostrate or creeping, 25-35(-60) cm, produced from a large rootstock. Branches numerous, stiff, often \pm spreading, sometimes short and dense together. Branchlets subdensely set with short, whitish, crisped or \pm spreading hairs in the youngest angular, glabrescent in the older subterete parts. *Leaves* rather densely arranged, reddish when young, dark green with age, oblong-elliptic, more rarely oblong or elliptic, apex and base broadly attenuate, subobtuse to subacute, coriaceous, \pm shining, ciliate in the lower part initially, quite glabrous at full age, very laxly glandular-pointed beneath, 0.4-0.7(-0.9) by c. 0.3 cm, margin cartilaginous, slightly or not recurved, \pm distinctly crenulate to subserrate-crenulate, rarely less distinctly so and seemingly entire, with a small tooth-like gland within each depression, midrib mostly faintly impressed above, slightly raised beneath, nerves 1-2 basal and suprabasal, high curved-ascending pairs, obsolete above, minutely prominent beneath as are the laxly reticulate veins; petiole pubescent, c. 1 mm. *Flowers* solitary in the upper axils. Peduncle 0. Pedicel glabrous or rarely hairy, 1(-2) mm, concealed by the rather large, ovate, imbricate, ciliate bracts (1.5-2 mm), which sometimes even cover the base of the calyx. *Calyx* glabrous, tube tubular-campanulate below, constricted below the limb, c. 2 mm at anthesis, afterwards soon swollen and subglobose, limb spreading, lobed to $\frac{2}{3}$, lobes broad ovate-triangular, obtuse by a small terminal gland, ciliate, 1 mm. *Corolla* broad-urceolate, sometimes more open, sometimes much constricted at the opening, rather thin, white or pink, glabrous outside, laxly hairy in the upper part inside, 4(-5) by 3(-3.5) mm in dry, up to 7 by 6 mm in fresh specimens, lobes slightly spreading, 1 mm. *Filaments* alternately 1.8 and 2 mm, subulate-linear, papillose, epilose; anther-cells broad-oblong or ovate-ellipsoid, c. 1 mm, base of each cell apiculate-appendiculate, no dorsal spurs; tubules as wide as the cells, 0.3 mm, transversely cut, resulting in a wide round pore. *Disk* glabrous. *Style* slenderly columnar, papillose, epilose, as long as the corolla. *Berry* fleshy, purple or black, 0.7-1 cm ϕ when fresh, palatable.

Distr. *Malesia*: New Guinea (Main Range from the Star Mts (Mt Antares) through the Western, Eastern and Southern Highlands to Owen Stanley and Maneau Ra.).

Ecol. In forest glades, *Sphagnum* formation or other wet places in grassland, on old landslides or open hillside on cleared summits, creeping over rocks, along creeks or forest borders, often massed, 2440-3680(-4265) m. *Fl.* Jan.-Dec.

Vern. *Tadampso*, Mendi.

var. maluseculum SLEUM. Bot. Jahrb. 72 (1942) 237; Blumea 11 (1961) 36; *ibid.* 12 (1964) 343.

Leaves larger, elliptic-oblong, subacute or obtuse at the apex, 0.8-1(-1.4) by (0.4-)0.5-0.6 cm.

Distr. *Malesia*: New Guinea (Mt Saruwaged

region, Western Highlands (Kubor Ra.) and the SE. part of the Main Range: Mt Dayman, Mt Simpson).

Ecol. In grass- and peaty moorland, on exposed ridges, 2000–3820 m, locally plentiful.

var. pungens SLEUM. *Blumea* 11 (1961) 36; *ibid.* 12 (1963) 127. — Fig. 93.

Erect stiff shrub, 0.3–0.7 m, smaller on dry places. *Leaves* elliptic or more rarely lanceolate-elliptic, the apex distinctly acuminate, acute, or not rarely even \pm pungent, 0.8–1.4 by 0.4–0.6 cm.

Distr. *Malesia*: New Guinea (Southern, Western and Eastern Highlands: Mt Giluwe, Hagen Ra., Wahgi Divide area, Mt Wilhelm).

Ecol. In shrubby mountain side or (sub)

alpine grassland or sedge-bog, or *Miscanthus* regrowth, also creeping over rock faces, locally common, sometimes together with *var. amblyandrum* but quite distinct in habit, (2040–)2400–3615 m.

Vern. *Rohn*, Enga, *kusuwamp*, Mendi.

70. *Vaccinium evanidinervium* SLEUM. *Blumea* 11 (1961) 36.

Terrestrial shrub, 1–1.5 m. Branches erect, rather robust, much branched apically. Branchlets reddish, subangular and subdensely short-pubescent at the tips, subterete and glabrescent below. *Leaves* dense, oblong-elliptic, apex shortly subacuminate-attenuate, the very tip subacute or bluntish, base \pm broadly attenuate, the pair of basal marginal glands minute and in a rather wide distance from the petiole, coriaceous, glabrous, rather lustrous beneath, crenulate along the whole margin or certainly so in the upper part, or entire in the lower part of the lamina, crenations initially set with a small, rather early caducous gland, (0.9–)1–1.5 by 0.5–0.7 cm, midrib slightly impressed above, not much prominent beneath, nerves in c. 3 curved-ascending and anastomosing pairs hardly visible above, raised with the lax reticulation on the undersurface of young, gradually evanescent beneath in fully mature leaves; petiole slender, c. 2 mm. *Flowers* solitary in a few of the upper axils. Peduncle c. 1 mm, \pm included by several small, ciliolate bracts. Pedicel rather stoutish, 3–5 mm, laxly set with fine glandular hairs or muriculate. *Calyx* green, glabrous, shining, tube rugulose, subcampanulate-obconical, 2–2.5 mm long, c. 2 mm ϕ below the limb, the latter much spreading, c. 1.5 mm high and 4–5 mm ϕ , shortly 5-lobed or -dented, lobes broadly deltoid, subacute, ciliate, 0.5 mm. *Corolla* subcylindric-urceolate, fleshy, bright red, glabrous at both sides, 9(–10) by 5(–6) mm, lobes erect, subacute, 1.5 mm. *Filaments* filiform, slightly dilated at the base, bearing a few long hairs in the lower part, glabrous otherwise, c. 4.5 mm; anther-cells oblong, 1.2 mm; tubules narrower than the cells, a little curved upwards and flaring at the oblique opening, 0.8 mm. *Disk* glabrous. *Style* columnar, laxly subappressedly long-hairy in the lower third, c. 7 by 1 mm. *Fruit* globose, blue-blackish, 5–6 mm ϕ .

Distr. *Malesia*: New Guinea (Mt Kinkain in the Central Kubor Ra., Western Highlands), in alpine thickets at 3560–3600 m. *Fl. fr.* July.

71. *Vaccinium coelorum* WERNH. *Trans. Linn. Soc. II, Bot.* 9 (1916) 91; SLEUM. *Bot. Jahrb.* 72 (1942) 237; *Blumea* 11 (1961) 36. — *V. arenarium* SLEUM. *Bot. Jahrb.* 72 (1942) 232.

Prostrate shrublet. Branchlets rather stoutish, tips angular, puberulous, very densely leaved. *Leaves* from a thick leaf-cushion, subsessile, elliptic or ovate-elliptic, apex obtuse or obtusely subacuminate, base very broadly attenuate or obtuse, coriaceous, stiff, glabrous, regularly \pm shallowly crenulate at least in the upper half of



Fig. 93. *Vaccinium amblyandrum* F. v. *M. var. pungens* SLEUM. Mt Wilhelm, 3600 m, New Guinea (SLEUMER 4161) (SLEUMER, 1961).

the distinctly marginate (thickened), not revolute edge, laxly glandular-punctate beneath, 0.4–0.6 (–0.7) by 0.25–0.4 cm, midrib and nerves faintly impressed above, or often inconspicuous on both faces; petiole hardly 1 mm. *Flowers* axillary, solitary, nodding, glabrous in all external parts. Peduncle 1–2 mm, with several oblong basal minute bracts. Pedicel rather stoutish, 3–5 (–6) mm. *Calyx* broadly turbinate, verruculose and shining in dry specimens, tube almost funnel-shaped, 1.5 mm, limb much expanded, deeply 5-lobed, lobes deltoid, subacute, laxly ciliolate, 1.5 mm. *Corolla* depressed-urceolate, the mouth contracted, glabrous outside, densely hairy inside, fleshy, red, 5–6 (–7) by 5 mm. *Filaments* subulate or almost filiform, laxly to subdensely hairy, 2.5 mm; anther-cells oblong, 1.7 mm; tubules 0.3 mm, obliquely cut apically. *Disk* glabrous. *Style* thick-columnar, glabrous, 3.5–4 mm.

Distr. *Malesia*: West New Guinea (Mt Carstenz and the N. slope of Mt Wilhelmina).

Ecol. In alpine grassland and edges of subalpine forest, locally abundant on weathered sandstone, 3200–4000 m. *Fl.* Sept.

72. *Vaccinium prostratum* SLEUM. Bot. Jahrb. 72 (1942) 230; *Blumea* 11 (1961) 37; *ibid.* 12 (1963) 127.

Prostrate subshrub, 30–60 cm. Branchlets spreading, somewhat flexuous, densely leaved, tips erect, youngest parts very shortly grey-pubescent. *Leaves* lanceolate to subelliptic-lanceolate, apex gradually acuminate, subacute, base attenuate, subcoriaceous, though rather firm, dark green above, paler below, glabrous, seemingly entire, in fact with several shallow crenulations on each side in the upper part of the lamina, 0.7–1 by c. 0.3 cm, a little shining, midrib impressed above, no nerves or veins; petiole c. 1 mm. *Flowers* axillary, solitary, glabrous in all outer parts. Peduncle 0. Pedicel rather slender, 3–4 mm, with several basal and slightly suprabasal, narrow-subulate bracts. *Calyx* turbinate or subcampanulate, contracted at the base, light green, tube 2 mm, lobes broadly triangular, subacute, 1 mm. *Corolla*

urceolate, fleshy, white or pink, glabrous outside, hairy inside, 6 mm, very shortly 5-lobed. *Filaments* filiform, base very slightly dilated and sparsely patently hairy, otherwise glabrous, 2.5–3 mm; anther-cells broad-oblong, papillose-granular, 1 mm; tubules very short, slightly narrower than the cells, obliquely cut distally. *Disk* glabrous. *Style* columnar, glabrous, almost as long as the corolla.

Distr. *Malesia*: New Guinea (Mt Saruwaged area), in open heath vegetation or alpine meadow on rather dry calcareous soil, 3000–3655 m. *Fl.* Febr., Oct.

73. *Vaccinium wollastonii* WERNH. Trans. Linn. Soc. II, Bot. 9 (1916) 93; SLEUM. Bot. Jahrb. 72 (1942) 237; *Blumea* 11 (1961) 37.

Shrublet. Branchlets slender, finely short-pubescent, subterete, subdensely leaved. *Leaves* lanceolate to lanceolate-oblong, ± acutely acuminate towards the apex, base ± broadly attenuate, coriaceous, regularly subserrate-crenulate at least in the distal half, margin hardly or not thickened nor revolute, 0.5–0.7 by 0.2–0.3 (–0.35) cm, midrib ± obsolete above, distinctly raised beneath as are the 2(–3) pairs of basal and supra-basal nerves beneath; petiole 0.5 mm. *Flowers* axillary, solitary, nodding, glabrous in all external parts. Peduncle slender, 2(–3) mm, with several minute basal bracts. Pedicel slender, 5–6 mm, with 2–3 basal bracteoles, 1 mm. *Calyx* tube obconical-subcampanulate, 1.5 mm, limb ± spreading, lobed to almost its base, 1 mm, lobes ovate-triangular, acute. *Corolla* ovoid-urceolate, contracted at the opening, glabrous outside, laxly hairy inside, red, 5–6 by 3–4 mm. *Filaments* linear, laxly hairy at the base, 2–2.5 mm; anther-cells oblong, echinulate, 1 mm; tubules cylindrical, as wide as the cells, 0.5 mm, obliquely cut distally. *Disk* glabrous. *Style* columnar, glabrous, c. 5 mm.

Distr. *Malesia*: New Guinea (Mt Carstenz and Mt Wilhelmina area).

Ecol. Epiphytic in subalpine forest, or terrestrial amongst grass in moist places, 2530–3800 (–4400) m. *Fl.* Sept.–Dec.

5. Section *Neojunghuhnia*

(KOORD.) SLEUM. Bot. Jahrb. 71 (1941) 419; *ibid.* 72 (1942) 217, 238; *Blumea* 11 (1961) 37. — *Neojunghuhnia* KOORD. Nova Guinea 8 (1909) 183, t. 48. — *Disiphon* SCHLTR, Bot. Jahrb. 55 (1918) 166, f. 8. — **Fig. 88, 94.**

Racemes ± lax, sometimes reduced to few-flowered fascicles or very rarely to a solitary flower; pedicels slender, elongate. Bracteoles inserted at the base of the pedicels, minute and very early caducous, practically absent. *Calyx* lobes (laciniac) long-subulate, (much) longer than the calyx tube.

Distr. *Malesia*: 13 spp., in New Guinea. Fig. 88.

KEY TO THE SPECIES

1. Tubules narrow-cylindrical, parallel to, but well separated from each other, laxly set with stalked glands, transversely cut at the very apex, the pore round. Corolla at least partly pubescent.
2. Corolla ellipsoid-urceolate or ventricose, gradually attenuate at both ends, widest in the middle, white, all over laxly hairy. (Leaves (3)–4–6 by (1.5)–2–3 cm.). **74. *schlechterianum***

2. Corolla elongate-urceolate, very shortly attenuate at the base, long so towards the mouth, widest below the middle, but partially hairy.
3. Corolla (red) laxly hairy along 5 vertical stripes. (Leaves ovate, (2.5-)3-4 by 1-1.8 cm.).
75. *V. kostermansii*
3. Corolla laxly hairy at the apex, glabrous for the rest.
4. Corolla white. Leaves ovate, 3-5.5 by (1.5-)1.8-3.5 cm, base rounded to subcordate
76. *V. insigne*
4. Corolla (pale) pink with reddish lobes. Leaves narrowly elliptic-ovate, 2.5-4 by 1-1.5 cm, base broadly cuncate 77. *V. malacothrix*
1. Tubules broad-cylindrical, parallel and close to each other, never set with stalked glands, obliquely cut at the apex, the pore \pm elliptic, the back of each tubule \pm prolonged into a kind of tooth, which may be minutely bidentate again. Corolla glabrous or practically so.
5. Calyx lobes (laciniae) $\frac{3}{4}$ - $\frac{1}{3}$ as long as the total corolla at full anthesis.
6. Calyx lobes narrow-deltoid to broad-subulate, \pm gradually attenuate or acuminate distally. (Anther-cells distinctly acute.) 78. *V. oreites*
6. Calyx lobes subulate, *i.e.* narrowed \pm abruptly upwards from a rather broad base into a long needle-like distal part.
7. Calyx and pedicels glabrous. Anther-cells bluntish 79. *V. timonioides*
7. Calyx and pedicels laxly to subdensely patently hairy, finally \pm glabrescent. Anther-cells distinctly acute 80. *V. longisepalum*
5. Calyx lobes (laciniae) at least half as long as the total corolla at full anthesis.
8. Leaves very densely imbricate, enclosing the branchlets 81. *V. imbricans*
8. Leaves more laxly to subdensely arranged, leaving the branchlets visible at least for their greater part.
9. Leaves ovate-lanceolate, (3.5-)4-5 by 1-1.6 cm, base broadly attenuate.
82. *V. hispidulissimum*
9. Leaves (broadly or narrowly) ovate, base rounded to subcordate.
10. Leaves (5-)6-8 by 3-4 cm 83. *V. cardiophorum*
10. Leaves smaller, up to 5 by 2.3 cm.
11. Calyx lobes dorsally glabrous, ciliate, 4-5 mm. Branchlets and pedicels with both eglandular and gland-tipped hairs. (Leaves laxly soft-hispidulous at the midrib and edge underneath, otherwise set with sparse, shorter, dark, subappressed glandular hairs on the intervenium. Style glabrous.) 84. *V. spaniotrichum*
11. Calyx lobes densely softly hispidulous, dorsally so at least in the lower half, 6-7 mm. Branchlets and pedicels exclusively with eglandular hairs.
12. Leaves densely softly hispidulous all over the undersurface, the hairs with a manifestly thickened base which persists when the proper hair is gone as a sort of minute wart, no proper glandular hairs present. Style glabrous 85. *V. subulisepalum*
12. Leaves softly hispidulous exclusively along the midrib underneath, the base of the hairs not thickened, otherwise laxly clad with short, appressed, dark glandular hairs. Style hairy to nearly the top 86. *V. eymae*

74. *Vaccinium schlechterianum* SLEUM. Bot. Jahrb. 71 (1941) 425; *ibid.* 72 (1942) 240; Blumea 11 (1961) 38. — *Disiphon papuanum* SCHLTR, Bot. Jahrb. 55 (1918) 166, f. 8.

Epiphytic shrub, *c.* 1 m. Branchlets slender, subterete, younger parts densely clothed with \pm patent, soft, longish hairs, older ones glabrescent, subdensely leaved. *Leaves* ovate, apex subcaudate-acuminate, base rounded to subcordate, subcoriaceous, glabrescent above, sparsely hispidulous beneath, entire, (3-)4-5(-6) by (1.5-)2-2.3(-3) cm, midrib rather strong below, much narrowed upwards, one pair of basal nerves anastomosing with 3 higher inserted pinnate pairs; petiole *c.* 3 by 1 mm. *Racemes* from the upper axils, laxly 2-3(-5)-flowered, \pm patently hispidulous-villous in all parts; rachis slender, 1-1.5 cm. Pedicels slender, 1.3-2 cm, the basal bracteoles very early caducous. *Calyx* tube short-obconical or campanulate, 2 mm, limb 5-partite to the base into lanceolate-subulate 6 mm long acute laciniae. *Corolla* ellipsoid-urceolate or ventricose, rather densely hairy outside, glabrous inside, mem-

branous, translucent-whitish, *c.* 1.4 cm long in all, *c.* 0.7 mm wide in the middle, 5-lobed at the contracted mouth, lobes obtuse, 1 mm, spreading or reflexed. *Filaments* filiform, patently long-hairy; anther-cells oblong, rather smooth, 1 mm; tubules subcylindrical, forming a wide angle with the cells, sparsely set with substipitate glands, the pore truncate, marginate, strictly apical. *Disk* hairy. *Style* said to be 1.2 cm long in the original diagnosis, only 0.75 cm in the added figure, hairy to nearly the top.

Distr. *Malesia*: New Guinea (Abrupt Mt = 'Etappenberg', Sepik Distr., April R. region), at 850 m. Once found. *Fl.* Oct.

75. *Vaccinium kostermansii* SLEUM. Blumea 11 (1961) 38; *ibid.* 12 (1963) 127.

Much branched, epiphytic or terrestrial shrub, (0.5-)1-4(-6) m, with pendent twigs. Branchlets laxly leaved, terete, slender and flexible, tips patently hispidulous hairy (1-2 mm), older parts glabrescent and early corticate. *Leaves* broadly to more narrowly ovate, apex rather abruptly

caudate-acuminate, acute, ending with a minute gland, base broadly attenuate or mostly rounded to slightly cordate, subcoriaceous, hairy on both faces when young, \pm glabrescent above and laxly hairy on the undersurface, more densely so on the midrib and the edge beneath, the hairs long, hispidulous and erect, hardly thickened at the base, mixed with more sparse and shorter subappressed glandular hairs beneath, entire, \pm revolute especially towards the base, olivaceous and dull above, brownish and a little shining beneath when dry, (2.5-)3-4(-5.5) by 1-1.8(-2.2) cm, midrib slightly impressed above, prominent beneath, lateral basal nerves in 1-2 pairs, high ascending, other upper and pinnate, irregular and curved nerves c. 4 pairs, all nerves curved-anastomosing, not or hardly prominent above, slightly so beneath, reticulation dense, fine, well visible beneath only; flush reddish or pink; petiole pubescent, 1-2 mm. *Racemes* axillary, much reduced, (2-)3-8-flowered, densely clothed with hispidulous patent hairs (0.5-1 mm) and more laxly with other shorter subappressed, brownish glandular hairs or stalked glands on rachis, pedicels and calyces; rachis 0.5-1 cm. Pedicels greenish, slender, 1-1.5 cm. *Calyx* greenish pinkish, tube obtusely obconical or subcampanulate-subglobose in the anthesis, 2-2.5 mm long, c. 3 mm σ , laciniae gradually subulate-attenuate, erecto-patent, 5(-6) by almost 1 mm at the base, hairy on both sides. *Corolla* elongate-urceolate, 10(-11) mm long in all, widest in the lower third (4-5 mm σ), constricted towards the opening to 1.5-2 mm σ , rather fleshy, red to deep pink, laxly long-hairy and glandular along 5 vertical lines or angles, which alternate with the calyx lobes, glabrous otherwise outside, lobes obtuse, reflexed, c. 1 mm. *Filaments* linear-subulate, glabrous at the very base, villous otherwise, 4 mm; anther-cells oblong, base obtuse, 0.7 mm; tubules cylindrical, set with several stalked glands, 0.5-0.6 mm, the pore round, strictly terminal. *Disk* hispidulous-hairy. *Style* subdensely subappressedly long-hairy below, glabrous and papillose for c. 2 mm below the stigma, c. 9 mm, a little exerted at the end of the anthesis.

Distr. *Malesia*: NNW. New Guinea (Tohkiri and Arfak Mts).

Ecol. In swampy forest, or generally under-shrub in light \pm mossy *Nothofagus* forest, 1250-2100 m, locally common. *Fl.* Oct.-Jan.

76. *Vaccinium insigne* (KOORD.) J. J. S. Nova Guinea 12 (1917) 533, in text; SLEUM. Bot. Jahrb. 72 (1942) 240; Blumea 11 (1961) 39. — *Neojunghuhnia insignis* KOORD. Nova Guinea 8 (1909) 184, t. 48.

Epiphytic shrub. Branchlets very slender, densely clad with spreading hirsute longish (1-2 mm) non-glandular hairs in young, glabrescent in older parts, densely but not properly imbricately leaved. *Leaves* ovate, very similar in form and size to those of *V. subulisepalum*, apex subcaudate-acuminate, acute, base rounded to subcordate, with a dark basal gland on each side near the petiole, subcoriaceous, glabrescent above except

the impressed midrib, \pm densely set with longish suberect basally not thickened hairs beneath especially on the prominent midrib and on the edge, less so on the intervenium, the latter bearing no fine puberulence (as is found in *V. subulisepalum*), but laxly clad with numerous fine, short, subappressed glandular hairs (which are absent in *V. subulisepalum*), rather glossy on both surfaces, entire, margin \pm strongly revolute especially in the lower half of the lamina (the leaf thus seemingly subrhomboid in dry specimens), 3-5.5 by (1.5-)1.8-3.5 cm, sub-3-5-plinerved, with 3-4 pairs of upper pinnate nerves, all faintly prominent on both sides and anastomosing, reticulation dense and fine, conspicuous beneath, less dense (veins only) above; petiole hispid, 1-2 mm. *Racemes* axillary, 4-8-flowered, up to 10 mm long in the immature state known up to date; outer perulae ovate or suborbicular, glabrous, 1-2 mm, inner ones ovate-acuminate, set with long hairs and very short stalked glands on the dorsal, somewhat keeled midrib and on the edge, up to 4 by 1.5 mm. Pedicels (only 3 mm long in the very young material at hand) and calyx densely villous-hirsutulous, moreover set with some stalked glands. *Calyx* lobes or laciniae seen up to 3 mm long in bud, hairy outside and in the upper part inside, no apical gland found (which is present in *V. subulisepalum*). *Corolla* glabrous except some hairs at the apex, apparently elongate-urceolate, said to be white. *Filaments* linear, glabrous below, hairy upwards; anther-cells oblong, narrowed into a cylindrical tube, which bears some stalked glands, the pore strictly apical, rightly cut. *Style* glabrous except some weak hairs below, papillose below the stigma.

Distr. *Malesia*: New Guinea (crest of Mt Resi, Oranje Mts), c. 500 m in primeval forest, once found. *Fl.* Sept.

Note. Description enlarged on base of a more developed flower in the Leyden isotype than KOORDERS has investigated in the Bogor holotype. The anthers are of the type found in *V. schlechterianum*.

77. *Vaccinium malacothrix* SLEUM. Bot. Jahrb. 72 (1942) 241; Blumea 11 (1961) 39.

Climbing shrub, c. 15 m, with slender, densely leaved branches, pendent from lower limbs of support tree. Branchlets and petioles densely set with spreading, rather soft hispid hairs (1-2 mm). *Leaves* subimbricate, i.e. partly covering each other, narrowly elliptic-ovate, apex subabruptly caudate-acuminate, acute, base broadly cuneate, said to be reddish when very young, mature ones pale olivaceous in dry specimens, chartaceous initially, covered on both sides with longish fine hispidulous, but soft and \pm erect hairs, glabrescent above with age, the midrib excepted, more persistently hairy all over beneath especially at midrib and edge, the undersurface moreover laxly set with short glandular \pm appressed hairs, entire, margin revolute, 2.5-4 by 1-1.5 cm, midrib and one pair of basal, high ascending nerves slightly sunken above, a little raised beneath, other higher

nerves and veins \pm obsolete, hardly visible beneath; petiole 2–3 by 1 mm. *Flowers* solitary or rarely in twos in the upper axils, perulac minute (2–3 mm), glabrous dorsally, ciliate. Pedicels very slender, densely patently hairy (c. 2 mm) as is the calyx, 1–1.5 cm. *Calyx* tube subcampanulate, 2–2.5 mm, the erecto-patent laciniae subulate or elongate-deltoid, c. 7 by 1 mm at base, hairy on both faces and moreover set with sparse stalked glands particularly at the margin. *Corolla* elongate-urceolate, (pale) pink with reddish lobes, glabrous besides some long hairs at and a little below the lobes, 1.2 cm long in all, c. 3 mm σ in the lower third. *Stamens* c. 7 mm; filaments linear-subulate, villous except the very base and top; anther-cells subovate-oblong, granular, 1 mm; tubules a little divergent, cylindric, slightly dilated distally, 1.3 mm, sparsely set with stalked glands, the pore transversely cut, orbicular, the margin wavy. *Disk* glabrous except the laxly hairy inner margin. *Style* columnar, subappressedly long-hairy in the lower $\frac{3}{4}$, papillose for the rest. *Fruit* globose, c. 5 mm σ , densely patently hairy, crowned by the calyx lobes.

Distr. *Malesia*: E. New Guinea (near Mafulu, Central Distr.), mountain crest forest, c. 1700 m, one collection.

78. *Vaccinium oreites* SLEUM. Bot. Jahrb. 72 (1942) 239; *Blumea* 11 (1961) 39.

Large shrub or small tree, 1.5–4 m. Branches stiff, down-turned. Branchlets densely covered with a \pm soft tomentum of horizontally spreading short brownish hairs in the youngest, early glabrescent in the older parts, densely subimbricately leaved. *Leaves* ovate, ovate-oblong or shortly ovate-lanceolate, apex subcaudate-acuminate, bluntish by a small terminal gland, base broadly attenuate to rounded, subcoriaceous, hairy on both faces initially, \pm glabrescent with age, but still laxly set with fine glandular bristle-like dark hairs beneath, entire, marginate, edge revolute, or the whole lamina \pm convex above in fresh specimens, 2.5–3.3 by (0.8–)1–1.4 cm, midrib impressed above, prominent beneath, nerves in 4–5 pairs, rather faintly raised beneath as is the very fine, almost obsolete reticulation; petiole hairy initially, c. 2 mm. *Racemes* from the upper axils, laxly 6–8-flowered; rachis slender, 1–1.5 cm, covered by a rather dense pubescence of fine, \pm patent hairs, and more laxly by thicker and shorter, dark, glandular hairs as is equally found on the pedicels and calyx. Pedicels rather slender, 0.8–1 cm, bracteoles basal, minute and early gone. *Calyx* subglobose as far as adnate to the ovary, 2–2.5 mm across, limb formed by narrow-deltoid or broadly subulate, \pm gradually attenuate or acuminate laciniae which are hairy in the upper part inside, (2–)2.5–3(–3.5) mm. *Corolla* cylindric-urceolate, contracted at the opening, fleshy, glaucous pink to rose red, or red, glabrous, 8–9 mm long in all, c. 3 mm σ in the lower third, lobes rounded, reflexed, 1 mm. *Filaments* 2.5 mm, dilated and long-haired in the lower third, glabrous and almost filiform distally;

anther-cells oblong, 1.5 mm; tubules nearly as wide as the cells, 1 mm, the back wall of each tubule extending into a short tooth. *Disk* conspicuous, glabrous. *Style* columnar, glabrous, as long as the corolla. *Fruit* globose, c. 5 mm σ , bluish blackish at full maturity.

Distr. *Malesia*: West New Guinea (Oranje Mts, Lake Habbema-Mt. Wilhelmina area).

Ecol. In subalpine mossy forest or low thickets of higher ridges, also common on shores of lake, 3225–3400 m. *Fl. fr.* Aug.–Sept.

79. *Vaccinium timonioides* WERNH. Trans. Linn. Soc. II, Bot. 9 (1916) 93; SLEUM. Bot. Jahrb. 72 (1942) 239; *Blumea* 11 (1961) 39.

Slender shrub. Branchlets very slender, youngest parts densely patently hairy (1 mm), oldest ones glabrescent, minutely verruculose. *Leaves* lax, lanceolate-ovate, rather gradually subcaudate-acuminate upwards, the very apex bluntish, base \pm rounded, the basal pair of marginal glands hardly visible, firmly chartaceous, glabrous except very short appressed glandular hairs scattered over the whole undersurface, entire, revolute in the lower third (and thus becoming ovate-rhomboid) in dry specimens, (2–)2.5–3(–3.5) by 0.8–1.2(–1.3) cm, midrib faintly impressed above, raised beneath, nerves and veins \pm inconspicuous; petiole 1–2 mm. *Racemes* very lax, 3–5-flowered, glabrous in all outer parts; rachis slender, 0.5–1 cm. Pedicels slender, 1–1.3 cm, thickened distally. *Calyx* tube subglobose, shining, 1.5 mm σ , lobes or laciniae \pm abruptly subulate from an ovate, membranous, wing-like base, keeled, 1.5–2 mm, ciliate below. *Corolla* narrow-urceolate, thin, glabrous at both sides, 6–7 mm long, 2–2.5 mm σ below, c. 1 mm σ distally, lobes ovate, reflexed, 0.5 mm. *Filaments* subulate, villous below only, 2.5 mm; anther-cells broad-oblong, 0.7 mm; tubules as wide as the cells, c. 0.3 mm, obliquely cut apically. *Disk* glabrous. *Style* slender, glabrous, 6 mm.

Distr. *Malesia*: New Guinea (ascent from Utakwa R. to Mt. Carstensz), 1900 m, once found.

80. *Vaccinium longisepalum* J. J. S. Med. Rijksherb. n. 25 (1915) 14; Nova Guinea 12 (1917) 535; *ibid.* (1918) t. 223; SLEUM. Bot. Jahrb. 72 (1942) 239; *Blumea* 11 (1961) 39.

Epiphytic, much branched shrub, 1–2 m. Branchlets slender, youngest parts patently hirsutulous, older ones early glabrescent. *Leaves* rather lax, elliptic-ovate, apex gradually long-acuminate, base broadly attenuate, obtuse to nearly rounded, entire, edge \pm revolute especially towards the base, with a blackish gland on each side of the apex of the petiole, thin-coriaceous, \pm convex and corrugate above in dry specimens, laxly hispid-hirsutulous on both faces, moreover set with sparse and short, weak, glandular, bristle-like hairs beneath, glabrescent and \pm glossy above with age, 1.8–3.1 by 0.6–1.2 cm, midrib sharply sunken above, prominent beneath, nerves in 4–6 pairs, curved-ascending and anastomosing, mostly rather inconspicuous, reticulation

very fine, \pm obsolete, or visible beneath only; petiole slender, 1–2 mm. *Racemes* from the upper axils, abbreviate and \pm sessile, laxly 3–6-flowered; rachis slender, hirsute, 0.6–1.2 cm. Pedicels slender, laxly patently hirsutulous initially, 6–8 mm. *Calyx* deeply 5-partite, tube subglobose, 2 mm ϕ , laxly hirsutulous initially, laciniae elongate, erecto-patent, \pm abruptly long subulate-acuminate, irregularly serrulate and ciliate, 2.5 (–3) by hardly 1 mm at the base. *Corolla* elongate, tubular-urceolate, contracted in the upper third, glabrous outside, dark vine red, 8(–9) mm by c. 3 mm ϕ at the base, lobes patent or reflexed, 1 mm. *Filaments* \pm sigmoid or wavy, rather abruptly dilated above the base and patently villous there, glabrous at the very base and in the upper subulate part, c. 3 mm; anther-cells oblong, c. 0.9 mm; tubules broad, c. 0.6 mm, the back wall of each tubule extended into a long subulate tooth (0.5 mm). *Disk* laxly hirsutulous. *Style* glabrous, 8 mm.

Distr. *Malesia*: New Guinea (crest of the Treub Mts), at c. 2400 m. Once found. *Fl.* Febr.

81. *Vaccinium imbricans* J. J. S. Med. Rijksherb. n. 25 (1915) 13; Nova Guinea 12 (1917) 534; *ibid.* (1918) t. 222; SLEUM. Bot. Jahrb. 72 (1942) 240; Blumea 11 (1961) 39.

Epiphytic shrub, c. 2 m. Branchlets elongate, pendulous, sparsely ramose, youngest parts covered with a soft tomentum of dense, patent, longish (c. 2 mm) and yellowish hairs. *Leaves* imbricately arranged, cordate, apex rather abruptly and shortly subcaudate-acuminate, acute, basal lobes rounded (each lobe with 1 or 2 blackish glands near the petiole), reddish when young, subcoriaceous, glabrous above, the undersurface set both with sparse, longish hairs especially at midrib, nerves and edge, and \pm densely with numerous short, \pm appressed, glandular, bristle-like hairs, entire, edge subrevolute in dry specimens, 5–7(–8.2) by 2.5–4.2 cm, midrib and nerves but little prominent on both sides, the latter in 2–3 basal, much curved and high-ascending, and 2–4 higher, pinnate and more straight pairs, all \pm anastomosing along the edge, reticulation fine and dense, well visible beneath only; petiole hirsutulous-villous, 2–3 by 1–1.5 mm. *Racemes* abbreviate, subsessile, (1–)2–5-flowered, axillary, \pm densely covered in all parts with shorter sub-patent and longer \pm villous yellowish hairs, the corolla excepted; rachis c. 3 mm. Pedicels rather slender, c. 1.5 cm. *Calyx* 5-partite to nearly the very short, cup-shaped basal part or tube, laciniae elongate, erecto-patent, subulate, acute, c. 9 by c. 2 mm at the base. *Corolla* urceolate-cylindrical, gradually contracted towards the opening, red, very laxly hairy in its uppermost part outside, glabrous otherwise, c. 1.4 cm long in all, c. 4.5 mm ϕ at the lower, c. 2 mm ϕ in the upper part, lobes \pm spreading or reflexed, obtuse, c. 1 mm. *Filaments* dilated and hairy in the lower, linear-narrowed and glabrous in the upper part, c. 3 mm; anther-cells oblong, papillose, c. 1.3 mm; tubules broad-cylindrical, erect, 1.2 mm, the back wall of each tubule prolonged into 2 very short

teeth. *Disk* villous. *Style* slightly pubescent, c. 1.4 cm.

Distr. *Malesia*: New Guinea (Perameles Mts, S of the Oranje Mts), once found at 1100 m in forest. *Fl.* Dec.

82. *Vaccinium hispidulissimum* WERNH. Trans. Linn. Soc. II, Bot. 9 (1916) 92; SLEUM. Bot. Jahrb. 72 (1942) 241; Blumea 11 (1961) 39.

Shrub. Branchlets slender, densely covered with patent hispidulous, initially gland-tipped hairs (c. 1.5 mm). *Leaves* lax, ovate-lanceolate, apex caudate-acuminate (1.5–2 cm), acumen subacute, not rarely a little curved, base broadly attenuate, firmly chartaceous in dry specimens, glabrescent with age above, persistently and subdensely long-hispid-hairy all over beneath, especially on the midrib, entire, edge \pm revolute in dry specimens, (3.5–)4–5 by (1–)1.2–1.6 cm, midrib slightly impressed above, rather sharply prominent beneath, nerves in 1–2 basal and suprabasal, high curved-ascending pairs, \pm obscure above, more visibly raised beneath as are other shorter nerves from the upper part of the midrib, reticulation rather dense, mostly finely raised beneath on the younger leaves; petiole slender, hispid-hairy, c. 3 mm. *Racemes* from the upper axils, lax, sub-corymbose, densely patently hispid-hairy in all parts except the corolla, c. 5-flowered; rachis slender, 1–1.5 cm. Pedicels slender, 0.8–1.2 cm, bracteoles not seen. *Calyx* tube campanulate, 2 mm, laciniae subulate, (5–)6–7 by c. 1 mm at the base, apex obtuse by a minute gland. *Corolla* elongate-urceolate, gradually narrowed distally, apparently red, c. 10 by 2.5 mm, glabrous at both sides, lobes obtuse, much reflexed, 1 mm. *Filaments* subulate-linear, densely hairy to almost the top, 3.5–4 mm; anther-cells oblong, 0.8 mm; tubules as wide as the cells, 0.7 mm, obliquely cut apically, the back wall of each tubule ending in one or two irregular erect teeth, which may bear a very minute apical gland. *Disk* glabrous. *Style* slender, glabrous, 9 mm.

Distr. *Malesia*: New Guinea (ascent from Utakwa R. to Mt Carstensz), once found, 1675 m.

83. *Vaccinium cardiophorum* SLEUM. Bot. Jahrb. 72 (1942) 240; Blumea 11 (1961) 39.

Low, straggling, epiphytic shrub, 1–1.5 m. Branchlets slender, terete, youngest parts subdensely clad with soft, \pm spreading, whitish hairs (1–1.5 mm), older ones glabrescent and greyish corticate. *Leaves* lax, ovate, apex caudate-acuminate (2–3 cm), acute, base slightly cordate, firmly subcoriaceous, glabrescent above with age, the midrib and sometimes also the nerves excepted, laxly clothed with suberect, soft hairs (c. 1 mm) all over beneath, more densely so on the midrib, furthermore with sparse, short, \pm appressed, glandular hairs beneath, entire, edge somewhat revolute, or the entire lamina convex above in dry specimens, (5–)6–8 by 3–4 cm, midrib faintly sunken above, prominent beneath, nerves 2–3 basal, much curved-ascending, and 4–5 upper, more straight pairs, all anastomosing, very slightly

impressed above, a little raised beneath, reticulation fine and dense, mostly subinconspicuous above, well visible beneath; petiole (3-)4-5 by 1 mm, pubescent. *Racemes* axillary, laxly 8-10-flowered, subsessile, known only in not yet fully developed state, covered in all parts by rather soft hispidulous and \pm spreading hairs (0.5 mm); perulae small, 3-4 mm, \pm glabrous; rachis (1-)1.5-2 cm, rather slender. Pedicels slender, 0.8-1 cm. *Calyx* tube subcampanulate, c. 2.5 mm, lobes subulate, hairy also inside, no glandular hairs. *Corolla* seen in bud only, apex laxly hairy, colour not known. *Stamens* seen in young stage, apparently of the type found in *V. oreites* and *V. imbricans*; tubules \pm obliquely cut apically, bearing no stalked glands; filaments apparently quite glabrous. *Fruit* obconical, pubescent, 5 mm long, 4-5 mm ϕ at the limb; disk thick, prominent beyond the calyx tube, densely hairy; calyx lobes or laciniae long-subulate, 8 mm; fruit-pedicel slender, 1.2-1.8 cm.

Distr. *Malesia*: New Guinea (Lake Habbema-Bele R. area), in forest, 2350-2950 m, twice found.

84. *Vaccinium spaniotrichum* SLEUM. Blumea 11 (1961) 39; *ibid.* 12 (1963) 127.

Shrub. Branchlets very slender, much branched, youngest parts clad with a dense tomentum of spreading, eglandular (0.5-1 mm) and minutely subclavate-glandular hairs, early glabrescent below, blackish in dry specimens. *Leaves* lax, ovate to sublanceolate-ovate, apex shorter or longer caudate-acuminate, acute, base rounded to subcordate, subcoriaceous, rather glossy on both faces, quite glabrous above, laxly set with long hispidulous hairs at the midrib and sometimes at the margin but not on the intervenium beneath, moreover with sparse, short, subappressed and \pm caducous glandular hairs all over the undersurface, entire, margin shortly revolute, 2.5-3.5 by 1-1.5 cm, midrib grooved above for its total length, prominent beneath, nerves in form of a basal high curved-ascending pair, and other 3-4 pairs which come pinnately from the upper part of the midrib and are less distinct, all anastomosing, obscure above, minutely raised beneath, reticulation found only beneath and rather inconspicuous; petiole hirsutulous for some time, 1-2 by 0.5 mm. *Racemes* from the upper axils, short, laxly (3-)4-6-flowered, clothed with spreading, eglandular and subcapitate-glandular hairs on rachis and pedicels, whilst the calyces exclusively bear dense subvillous hairs; rachis very slender, 0.5-1 cm. Pedicels very slender, 0.7-1(-1.2) cm. *Calyx* tube semiglobose or campanulate, 2 mm long and ϕ , laciniae broadly subulate, erecto-patent, 4-5 mm by 1-1.5 mm at the base, glabrous dorsally, laxly hairy at the margin, which bears some stalked glands in its upper part. *Corolla* elongate-urceolate, rather fleshy, glabrous, 8(-9) mm by 2.5-3 mm ϕ below, 1.5 mm distally, red, lobes obtuse, reflexed, 1 mm. *Filaments* subulate, glabrous at the base, villous otherwise, 2.5-3 mm; anther-cells broad-oblong, 0.5 mm, smooth, base obtuse; tubules almost as wide as the cells, hardly 0.5 mm, obliquely cut

apically, the posticous wall of each tubule extending into one, or sometimes into two teeth. *Disk* rather villous. *Style* minutely papillose, not hairy, c. 7 mm.

Distr. *Malesia*: New Guinea (Wissel Lakes region).

Ecol. In secondary forest on peaty soil, 1630-2300 m, two collections. *Fl.* Jan., May.

Vern. *Pamokieta*, Kapauku.

85. *Vaccinium subulisepalum* J. J. S. Med. Rijksherb. n. 25 (1915) 13; Nova Guinea 12 (1917) 532; *ibid.* (1918) t. 221; SLEUM. Bot. Jahrb. 72 (1942) 240; Blumea 11 (1961) 40.

Epiphytic shrub, with pendulous branches, c. 3 m. Branchlets slender, much branched again, patently villous-hirsutulous in the younger, glabrescent or corticate in the older parts. *Leaves* rather dense, ovate, apex \pm abruptly and rather long (1-1.5 cm) caudate-acuminate, acute, base rounded, subcoriaceous, of a firm texture, with a basal marginal impressed gland on each side near the petiole, laxly and shortly hispid-hairy, though early glabrescent above, more densely and longer hispid-hairy beneath, especially on the midrib, moreover subdensely clad with erect, fine, soft hairs, each of which comes from a gland-like, thickened foot (which persists when the proper hair is gone, and then looks like a minute gland), no proper glandular hairs present, 2.7-4.1 by (1.2-)1.5-2.3 cm, margin much revolute especially in the lower part of the lamina, which thus becomes \pm rhombic at least in dry specimens, midrib narrowly sunken above for the whole length, prominent beneath, nerves 5-6 rather obscure pairs, reticulation none; petiole hirsutulous-villous, 2-3(-4) by c. 1 mm. *Racemes* from the upper axils, laxly 3-5-flowered, shortly peduncled, covered with dense patent yellowish hairs (1 mm) in all parts except the corolla; rachis 0.7-1.5 cm, slender. Pedicels slender, 8-10(-12) mm. *Calyx* tube subglobose, c. 2.5 mm ϕ , laciniae subulate, erecto-patent, 6-7 by 1-1.5 mm at the base, hairy on both sides, each with a sessile, glabrous, terminal gland. *Corolla* tubular-conical or -urceolate, elongate, contracted distally, glabrous, apparently red, c. 1 cm long in all, 4 mm ϕ in the lower, c. 2 mm ϕ in the upper part, lobes reflexed, 1 mm. *Filaments* wavy, linear and glabrous at the base, villous above, again glabrous and filiform for one mm from the top; anther-cells oblong, 1 mm; tubules 1 mm, very obliquely cut distally, the back wall of each tubule thus protracted into an elongate tooth, which again is shortly bifid. *Disk* hirsutulous. *Style* glabrous, c. 12 mm. Immature *fruit* subglobose, 4-5 mm ϕ , mature one said to be blackish.

Distr. *Malesia*: New Guinea (Hellwig Mts), 1900 m, once found. *Fl. fr.* Dec.

86. *Vaccinium eymae* SLEUM. Blumea 11 (1961) 40. — Fig. 94.

Epiphytic shrublet? Branchlets very slender, 1-1.5 mm ϕ , tips densely and subpatently long-haired. *Leaves* lax, lanceolate-ovate, apex caudate-

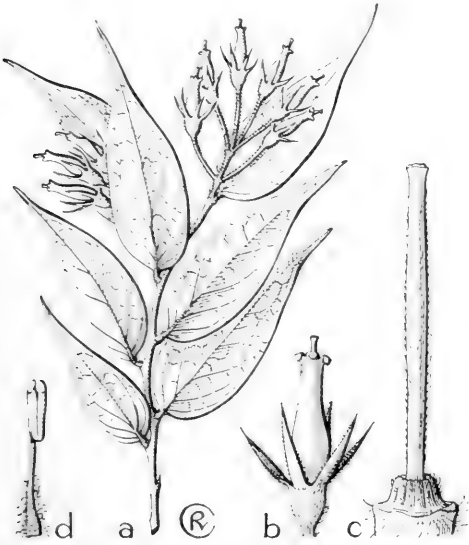


Fig. 94. *Vaccinium eymae* SLEUM. a. Habit, $\times \frac{2}{3}$, b. flower, $\times 1\frac{1}{3}$, c. disk and style, $\times 4$, d. stamen, $\times 4$ (a-d EYMA 5194).

acuminate, acute, base rounded, with 2 minute marginal basal glands, subcoriaceous, glabrous above with full age, with long hispidulous hairs in the lower part of the midrib and moreover with sparse, shorter, subappressed brownish glandular

ones on the intervenium beneath, entire, edge \pm revolute in dry specimens, 3-5 by 1-1.6 cm, midrib slightly sunken above, a little prominent beneath, nerves 2 basal and slightly suprabasal, and 3-5 upper irregular, shorter pairs, all high-ascending, anastomosing before the edge, faintly impressed above, slightly raised beneath, reticulation rather obscure above, dense and slightly prominent beneath; petiole pubescent initially, or early glabrescent, 2-3 by 2 mm. *Racemes* axillary, subsessile, laxly 5-8-flowered, sometimes reduced to 3-4-flowered fascicles, clothed in all parts besides the corolla with dense, soft, spreading hairs (0.5 mm); rachis slender, up to 1 cm; perulae several, minute, glabrous. Pedicels slender, 0.8-1.3 cm. *Calyx* tube obconical or subcampanulate, 2.5-3 mm, laciniae subulate, clothed with long hairs at the base and the middle outside, ditto with shorter hairs towards the apex outside and all over inside, 6-7 by c. 1 mm wide at the base, acute. *Corolla* elongate-urceolate, somewhat fleshy, colour not known, 11-12 mm long in all, c. 3 mm ϕ below, hardly 2 mm ϕ distally, glabrous, lobes obtuse, reflexed, 1 mm. *Filaments* subulate, 3 mm, glabrous at the base, villous per c. 1.5 mm above, again glabrous towards the apex; cells oblong, base obtuse, 1.3 mm; tubules almost as wide as the cells, 0.9 mm, obliquely cut distally, the back wall of each tubule protracted in one tooth (or sometimes in two short teeth). *Disk* prominent, pubescent. *Style* puberulous at the apex, otherwise appressed-hairy.

Distr. Malesia: New Guinea (Wissel Lakes area), 1750 m, once found. *Fl.* Sept.

6. Section Bracteata

NAKAI, Trees Shrubs Japan ed. 2 (1927) 241; SLEUM. Bot. Jahrb. 71 (1941) 420, 467; *ibid.* 72 (1942) 265; Blumea 11 (1961) 41. — *Vaccinium sect. Nesococcus* COPEL. f. Philip. J. Sc. 42 (1930) 549; SLEUM. Blumea 11 (1961) 57. — *Vaccinium sect. Euepigynium* SCHLTR, Bot. Jahrb. 55 (1918) 174, p.p., *nom. subnud.*; SLEUM. *ibid.* 71 (1941) 420; *ibid.* 72 (1942) 241, *non Vaccinium sect. Epigynium* (KL.) HOOK. f. (1876) p.p. — Fig. 95-115.

Racemes few- to many-flowered, very rarely in part in the same specimen reduced to a solitary flower; each flower whether or not subtended by a bract, the latter whether or not foliaceous or persistent; each pedicel whether or not provided with $2 \pm$ caducous bracteoles. Anthers whether or not 2-spurred dorsally; tubules opening by introrse \pm oblique or terminal pores.

Distr. About 163 spp., 10 of which are found in SE. Asia (S. India to Assam, Burma, S. China, Hainan, Indochina, Formosa, Riu-Kiu and Bonin Is., 1 sp. (*V. bracteatum* THUNB.) distributed from Upper Burma, Indochina, S. China, Formosa, Korea to Siam, Japan and W. Malesia, 1 sp. (*V. macgillivrayi* SEEM.) in New Caledonia and the New Hebrides, the rest confined to Malesia. Fig. 95.

KEY TO THE SPECIES

1. Subtending bract of each flower conspicuous, \pm foliaceous, persisting at least for some time during the anthesis, mostly so to the fruiting stage.
2. Leaves manifestly cren(ul)ate or cren(ul)ate-serrate all along the margin.
3. Leaves acuminate at apex.
4. Leaves chartaceous to subcoriaceous at maturity, crenulate-serrate, the apex ending with a sharp point. Tubules \pm twice as long as the anther-cells. 87. *V. bracteatum*
4. Leaves coriaceous at maturity, remotely impressedly crenulate, the very apex bluntish. Tubules \pm as long as the anther-cells 88. *V. kjellbergii*
3. Leaves (crenate or crenulate) obtusely attenuate to rounded at apex.

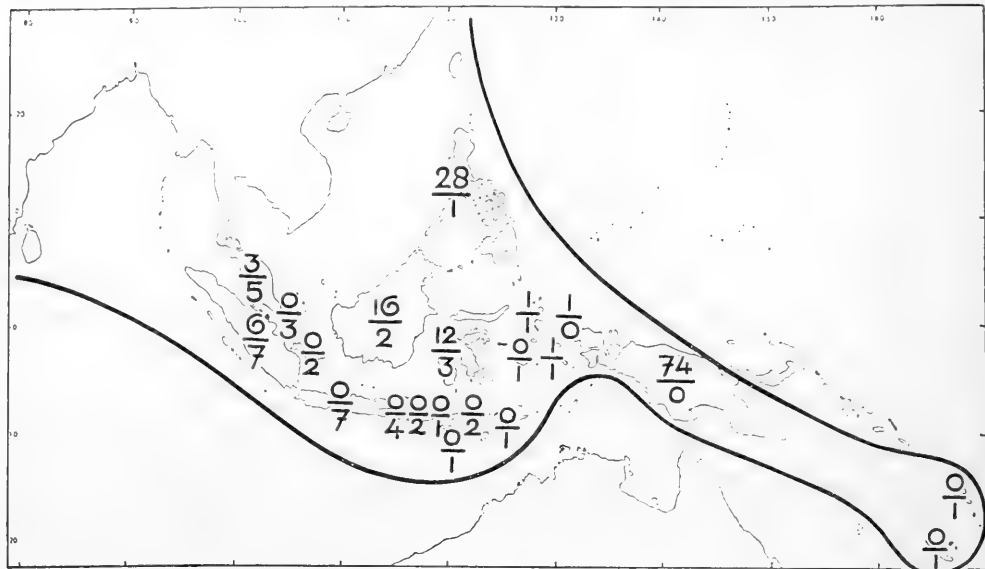


Fig. 95. Distribution of *Vaccinium* sect. *Bracteata* in Malesia. The number above the hyphen indicates the number of endemic species, that below the hyphen the number of non-endemic species in each island or district.

5. Calyx lobes with a distinct callose, apical gland (marginal glands not present).
6. Leaves oblong or elliptic-oblong, sometimes lanceolate or subobovate-oblong, crenulate by a few remote depressed glands **89. *V. timorense***
6. Leaves oblong- to elliptic-obovate, rather deeply and much more densely subserrate-crenate. **90. *V. centrocelebicum***
5. Calyx lobes not callose-thickened at apex, whether or not provided with a row of rather numerous marginal, sessile glands.
7. Calyx lobes provided with a row of rather numerous sessile, marginal glands. **155. *V. coriaceum***
7. Calyx lobes without any apical or marginal glands. **91. *V. gitingense***
2. Leaves entire or practically so (faint crenulations or subimpressed marginal glands, if any, generally restricted to the lower half of the lamina).
8. Leaves initially hairy all over the upper- and/or undersurface, tardily glabrescent.
9. Corolla laxly to densely pubescent.
10. Corolla c. 1.5 cm. Stamens at least 1 cm. **92. *V. indutum***
10. Corolla up to 1.1 cm. Stamens up to 5.5 mm.
11. Corolla (ampullaceous) 1–1.1 cm **93. *V. ampullaceum***
11. Corolla up to 7.5 mm.
12. Corolla subcylindric, 7–7.5 mm. Anthers provided with 2 dorsal spurs. Style hairy **94. *V. glabrescens***
12. Corolla 4–5 mm. Anthers not spurred. Style glabrous.
13. Leaves deeply cordate at the base. Corolla broadly or almost subglobular-urceolate. **95. *V. auriculifolium***
13. Leaves ± rounded to subcordate at the base. Corolla narrowly campanulate to cylindric-urceolate.
14. Leaves elliptic, apex obtuse to rounded. **96. *V. trichocarpum***
14. Leaves ovate or ovate-oblong, shortly obtusely acuminate. **163. *V. molle* var. *mollissimum***
9. Corolla glabrous.
15. Leaves ovate to oblong-ovate, base slightly cordate. **97. *V. wisselianum***
15. Leaves elliptic to oblong, sometimes subovate- or subobovate-oblong, base subtruncate-rounded or broadly attenuate **110. *V. korinchense* var. *korinchense***
8. Leaves glabrous or practically so from the beginning (some puberulence may be found underneath at the base).

16. Calyx lobes (all or in part) provided with a distinct thickened or callose apical gland (marginal glands not present).
17. Calyx lobes distinct, 1–1.5 mm.
18. Corolla subglobose-urceolate, apex much contracted, densely hairy outside. **98. *V. thibaudifolium***
18. Corolla (sub)cylindric-urceolate, subdensely glandular-muriculate or glabrous outside.
19. Corolla subdensely glandular-muriculate outside at least initially. **220. *V. acrobacteatum***
19. Corolla glabrous outside.
20. Leaves oblong or elliptic-oblong, sometimes lanceolate or subobovate-oblong. Style laxly hairy in the lower third, glabrous for the rest, c. 6 mm. **89. *V. timorense***
20. Leaves ovate to oblong-ovate, or broad-elliptic. Style quite glabrous, c. 3 mm. **111. *V. myrtoideis***
17. Calyx limb very low, wavy, not properly lobed (the lobe merely indicated by a gland).
21. Calyx glabrous **197. *V. fraternum***
21. Calyx glandular-muriculate and short-pubescent. **172. *V. amphoterum***
16. Calyx lobes not callose-thickened at the apex, whether or not provided with a row of sessile marginal glands.
22. Calyx lobes provided with a row of sessile yellowish marginal glands . . . **156. *V. stapfianum***
22. Calyx lobes without any glands at all.
23. Tubules longer than the cells, or, if as long as, then much narrower than the cells.
24. Corolla at least 9 mm, generally much longer.
25. Corolla exclusively and properly hairy **92. *V. indutum***
25. Corolla laxly to subdensely glandular-muriculate, furthermore whether or not finely short-pubescent.
26. Leaves subcoriaceous, flexible. Style laxly hairy in the lower half . **99. *V. epiphyticum***
26. Leaves coriaceous, firm. Style quite glabrous **100. *V. barandanum***
24. Corolla 5–6(–7) mm.
27. Tubules \pm double as long as the cells **87. *V. bracteatum***
27. Tubules \pm as long as the cells **88. *V. kjellbergii***
23. Tubules shorter than the cells, or, if as long, then \pm as wide as the cells.
28. Anthers with 2 distinct (shorter or longer) dorsal spurs.
29. Leaves 0.8–1.5 by 0.4–1 cm.
30. Leaves with the pair of marginal glands near to the petiole. One or two racemes from the ultimate axil, seemingly terminal **101. *V. scortechinii***
30. Leaves with the pair of marginal glands in the lower third of the lamina, *i.e.* in a marked distance from the petiole. Racemes in the upper 3 or 4 axils. **109. *V. miquelii* var. *miquelii***
29. Leaves much larger.
31. Leaves \pm broadly attenuate or subacuminate at the apex. Corolla at least 7 mm. **115. *V. varingiaefolium* var. *calcaratum***
31. Leaves distinctly acuminate to subcaudate at the apex. Corolla up to 6 mm.
32. Corolla (densely hairy outside) subglobose-urceolate, apex much contracted, 3.5–4 mm. **98. *V. thibaudifolium***
32. Corolla tubular- to broad-urceolate, 4–6 mm.
33. Corolla puberulous outside, 2.5–3 mm σ . Tubules obliquely cut distally, the pore oval. **102. *V. agusanense***
33. Corolla glabrous outside. Tubules transversely cut apically, the pore round.
34. Corolla 5–6 by 4–4.5 mm **103. *V. philippinense***
34. Corolla 4 by 2–2.5 mm **104. *V. dubiosum***
28. Anthers with no trace of dorsal spurs.
35. Posticous wall of each tubule ending in 2 distinct teeth.
36. Leaves 8–11 by 2.5–4 cm. Corolla 8–10 mm **105. *V. grandibracteatum***
36. Leaves up to 7 by 3 cm.
37. Leaves (1–)1.2–1.7 by 0.5–0.8 cm **106. *V. dominans***
37. Leaves larger.
38. Leaves 4.5–5.5 by 2–3 cm. Corolla glabrous. Calyx lobes with an apical tuft of hairs. **107. *V. montis-ericace***
38. Leaves (2.4–)4–6(–7) by (1–)2–2.5(–3) cm. Corolla subdensely set with muriculate glands and sometimes furthermore sparsely with a fine puberulence (sometimes rather early glabrescent). Calyx lobes not barbate at apex **220. *V. acrobacteatum***
35. Posticous wall of each tubule ending in one \pm broad tooth or obtuse.
39. Leaves (5–)6–14 by (3–)3.5–5(–7) cm.
40. Leaves elliptic or oblong-elliptic, sometimes subovate, base \pm broadly attenuate. **108. *V. platyphyllum***
40. Leaves ovate, base deeply cordate and auriculate **204. *V. hooglandii***
39. Leaves much smaller in general.

41. Flowers sessile or very shortly pedicelled (up to 2 mm in anthesis, slightly longer in fruit).
 42. Calyx lobes obtuse. Corolla urceolate 109. *V. miquelii*
 42. Calyx lobes acute or subacute. Corolla ampullaceous or narrow-urceolate.
 110. *V. korinchense*
41. Flowers pedicelled (at least for 3 mm in anthesis).
 43. Corolla 4(–4.5) mm (shortly cylindric-urceolate). Style c. 3 mm. 111. *V. myrtoides*
 43. Corolla at least 7 mm. Style at least 6 mm.
 44. Corolla elongate-urceolate or ampullaceous, gradually or mostly rather abruptly narrowed in the upper half, membranous. Branchlets rather slender.
 45. Leaves (4–)4.5–7(–10) by (1.8–)2–3 cm (subovate or lanceolate, sometimes elliptic or oblong-elliptic, shortly subcaudate-acuminate).
 46. Style glabrous 112. *V. glandellatum*
 46. Style \pm densely patently hairy. 215. *V. capillatum*
 45. Leaves up to 2.5 by 1.2 cm.
 47. Leaves ovate, coriaceous, 0.6–1(–1.2) by (0.4–)0.5–0.8 cm . 113. *V. paludicolum*
 47. Leaves oblong-elliptic to obovate, thin-coriaceous, (1–)1.5–2.5 by 0.6–1.2 cm.
 114. *V. lucidum*
44. Corolla urceolate-cylindric, gradually or hardly narrowed towards the apex, fleshy. Branchlets stoutish 115. *V. varingiaefolium*
1. Subtending bract of each flower small and early caducous in general, rarely persistent up to the beginning of the anthesis.
48. Corolla partite to c. $\frac{1}{2}$ or more into 5(–7) erect or slightly reflexed lobes.
 49. Corolla lobes rather broad, ovate to deltoid.
 50. Anthers provided with two distinct dorsal spurs (1 mm) 116. *V. latissimum*
 50. Anthers with minute or no dorsal spurs.
 51. Filaments and style glabrous.
 52. Racemes contracted; rachis up to 5 mm 117. *V. contractum*
 52. Racemes not contracted; rachis at least 1.5 cm.
 53. Leaves 5–8 by 3–4.5 cm. Rachis 4–6(–7) cm. 118. *V. warburgii*
 53. Leaves 11–16 by (4.5–)5–6.5 cm. Rachis 1.5–2 cm 119. *V. aucupis*
 51. Filaments and style hairy 120. *V. minuticalcaratum*
49. Corolla lobes narrow to almost subulate.
 54. Corolla subdensely hairy outside 121. *V. quinquefidum*
 54. Corolla practically glabrous outside.
 55. Leaves obovate to elliptic-obovate, apex obtuse to rounded 122. *V. brachygyne*
 55. Leaves other than obovate, apex \pm acuminate.
 56. Leaves subovate-oblong to lanceolate, apex subcaudate-acuminate . . 123. *V. paradisearum*
 56. Leaves elliptic to oblong-elliptic, apex shortly acuminate.
 57. Corolla glabrous inside. Tubules less than half as long as the cells. 124. *V. megalophyes*
 57. Corolla densely short-hairy inside. Tubules as long as the cells . . 125. *V. stenolobum*
48. Corolla shortly (up to $\frac{1}{3}$, or mostly less deeply) 5(–7, rarely 8)-lobed, lobes (\pm broad and obtuse) generally conspicuously reflexed in anthesis.
58. Anthers (cells and/or tubules) provided with a few \pm spreading gland-tipped hairs, or with shortly stalked glands, or with a few sessile, point-like, generally dark coloured glands.
59. Corolla (broad-urceolate or \pm campanulate) distinctly constricted in the middle or lower third. Tubules elongate, as long as or mostly longer than the cells, pipe-like, gradually slightly dilated upwards or flaring distally; cells with elongate dorsal spurs.
60. Leaves cuneate to rounded at base.
 61. Leaves elliptic, 7–15.5 by (2.6–)3–6 cm, shortly \pm gradually attenuate or subacuminate towards the bluntish apex 126. *V. daphniphyllum*
 61. Leaves ovate or oblong-ovate, caudate-acuminate and acutish at the apex, 5–8 by (1.5–)1.8–3 cm 127. *V. convallariiflorum*
60. Leaves cordate and \pm auriculate at base.
 62. Inflorescence quite glabrous. (Leaves 7–12 by 3.5–5.5 cm.) 128. *V. appendiculatum*
 62. Inflorescence short-pubescent, the corolla excepted.
 63. Leaves 2.8–3.5(–4.3) by 2–2.8 cm 203. *V. amplexicaule*
 63. Leaves 6–8 by 3.5–4.5 cm 129. *V. otophyllum*
59. Corolla not constricted in the lower half. Tubules, if elongate, not flaring distally; dorsal spurs of cells, if any, relatively short.
64. Leaves \pm distinctly cordate.
 65. Inflorescences densely short-pubescent, the 5–6 mm wide corolla excepted.
 130. *V. cordifolium*
 65. Inflorescences glabrous. Corolla 3–4 mm wide 131. *V. cercidifolium*
 64. Leaves occasionally or in part in the same specimen subcordate, generally cuneate to rounded at the base.

66. Style glabrous or practically so.
67. Calyx lobes (all, or rarely at least for their greater number) provided with a generally distinct (mostly thick) apical gland, and/or with a row of smaller, sessile or subsessile (sometimes rather early caducous) marginal glands.
68. Calyx 4–6 mm long in all, 5–6 mm σ at the limb at anthesis. Mature fruit 1–1.3 cm σ .
68. Calyx up to 3.5 mm long in all and up to 4 mm σ at the limb at anthesis. Mature fruit as far as known up to 6 mm σ .
69. Pedicels *c.* 2 cm at anthesis 133. *V. tentaculatum*
69. Pedicels up to 1.5 cm at anthesis.
70. Calyx tube densely glandular-muriculate 134. *V. muriculatum*
70. Calyx tube pubescent or glabrous, sometimes also very sparsely glandular-muriculate.
71. Tubules transversely cut apically, their back wall not extended into one or two teeth, the pore round.
72. Leaves crenulate, 0.6–2 by 0.3–0.8 cm 155. *V. coriaceum*
72. Leaves entire, 3.5–5.5 by 1.5–2 cm 135. *V. elegans*
71. Tubules (very) obliquely cut distally, their back wall \pm extended into one or two teeth, the pore elliptic to subovate.
73. Back wall of each tubule extended distally into an erect beak which is as long as or mostly longer than the proper tube of the tubule.
74. Calyx limb very low, wavy, lobes irregular, hardly properly indicated as such, *i.e.* merely represented as apical glands 136. *V. goodenoughii*
74. Calyx limb at least 0.5 mm high, lobes regular, markedly distinct as such.
75. Calyx lobes broadly ovate-deltoid, apex roundish-obtuse. 137. *V. hellwigianum*
75. Calyx lobes \pm deltoid, apex subacute.
76. Calyx lobes *c.* 0.5 mm. Leaves elliptic or subovate-elliptic, apex shortly, subacutely or obtusely acuminate, 4.5–6 by 2.3–3 cm 138. *V. psammogenes*
76. Calyx lobes *c.* 1 mm. Leaves lanceolate or rarely elliptic-lanceolate, apex caudate-acuminate, 5–7 by 1.4–2 cm 139. *V. longiporum*
73. Back wall of each tubule extended distally into a short, sometimes bifid, erect or not rarely horizontally directed or even reflexed tooth.
77. Marginal glands of the leaves restricted to 1 or 2 basal (or a little suprabasal) pair(s).
78. Leaves 2–3 by 1–1.7 cm 140. *V. acutissimum* var. *acutissimum*
78. Leaves (4–)5–9(–10) by (1.5–)2–3(–4) cm.
79. Leaves 5–7(–9)-plinerved. Corolla elongate, narrowly urceolate.
141. *V. carneolum* var. *carneolum*
79. Leaves sub-5-plinerved. Corolla subventricose-urceolate.
141. *V. carneolum* var. *nesophilum*
77. Leaves provided with several remote, distinctly or more obscurely impressed glands or glandular points along the whole margin or at least its lower half. 142. *V. albicans*
67. Calyx lobes showing no such glands.
80. Corolla at least 9 mm 143. *V. viridiflorum*
80. Corolla up to 7 mm.
81. Corolla *c.* 7 mm long 139. *V. longiporum*
81. Corolla 3.5–4 mm long 144. *V. aitapense*
66. Style hairy at least in the lower third.
82. Axillary buds generally very conspicuous.
83. Axillary buds almost globular, 2–3 mm σ , the perulae broadly ovate and obtuse, or sub-orbicular.
84. Rachis and pedicels glabrous 145. *V. simulans*
84. Rachis and pedicels generally subdensely, rarely laxly short-pubescent, or subtomentose.
85. Inflorescence 3–3.5 cm. Corolla 4(–5) mm. 146. *V. mjoebergii*
85. Inflorescence 4–6(–9) cm. Corolla 8–9 mm 147. *V. pachydermum*
83. Axillary buds \pm ovoid-oblongoid, at least 2 mm long, the perulae stipule-like, ovate-lanceolate or subsubulate, \pm acute.
86. Corolla 9–12 mm.
87. Leaves 2–4 by 1.3–2.5(–3) cm 148. *V. elliptifolium*
87. Leaves 4.5–9.5 by 2.5–4.3 cm 149. *V. endertii*
86. Corolla 6–8 mm.
88. Petiole much flattened, 1–4 by 2–4 mm. 150. *V. camiguinense*
88. Petiole less or hardly flattened, more slender, 1–6 by 1–1.5 mm.
89. Leaves at apex broadly attenuate and obtuse, or rounded . . . 151. *V. clementis*
89. Leaves at apex more narrowly subacuminate-attenuate, the very tip obtuse.
152. *V. palawanense*
82. Axillary buds, if any, very small.

90. Calyx lobes provided with a conspicuous, thick, apical gland, but with no row of smaller marginal sessile glands.
91. Corolla (9-)10-12 mm **153. V. cornigerum**
91. Corolla up to 8 mm.
92. Leaves ovate-acuminate, coriaceous, 2.3-3 by 1-1.7 cm.
- 140. V. acutissimum var. pilosistylum**
92. Leaves oblong or elliptic-oblong, sometimes lanceolate- or subovate-oblong, apex obtuse to rounded, subcoriaceous, 2-4 by (0.5-)0.8-1(-1.5) cm **89. V. timorense**
90. Calyx lobes whether or not provided with a small or inconspicuous apical gland and/or a row of small, sessile marginal glands, or without any such glands at all.
93. Leaves (oblong-obovate, 1.8-3 by 0.6-1.1 cm) retuse for *c.* 1 mm. **154. V. besagiense**
93. Leaves faintly or generally not retuse.
94. Leaves (0.6-)0.7-1.5(-2) by (0.3-)0.4-0.7(-0.8) cm.
95. Leaves distinctly crenulate along the whole margin **155. V. coriaceum**
95. Leaves entire, or with 1 or 2 pairs of marginal glands at intervals in the lower half of the lamina **156. V. stapfianum**
94. Leaves in part in the same specimen at least 2.5 by 1 cm.
96. Corolla 9-10 mm **157. V. horizontale**
96. Corolla (5-)6-7(-8) mm.
97. Leaves narrow-elliptic to lanceolate, oblong or elliptic (4-8 cm long then), rarely ovate-elliptic **158. V. bancanum**
97. Leaves elliptic- or oblong-obovate, or obovate, rarely elliptic (and 2-4 cm long then).
98. Leaves 2-4 by 0.8-2 cm. Corolla 3-4 mm \varnothing **151. V. clementis**
98. Leaves 3.5-6 by (1.5-)2-4.5 cm. Corolla 2-2.5 mm \varnothing **159. V. stenanthum**
58. Anthers (cells and tubules) bearing no such glands or gland-tipped hairs.
99. Rachis provided with gland-tipped, horizontally spreading, almost bristle-like hairs (which are mostly found also on the branchlets, but rarely on the pedicels).
100. Leaves elliptic or oblong-elliptic, apex shortly obtusely acuminate. Racemes 7-9(-10) cm. **160. V. luzoniense**
100. Leaves ovate to lanceolate, apex shortly (sub)caudate-acuminate. Racemes (2-)3-5 cm. **161. V. tenuipes**
99. Rachis (and branchlets) never bearing such hairs (though they may be laxly set with short, muriculate or club-shaped glands).
101. Corolla exclusively laxly glandular-muriculate outside.
102. Leaves 0.8-1.3 by 0.4-0.7 cm **223. V. tomicipes**
102. Leaves exceeding 3.5 by 1 cm.
103. Leaves lanceolate to elliptic-lanceolate, apex long subcaudate-acuminate. **162. V. filipes**
103. Leaves obovate to obovate-subspathulate, sometimes suborbicular- or oblong- or elliptic-obovate, apex \pm rounded **220. V. acrobacteatum**
101. Corolla hairy, or hairy *and* glandular-muriculate, or glabrous outside.
104. Corolla at least initially \pm densely short-hairy and may be glandular-muriculate outside.
105. Corolla distinctly widened towards the mouth, *i.e.* campanulate or subcylindric-campanulate. **163. V. molle**
105. Corolla equally wide at both ends or narrowed towards the mouth, *i.e.* urceolate to tubular.
106. Style completely glabrous.
107. Anthers (cells plus tubules) 1-1.5 mm. **237. V. striicaule var. publiflorum**
107. Anthers (cells plus tubules) 2.2-3 mm.
108. Leaves 1.8-2.5(-3.5) by 1.1-1.5(-2) cm. **164. V. summifaucis**
108. Leaves larger, at least in part in the same specimen.
109. Leaves elliptic to oblong, generally 5-8 by 2-3.5 cm **165. V. costerifolium**
109. Leaves obovate or oblong-obovate, 6-8.5 by 2.5-5 cm **166. V. adenotrichum**
106. Style hairy at least in the basal part.
110. Leaves 3-5(-6.5) by 2-3.3 cm **167. V. rigidifolium**
110. Leaves 2.5-3.5 by 1-1.8(-2) cm **168. V. brachytrichum**
104. Corolla glabrous outside or practically so (some hairs may occur on the corolla in early stage, or at the lobes).
111. Filaments completely glabrous.
112. Leaves 9-13 by 5-10 cm. Anthers with 2 dorsal spurs **116. V. latissimum**
112. Leaves up to 9 by 5 cm. Anthers not dorsally spurred.
113. Leaves (3-)4-6 by 2-3(-3.5) cm. Corolla 5 by 2.5 mm **169. V. cuneifolium**
113. Leaves 6-9 by (2.5-)3-5 cm. Corolla 7 by 2.5 mm **170. V. ambivalens**
111. Filaments hairy at least at the base.
114. Calyx lobes bearing a distinct, generally thick apical gland (which sometimes may be covered by hairs) and/or a row of several minor (\pm sessile) marginal glands.
115. Calyx lobes bearing a \pm thick apical gland, but no row of minor marginal glands.

116. Leaves remotely (sub)crenulate, *i.e.* with several conspicuous glands along the whole margin or at least in the lower $\frac{2}{3}$ of the margin on each side.
117. Style pubescent 89. *V. timorensis*
117. Style glabrous.
118. Anthers provided with 2 very distinct dorsal spurs 171. *V. vidalii*
118. Anthers provided with very short, subinconspicuous dorsal spurs or knobs, or generally without any trace of them.
119. Calyx tube densely set with short hairs and muriculate glands.
120. Leaves elliptic or subovate-elliptic, apex subabruptly acuminate for 0.5–1 cm, 2–2.5(–2.8) cm wide 172. *V. amphoterum*
120. Leaves elliptic to oblanceolate-elliptic, apex shortly and broadly attenuate or sub-acuminate, generally obtuse, rarely subacute, (0.8–)1–1.6 cm wide. 173. *V. banksii*
119. Calyx tube glabrous.
121. Disk glabrous.
122. Corolla (8–)9–10(–11) by 3–4 mm 142. *V. albicans* var. *albicans*
122. Corolla 5 by 2.5 mm.
123. Petiole 4–5(–6) mm. Racemes generally many-flowered. 174. *V. crenatifolium*
123. Petiole 1–2 mm. Racemes 3–5-flowered 175. *V. apophysatum*
121. Disk sparsely or mostly \pm densely short-hairy.
124. Leaves elliptic to obovate-elliptic, sometimes obovate, apex \pm obtuse. 176. *V. woodianum*
124. Leaves narrow-elliptic, elliptic-oblong or narrowly elliptic-obovate, apex \pm acuminate 177. *V. cumingianum*
116. Leaves practically entire, *i.e.* set with 1 or 2 (rarely 3) basal or suprabasal marginal \pm impressed glands on each side, which are restricted to the lower third, or very rarely to the lower half of the lamina.
125. Style pubescent at least in the lower part.
126. Leaves 2–4 by (0.5–)0.8–1(–1.5) cm 89. *V. timorensis*
126. Leaves larger.
127. Corolla tubular, elongate-conical or suburceolate, 1.1–2 cm.
128. Leaves ovate, apex caudate-acuminate, 6.5–10 by 1.8–3.7 cm 178. *V. gracile*
128. Leaves elliptic, (3–)4–7 by (1.3–)2–3 cm 179. *V. tubiflorum*
127. Corolla campanulate, 7–8(–9) mm 120. *V. minuticalcaratum*
125. Style quite glabrous.
129. Calyx tube winged, the 5 wings or ribs extending into the calyx lobes. 180. *V. debilescens*
129. Calyx tube obscurely or mostly not winged or angled.
130. Anthers distinctly 2-spurred dorsally, the spurs almost as long as the tubules. 181. *V. minusculum*
130. Anther spurs, if any, mostly rudimentary, or certainly much shorter than the tubules.
131. Tubules slender, (much) narrower than, and as long as or longer than the cells.
132. Leaves \pm obovate, with thickish glandular or almost resinous points underneath.
133. Pedicels rather slender, (3–)4–6 mm. Apical gland of the calyx lobes (if any) minute, subglobular 182. *V. viscifolium* var. *viscifolium*
133. Pedicels robust, 1.5–2(–3) mm. Apical gland of the calyx lobes thick, broadly subglobular or mostly somewhat broadened marginally to each side. 183. *V. loranthifolium*
132. Leaves of other shape, *i.e.* not decidedly obovate, underneath with caducous glandular-muriculate hairs or their bases, or with minute glandular points, or quite glabrous.
134. Rachis, pedicels and calyx tube short-pubescent 231. *V. pseudocaudatum*
134. Rachis, pedicels and calyx tube quite glabrous.
135. Corolla subdensely short-hairy in the lower half inside. (Leaves (5–)6–10 by (1.5–)2–3(–4.8) cm.) 232. *V. benguetense*
135. Corolla quite glabrous inside.
136. Leaves 7–15 by (1–)1.2–3 cm 184. *V. scandens*
136. Leaves up to 7 by 3.5 cm.
137. Reticulation of the leaves rather conspicuous. Apical gland of the calyx lobes thick, well perceptible. Stamens remaining included at full anthesis. 185. *V. littoreum*
137. Reticulation of the leaves rather faint or obscure. Apical gland of the calyx lobes (if any) minute. Stamens a little exerted at full anthesis. 233. *V. caudatum*
131. Tubules \pm as wide and rarely as long as, generally (much) shorter than the cells, or if slender, distinctly shorter than the cells.
138. Pedicels very slender to almost filiform, (1–)1.4–1.6 cm.

139. Rachis \pm densely, base of the pedicels laxly hairy. (Leaves 1.5–2.5 by 0.5–0.9 cm.) 186. *V. artum*
139. Rachis and pedicels completely glabrous 187. *V. habbema*
138. Pedicels slender to robust, and shorter in general (rarely up to 2 cm).
140. Petiole robust (1.5–2 mm σ), at least 1 (and up to 2) cm.
141. Corolla 0.9–1(–1.2) cm 188. *V. perrigidum*
141. Corolla 0.6 cm 189. *V. retivenium*
140. Petiole shorter, rarely robust, mostly more slender.
142. Corolla abruptly saccate-widened at the base 190. *V. angulatum*
142. Corolla not or hardly widened at the base.
143. Leaves small, up to 4 by 2.2 cm.
144. Leaves lanceolate to narrow-oblong or -elliptic, (0.5–)0.7–1.5 cm wide. 177. *V. cumingianum*
144. Leaves of other form, or at least in part in the same specimen wider than 1.5 cm.
145. Leaves manifestly, *i.e.* densely and prominently reticulate on both faces, or at least beneath.
146. Leaves subcaudate-acuminate 172. *V. amphoterum*
146. Leaves obtuse at apex 195. *V. dictyoneuron*
145. Leaves less distinctly, *i.e.* widely and much less prominently reticulate, or not reticulate at all.
147. Calyx tube pubescent *and* glandular-muriculate 200. *V. roseiflorum*
147. Calyx tube exclusively hairy, or with sparse muriculate glands, or glabrous.
148. Calyx tube pubescent 192. *V. cruentum*
148. Calyx tube sparsely muriculate or glabrous.
149. Corolla (5–)6 by *c.* 2 mm 191. *V. angiese*
149. Corolla (7–)8(–9) by 3–4 mm.
150. Petiole 2–3 mm 192. *V. cruentum*
150. Petiole 4–6(–10) mm 227. *V. gjellerupii*
143. Leaves generally larger, at least for the greater part in the same specimen.
151. Calyx tube pubescent *and* glandular-muriculate 172. *V. amphoterum*
151. Calyx tube exclusively pubescent, or exclusively and very laxly glandular-muriculate, or glabrous.
152. Leaves \pm shortly and broadly, in general \pm obtusely attenuate or acuminate at the apex.
153. Corolla subventricose-cylindric or barrel-shaped, 10–11 by *c.* 5 mm. 193. *V. alvarezii*
153. Corolla urceolate-cylindric, 4–10 by 2–4 mm.
154. Corolla 4(–5) mm 194. *V. cavendishioides*
154. Corolla 7–10 mm.
155. Anthers spurred dorsally. 228. *V. laurifolium* var. *glanduligerum*
155. Anthers without dorsal spurs.
156. Leaves \pm densely and prominently reticulate on both faces or at least on the undersurface. 195. *V. dictyoneuron* var. *dictyoneuron*
156. Leaves may be finely reticulate above, never so beneath. 227. *V. gjellerupii*
152. Leaves \pm caudate-acuminate and \pm acute at the apex.
157. Corolla 4(–5) mm 194. *V. cavendishioides*
157. Corolla 6–8 mm.
158. Corolla cylindric below, subabruptly contracted and much narrower in the upper third 196. *V. irigaense*
158. Corolla urceolate or cylindric-urceolate, gradually narrowed upwards.
159. Corolla thin, greenish white 197. *V. fraternum*
159. Corolla fleshy, deep pink to purple. 237. *V. stricaule* var. *adenodes*
115. Calyx lobes besides a small or rather inconspicuous (or no) apical gland bearing a row of minor, sessile or subsessile, yellowish marginal glands.
160. Anther-cells free but for the very base. Leaves (6–)8–13(–14) by (3–)4–7.5(–8.5) cm 198. *V. claoxylon*
160. Anthers bipartite halfway or less.
161. Leaves 6–9(–11) by 2–3.5(–4) cm 199. *V. halconense*
161. Leaves 0.7–5(–6.5) cm long.
162. Pedicels very slender, 1–1.5 cm. (Leaves (2.5–)3–4.5 by 1–1.5 cm.). 187. *V. habbema* var. *pluriglandulosum*
162. Pedicels slender or more robust, up to 0.7 cm.

163. Calyx tube and lobes densely puberulous *and* laxly glandular-muriculate. (Leaves 2.4–3.4 by 1.3–2.2 cm.) 200. *V. roseiflorum*
163. Calyx tube and lobes exclusively pubescent.
164. Leaves (0.7–)0.8–1 by 0.25–0.3 cm 201. *V. leptocladum*
164. Leaves much larger.
165. Leaves 2.2–3(–3.5) by 0.5–0.8(–1) cm 202. *V. phillyreoides*
165. Leaves 3–5(–6.5) by 2–3.3 cm 167. *V. rigidifolium*
114. Calyx lobes mostly without any apical or marginal glands, rarely bearing a minute and inconspicuous apical gland.
166. Leaves deeply cordate.
167. Anther-cells dorsally set with 2 elongate spurs; tubules slenderly elongate-cylindric, longer than the cells 203. *V. amplexicaule*
167. Anther-cells not spurred dorsally; tubules shorter than the cells.
168. Corolla subglobose-urceolate, c. 5 mm long 204. *V. hooglandii*
168. Corolla cylindric-urceolate, 11–12 mm long 205. *V. schoddeii*
166. Leaves shallowly cordate (the basal lobes never amplexicaul), or cuneate to rounded at base.
169. Corolla subglobose, or subglobose- or conical-urceolate.
170. Corolla 8–10(–12) mm.
171. Leaves \pm elliptic, slightly retuse, 1.5–2.3 by (0.8–)1–1.5 cm. 206. *V. stellae-montis*
171. Leaves obovate, apex rounded-obtuse, 6.5–7.3 by 3.1–3.4 cm. . 207. *V. lageniforme*
170. Corolla up to 6 mm.
172. Leaves (1.5–)2–3 cm wide. Branchlets quite glabrous 208. *V. crassistylum*
172. Leaves 0.7–1.4 cm wide. Branchlets \pm densely and shortly (hispid-)pubescent in the younger parts.
173. Racemes reduced to an umbel-like inflorescence with 2–3 flowers, or even a solitary flower, on top of a very short (c. 2 mm) peduncle 209. *V. brevipedunculatum*
173. Racemes laxly 10–15-flowered; rachis 4–6 cm 210. *V. longepedicellatum*
169. Corolla (narrowly to broadly) urceolate, or barrel-shaped, or tubular (cylindric), or tubular-urceolate, very rarely subcampanulate-cylindric (if campanulate, *cf.* 134. *V. muriculatum*).
174. Style entirely or partly distinctly pubescent.
175. Leaves apex \pm rounded, or broadly attenuate and obtuse, or slightly retuse.
176. Corolla 11(–12) mm 211. *V. retusifolium*
176. Corolla up to 9 mm.
177. Leaves up to 5.5 by 2.5 cm.
178. Leaves (1–)1.5–2.5 by 0.6–1.2 cm 114. *V. lucidum* var. *lucidum*
178. Leaves 3–5.5 by 1.5–2.5 cm. 212. *V. xerampelinum*
177. Leaves 6–9(–11) by 2–3.5(–4) cm 199. *V. halconense*
175. Leaves apex \pm acuminate, acute, or at least subacute.
179. Corolla broadly cylindric, but slightly narrowed below the lobes, or even subcampanulate-cylindric, 7–8 by 5–6 mm 213. *V. brassii*
179. Corolla tubular-urceolate, up to 4(–5) mm wide.
180. Leaves 2.5–3.5 by (0.7–)0.9–1.4 cm 214. *V. leptomorphum*
180. Leaves 3.5–10(–12) by (1.5–)2–2.5(–5.5) cm.
181. Pedicels stoutish.
182. Calyx exclusively short-pubescent. Disk hairy 215. *V. capillatum*
182. Calyx short-pubescent and densely glandular-muriculate. Disk glabrous. 170. *V. ambivalens*
181. Pedicels (rather) slender.
183. Rachis and pedicels short-pubescent to finely patent-puberulous.
184. Corolla 10(–11) mm 216. *V. reticulato-venosum*
184. Corolla (5–)6–7 mm 199. *V. halconense*
183. Rachis and pedicels quite glabrous.
185. Calyx tube cylindric, base truncate, lobes quite glabrous, 0.5 mm. 178. *V. gracile*
185. Calyx tube cup-shaped, base rounded, lobes penicillate apically, c. 1.3 mm. 229. *V. turfosum*
174. Style quite glabrous.
186. Corolla (1.6–)2–2.5(–3) cm long.
187. Disk hairy to various degree.
188. Leaves ovate to oblong-ovate 217. *V. pilosilobum*
188. Leaves narrowly oblong-obovate, more rarely obovate 218. *V. sclerophyllum*
187. Disk glabrous. (Leaves elliptic to elliptic-obovate.) 190. *V. angulatum*
186. Corolla up to 1.4 cm long.
189. Leaves obovate or oblong- or elliptic-obovate or -spathulate.

190. Tubules \pm as wide and as long as or mostly shorter than the cells.
 191. Leaves small, 0.7–2.5 by 0.4–2 cm.
 192. Leaves (1–)1.5–2.5 by 0.6–2 cm **114. V. lucidum var. lucidum**
 192. Leaves 0.7–1.2 by 0.4–0.6(–0.7) cm **219. V. bartlettii**
 191. Leaves generally larger, at least in part in the same specimen.
 193. Corolla 6–8(–10) by 3–4(–5) mm **220. V. acrobacteatum**
 193. Corolla 8 by 8 mm **207. V. lageniforme**
 190. Tubules \pm half as wide and as long as or longer than the cells.
 194. Stamens about half as long as the corolla **221. V. nitens**
 194. Stamens as long as and finally a little exerted from the corolla. **182. V. viscifolium**
 189. Leaves other than predominantly obovate or spatulate.
 195. Leaves generally up to 3.5, rarely in part in the same specimen up to 4 cm long.
 196. Tubules about half as wide and as long as or longer than the cells.
 197. Leaves elliptic or oblong-elliptic, minutely crenulate in the upper third. Flowers in racemes **222. V. apiculatum**
 197. Leaves ovate, quite entire. Flowers solitary on an elongate peduncle. **223. V. tomicipes**
 196. Tubules \pm as wide and long as or mostly shorter than the cells.
 198. Pedicels slender to filiform.
 199. Leaves (1–)1.5–2.5 by 0.6–2 cm **114. V. lucidum var. lucidum**
 199. Leaves 0.7–1.2 by 0.4–0.6(–0.7) cm **219. V. bartlettii**
 198. Pedicels slender or generally more robust.
 200. Corolla broadly urceolate, 6–8 mm ϕ . Leaves retuse for 0.5–1 mm. **206. V. stellae-montis**
 200. Corolla more narrowly urceolate, up to 4.5 mm wide.
 201. Leaves (\pm reticulate) \pm rounded at apex. Small-leaved glabrescent forms of **220. V. acrobacteatum**
 201. Leaves \pm acuminate or broadly attenuate at apex, tip generally blunt.
 202. Leaves manifestly, *i.e.* densely (narrowly) and prominently reticulate on both faces, or at least on the undersurface **195. V. dictyoneuron**
 202. Leaves faintly or not reticulate.
 203. Calyx tube pubescent. Corolla 7.5 mm **224. V. ligustrifolium**
 203. Calyx tube very laxly glandular-muriculate or practically glabrous. Corolla 5–8 mm.
 204. Leaves quite entire. Corolla 5–6 mm **191. V. angiense**
 204. Leaves crenulate in the upper third. Corolla 7–8 mm . **222. V. apiculatum**
 195. Leaves larger at least for the greater part in the same specimen.
 205. Leaves obovate to obovate-spatulate or elliptic-obovate.
 206. Tubules as long as or mostly shorter and not or not much narrower than the anther-cells.
 207. Corolla 6–8(–10) by 3–4(–5) mm **220. V. acrobacteatum**
 207. Corolla 8 by 8 mm **207. V. lageniforme**
 206. Tubules elongate, longer and much narrower than the cells.
 208. Stamens about half as long as the corolla **221. V. nitens**
 208. Stamens as long as and finally a little exerted from the corolla. **182. V. viscifolium**
 205. Leaves of other shape than predominantly obovate.
 209. Leaves provided at intervals with several impressed marginal glands or faint crenulations up to the top of the lamina.
 210. Calyx tube and disk glabrous. Leaves shortly petioled or almost sessile. **225. V. jagori**
 210. Calyx tube and disk pubescent. Leaves distinctly petioled . . **226. V. sylvaticum**
 209. Leaves provided with 1 or 2 (or at most 3) pairs of marginal glands at or near the base, *i.e.* certainly within the lower third of the lamina.
 211. Leaves \pm shortly and broadly, in general \pm obtusely attenuate or acuminate at apex.
 212. Corolla subventricose-cylindric or barrel-shaped, 1–1.1 by *c.* 0.5 cm. **193. V. alvarezii**
 212. Corolla urceolate-cylindric, 4–6(–10) by 2–3(–5) mm.
 213. Corolla 4(–5) mm.
 214. Tubules shorter than the cells, the back wall of each cell extending into 1 or 2 short teeth **194. V. cavendishioides**
 214. Tubules longer than the cells, the back wall of each cell extending into 1 elongate tooth **144. V. aitapense**
 213. Corolla (5–)6–9(–10) mm.

215. Leaves predominantly pli-nerved, *i.e.* all main nerves steeply curved-ascending.
216. Leaves sub-5-plinerved 165. *V. costerifolium*
216. Leaves 9-11-plinerved 170. *V. ambivalens*
215. Leaves besides 1 or 2 pairs of (sub)-basal ascending nerves provided with one or several upper, more spreading and generally \pm straight ones.
217. Leaves 3.5-6.5(-7.5) by (1-)1.5-2.5 (rarely in part in the same specimen up to 3) cm, with 1-2 basal, high-ascending, and 1-2 upper, shorter and more spreading pairs of nerves 227. *V. gjellerupii*
217. Leaves larger, especially wider in general, with (3-)4-6 upper pairs of nerves 228. *V. laurifolium*
211. Leaves \pm caudate-acuminate and \pm acute at the apex.
218. Corolla 1.2-1.3(-1.4) cm 229. *V. turfosum*
218. Corolla up to 9 mm.
219. Tubules distinctly longer than (and generally but half as wide as) the cells.
220. Pedicels 10-15(-17) mm, (very) slender. (Corolla hairy below inside.)
230. *V. gracilipes*
220. Pedicels up to 6 mm.
221. Rachis, pedicels and calyx tube short-pubescent . . . 231. *V. pseudocaudatum*
221. Rachis, pedicels and calyx tube quite glabrous.
222. Corolla subdensely short-hairy in the lower half inside. Calyx limb \pm fleshy, low, wavy or shortly (up to 0.5 mm) and bluntly lobed. Leaves (5-)6-10 by (1.5-)2-3(-4.8) cm 232. *V. benguetense*
222. Corolla quite glabrous inside. Calyx limb membranous, lobes more conspicuous (0.5-0.8 mm) and generally subacute. Leaves (3-)4-6 by (1-)1.3-2 cm 233. *V. caudatum*
219. Tubules distinctly shorter than (and generally \pm as wide as) the cells.
223. Corolla 4(-5) mm.
224. Leaves ovate-elliptic, 5-8 by 2.5-4 cm 234. *V. steinii*
224. Leaves elliptic to narrowly oblong or lanceolate.
225. Leaves long caudate-acuminate, 4-7 by 1.3-2 cm . . . 235. *V. blepharocalyx*
225. Leaves more shortly subcaudate-acuminate, 3-5.5(-7) by (1.3-)1.5-2.5 (-3) cm 194. *V. cavendishioides*
223. Corolla 6-9 mm.
226. Calyx tube glandular-muriculate, or glandular-muriculate and hairy.
227. Calyx tube exclusively glandular-muriculate 236. *V. sparsum*
227. Calyx tube glandular-muriculate and hairy 170. *V. ambivalens*
226. Calyx tube glabrous.
228. Leaves oblanceolate or elliptic-oblanceolate, the base \pm cuneate.
196. *V. irigaense*
228. Leaves lanceolate, ovate-oblong or -lanceolate, the base broadly attenuate to almost rounded.
229. Pedicels stoutish, 6-8 mm 237. *V. striicaule* var. *striicaule*
229. Pedicels (very) slender, 1.2-2 cm.
230. Leaves 3.5-6 by 0.9-1.9 cm 238. *V. gracillimum*
230. Leaves 3-4.5 by 0.5-0.9(-1) cm 239. *V. rubroviolaceum*

87. *Vaccinium bracteatum* THUNBG, Fl. Jap. (1784) 156; G. DON, Gen. Syst. 3 (1834) 854; DUNAL in DC. Prod. 7 (1839) 573; MIQ. Ann. Mus. Bot. Lugd.-Bat. 1 (1863) 29; *ibid.* 2 (1865) 160; DOP, in Fl. Gén. I.-C. 3 (1930) 710; FLETCHER, Fl. Siam. En. 2 (1938) 312; SLEUM. Bot. Jahrb. 71 (1941) 470 (*with further synonymy*); STEEN. Act. Hort. Berg. 15, 2 (1949) 40, f. 1 (*distr. map*); MAKINO, Ill. Fl. Japan (1954) 240, fig.; SLEUM. Blumea 11 (1961) 44. — *V. malaccense* WIGHT, Calc. J. Nat. Hist. 8 (1847) 172; Ic. Pl. 4 (1848) t. 1186 ('malacca'); MIQ. Fl. Ind. Bat. Suppl. 1 (1860) 251; KURZ, Nat. Tijds. N.I. 27 (1864) 215; SCHEFFER, *ibid.* 31 (1870) 363; CLARKE in Fl. Br. Ind. 3 (1882) 454; RIDL. J. Str. Br. R. As. Soc. n. 23 (1891) 146; Trans. Linn. Soc. II, Bot. 3 (1893) 315; J. Str. Br. R. As. Soc. n. 33 (1900) 103; K. & G. J. As. Soc. Beng. 74, ii (1905) 67; KOORD. Exk. Fl. Java 3

(1923) 19; RIDL. J. Fed. Mal. St. Mus. 7 (1916) 45; Fl. Mal. Pen. 2 (1923) 211; HEYNE, Nutt. Pl. (1927) 1218; REHD. J. Arn. Arb. 15 (1934) 285; BURK. Dict. (1935) 2217; CORNER, Wayside Trees (1940) 219, f. 59; AMSH. in Back. Bekn. Fl. Java (cm. ed.) 7 (1948) fam. 163, p. 3; HENDERS. Mal. Nat. J. 6 (1950) 259. — *V. malaccense* WIGHT var. *bancanum* MIQ. Fl. Ind. Bat. Suppl. 1 (1860) 587; Ann. Mus. Bot. Lugd.-Bat. 1 (1864) 221; KURZ, Nat. Tijds. N. I. 27 (1864) 215. — *V. pubicarpum* RIDL. J. Linn. Soc. Bot. 38 (1908) 313, repr. J. Fed. Mal. St. Mus. 2 (1908) 119; *ibid.* 6 (1915) 156; Fl. Mal. Pen. 2 (1923) 211.

Shrub or small terrestrial tree, up to 6 m. Branchlets slender, tips greyish puberulent, older parts mostly early glabrescent. Leaves lax, lanceolate-oblong to elliptic- or ovate-lanceolate, variable in shape and size, rather long acuminate, acute, the

tip with a sharp point, often somewhat curved, base acutely attenuate to the petiole, chartaceous to subcoriaceous, in erect reddish pink flushes when young, old ones withering red, light green, glabrous, finely though distinctly crenulate-serrate in general, rarely subentire, (3-)4-8 by (1.5)-2-3(-3.5) cm, midrib and nerves slightly prominent on both faces, sometimes puberulent as is the petiole, nerves 6-7 pairs, rather steeply ascending and anastomosing, reticulation lax, not much visible; petiole slender, 2-4 mm. *Racemes* from the upper axils, many-flowered, mostly greyish and shortly pubescent in all outer parts, glabrescent towards the fruiting stage; rachis slender, (2.5-)3-8 (in fruit up to 15) cm. *Flowers* fragrant, all set in a row and facing down. Pedicels 1-2(-4, in fruit rarely up to 6) mm, bract foliaceous, small, subsistent. *Calyx* tube cup-shaped, 1-1.5 mm, lobes triangular, acute, 1-1.5 mm. *Corolla* urceolate-cylindric, slightly 5-angular, pink or white, pubescent on both sides, 5-6(-7) by 2.5 mm, lobes recurved, 1 mm. *Filaments* subulate, hairy below, 2-2.5 mm; anther-cells broad-oblong, base obtuse, almost 1 mm, whether or not minutely 2-spurred at the back; tubules slender, cylindric, c. 1.8 mm, opening by oblique short slits. *Disk* densely grey-pubescent. *Style* slender, glabrous, c. 5.5 mm. *Berry* globose, pubescent at the top, glabrescent elsewhere, reddish or finally dull purple or blackish, c. 4 mm ϕ .

Distr. In SE. Asia from Upper Burma, Siam and Indochina, China (Yunnan to Kiangsu), Formosa, Riu Kiu Is. and Korea to S. Japan (Kiushiu, Shikoku, Hondo), in *Malesia*: Sumatra (Palembang: Indragiri Highland, Mt Pesagi), Malay Peninsula, Banka, Billiton, Lingga Arch., Java (Karimun I.) and Karimata Arch.

Ecol. Common locally on sandy coasts, also in shady ravines on sandstone or granite mountain tops (where the leaves are slightly tougher), in moist places, said to occur also in padang vegetation, from the sea-shore up to 1830 m, always on acid soil. *Fl. fr.* Jan.-Dec.

Vern. *Ais*, *inai* (*enai*) *batu*, *kĕlampadang*, *mata kĕli*, *mĕmpadang*, *rangkas*, *rĕmpadang*, *M*, *kĕndalu*, *progadang*, *Banka*, *kĕmsĕnting padang*, *Lingga*, *pĕrai*, *pĕrangkas*, *Billiton*.

Uses. Fruit rather hard and not much juicy, edible when quite ripe.

88. *Vaccinium kjellbergii* J. J. S. Bot. Jahrb. 68 (1937) 211; SLEUM. Blumea 11 (1961) 44. — *V. malaccense* WIGHT *var. celebense* J. J. S. Bull. Jard. Bot. Btzg II, 8 (1912) 48.

Terrestrial shrub or treelet. Branchlets patent-puberulous in the youngest, glabrescent in the older parts. *Leaves* scattered, subovate-elliptic, apex gradually to subcaudately acuminate, often a little curved, tip bluntish, base \pm cuneate into the petiole, coriaceous at full age, patent-puberulous initially on both faces, rather early glabrescent except the base and the petiole which remain puberulous for a longer time, remotely crenulate by a number of impressed small glands within the slightly thickened margin, rarely subentire,

(3-)3.5-8.5 by (1.5-)2-2.7(-3.3) cm, 5(-sub-7)-plinerved, moreover with several shorter upper nerves, all \pm steeply curved-ascending and inarching near the edge, prominent on both faces, or sometimes impressed above in old leaves, reticulation rather dense, more distinct beneath, raised on both sides; petiole puberulous initially, (2.5-)5-7(-11) by 0.5-1 mm. *Racemes* axillary, laxly 8-12-flowered, \pm densely patently short-pubescent in all outer parts at anthesis; rachis subangular, slender, 4.5-8(-10) cm. Pedicels very slender 6-8(-12) mm, bract foliaceous, subsistent, membranous, ovate- to lanceolate-oblong, crenulate, 1-2.5(-3) by 0.3-0.7(-1.3) cm, shortly petioled. *Calyx* tube subglobose, c. 2 mm ϕ , limb spreading, its lobes triangular, obtuse by a small dark apical gland, 1 mm. *Corolla* urceolate-cylindric, white or pinkish, 5-angular, a little fleshy, densely short-pubescent outside, laxly so or almost glabrous inside, 6 by 3 mm, lobes obtuse, recurved, 1 mm. *Filaments* subulate, long-hairy or nearly villous to the top, c. 2.5 mm; anther-cells broad-oblong, 1.2 mm, whether or not provided with 2 very short dorsal spurs; tubules slender, c. 1.2 mm, obliquely cut apically, the posticous wall of each very shortly and irregularly bifid. *Disk* subvelutinous. *Style* pubescent at the base, glabrous otherwise, slender, 6-7 mm, finally exerted. *Berry* globose, c. 5 mm ϕ , short-pubescent, crowned by the somewhat swollen disk.

Distr. Malesia: Central and SE. Celebes, also on Kabaena I.

Ecol. Both in forest and rather dry shrub formation, on phyllites or crystal schistes, from sea-shore to 900 m. *Fl. fr.* Aug.-Oct.

89. *Vaccinium timorense* FAWC. in Forbes, Wand. (1885) App. 6, p. 509, *incl. var. denticulatum* FAWC. *Lc.*; SLEUM. Blumea 11 (1961) 45. — *V. cf. varingiaefolium* (BL.) MIQ., MEIJER DREES, Comm. n. 33 For. Res. Inst. Bogor (1951) 49.

Straggling bushy shrub, 1-2 m, rarely treelet up to 8 m. Branchlets angular, puberulous, rather densely leaved; young shoots reddish. *Leaves* oblong or elliptic-oblong, sometimes lanceolate- or subobovate-oblong, apex obtuse to rounded, base cuneate or attenuate into the somewhat flattened petiole, the basal pair of glands distant from the petiole and minutely depressed, subcoriaceous, glabrous, shining above, entire or remotely crenulate by a few impressed, minute, marginal glands, 2-4 by (0.5-)0.8-1(-1.5) cm (smaller at higher altitudes), midrib and 4-5 ascending pairs of nerves slightly raised on both faces, reticulation rather dense and finely prominent on both faces, or sometimes subinconspicuous; petiole pubescent initially, (1-)1.5-3 by 0.5-1 mm. *Racemes* from the uppermost axils, 8-15 (-20)-flowered, laxly to subdensely pubescent or glabrous at rachis, pedicels and calyces; rachis angular, rather slender, (1-)2.5-5 cm. Pedicels slender, 0.5-1 cm, bract similar to though smaller than the leaves, up to 1.5 by 0.5 cm, \pm caducous in the course of the anthesis, rarely persistent for a longer time especially in specimens of higher

altitudes. *Calyx* tube obconical to subsemiglobose, 1–1.5 by 2 mm, limb spreading, 5-lobed almost to the base, lobes deltoid, 1 mm, the apical gland distinct though sometimes \pm hidden by the hairs. *Corolla* subcylindric-urceolate, whitish or pink or in shades of a vivid red or even scarlet, glabrous outside, pubescent inside, 6–7 by 2.5–3 mm, lobes obtuse, reflexed, 1 mm. *Filaments* subulate, densely hairy to the top, 2.5–3 mm; anther-cells broad-oblong, 1–1.2 mm, whether or not provided with 2 short dorsal spurs (which are shorter than the tubules); tubules sometimes with some sparse very shortly stalked glands or glandular points, cylindrical, a little narrower than the cells, 0.3–0.5 mm, \pm transversely cut apically, the pore round. *Style* slenderly cylindrical, c. 6 mm, laxly hairy to the lower third, glabrous for the rest. *Disk* laxly hairy. *Berry* globose, glabrous, bluish-blackish at maturity, c. 5 mm ϕ .

Distr. *Malesia*: Lesser Sunda Is. (Flores, Sumba, Timor, Alor) and S. Celebes.

Ecol. In Timor (secondary) *Eucalyptus* and *Podocarpus* forest as well as in shrubberies, often along forest borders from 520–2950 m, in the other islands in scrubby low forest on exposed slopes or ridge crests, also on volcanic rocks, on stony ground, edge of craters, locally common, 950–2850 m. *Fl.* Jan.–Dec.

Vern. *Torovara*, Flores, *aipada*, Sumba, *kewan*, *tali*, Alor, *kunkole*, Timor: Dawang, *tjampaga romang*, S. Celebes: Makassar.

Uses. After MEIJER DREES (1951) fairly resistant against fire and cattle, but unsuitable for silviculture owing to its small dimensions.

Note. *V. timorense* on Sumba is the cause of a column-like erosion in the places where its extensive root-system prevents the softer layers of sandstone from becoming early eroded (cf. GREVENSTUK, *Trop. Natuur* 28, 1939, 61, f. 2–4, sub *V.?* *bancanum*).

90. *Vaccinium centrocelebicum* SLEUM. *Blumea* 11 (1961) 45.

var. centrocelebicum.

Shrub. Branchlets angular, blackish purplish when dry, glabrous. *Leaves* rather dense, oblong- to elliptic-obovate, broadly attenuate towards the apex, which is subobtuse and provided with a small gland, base cuneate and a little decurrent into the petiole, thin-coriaceous, glabrous, laxly punctate beneath, edge regularly subserrate-crenate (crenations ending in a gland, 1–2 mm spaced, 0.3 mm high), 1.4–1.9 by (0.5–)0.6–0.8 cm, nerves 4–5 steeply ascendent pairs, raised on both sides as is the midrib, reticulation indistinct above, subinconspicuous beneath; petiole 1(–2) by 0.5–1 mm. *Racemes* axillary, puberulous except the corolla, 10–15-flowered; rachis slender, angular, 3–4(–6) cm. Pedicels slender, 4–7 mm, bract foliaceous, c. 7 by 2–3 mm, persistent to the end of the anthesis. *Calyx* tube cupular-campanulate, 1.5 by c. 2 mm, base rounded-obtuse, limb spreading, lobes ovate-deltoid, 1 mm, calloscapiculate. *Corolla* tubular, 5 by c. 2.5 mm, white,

glabrous outside, very shortly pubescent all over inside, lobes obtuse, reflexed, 0.8 mm. *Filaments* subulate, hairy to the top; anther-cells broadly oblong, 0.9 mm, manifestly bicalcarate dorsally; tubules broad-cylindric, a little narrower than the cells, 0.5 mm. *Disk* laxly hairy. *Style* slender, glabrous, c. 4.5 mm, slightly exerted at anthesis.

Distr. *Malesia*: SW. Central Celebes (Latimodjong Ra.: between Pintealón, Pokapindjang and Tinábang ridge), 2600–3000 m. Once found. *Fl.* June.

var. maius SLEUM. *Blumea* 11 (1961) 46.

Leaves broader and more obovate or rhombic-elliptic, 1.5–2 by 1–1.3 cm, more distinctly veined beneath. *Fruit* subglobose, c. 4 mm ϕ in submature state.

Distr. *Malesia*: Central Celebes (Masamba Subdistr.), in forest, 2400 m. Once found. *Fr.* Nov.

91. *Vaccinium gitingense* ELM. *Leaf.* *Philipp. Bot.* 4 (1912) 1490; MERR. *En. Philipp.* 3 (1923) 249; COPEL. *f. Philipp. J. Sc.* 42 (1930) 559, t. 1, f. 6–8; SLEUM. *Blumea* 11 (1961) 46.

Spreading shrub, 1–3 m, branched from the base. Branchlets slender, faintly cinereous-puberulent at the tips, glabrescent below. *Leaves* scattered, ovate to elliptic-ovate, short-acuminate towards the bluntish apex, base rounded, coriaceous, glabrous, regularly minutely to more deeply subserrate-crenulate, (1.5–)2–3(–3.5) by 0.8–1.5 (–1.8) cm, midrib and 3–4(–5) of rather steeply ascending nerves hardly raised above, \pm distinctly so beneath, reticulation lax, a little prominent beneath; petiole compressed, initially puberulous, 2(–3) by 1 mm. *Racemes* lax, 5–10-flowered; rachis slender, glabrous or slightly puberulous, 4–6 cm. Pedicels slender, (0.7–)1–1.5 cm, glabrous, bract leafy, lanceolate, rather coriaceous, still persistent in fruiting time, up to 2 by 1 cm. *Calyx* glabrous, tube obconical or cup-shaped, c. 2 by 3 mm, limb a little spreading, 5-lobed to almost the base, lobes deltoid, subacute, ciliate, 1 mm. *Corolla* broadly tubular-urceolate, white or (deep) red, glabrous at both sides, but sometimes with some hairs at the throat, 6 by 3 mm at the base and 2 mm ϕ at the opening, lobes subacute, 1 mm. *Filaments* subulate, densely hairy or villous, 1.5–2 mm; anther-cells oblong, base subacute, 1.5 mm, provided with 2 short dorsal spurs; tubules much more slender than the cells, cylindrical, obliquely cut apically, 1.5 mm. *Disk* pubescent. *Style* slender, glabrous, c. 6 mm, slightly exerted at full anthesis. *Berry* becoming blackish at maturity, said to attain up to 1 cm ϕ . *Seeds* few, fusiform, 1 mm.

Distr. *Malesia*: Philippines (Mindanao, Sibuyan, Dinagat I.).

Ecol. On hot, dry, gravelly river bottom (probably washed down from mountain forest, showing minor leaves) or along streams and on ridges at low altitude, ascending to 450 m.

Vern. *Pagangpang*, P. Bis.

Uses. Fruits said to be of sweet taste and edible.

92. *Vaccinium indutum* VIDAL, Rev. Pl. Vasc. Filip. (1886) 169; MERR. Philip. J. Sc. 3 (1908) Bot. 376; *ibid.* 7 (1912) Bot. 96; En. Philip. 3 (1923) 249; COPEL. f. Philip. J. Sc. 42 (1930) 553, t. 2, f. 1-3; SLEUM. Blumea 11 (1961) 46. — *V. macgregorii* MERR. Philip. J. Sc. 10 (1915) Bot. 53; En. Philip. 3 (1923) 250. — *V. sorsogonense* ELM. Leaf. Philip. Bot. 10 (1939) 3730.

Shrub, sometimes epiphytic, 1-4 m. Branchlets puberulous at the ends, early glabrescent and greyish corticate. *Leaves* distant from each other, ovate, ovate-elliptic to elliptic-oblong or oblong-ovate, apex rather abruptly or subcaudately acuminate (*c.* 2 cm), subacute, base broadly attenuate to rounded and even subcordate, coriaceous, (7-)-8-14(-18) by 4-6(-7) cm, entire, initially soft-hairy on both faces, glabrescent except the midrib and nerves beneath, rarely glabrous from the beginning, prominently 7-plinerved, reticulation \pm dense, raised on both faces; petiole 4-6(-8) by 1.5-2 mm, flattened, pubescent at first. *Racemes* from the uppermost axils, sparingly to densely short-hairy in all outer parts, 5-12(-15)-flowered; rachis stoutish, angular, 3-7(-9) cm, even longer in fruit. Pedicels robust, 1-1.5 cm, bract leafy, up to 2(-3) by 0.8 cm, caducous towards the end of the anthesis. *Calyx* tube hemispherical, slightly constricted above, 2-2.5 by 3 mm, limb \pm spreading, lobes broadly triangular, acute or acuminate, *c.* 2 mm, ciliate. *Corolla* tubular-subcampanulate, *c.* 1.5 cm long in full anthesis, *c.* 4 mm \emptyset below, widened to 6 mm across the mouth, red, lobes obtuse, *c.* 4 by 2 mm. *Filaments* linear, \pm densely set with long white hairs, 7-9 mm; anther-cells narrow-oblong, base slightly curved inward and apiculate, not spurred, 3.5-4 mm; tubules cylindric, narrower than the cells, 3-3.5 mm, pores somewhat oblique. *Disk* densely white-pubescent. *Style* slender, rather glabrous, 1.5 cm. *Fruit* pubescent, *c.* 5 mm \emptyset .

Distr. *Malesia*: Philippines (Luzon).

Ecol. In rocky ground of densely wooded steep slopes, also in mossy forest, apparently generally above 1000 m, rarely down to 600 m. *Fl.* Febr.-Aug.

Vern. *Banuái, paluai, bunuái, malabanuái*, Bon.

93. *Vaccinium ampullaceum* SLEUM. Bot. Jahrb. 72 (1942) 266; Blumea 11 (1961) 46; *ibid.* 12 (1963) 127.

Scandent or epiphytic shrub. Branchlets patently pubescent or tomentulose distally, slender, subimbricately leaved. *Leaves* ovate to elliptic-ovate, apex broadly acuminate or attenuate, bluntish, base mostly cordate, sometimes in part subtruncate-rounded, subcoriaceous to coriaceous, shortly tomentulose on both faces initially, glabrescent, remaining pubescent on the midrib beneath, entire, 2-4 by (1.5)-2-3.5(-4) cm, the lowest 2(-3) pairs of nerves oriented from the base, the upper 3-4 ones \pm steeply ascending and rather straight from the midrib, obscurely anastomosing, slightly raised on both sides, reticulation visible beneath; petiole *c.* 2 by 1.5-2 mm. *Racemes* from the upper axils, suberect, softly short-tomentose

in all outer parts, 6-12-flowered; rachis stoutish, (3-)-5-7 cm. Pedicels rather slender, 4-5 mm, bract leafy, thin, pubescent, oblong to ovate-oblong, up to 2 by 0.8 cm, persistent at least during the anthesis, the 2 bracteoles subulate and early caducous. *Calyx* tube campanulate-obconical, 1.5(-2) mm, limb spreading, lobes narrow-deltoid, subacute, *c.* 2 mm. *Corolla* ampullaceous or elongate-urceolate, 1-1.1 cm by 3 mm at the base and 2 mm \emptyset above, again slightly dilated at the opening, densely hairy outside, glabrous inside, white, tinged with rose, or red, lobes obtuse, spreading, 1.5 mm. *Filaments* subulate, densely hairy below, 2.5 mm; anther-cells oblong, 1.6 mm, not spurred; tubules as wide as the cells, obliquely cut, 0.5 mm, the back-wall of each tubule ending in a \pm sharp tooth. *Disk* hairy on the inner angle. *Style* columnar, 9 mm, laxly hairy to nearly the top.

Distr. *Malesia*: E. New Guinea (Main Range from the Central Distr. to the Eastern Highlands).

Ecol. In mountain forest, 1900-2550 m. *Fl.* Nov.-Dec.

94. *Vaccinium glabrescens* K. & G. J. As. Soc. Beng. 74, ii (1905) 63; RIDL. Fl. Mal. Pen. 2 (1923) 208; SLEUM. Blumea 11 (1961) 46. — *V. longibracteatum* RIDL. J. Linn. Soc. Bot. 38 (1908) 313, repr. J. Fed. Mal. St. Mus. 2 (1908) 119; *ibid.* 6 (1915) 49, 156; Fl. Mal. Pen. 2 (1923) 208; HENDERS. J. Fed. Mal. St. Mus. 13 (1927) 5.

Shrub or treelet, 3-5 m, sometimes epiphytic. Branchlets rather robust, laxly or mostly subdensely leaved, at first with a short grey tomentum also found on the leaves and the inflorescences, \pm glabrescent. *Leaves* ovate to oblong-ovate or ovate-elliptic, apex obtuse or mostly shortly sub-acuminate, the very tip blunt, base rounded-truncate to slightly cordate, coriaceous, stiff, flat, entire, with 1 (or 2) small impressed marginal gland(s) at some distance from the petiole, glabrescent and smooth except the base underneath and the petiole, (1.5)-2-3.5(-5) by (1.2)-2-2.5(-3.5) cm, midrib sunken above, obtusely raised beneath, nerves 2-3(-4) basal and slightly suprabasal and 2-3 upper pairs, all rather steeply curved-ascending and anastomosing, faintly impressed above, \pm visibly prominent beneath, reticulation somewhat raised above, or subinconspicuous on both faces; petiole 1.5-2(-2.5) by 1-1.5 mm. *Racemes* from the uppermost axil, seemingly terminal, suberect, densely flowered, all over with a yellowish soft and short tomentum; rachis stout, 3-6(-8) cm by 1.5-2 mm \emptyset at base. Pedicels curved, 3-6 mm at anthesis, up to 12 mm in fruit, stoutish, bract lanceolate to ovate-oblong, subacuminate, up to 1.5 by 1 cm, subsistent. *Calyx* tube subglobose, 2 mm \emptyset , lobes narrow-deltoid, subacute, 1.5 mm, no apical gland. *Corolla* subcylindric, slightly narrowed towards the lobes, rose or pink, 7-7.5 by 2.5 mm, somewhat 5-angled, densely hairy outside, less so inside, lobes suberect, rather acute, 1.3 mm. *Filaments* subulate, subdensely hairy, *c.* 3 mm; anther-cells oblong, granular, 1.5 mm, with 2 distinct dorsal

spurs; tubules with a few shortly stalked or sessile glands, narrow-cylindric, 1.3 mm, slightly dilated distally, pore round. *Disk* shortly hairy. *Style* rather slender, 6 mm, hairy. *Fruit* subglobose or nearly ellipsoid, softly pubescent, *c.* 4 by 3 mm, rather hard, pink or green with reddish cheeks when ripe, crowned by the inflexed triangular calyx teeth, 5-celled, each cell with several angled seeds.

Distr. Malesia: Malay Peninsula (Main Range in Perak, Pahang, Selangor, and on Mt Tahan).

Ecol. In summit scrub, open country and ridge forest, common locally, 1000–2165 m. *Fl. fr.* Jan.–Dec.

95. *Vaccinium auriculifolium* SLEUM. *Blumea* 12 (1963) 131.

Shrub, 1.2–3 m, sometimes scrambling; stems shortly branched distally. Branchlets at least initially densely set with short spreading soft hairs as are the young leaves, the inflorescences and the infructescences. *Leaves* imbricate, ovate or elliptic-ovate, apex broadly and shortly attenuate or subacuminate, acutish or obtuse, base deeply auriculate-cordate, basal lobes not amplexant, 1–1.5 cm ϕ , the pair of basal marginal glands small and found close to the petiole, coriaceous, tardily glabrescent, mature ones still pubescent on the basal part of the midrib beneath and on the petiole, entire, flat, (2.5–)3–6 by (2–)2.5–4.5 (–5) cm, irregular in size, upper ones generally decrescent, 7–9-plinerved, other (upper) nerves from the midrib 3–4, all nerves arching before the edge and prominent, reticulation dense, slightly raised on both faces; flush pink; petiole slightly depressed, 1.5–3 by 1.5–2 mm. *Racemes* from the upper 1–2 axils, condensed, almost umbelliform, (3–)4–8(–12)-flowered; rachis short, rarely up to 1 cm. Pedicels stoutish, 3–5 mm, bract foliaceous and persistent to fruiting time, broad-ovate to ovate-elliptic, 0.5–1 by 0.5–1 cm. *Calyx* tube cup-shaped, 1–1.5 mm, lobes erect, deltoid, 1–1.5 mm, apical gland small, glabrous. *Corolla* subglobose-urceolate, depressed, *c.* 4 by 5–6 mm, opening *c.* 2 mm ϕ , fleshy, pale to more intense pink, hairy outside and in the upper part inside, lobes reflexed, 0.7 mm. *Filaments* subulate, villous, 1.5 mm; anther-cells broad-oblong, almost smooth, 1–1.2 mm; tubules as wide as the cells, 0.3–0.4 mm, pore oblique. *Disk* prominent, hairy. *Style* 3 by 1 mm, glabrous. *Fruit* subglobose, truncate at apex, 7–8 mm ϕ , the prominent disk exceeding the non-acrescent calyx lobes, blackish purple, pedicel 5–7 mm.

Distr. Malesia: New Guinea (Western and Southern Highlands).

Ecol. In *Nothofagus* forest, in boggy area covered with (also secondary) low forest or shrubs, or in *Miscanthus* grass swamp, 1980–2860 m. *Fl. fr.* July–Sept.

Vern. *Orsar*, Mendi, *porr*, Merimanta, *gulaneh*, Ialibu.

96. *Vaccinium trichocarpum* SLEUM. *Blumea* 11 (1961) 47.

Treelet, 2–4 m. Branchlets (very) slender, patently hirsutulous in the youngest, glabrescent in the older parts, rather densely to laxly leaved. *Leaves* elliptic, apex rounded-obtuse, sometimes faintly emarginate, the apical gland hardly visible, base broadly attenuate or almost rounded, the pair of basal marginal glands minute and much distant from the petiole, young ones membranous and hirsutulous especially along the midrib beneath and at the petiole, shorter and less densely so beneath, ciliate, glabrous above, mature ones subcoriaceous and glabrous except some hairs on the midrib beneath, dull, entire, 2–2.8 by 0.8–1.3 cm, midrib slightly impressed above, prominent beneath, nerves \pm pinnate, 4–5 not much conspicuous pairs, reticulation lax and subobscure; petiole rather slender, 1.5–2 mm. *Racemes* axillary and subterminal, short, laxly remotely 2–4-flowered; rachis slender, densely patently set with a soft hirsutulous tomentum as are pedicel and calyx, 1–3(–4) cm, accrescent during anthesis, the flowers restricted to its upper part. Pedicels 0.5 mm, up to 2 mm in fruit, bract leafy, ovate to ovate-elliptic, persistent, membranaceous and densely hairy at first, subchartaceous and glabrescent in fruit, up to 1 by 0.9 cm; bracteoles subulate, *c.* 1.5 mm, very early caducous. *Calyx* tube subcylindric, *c.* 2 mm, limb erecto-patent, 1 mm, 5-lobed halfway, lobes deltoid, obtuse, sometimes with an apical gland which is \pm covered by the hairs. *Corolla* cylindric-urceolate, pink, laxly long-hairy outside, glabrous inside, *c.* 4 by 2 mm, shortly 5-lobed. *Filaments* broadly linear, laxly short-pubescent, 1 mm; anther-cells narrowly-oblong, 1.2 mm, no spurs; tubules cylindric, erect, half as wide as the cells, slightly divergent, *c.* 1 mm, opening by an elongate introrse slit. *Disk* glabrous. *Style* rather robust, glabrous, \pm as long as the corolla. *Fruit* globose, apex truncate, crowned by the inflexed calyx lobes, *c.* 5 mm ϕ (submature), subdensely hirsutulous.

Distr. Malesia: Philippines (Mindanao: Mt Hilong-Hilo, Mt Mayo).

Ecol. In summit vegetation, 1300–1750 m. *Fl. fr.* April.

97. *Vaccinium wisselianum* SLEUM. *Blumea* 11 (1961) 47; *ibid.* 12 (1963) 127.

Shrub, 1–2.5 m. Branches terete, robust. Branchlets rather slender, tips covered with a soft, spreading yellowish tomentum, older parts glabrescent and cinereous-corticate, subimbricately leaved. *Leaves* ovate to oblong-ovate, apex gradually attenuate or subacuminate, bluntish, base slightly cordate, the pair of basal marginal glands a little distant from the petiole, subcoriaceous, initially shortly and softly hairy on both faces, especially at the midrib underneath, \pm glabrescent, remaining hairy for a longer time at the midrib and nerves beneath, entire, edge \pm revolute, 2–3 by 1.5–2.5 cm, midrib much impressed above, prominent beneath, nerves 4–5 pairs, the lower 2 pairs ascending from the base, the upper ones \pm pinnately from the midrib, all curved-ascending and anastomosing, slightly

sunken above or raised beneath, reticulation obscure; flush light pink; petiole tomentulose, c. 2 by 1 mm. Racemes pseudoterminal from the uppermost axil, in form of a shoot with decrescent leaves and a solitary flower in the axil of each leaf, softly and patently tomentulose in all outer parts except the corolla; rachis rather robust, 4–6 cm. Pedicels rather slender, 3–5 mm, accrescent to 1 cm in fruit, bract similar to the leaves, though smaller and thinner, up to 1.5 by 1.2 cm; bracteoles subulate, early caducous. *Calyx* tube semiglobose, c. 2 mm, contracted apically, limb erecto-patent, 5-lobed to almost the base, lobes ovate-deltoid, acute, 2 mm. *Corolla* elongate-urceolate, rather fleshy, glabrous at both sides, deep red or purplish, 9–10 mm long, c. 2.5 mm \varnothing below, lobes obtuse, reflexed, c. 1 mm. *Filaments* subulate, quite glabrous, 2 mm; anther-cells oblong, 1 mm; tubules nearly as wide as the cells, 0.5 mm, obliquely cut apically, the pore large. *Disk* glabrous. *Style* glabrous, 8 mm. *Fruit* subglobose, pubescent, c. 5 mm \varnothing when dry, black when ripe.

Distr. *Malesia*: West New Guinea (Wissel Lakes).

Ecol. In secondary (*Dacrydium*) forest or heath vegetation, or in swamps, temporarily covered by water, on peaty soil, locally not rare, 1750–1800 m. *Fl. fr.* March–Nov.

Vern. *Bommo*, *koglè*, *kore*, *wodik*, Kapauku.

98. *Vaccinium thibaudifolium* WERNH. Trans. Linn. Soc. II, Bot. 9 (1916) 93; SLEUM. Bot. Jahrb. 72 (1942) 267; Blumea 11 (1961) 48; *ibid.* 12 (1963) 127.

Shrub, up to 4 m, with spreading branches. Branchlets glabrous or puberulent, rather slender. *Leaves* scattered, elliptic or ovate-elliptic, apex (sub)caudate-acuminate (2–2.5 cm), subacute, base broadly attenuate into the petiole, the basal pair of marginal glands conspicuous, rather close to the petiole, coriaceous, quite glabrous, entire, flat, 6–9 by (2.5–)3–4 cm, 7-plinerved from and from above the base, midrib slightly impressed above, prominent beneath, nerves a little sunken or sometimes raised above, always prominent beneath, reticulation \pm dense, conspicuously raised beneath; petiole 5–8 by 1–1.3 mm. *Racemes* axillary, laxly 6–8-flowered, glabrous or finely puberulous (and sometimes furthermore laxly glandular-muriculate) at rachis, pedicels and calyces; rachis slender to stoutish, (4–)6–9 cm. Pedicels (very) slender, 1–2 cm, bract \pm persistent to fruiting time, foliaceous, thin, ovate-oblong, acuminate, 6–8(–10) by 3–5 mm; bracteoles subulate, 2 mm, very early caducous. *Calyx* tube cup-shaped, 1.5 by 2 mm, limb erect, deeply 5-lobed, lobes ovate-deltoid, subacute, whether or not provided with an apical gland, hardly 1 mm. *Corolla* subglobose-urceolate, \pm contracted into an apiculus distally, pink or greenish white, densely grey-pubescent outside, more laxly so in the lower half inside, 3.5–4 by 2.5 mm, lobes very short, white or cream. *Filaments* subulate, villous except the very base, c. 1.5 mm; anther-cells oblong, 1.2 mm, granular, with 2 very short

dorsal spurs, slightly narrowed to the tubules (0.3 mm), which open by oblique pores. *Disk* glabrous. *Style* columnar, glabrous, 2.5 mm. *Fruit* subglobose, apex truncate, crowned by the much swollen disk which surpasses the calyx lobes, c. 5 mm \varnothing when dry, becoming purple when ripe.

Distr. *Malesia*: New Guinea (ascent to Mt Carstensz via the Utakwa R.; from the Sibil R. and Minam-Bon R. valley, and Telefomin in Sepik Distr.).

Ecol. In forest, on white impervious clay or peaty soil, 760–1500 m, locally frequent. *Fl. fr.* April–Dec.

99. *Vaccinium epiphyticum* MERR. Philip. J. Sc. 7 (1912) Bot. 322; En. Philip. 3 (1923) 249; COPEL. f. Philip. J. Sc. 42 (1930) 555; SLEUM. Blumea 11 (1961) 48.

Epiphytic shrub, 2–3 m. Branchlets very slender, papillose-puberulous at the tips, glabrous below. *Leaves* laxly arranged, ovate-oblong or -elliptic, apex caudate-acuminate (acumen 1.5–2 cm), subacute, base broadly attenuate into the petiole to almost rounded, the basal pair of minutely impressed marginal glands remote from the petiole, subcoriaceous, flexible, seemingly glabrous but in fact very sparsely set with minute, reddish-brownish, appressed glandular hairs beneath (lens!), \pm glossy, entire, 10–12 by 4–5.5 cm, 5(-sub-7)-plinerved, midrib and nerves slightly raised above, much more so beneath, other upper pinnate nerves less distinct, reticulation fine and dense, well visible on both faces; petiole 5–8 by 1–1.5 mm. *Racemes* from the uppermost axil, slender, 6–8-flowered, subpendent; rachis slender, as the pedicels, calyx, corolla and disk with a fine, very short, non-glandular puberulence and laxly set with thicker minute gland-tipped hairs. Pedicels rather stoutish, 1–1.5 cm, much thickened distally, bract foliaceous, membranous, acuminate, up to 1 by 0.5 cm, subsistent; bracteoles subulate, very early caducous. *Calyx* tube cup-shaped, 2 by 3 mm, limb short, deeply 5-lobed, lobes deltoid, subacute, ciliate, 1.5 mm. *Corolla* tubular, (1–)1.1–1.2 cm long in all and 4–5(–6) mm \varnothing below, slightly dilated or subcampanulate distally, thin, glabrous inside, lobes obtuse, reflexed, 2 mm. *Filaments* subulate to almost filiform, subdensely pubescent, 5–5.5 mm; anther-cells oblong, echinulate, base obtusely apiculate and inflexed, 2.5 mm, no spurs; tubules cylindrical, a little narrower than the cells, 1.5–1.8 mm, transversely cut at the apex, pore round, somewhat flaring. *Disk* hairy. *Style* filiform, laxly hairy in the lower half, 1.2 cm.

Distr. *Malesia*: Philippines (Mindanao: Sax R. Mts, Zamboanga Prov.), at c. 900 m. Once found. *Fl. Nov.*

Vern. *Maladúsong*.

100. *Vaccinium barandanum* VIDAL, Rev. Pl. Vasc. Filip. (1886) 169; MERR. Philip. J. Sc. 3 (1908) Bot. 376; *ibid.* 5 (1910) Bot. 372; En. Philip. 3 (1923) 248; COPEL. f. Philip. J. Sc. 42 (1930) 556, t. 2, f. 4–6; SLEUM. Blumea 11 (1961) 48.

See for synonymy under the variety.

KEY TO THE VARIETIES

1. Leaves broadly elliptic-ovate, 5.5–7 cm wide. Rachis and pedicels quite glabrous. (Disk puberulous.) 2. *var. hutchinsonii*
1. Leaves lanceolate, ovate-lanceolate or ovate-elliptic or -oblong, (2.5–)3.5–4.5(–5.5) cm wide. Rachis and pedicels minutely pubescent and/or laxly glandular-muriculate.
2. Disk glabrous 1. *var. barandanum*
2. Disk pubescent 3. *var. cagayanense*

1. *var. barandanum*.

Tree or shrub, 2–8 m, glabrous except the filaments. Branchlets striate and angular, flexuous, early covered with ashy cork. *Leaves* scattered, rather variable in shape, generally lanceolate or ovate-lanceolate, apex longish and subabruptly acuminate to subfalcate, the very tip bluntish, base acutely cuneate into the petiole, the basal glands conspicuous, other marginal glands few, minute, scattered along the somewhat wavy or subrevolute edge, practically entire, coriaceous, firm, (6–)8–15 by (2.5–)3.5–4.5(–5.5) cm, 5–7(–9)-plinerved, midrib and nerves a little sunken above, prominent beneath, reticulation lax, conspicuous beneath only; petiole 0.5–1 cm by 1–2 mm, \pm flattened. *Racemes* from the upper 2–3 axils, erect, many-flowered; rachis sparsely pubescent and whether or not glandular-muriculate, 4–6(–10) cm. Pedicels rather slender, laxly glandular-muriculate, 4–8 (–10) mm, bract foliaceous, thin, persistent up to the fruiting time, lanceolate, acute, up to 1.5 by 0.5 cm; 2 bracteoles subulate, minute, caducous. *Calyx* tube campanulate, glandular-muriculate, 2 by 2.5 mm, limb low, 5-denticulate, the teeth ciliate, *c.* 0.6 mm. *Corolla* tubular or more ample, *i.e.* tubular-subcampanulate in the upper half, (9–)10–12(–15) by *c.* 2.5 mm ϕ below, 3–5 mm ϕ distally, blood red, subdensely glandular-muriculate by stalked, appressed glandular hairs outside, glabrous inside, lobes 1.5 mm. *Filaments* filiform, *c.* 5 mm, shortly pubescent at least below; anther-cells narrow-oblong, 3.5 mm, echinulate, base minutely rostrate, shortly 2-spurred dorsally; tubules elongate-cylindric, smooth, \pm half as wide as the cells, 3.5 mm, the pore round, *i.e.* strictly terminal. *Disk* glabrous. *Style* rather slender, \pm as long as the corolla, glabrous. *Fruit* globose, *c.* 6 mm ϕ , dark red when ripe, pedicel up to 1.5 cm. *Seeds* fusiform, minutely rugose, blackish, 1 mm.

Distr. *Malesia*: Philippines (Luzon).

Ecol. In damp shaded ravines and in mossy forest, also in pine-oak association, reported to be tree-like on cliffs, 1300–2600 m, locally not rare. *Fl. fr.* Jan.–Dec.

Vern. *Dusóng, loso, lusong, Ig.*

2. *var. hutchinsonii* (MERR.) COPEL. *f. Philip. J. Sc.* 42 (1930) 558; SLEUM. *Blumea* 11 (1961) 49. — *V. hutchinsonii* MERR. *Philip. J. Sc.* 2 (1907) Bot. 294; *En. Philip.* 3 (1923) 249.

Leaves broadly elliptic-ovate, 8–11 by 5.5–7 cm, 9–11-plinerved; petiole 1–1.5 cm. *Racemes* 8–14

cm; rachis and pedicels quite glabrous, bract up to 2 by 0.5 cm. *Corolla* 1.4–1.7 cm; filaments 6–7 mm. *Disk* puberulous.

Distr. *Malesia*: Philippines (Mindoro: Mt Halcon), epiphytic in mossy ridge forest, 1600–2000 m. *Fl.* Nov.

3. *var. cagayanense* COPEL. *f. Philip. J. Sc.* 42 (1930) 557; SLEUM. *Blumea* 11 (1961) 49.

Differs from *var. barandanum* by a pubescent calyx and disk. Sometimes a short puberulence is found between the glands on the corolla. *Leaves* ovate-lanceolate.

Distr. *Malesia*: Philippines (Luzon).

101. *Vaccinium scortechinii* K. & G. *J. As. Soc. Beng.* 74, ii (1905) 62; RIDL. *J. Fed. Mal. St. Mus.* 4 (1909) 41; *ibid.* 6 (1915) 156; *Fl. Mal. Pen.* 2 (1923) 207; HENDERS. *Mal. Nat. J.* 6 (1950) 259, f. 243; SLEUM. *Blumea* 11 (1961) 49.

Shrub or sometimes a small tree. Branchlets slender, tips angled and puberulous. *Leaves* dense, elliptic or obovate-elliptic, rarely suborbicular, apex \pm rounded, with an obscure terminal gland underneath, base broadly attenuate, the pair of basal glands small, dark, close to the petiole, coriaceous, stiff, glabrous, laxly punctate beneath, edge \pm recurved, entire, 0.8–1.5 by (0.4–)0.5–0.8 (–1) cm, midrib depressed above, raised beneath, nerves 1–2 basal or slightly suprabasal pairs, curved-ascending and faintly visible, reticulation subinconspicuous beneath; flush and old leaves reddish; petiole *c.* 1 mm. *Racemes* 1(–2) from the uppermost axil, seemingly terminal, erect, many-flowered, 2–4 cm; rachis angular, pubescent. Pedicels 0.5–1 mm, up to 2 mm in fruit, pubescent, bract similar to the leaves, but generally only about half as large and often rather narrow, \pm persistent, up to 0.8 by 0.5 cm; bracteoles subulate, up to 3 times as long as the pedicel, finally caducous. *Calyx* pubescent, tube cup-shaped, 1.5 mm, limb 5-lobed to the base, lobes ovate-deltoid, erect, subacute, 1 mm. *Corolla* subcylindric, inflated below, tapering to the mouth, somewhat 5-angular, 5 by 2 mm, white or rose-pink, densely grey-pubescent at both sides, lobes suberect, *c.* 1 mm. *Filaments* subulate-linear, 2 mm, densely short-hairy up to the connective; anther-cells oblong, *c.* 1.3 mm, with 2 distinct dorsal spurs; tubules nearly half as wide as the cells, cylindric, 0.6–0.7 mm, the pore oblique. *Disk* slightly pubescent. *Style* glabrous, or pubescent below, 4 mm. *Fruit* globular, crowned by the inflexed calyx lobes, \pm densely pubescent, *c.* 5 mm ϕ .

Distr. *Malesia*: Malay Peninsula (Main Range: between Mt Kerbau and Mt Batu Puteh, and on Mt Tahan).

Ecol. In open forest or summit vegetation, on top of rocks, (915–)1900–2275 m. *Fl. fr.* Jan.–Dec.

102. *Vaccinium agusanense* ELM. *Leaf. Philip. Bot.* 7 (1915) 2630; MERR. *En. Philip.* 3 (1923) 247; COPEL. *f. Philip. J. Sc.* 42 (1930) 551, t. 1, f. 3–5; SLEUM. *Blumea* 11 (1961) 49.

Epiphytic or terrestrial shrub, up to 4 m.

Branchlets angular, glabrous. *Leaves* scattered, lanceolate to ovate-lanceolate or -oblong, apex subcaudate-acuminate and \pm falcate (acumen 1–2 cm), the very tip subacute, base broadly attenuate or rounded and somewhat decurrent into the petiole, basal pair of glands minute as are the few other remote glands impressed along the edge on each side, entire, \pm coriaceous, glabrous, (6–)7–10 by 3–4(–4.5) cm, margin very slightly revolute, 5-plinerved from and from above the base, midrib and nerves slightly sunken above, prominent beneath, reticulation subdense and finely, though well visibly raised on both faces; petiole 5–8(–10) by 1–1.5 mm. *Racemes* from the upper axils, somewhat pendulous, puberulent in all external parts, many-flowered; rachis angular, rather slender, 5–7(–10) cm. Pedicels slender, c. 1 cm, recurved, bract foliaceous, rather fugacious during anthesis, absent in fruit. *Calyx* tube depressedly cup-shaped, nearly rim-like, c. 1 by 2.5–3 mm, limb low, spreading, lobes broad-deltoid, obtuse, ciliate, 1 mm. *Corolla* broad-urceolate, cream or pink, 5 by 2.5–3 mm, puberulous outside, said to be pubescent inside, lobes obtuse, reflexed, 0.8 mm. *Filaments* subulate, densely long-hairy, 2.5 mm; anther-cells broad-oblong, granular, 1 mm, with 2 dorsal erect spurs, (0.7 mm); tubules cylindrical, slender, c. 0.8 mm, obliquely cut apically, the pore oval. *Disk* bulky, much raised above the calyx lobes, glabrous. *Style* glabrous, 3 mm. *Fruit* subglobose, apex truncate, c. 5 mm \varnothing .

Distr. *Malesia*: Philippines (Mindanao).

Ecol. In semi-open mountain forest, or in mossy forest, 1100–1800 m. *Fr.* Febr., Sept.

Vern. *Dulingagan*, Mbo.

Note. The above given description of the bracts and flowers is based on the original diagnosis and on COPELAND *f.* comments, as in the specimens at hand with rather developed inflorescences no flowers have been found.

103. *Vaccinium philippinense* WARB. in Perk. *Fragm. Fl. Philip.* (1905) 174; MERR. *Philip. J. Sc.* 3 (1908) Bot. 377; En. *Philip.* 3 (1923) 251; COPEL. *f. Philip. J. Sc.* 42 (1930) 550, t. 1, f. 1–2; SLEUM. *Blumea* 11 (1961) 49.

Terrestrial shrub, 2–5 m. Branchlets glabrous, striate, early covered with cork. *Leaves* lax, elliptic to ovate-elliptic, apex obliquely and \pm caudately acuminate (1–2 cm), the very tip subacute, base broadly attenuate or cuneate and a little decurrent into the petiole, coriaceous, glabrous, shining above, the pair of basal marginal glands minute, edge slightly revolute and provided with a few impressed glands similar to the basal ones on each side, practically entire, 5-plinerved from and from above the base, midrib slightly impressed above, prominent beneath, additional nerves coming from the upper part of the midrib few, all nerves initially raised a little on both faces, finally faintly sunken in fully mature leaves, reticulation rather dense, slightly but well visibly elevated on both sides, 5–8(–10) by (2.5–)3–5 cm; petiole grooved above, 5–7(–10) mm. *Racemes*

from the upper 1–3 axils, erect, sparsely puberulent except calyx and corolla; rachis rather robust, (6–)8–12 cm. Pedicels curved, stoutish, 6–10(–12) mm, bract leafy, thin, lanceolate, acute, 1–1.5 by 0.3–0.8 cm, subpersistent; bracteoles subulate, basal, 2 mm, early caducous. *Calyx* glabrous, tube low, broadly cup-shaped, 2 by 3 mm, limb spreading \pm , lobes ovate-deltoid, subacute, ciliolate, 0.8 mm, no apical glands. *Corolla* broadly urceolate, 5–6 by 4–4.5 mm, quite glabrous outside, densely hairy inside, lobes obtuse, reflexed, 1 mm. *Filaments* subulate, almost villous to the top, 2 mm; anther-cells broad-oblong, granular, c. 1.5 mm, with 2 dorsal spurs, curved upwards, almost 1 mm; tubules cylindrical, slender, 1 mm, apex transversely cut, the pore round. *Disk* bulky, glabrous. *Style* slender, glabrous, 5 mm. *Fruit* subglobose, glabrous, c. 5 mm \varnothing , blackish when ripe, pedicel c. 1.5 cm.

Distr. *Malesia*: Philippines (Luzon).

Ecol. On forested slopes and ridges, 800–1200 m. *Fl. fr.* April–Dec.

Vern. *Tengé*.

104. *Vaccinium dubiosum* J. J. S. Bot. Jahrb. 68 (1937) 214; SLEUM. *Blumea* 11 (1961) 50.

Small tree, 7–15 m, trunk up to 40 cm \varnothing breast height. Branchlets angular, puberulous. *Leaves* lax, elliptic, or subovate- or elliptic-lanceolate, apex shortly or mostly subcaudately acuminate, tip blunt, base attenuate into the petiole, provided with a few minute impressed marginal glands in the lower half, glabrous except the midrib, which is puberulent above, and the scattered glandular-muriculate hairs or points underneath, subcoriaceous, \pm shining, entire, the very edge slightly revolute towards the base of the lamina, (3.5–)4–6 by (1.3–)1.5–2.3 cm, midrib narrowly sunken above, rather prominent beneath, nerves c. 2 basal, steeply ascending, and 2–3 upper, shorter, more spreading pairs, all anastomosing and but slightly or hardly raised above, more distinctly so beneath, reticulation dense, raised on both faces or beneath only; petiole \pm flattened, puberulous initially, 2–3 by c. 1 mm. *Racemes* from the upper 2–5 axils, subdensely 8–15-flowered; rachis rather slender, puberulous, 2–3(–3.5) cm, eperulate in anthesis. Pedicels rather slender, puberulous, 3–4 (–5) mm, bract foliaceous, firm, oblong, sub-acuminate, up to 1.5 by 0.4 cm, persistent at least in part into the fruiting time; bracteoles not seen. *Calyx* tube cup-shaped, short-pubescent and sparsely clavate-glandular, 1.5 mm, limb erect, 0.7 mm, 5-lobed to almost the base, lobes triangular, subacute, subglabrous dorsally, ciliate, no proper apical gland. *Corolla* cylindrical-urceolate, membranous, red, glabrous outside, subdensely pubescent in the lower part inside, c. 4 by 2.5 mm, lobes reflexed, 0.5 mm. *Filaments* subulate, glabrous at the very base, subvillous above, again glabrous in the upper third, c. 1.5 mm; anther-cells oblong, 0.5 mm, shortly 2-spurred dorsally; tubules cylindrical, almost as wide as the cells below, slightly widened upwards, transversely cut, pore a little flaring. *Disk* rather prominent, pubescent.

Style slender, quite glabrous, *c.* 4 mm. Submature fruit subglobose, *c.* 3.5 mm ϕ , with small appressed calyx lobes, on slender fruit pedicel 6–8 mm; mature fruit black.

Distr. *Malesia*: Central Celebes, twice found.

Ecol. In rain-forest, on limestone, 800–1200 m, locally abundant. *Fl.* March, July.

Vern. *Buli*, Malili: Torongkong.

Note. The flowers in the original material are anomalous (probably due to thrips). The above given description of the inflorescence is based on flowering and fruiting material from Porehu, Subdiv. Malili, 1200 m.

105. *Vaccinium grandibracteatum* SCHLTR., Bot. Jahrb. 55 (1918) 180; SLEUM. *ibid.* 72 (1942) 267; Blumea 11 (1961) 50.

Shrub. Branchlets glabrous. *Leaves* lax, obovate-elliptic, apex blunt, base long-cuneate, coriaceous, glabrous, edge recurved, 8–11 by (2.5–)3–4 cm. *Racemes* up to 10 cm, erecto-patent, glabrous, laxly 15–20-flowered. Pedicels slender, curved, 3 mm, subtending bract oblong-lanceolate, acute, *c.* 1 cm long, rather long persistent. *Calyx* cup-shaped, *c.* 2.5 mm, lobes triangular, acute. *Corolla* narrowly-urceolate, ventricose below, white, glabrous outside, puberulous towards the base inside, 8–10 by 3 mm, lobes ovate, bluntish, *c.* 1 mm. *Filaments* subulate, puberulous, *c.* 1.5 mm; anther-cells oblong, 1.5 mm including the tubules, the latter narrower than the cells, obliquely cut distally, the posticous wall of each tubule bicuspidate, the pore oblong. *Disk* glabrous. *Style* as long as the corolla.

Distr. *Malesia*: New Guinea (upper course of the Sepik R.), twice found. *Fl.* Oct.

Note. The above given description is a translation of the original diagnosis, as the type material is lost and the species has not yet been recollected.

106. *Vaccinium dominans* SLEUM. Bot. Jahrb. 72 (1942) 268; Blumea 11 (1961) 50.

Erect shrub, 2–4 m, or treelet up to 10 m, with erect branches. Branchlets densely to subdensely leaved in the upper part or towards the tips, minutely pubescent initially, subterete, glabrescent. *Leaves* on thick leaf-cushions, subovate-oblong or elliptic, more rarely elliptic-oblong, subcoriaceous to rather coriaceous, apex broadly attenuate and obtuse or almost rounded, base rounded-truncate, the 2 basal glands distinct, impressed at the margin, in 1–1.5 mm distance from the petiole, glabrous, shining above, \pm convex, entire, edge slightly revolute, (1–)1.2–1.7 by (0.5–)0.6–0.8 cm, midrib slightly sunken above and raised beneath, nerves 2(–3) pairs from and a little from above the base, high curved-ascending to the leaf-apex, indistinct above, often well visible beneath, as is the reticulation; petiole 1–1.5 mm. *Racemes* dense, erect, many-flowered, from the upper axils, flowers nodding to one side; rachis angular, stoutish, patent-puberulous, 3–4 cm. Pedicels robust, curved, puberulous, 3–4 mm, bract foliaceous, similar in shape to the leaves though smaller, up to 0.8 by 0.5 cm, persistent for a while, caducous

towards the end of the anthesis; bracteoles subulate, minute, early caducous. *Calyx* tube sub-cylindric-campanulate, puberulous, 2.5 by 2.5 mm, limb erect, deeply 5-lobed, \pm glabrescent, lobes ovate-deltoid, obtuse, ciliate, *c.* 1.5 mm. *Corolla* suburceolate-cylindric, fleshy, colour variable, glaucous-pink at first, red, purplish, bluish, dark greenish violet or yellowish green with red lobes in later stages, glabrous at both sides, papillose at the lobes inside, 6–7 by 3–4 mm, lobes obtuse, reflexed, 1 mm. *Filaments* almost linear, a little narrowed and glabrous at both ends, dilated and densely white-hairy between, 2–2.5 mm; anther-cells oblong, 1–1.3 mm, base obtuse; tubules cylindric, a little narrower than the cells, *c.* 1.3 mm, obliquely cut apically, the posticous wall of each tubule ending with 2 sharp irregular teeth. *Disk* glabrous. *Style* glabrous, *c.* 6 mm. *Fruit* subglobose, nearly blackish when ripe, *c.* 4 mm ϕ .

Distr. *Malesia*: New Guinea (Mt. Wilhelmina-Lake Habbema area).

Ecol. In the upper subalpine forest, in mossy thickets of ridges, in forest patches of moist hollows or in timber clumps in grassland, often locally dominant, 3225–3800 m. *Fl.* fr. Aug.–Sept.

107. *Vaccinium montis-ericae* SLEUM. Bot. Jahrb. 72 (1942) 267; Blumea 11 (1961) 50.

Shrub, up to 4 m. Branchlets subangular, laxly set with very short stalked glands. *Leaves* subobovate-oblong or -elliptic, apex broadly attenuate or subacuminate, obtuse, base cuneate and somewhat decurrent into the petiole, the pair of basal glands at the end of the petiole, thick and \pm prominent, coriaceous, firm, lustrous above, glabrous, laxly glandular-punctate beneath, 4.5–5.5 by 2–3 cm, margin much revolute, entire, 5-plinerved from and a little from above the base, with 1–2 pairs of upper nerves from the midrib which is slightly sunken above and obtusely prominent beneath, nerves somewhat raised and distinct on both faces, reticulation dense, finely prominent on each side; petiole flattened, stout, 3–4 by 1.5 mm. *Racemes* subterminal, erect, many-flowered; rachis acutangular, laxly set with minute gland-tipped hairs, 8–10 cm. Pedicels rigid, 5–7 mm, bract foliaceous, oblong, subacute, laxly clad with gland-tipped hairs beneath, up to 1 by 0.5 cm; bracteoles very early caducous. *Calyx* broadly campanulate, tube 1 mm, minutely \pm densely muriculate, limb spreading, deeply 5-lobed, lobes deltoid, subacute, ciliate or even almost bearded apically, *c.* 1.5 mm. *Corolla* subovate-urceolate (not known in fully mature state), attenuate distally in bud, fleshy, light red, quite glabrous, at least 6 by 3 mm (probably longer in full-grown state). *Filaments* linear-subulate, densely long-hairy, 2 mm; anther-cells oblong, 0.8 mm; tubules cylindric, narrower than the cells, *c.* 0.6 mm, very obliquely cut distally, the posticous wall of each tubule biaristate. *Disk* glabrous. *Style* glabrous, as long as the corolla.

Distr. *Malesia*: West New Guinea (Ericatop, Wichmann Mts), in heath vegetation, 1520 m. Once found. *Fl.* Dec.

108. *Vaccinium platyphyllum* MERR. Philip. J. Sc. 12 (1917) Bot. 294; En. Philip. 3 (1923) 251; COPEL. f. Philip. J. Sc. 42 (1930) 573, t. 5, f. 1-2; SLEUM. Blumea 11 (1961) 50. — *V. ilocanum* MERR. Philip. J. Sc. 14 (1919) 441; En. Philip. 3 (1923) 294. — *V. rizalense* MERR. Philip. J. Sc. 27 (1925) 43.

Shrub or small tree, glabrous except the sparingly pubescent inflorescences. Branchlets reddish brown, stout, subangular. *Leaves* scattered, elliptic or oblong-elliptic, or sometimes subovate, apex subabrupt, shortly (0.5–1.5 cm) and bluntly acuminate, base \pm broadly attenuate and decurrent into the flattened petiole, the 2 basal marginal glands distinct and in some distance from the petiole, coriaceous, stiff, (6–)7–11(–14) by (3–)3.5–5(–7) cm, entire, recurved at the very edge, brownish blackish punctate beneath, midrib broadened and a little sunken in the lower part above, obtusely raised beneath, 5(–7)-plinerved from and from above the base, with additional upper and shorter nerves \pm spreading from the midrib, all nerves equally slightly prominent on both faces, reticulation lax, visibly raised beneath only; petiole 5–8(–10) by 2–3 mm, grooved above. *Racemes* from the upper axils, many-flowered, shortly patent-pubescent on rachis, pedicels and disk, more densely so on calyx and filaments; rachis firm, 4–6(–8) cm. Pedicels robust, (3–)5–7 mm, bract oblong-lanceolate, subsistent, usually acute, up to 8 by 5 mm; bracteoles ovate-acuminate, 2 mm, very early caducous. *Calyx* tube

very short, lobes triangular, acute, 1–1.5 mm. *Corolla* oblong-ovoid or ovoid-urceolate, red or purple, rather fleshy, glabrous or laxly appressedly glandular-muriculate and pubescent outside, longer and more densely hairy in the lower half inside, 5(–6) by 3–3.5 mm in the lower, c. 1.5 mm σ in the upper third, lobes broadly ovate, recurved, hardly 1 mm. *Filaments* subulate, densely long hairy, 1.5–2 mm; anther-cells oblong, not spurred, 1–1.3 mm; tubules slightly narrower than the cells, c. 0.5 mm, obliquely cut apically, the backwall of each tubule forming an upright tooth. *Style* stout, glabrous, 3–4 mm.

Distr. *Malesia*: Philippines (Luzon).

Ecol. Whether or not epiphytic in primary forest at medium altitude or in moss forest, 200–1100 m. *Fl.* June–Aug.

Vern. *Dusóng-ilóko*, *dusóng-lapáran*.

109. *Vaccinium miquelii* BOERL. in Veth, Midden-Sumatra 4, 2 (1884) 22; RIDL. J. Fed. Mal. St. Mus. 8 (1917) 56; JACOBS, Reinwardtia 3 (1958) 68; SLEUM. Blumea 11 (1961) 50. — *V. myrtooides* var. β , MIQ. Ann. Mus. Bot. Lugd.-Bat. 1 (1863) 38. — *V. forbesii* FAWC. in Forbes, Wand. (1885) 278, fig., non HOOK. 1841. — *V. dempoense* FAWC. J. Bot. 23 (1885) 254; SP. MOORE, *ibid.* 63 (1925) Suppl. 57; FREY-WYSSLING, Trop. Natuur 22 (1933) 7, f. 6. — Fig. 96.

var. *miquelii*.

Large shrub or tree up to 6 m, though often



Fig. 96. *Vaccinium miquelii* BOERL. Mt Kerintji, 3100 m, Sumatra (JACOBS 4401) (JACOBS, 1956).

stunted according to altitudes; trunk up to 40 cm σ . Branchlets relatively short and robust, subangular, densely clothed with short, spreading, hirsute hairs, densely to subimbricately leaved, defoliate parts remarkable by their dense leaf-cushion scars. *Leaves* elliptic-oblong in general, apex shortly attenuate or subacuminate, bluntish, base \pm rounded, the 2 basal marginal glands distinctly impressed in the lower third of the lamina, always distant from the petiole (red when young, dark green at full age when fresh), coriaceous, glabrous, laxly brownish punctate beneath, entire or practically so, edge slightly revolute, 1-1.5(-2) by (0.4-)0.5-0.8 cm, midrib sunken above, prominent beneath, nerves 2-3(-4) pairs which are oriented from and from somewhat above the base, steeply ascending and anastomosing, \pm obscure above, a little raised beneath, reticulation rather faint beneath; petiole flattened, 0.5-1 mm. *Racemes* from the upper 3-5 axils or subterminal, densely 10-20-flowered, the flowers \pm nodding to one side, scented; rachis stoutish, angular, 2-5 (-10) cm, densely patently hirsutulous to subtomentose as are pedicels and calyces. Pedicels robust, 1-2 mm in anthesis, bract foliaceous, subcoriaceous and persistent for a long time, up to 1 by 0.5 cm. *Calyx* tube obconical, 1.5-2 mm, limb erecto-patent, 5-lobed almost to the base, lobes ovate-deltoid, obtuse, 1.5-2 mm, more densely hairy at margin and apex. *Corolla* urceolate, rather fleshy, bright scarlet, red or pink, glabrous at full anthesis outside, laxly hairy inside, 5-6(-7) by 2.5-3 mm, lobes subpatent or recurved, often paler than the corolla tube or even whitish, 1 mm. *Stamens* 8 or 10, alternately subequal; filaments subulate, villous to nearly the top, 2-2.5 mm; cells broad-oblong, granular, base mostly with a distinct thickened knob or apiculus, 0.8-1.2 mm, not or rarely shortly spurred dorsally; tubules a little more slender than the cells, cylindrical, 0.3-0.6 mm, subobliquely or almost transversely cut apically. *Disk* subtomentose. *Style* robust, villous below, gradually less densely hairy upwards in the lower half, 4-5 mm. *Fruit* globular, pubescent, dark blue-blackish and juicy when fresh, 4-5 mm σ , crowned by the hairy disk, pedicel 2-3 mm.

Distr. Malesia: Sumatra.

Ecol. In summit vegetation, alpine scrub, on rocky or volcanic soil, 1700-3400 m (vegetation limit), common locally. *Fl.* Jan.-Dec.

Uses. The fruit is said to be edible.

Vern. Pandjang umur, Dempo, *bunga karang*, Kerintji.

Note. The form with shortly spurred anthers is known from Mt Merapi.

var. atjehense SLEUM. *Blumea* 11 (1961) 51.

Small shrub, sometimes dwarf and almost creeping. *Leaves* 0.7-1.2 by 0.4-0.6(-0.8) cm. *Corolla* narrow-urceolate, 4(-5) by c. 2.5 mm, subdensely hairy outside, similarly so at the base, more laxly towards the opening inside. *Stamens* 10, alternately subequal; filaments 2-2.4 mm, densely hairy; cells 0.8-0.9 mm; tubules 0.2-0.3 mm,

obliquely cut apically. *Style* 3.5-4 mm, densely hairy below.

Distr. Malesia: Sumatra (Gajo Lands: Mt Losir and neighbouring mountains).

Ecol. In ericoid scrub forest on ridges, summits or top plateaus, locally common, 2250-3500 m. *Fl.* Jan.-Febr.

Vern. Kaju katjar, Gajo.

110. *Vaccinium korinchense* RIDL. *J. Fed. Mal. St. Mus.* 8 (1917) 56; SLEUM. *Blumea* 11 (1961) 51. — *V. eugenioides* SP. MOORE, *J. Bot.* 63 (1925) Suppl. 56. — *V. parvibaccatum* J. J. S. in Merr. *Contr. Arn. Arb.* 8 (1934) 128. — *V. dempoense* (non SP. MOORE) DE VOOGD, *Trop. Natuur* 23 (1934) 82, 83, in text. — Fig. 97.

var. korinchense. — Fig. 97.

Much branched shrub, 1-2.5(-5) m, rarely epiphytic, flush red. Branchlets rather slender, juvenile parts angular and mostly shortly patently hairy, glabrescent, rarely subglabrous from the beginning, laxly to subdensely leaved. *Leaves* elliptic to oblong, sometimes subovate-, rarely subobovate-oblong in the same specimen, apex gradually attenuate, obuse, rarely faintly retuse,

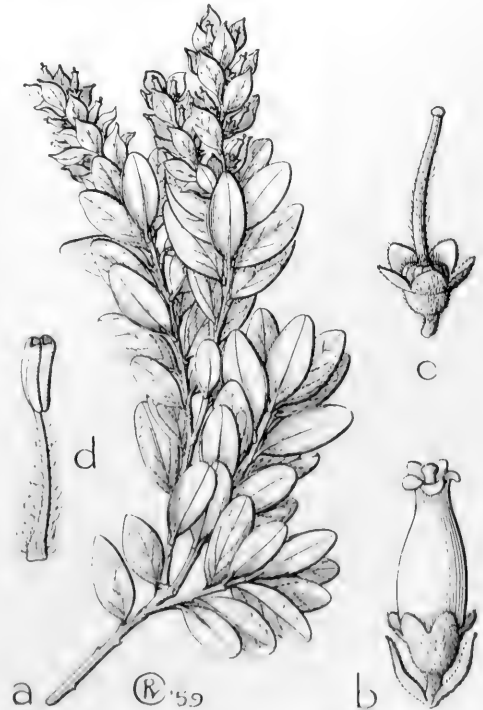


Fig. 97. *Vaccinium korinchense* RIDL. *var. korinchense.* a. Habit, $\times \frac{2}{3}$, b. flower, $\times 3\frac{1}{3}$, c. ovary and style, $\times 3\frac{1}{3}$, d. stamen, $\times 6$ (a-d ALSTON 14153).

base broadly attenuate or generally subtruncate-rounded, the pair of basal marginal glands small and in some distance from the petiole, thin-coriaceous, entire, edge \pm recurved, mostly \pm pubescent on both faces initially, early glabrescent except the basal part of the lamina, the petiole and the midrib beneath which remain patently hairy for a rather long time, finally glabrescent also there, sparsely punctate beneath, (1.2-)1.8-3.5(-4) by (0.8-)1-1.5 (-1.8, rarely up to 2) cm, midrib sunken above, prominent beneath, nerves 4-6(-7) pairs, the lowest 2 from and from above the base, the other higher from the midrib, all steeply ascending, obscurely anastomosing, slightly raised on both faces, reticulation dense, generally faintly raised beneath only; petiole (1-)2-3 by 1 mm. *Racemes* from the upper 1-3 axils, seemingly terminal, (2-)2.5-8 cm, many-flowered, in general \pm densely short-pubescent to hirsutulous in all outer parts, the corolla excepted. Pedicels, if any, robust, 0-2 mm, bract foliaceous, subsistent, much thinner, smaller and paler green than the normal leaves, elliptic to oblong, the upper ones more acuminate, up to 1(-1.5) by 0.5 cm; bracteoles narrowly ovate-acuminate to subulate, caducous, 2-3(-5) by 0.5 mm. *Calyx* tube obovate, 2-2.5 mm, limb spreading, 1.3-1.5 mm, 5-lobed to the base, lobes deltoid, acute or subacute, ciliate. *Corolla* elongate-urceolate, *i.e.* markedly narrowed upwards, fleshy, white or pale greenish cream with pink tips, or deep pink or even light red, glabrous outside, laxly hairy all over inside, (5-)6-8(-10) by (2-)3 mm, lobes obtuse, reflexed, 1 mm. *Filaments* subulate or subfiliform, densely hairy, (2.5-)3-4 mm; anther-cells broadly oblong, 0.9-1 mm, base obtuse, the basal apiculus obsolete, no spurs; tubules as wide as the cells, 0.3-0.4 mm, obliquely cut distally. *Disk* hairy. *Style* rather slender, generally appressed-hairy up to the middle, glabrous above, or sometimes glabrous all over, slightly exerted at full anthesis. *Fruit* globular, pubescent or finally glabrescent, dark purple when ripe, *c.* 4 mm σ , pedicel up to 3 mm.

Distr. *Malesia*: Sumatra.

Ecol. In mountain forest, in \pm open subalpine forest or other open places in summit vegetation, often abundant, not rarely on peaty soil, once found on stony mud flow of Mt Beriti (Bencoolen) on very dry soil, 1000-2600 m. *Fl.* Jan.-Dec.

Uses. The flowers are reported to be eaten for the nectar.

Vern. *Leo-leo*, Siborong, *kaju kotip-kotip*, *k. taloping*, Toba, *sawai ibao*, Lebong.

var. losirense SLEUM. *Blumea* 11 (1961) 51.

Leaves densely arranged, (0.8-)1-1.5 by (0.4-)0.5-0.6(-0.7) cm. *Calyx* glabrous or subglabrous. *Corolla* red, subovoid-cylindric or ampullaceous, \pm abruptly narrowed in the upper third, 6 by 2-2.5 mm (below). *Stamens* alternately 2.5 and 3 mm; filaments 2-2.5 mm; cells *c.* 0.5 mm; tubules 0.3 mm, obliquely cut apically. *Style* glabrous, 5 mm.

Distr. *Malesia*: N. Sumatra (Gajo Lands: Mt Losir).

Ecol. In mountain scrub, 2950-3500 m. *Fl.* Feb.

111. *Vaccinium myrtoides* (BL.) MIQ. *Fl. Ind. Bat.* 2 (1859) 1062; *Ann. Mus. Bot. Lugd.-Bat.* 1 (1863) 38; *KOORD.-SCHUM. Syst. Verz.* 3 (1914) 100; *J. J. S. Med. Rijksherb. n.* 30 (1916) 7, *incl. var. celebicum* *J. J. S. l.c.* 8; *MERR. Philip. J. Sc.* 12 (1917) Bot. 293; *BROWN, Min. Prod. Philip. For.* 2 (1921) 362, f. 77; *MERR. En. Philip.* 3 (1923) 250; *HEYNE, Nutt. Pl.* (1927) 1218 (*var. celebicum*); *COPEL. f. Philip. J. Sc.* 42 (1930) 596, t. 7, f. 1-2; *SLEUM. Blumea* 11 (1961) 51; *ibid.* 12 (1963) 127. — *Thibaudia myrtoides* BL. *Bijdr.* (1826) 861. — *Agapetes myrtoides* (BL.) G. DON, *Gen. Syst.* 3 (1834) 863 ('*myrtoidea*'); *DUNAL in DC. Prod.* 7 (1839) 555. — *V. microphyllum* (*non* REINW. *ex* BL.) F.-VILL. *Nov. App.* (1880) 121, *p.p.*; *KOORD. Minah.* (1898) 514. — *V. varingaefolium* [(*non* BL.) MIQ.] VIDAL, *Sinopsis Atl.* (1883) 30, t. 60, f. D. — *V. sp.*, VIDAL, *Phan. Cum. Philip.* (1885) 27, 123. — *V. villarii* VIDAL, *Rev. Pl. Vasc. Filip.* (1886) 166; *ROLFE, J. Bot.* 24 (1886) 348; *MERR. Philip. J. Sc.* 2 (1907) Bot. 294; *ibid.* 3 (1908) Bot. 374; *ibid.* 5 (1910) Bot. 372; *ELM. Leaf. Philip. Bot.* 3 (1911) 1092. — **Fig. 98.**

Shrub or small tree, 0.3-2 m. Branchlets slender, erect, shortly patently pubescent. *Leaves* \pm densely to subimbricately arranged, ovate to oblong-ovate or broad-elliptic, apex gradually attenuate or subacuminate, obtuse, base rounded or slightly cordate, with 1-2 minute, impressed, marginal glands in the lower third on each side, (sub) coriaceous, fugaciously puberulous when very young, glabrous at maturity, though remaining \pm puberulous and ciliate at the very base, the petiole and the very apex, sparsely glandular-punctate beneath, 1.3-2(-2.5) by (0.6-)0.7-1.3(-1.8) cm, entire, edge marginate, midrib slightly sunken at least in the lower part above, prominent beneath, nerves 4-5(-6) pairs (the lowest pair from the base), spreading, anastomosing, raised beneath only, reticulation subdense and mostly well recognizable beneath; petiole 1-1.5 by *c.* 0.8 mm. *Racemes* from the upper axils, laxly (4-)6-8(-12)-flowered; rachis angular, finely puberulous or mostly glabrous, (1-)1.5-4 cm. Pedicels nodding at anthesis, puberulous or mostly glabrous, 0.5-1(-1.4) cm, bract foliaceous, small and but partly persistent, up to 0.8 cm. *Calyx* tube cup-shaped, base \pm truncate, glabrous, *c.* 1.5 mm long and wide, lobes triangular, \pm acute, not rarely in part (1 or 2) minutely gland-apiculate, ciliolate, *c.* 1 mm. *Corolla* shortly cylindric-urceolate, red, pink or white to cream, glabrous at both sides, 4(-4.5) by *c.* 2.5 mm, lobes obtuse, recurved, *c.* 0.8 mm. *Filaments* linear, dilated below, curved, villous especially below, 1.5 mm; anther-cells broad-oblong, echinulate-papillose, 1-1.3 mm including the tubules, the latter as wide and almost half as long as the cells, obliquely cut at apex. *Disk* densely hairy. *Style* glabrous, *c.* 3 mm. *Fruit* globose, glabrous, finally bluish blackish, 4-5 mm σ .

Distr. *Malesia*: Philippines (Mindanao, Min-



Fig. 98. *Vaccinium myrtilloides* (BL.) MIQ. Mt Data, 2000 m, Luzon, Philippines (STEINER, VAN ROYEN & SLEUMER 2216) (SLEUMER, 1961)

doro, Luzon), N. Celebes (Minahasa), Moluccas (Peak of Tidore).

Ecol. On steep rocky, open and bare slopes, under pine trees in mossy forest undergrowth, summit vegetation, open grassland, on sandy or volcanic soil, locally (Benguet) abundant, 1000–3200 m. Fl. Jan.–Dec.

Uses. Berries edible, with excellent taste, making fine preserves and pies.

Vern. *Tente-in-talun*, Tt., Minahasa, *alimáni*, Ilk., *ayumani*, *panlina*, *tenge*, Bon., *dungal*, Bag., *gatmo*, *gutmo*, Ig.

112. *Vaccinium glandellatum* SLEUM. Blumea 11 (1961) 52.

Shrub up to 1.5 m. Branchlets slender, young parts glabrous and striate, older ones early blackish corticate. *Leaves* rather lax, subovate- or lanceolate-, sometimes oblong-elliptic, apex shortly (c. 1 cm) subcaudate-acuminate, somewhat curved, bluntish, base broadly attenuate into the petiole, the very base protracted for 2–4 mm and set with a gland on each side of the petiole, subcoriaceous, glabrous, undersurface much paler, laxly glandular-muriculate or -punctulate beneath, entire, (4–)4.5–5.5(–7) by (1.8–)2–3 cm, 7–9-plinerved from and a little from above the base, midrib

slightly impressed especially in its lower part above, obtusely prominent beneath, basal and suprabasal nerves steeply ascendent, excurrent along the edge or obscurely anastomosing, other upper nerves (or veins) few, pinnate and much shorter, all hardly prominent above, slightly raised beneath, reticulation rather dense, obscure above, somewhat raised beneath; petiole 4–6 by c. 1 mm, a little flattened, markedly grooved above. *Racemes* from the upper axils, erecto-patent, many-flowered to the base; rachis variously angular and striate, (4–)5–9 cm, c. 1 mm \varnothing at the base. Pedicels slender, 5–8 mm, bract subfoliaceous, membranous, narrow-elliptic, acutely attenuate at both ends, provided with a pair of basal marginal glands, 4–7(–10) by 1.5–2.5(–3) mm, persistent during the anthesis, subdensely glandular-muriculate as is the *calyx* tube; the latter broadly cup-shaped, base rounded, 1–1.2 mm, limb \pm spreading, 5-lobed to the base, lobes ovate-deltoid, obtuse, no apical gland, very laxly glandular-muriculate dorsally, ciliolate, 1–1.5 mm. *Corolla* ampullaceous, c. 1 cm by 4–5 mm \varnothing below, c. 2 mm \varnothing at the rather abruptly narrower upper part, membranous, pink at the tube, laxly minutely puberulous or more densely subappressedly glandular-muriculate outside, glabrous

inside, lobes obtuse, white to cream, reflexed, *c.* 1.5 mm. *Filaments* linear, dilated towards the base, densely short-hairy, *c.* 2 mm; anther-cells broad-oblong, no spurs, 1.3–1.5 mm including the tubules, the latter as wide as the cells, very short, obliquely cut distally, the large pore oval. *Disk* glabrous or puberulous. *Style* thickish, glabrous, 6–7 mm.

Distr. *Malesia*: Central New Guinea (Sibil R. valley), on poor, white, impervious clayey soil, rather common, at 1260 m. Twice found. *Fl.* May.

113. *Vaccinium paludicolum* SLEUM. *Blumea* 11 (1961) 53.

Terrestrial shrub. Branchlets slender, terete, densely subpatently hirsutulous both in the younger and older parts. *Leaves* dense, ovate, apex shortly attenuate or subacuminate, blunt, base rounded, the pair of basal marginal glands distinct and much distant from the petiole, coriaceous, glabrous, blackish punctulate beneath in dry specimens, entire, edge very shortly or not recurved, 0.6–1(–1.2) by (0.4)–0.5–0.8 cm, midrib slightly impressed above, very obtusely and minutely prominent beneath, nerves and veins subinconspicuous; petiole thickish, hirsutulous, *c.* 1 mm. *Racemes* from several of the upper axils, 5–10-flowered and secund; rachis rather stoutish, ± densely yellowish hirsutulous as are the pedicels, (1)–1.5–2(–3) cm. *Pedicels* 3 mm, bract foliaceous, thin, much smaller than the normal leaves, caducous after the anthesis. *Calyx* laxly to very laxly set with straight hairs, tube campanulate, 1.5 by 2 mm, limb spreading or reflexed, lobes deltoid, subacute, 0.5–0.8 mm, no apical gland. *Corolla* subampullaceous-cylindric, rather abruptly attenuate in the upper third, deep red, glabrous outside, laxly hairy inside, 7–8 by 2 mm below, or 1–1.3 mm distally, lobes suberect or ± reflexed, *c.* 0.5 mm. *Filaments* subulate, densely hairy, alternately 2 and 2.7 mm; anther-cells subquadrate, ecalcarate, *c.* 1 mm including the tubules, the latter very short, transversely cut apically, the pore large. *Disk* glabrous. *Style* slender, glabrous, almost 7 mm.

Distr. *Malesia*: Central Celebes.

Ecol. On peaty quartzite plateau, 1700–2000 m. *Fl.* Aug.–Nov.

114. *Vaccinium lucidum* (BL.) MIQ. *Fl. Ind. Bat.* 2 (1859) 1061; O. KTZE, *Rev. Gen. Pl.* 2 (1891) 385, *incl. f. terrestre* O. KTZE *et f. epiphyticum* O. KTZE, *l.c.*; KOORD.-SCHUM. *Syst. Verz.* 1 (1912) fam. 233, p. 110; KOORD. *Exk. Fl. Java* 3 (1912) 12; J. J. S. in K. & V. *Bijdr.* 13 (1914) 148; KOORD. *Fl. Tjib.* 3 (1918) fam. 233, p. 9; SP. MOORE, *J. Bot.* 63 (1925) *Suppl.* 55; HOCHR. *Candollea* 2 (1925) 499, *incl. var. typicum* HOCHR. *et var. micranthum* HOCHR. *l.c.* 500; J. J. S. in Fedde, *Rep.* 30 (1932) 177; MALM, in *ibid.* 34 (1934) 284; DOCTERS VAN LEEUWEN, *Pangrango* (1933) 209; J. J. S. *Bot. Jahrb.* 68 (1937) 211; AMSH. in Back. *Bekn. Fl. Java* (em. ed.) 7 (1948) fam. 163, p. 3; SLEUM. *Blumea* 11 (1961) 54. — *Glaphyria nitida* JACK, *Trans. Linn. Soc.* 14 (1823) 128, reimpr. *Calc. J.*

Nat. Hist. 4 (1843) 306; *cf.* STEEN. *Blumea* 12 (1963) 18, non *V. nitidum* ANDR. 1807. — *Thibaudia lucida* BL. *Bijdr.* (1826) 860; HASSK. *Cat. Hort. Bog.* (1844) 161. — *Agapetes lucida* (BL.) G. DON, *Gen. Syst.* 3 (1834) 863; DUNAL, in DC. *Prod.* 7 (1839) 555; MOR. *Syst. Verz.* (1846) 42; HASSK. *Pl. Jav. Rar.* (1848) 471; ZOLL. *Syst. Verz.* 2 (1854) 137. — *Agapetes microphylla* JUNGH. *Nat. Geneesk. Arch. N. I.* 2 (1845) 35; HASSK. *Flora* 5 (1847) 524; WALP. *Ann.* 1 (1848–49) 475. — *Epigynium lucidum* (BL.) KL. *Linnaea* 24 (1851) 52. — *V. rollinsoni* HOOK. *Bot. Mag.* (1851) t. 4612; WALP. *Ann.* 5 (1858) 440; MIQ. *Fl. Ind. Bat.* 2 (1859) 1062; *Ann. Mus. Bot. Lugd.-Bat.* 1 (1863) 37; HALL. *f. Med. Rijksherb. n.* 12 (1912) 29. — **Fig. 99.**



Fig. 99. *Vaccinium lucidum* (BL.) MIQ. Young epiphytic plant with swollen hypocotylar base, Java (drawing after photograph).

var. lucidum. **Fig. 99.**

Shrub, 0.5–6(–12) m, often epiphytic, much-branched; stem up to 8 cm ø. Branchlets slender, subtrigonal, grooved lengthwise, tips puberulous, pale green suffused with red when fresh, laxly to subdensely leaved. *Leaves* *Buxus*-like, obovate or sometimes oblong-elliptic, apex rounded to subacuminate, mostly obtuse, sometimes subretuse, rarely acutish, base cuneate, with 1 (rarely more) impressed marginal glands in some distance from the petiole on each side, thin-coriaceous, glabrous except the petiole and the midrib above, which

may be puberulent, laxly glandular-punctate beneath, reddish when very young, dark to almost blackish green and shining above, paler beneath at maturity, edge \pm recurved, entire, (1-)1.5-2.5 by 0.6-1.2 cm, midrib sunken above, prominent beneath, nerves 3-4 pairs, ascendent, a little raised or obsolete on both faces, reticulation dense, fine, sometimes rather inconspicuous; petiole flattened, pale green or reddish, 2-3 mm. *Racemes* from the upper axils or subterminal, 6-10-flowered, very shortly peduncled; rachis 1.3-3 cm, slender, angular, glabrous or puberulous to hirtellous, greenish suffused with red. Pedicels slender, glabrous or puberulous, 0.4-1 cm, bract foliaceous, oblong to lanceolate-ovate, generally caducous in the course of the anthesis, sometimes subpersistent, rarely early caducous, 5-9 by 2-5 mm. *Calyx* pale green, tube cup-shaped, somewhat constricted distally, 2 mm, lobes \pm spreading, triangular, acutish, ciliate, glabrous or sometimes puberulous, 1.5-2 by 1-1.5 mm, no apical gland. *Corolla* elongate-urceolate, gradually or not rarely subabruptly narrowed in the upper half, obtusely 5-angular, glabrous outside, long white-pubescent hairy especially towards the base inside, dark purple to vine red (occasionally white or pink), in general 8-9 mm long and 3-4.5 mm ϕ below, lobes suborbicular-ovate, c. 1 mm, recurved. *Filaments* subulate, hairy, white or pale rose, 2-2.5 mm; anther-cells broad-oblong, base obtuse, 1 mm, no spurs; tubules nearly as wide as the cells, short or very short, c. 0.5 mm, obliquely cut distally. *Disk* glabrous or mostly hirtellous, light green. *Style* slenderly columnar, glabrous or laxly hairy at and a little above the base, white, c. 7.5 mm, slightly exerted at full anthesis. *Fruit* globose, glabrous or laxly pubescent, dark blue or purple, about 5(-6) mm ϕ . *Seeds* few, compressed, c. 1.5 mm.

Distr. Malesia: Sumatra, Java, Lesser Sunda Is. (Bali, Lombok, W. Flores), Central and SW. Celebes.

Ecol. Mostly epiphyte in primary (also mossy) forest (and thus not gregarious as the predominantly terrestrial *V. varingiaefolium*, though sometimes difficult to distinguish from narrow-leaved forms of the latter), terrestrial in more open places as dry slopes or rocks, (500-)1500-2500 (-3150) m, locally common especially in Java. *Fl. Jan.-Dec.* (cf. SCHIMPER-FABER, *Pflanzengeogr.* 1935, 25, f. 5).

Pollination. DOCTERS VAN LEEUWEN has noticed repeatedly that the flowers were visited by *Bombus rufipes*.

Vern. Sauwagi kri, suwago létik, tjantigi, tj. areuj, tj. lentiek, S, manis redjo, mértigi, piijisan, pulasari, purwiot ajarito, srinitil, J, kajupanda, Bali, kadju té, Madur., kaju inei, M.

var. roseitinctum SLEUM. *Blumea* 11 (1961) 55. *Corolla* dark dull rose, all over subdensely pubescent.

Distr. Malesia: N. Sumatra (Gajo Lands; Mts Losir, Kemiri, Lembuh), in summit scrub, 1850-3300 m. *Fl. March.*

115. *Vaccinium varingiaefolium* (BL.) MIQ. *Fl. Ind. Bat.* 2 (1859) 1061; *Ann. Mus. Bot. Lugd.-Bat.* 1 (1863) 38, *excl. specim. borneense, incl. f. parvifolia et f. sublanceolata* MIQ. *l.c.*; *Bl. Fl. Jav. Pl. inéd.* (1863-83) t. 19; O. KTZE, *Rev. Gen. Pl.* 2 (1891) 385, *incl. var. angustifolium* O. KTZE *et var. erythrinum* (HOOK.) O. KTZE, *l.c.*; KOORD. Junguhn Gedenkb. (1910) 185; DOCTERS VAN LEEUWEN, *De Levende Natuur* 16 (1911) 106, fig.; KOORD. *Exk. Fl. Java* 3 (1912) 14, f. 3; HALL. *f. Med. Rijksherb. n.* 12 (1912) 29; KOORD.-SCHUM. *Syst. Verz.* 1 (1912) fam. 233, p. 112; J. J. S. in K. & V. Bijdr. 13 (1914) 152 (*'varingiaefolium'*); KOORD. *Fl. Tjib.* 3 (1918) fam. 233, p. 8; SP. MOORE, *J. Bot.* 63 (1925) Suppl. 56; HOCHR. *Candollea* 2 (1925) 497, *incl. var. typicum, var. racemosum et var. pilosiusculum* HOCHR. *l.c.*; HEYNE, *Nutt. Pl.* (1927) 1219; DOCTERS VAN LEEUWEN, *Pangrango* (1933) 209, t. 20; AMSH. in *Back. Bekn. Fl. Java* (em. ed.) 7 (1948) fam. 163, p. 3; SLEUM. *Blumea* 11 (1961) 55. — *Thibaudia varingiaefolia* BL. *Bijdr.* (1826) 860; HASSK. *Cat. Hort. Bog.* (1844) 161. — *Agapetes vulgaris* JUNGH. *Nat. Geneesk. Arch. N.I.* 2 (1845) 34; HASSK. *Flora* 5 (1847) 524; WALP. *Ann.* 1 (1848-49) 475; JUNGH. *Java ed.* 2 (1853) 578, 580. — *V. obversum* MIQ. *Ann. Mus. Bot. Lugd.-Bat.* 1 (1864) 220. — *Agapetes varingiaefolia* (BL.) G. DON, *Gen. Syst.* 3 (1834) 862; DUNAL, in *DC. Prod.* 7 (1839) 555; MOR. *Syst. Verz.* (1846) 42; ZOLL. *Syst. Verz.* 2 (1854) 137. — *V. erythrinum* HOOK. *Bot. Mag.* (1852) t. 4688; PLANCH. *Fl. Serres* II, 1 (1856) t. 1115; WALP. *Ann.* 5 (1858) 440; RIDL. *Fl. Mal. Pen.* 2 (1923) 211. — *Epigynium varingiaefolium* (BL.) KL. *Linnaea* 24 (1851) 52. — *V. ellipticum* MIQ. *Fl. Ind. Bat.* 2 (1859) 1060, *p.p.*, cf. MIQ. *Ann. Mus. Bot. Lugd.-Bat.* 1 (1863) 38, *nota*. — *Diplycosia erythrina* (HOOK.) K. & G. *J. As. Soc. Beng.* 74, ii (1905) 72; RIDL. *J. Fed. Mal. St. Mus.* 5 (1914) 39; *ibid.* 10 (1920) 146. — *V. schimperii* KOORD. *Exk. Fl. Java* 3 (1912) 15, *p.p.*; KOORD.-SCHUM. *Syst. Verz.* 1 (1912) fam. 233, p. 111. — *V. sp.*, KOORD. *Nat. Tijds. N. I.* 60 (1901) 264; *ibid.* 63 (1904) 41. — **Fig. 100-105.**

See for further synonyms under the varieties.

KEY TO THE VARIETIES

1. Anthers without dorsal spurs.
2. Leaves laxly to subdensely arranged, with 5-8 pairs of nerves, ovate to obovate or rhombic, rarely more lanceolate-elliptic, variable in shape and size, in general larger than 2 by 1 cm. Branchlets glabrous or pubescent.

1. *var. varingiaefolium*

2. Leaves densely to subimbricately arranged, \pm elliptic, with 3-4 pairs of nerves, the reticulation mostly more distinctly visible, 1-1.5(-2) by 0.5-1 cm. Branchlets \pm densely hairy to subtomentellous 3. *var. orientale*

1. Anthers distinctly 2-spurred dorsally

2. *var. calcaratum*



Fig. 100. *Vaccinium varingiaefolium* (BL.) MIQ. in old crater of Mt Kawi, E. Java (ARENS, 1916).

1. *var. varingiaefolium*.

Polymorphous, from dwarfed shrub (1-)3-5 m to tree usually up to 8 (occasionally up to 20) m, mostly with a crooked trunk (up to 0.5 m \emptyset), generally terrestrial (rarely epiphytic?), regularly branched; bark dark, with many cracks; crown dense. Branchlets \pm angular, grooved lengthwise, purplish, glabrous or pubescent. *Leaves* laxly to subdensely arranged, very variable in shape and

size, from ovate to oblong, elliptic-rhomboid to obovate, more rarely lanceolate, apex \pm acuminate to attenuate, obtuse or subacute, base subspathulate-attenuate or obtuse, rarely rounded, often \pm decurrent into the petiole, with a pair of impressed marginal glands in a short distance from the petiole, newly expanded ones a brilliant blood red or purple, mature ones \pm coriaceous, of a dark glossy green above, paler and dull

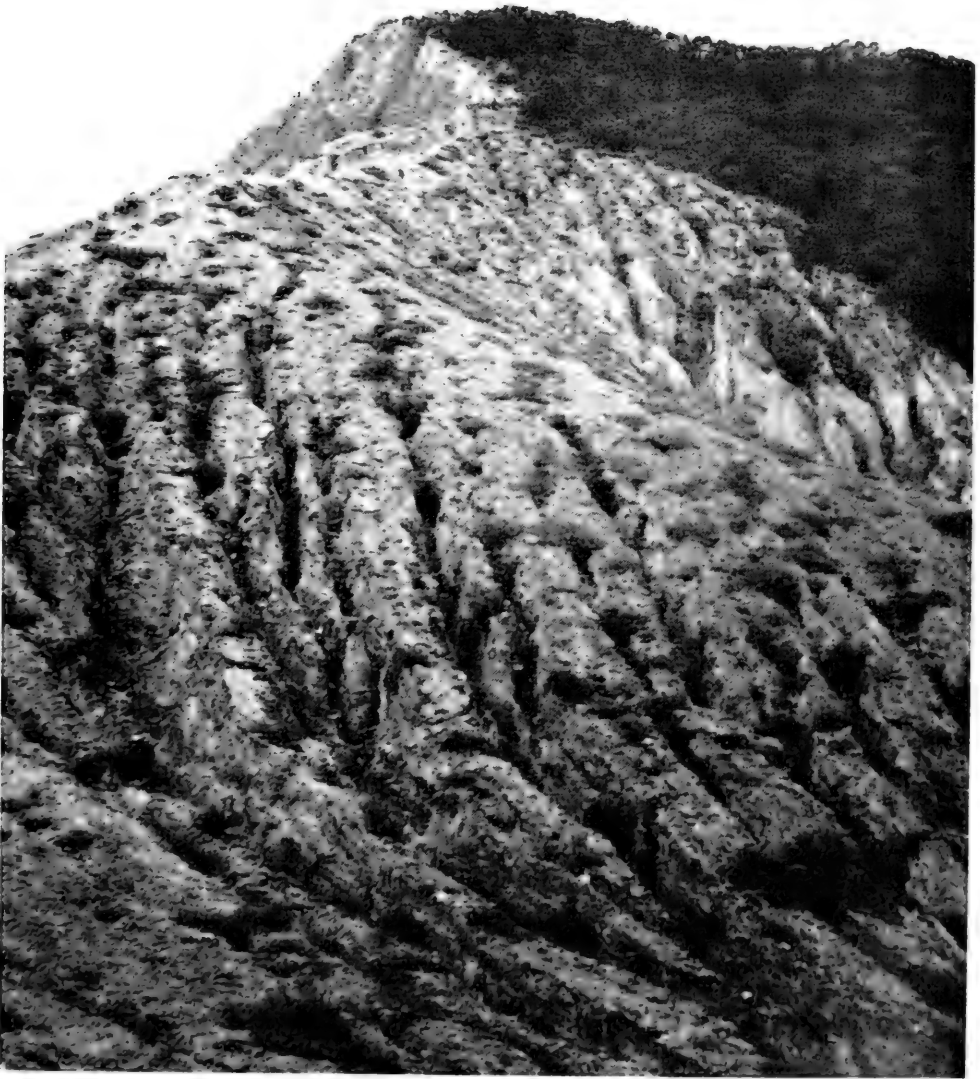


Fig. 101. *Vaccinium varingiaefolium* (BL.) Miq. as poor prostrate shrubs ('Spaliersträucher') near Kawah Idjen, E. Java, c. 2000 m. Exceedingly poor, eroded, very young volcanic soil. This species also grows in the mountain forest on the ridge behind as 3-6 m tall trees.

beneath, entire, sparsely glandular-punctate beneath, glabrous or practically so, (1.5-)2.5-6 by (0.5-)1-2.5 cm, midrib red, slightly sunken above or raised beneath, nerves (5-)6-8 spreading pairs, curved and \pm irregularly inarching before the edge, not much prominent on both faces or exclusively beneath, reticulation mostly rather

indistinct; petiole purplish, \pm flattened, glabrous or pubescent, 2-4 by 1-2 mm. *Racemes* axillary and subterminal, few- to many-flowered; rachis stout, angular, glabrous or pubescent, 3-8.5 cm. *Flowers* turned to one side, obliquely drooping, almond-scented. Pedicels robust, glabrous or pubescent, 5-9 mm at anthesis, bract foliaceous,

often similar and as large as the normal leaf, though decrescent upwards, not rarely persistent to the fruiting stage. *Calyx* glabrous or pubescent, tube green, cup-shaped, 1.5–2 mm, limb erectopate, lobes red, triangular, acute or more bluntish, ciliolate, 1.5–2 mm, no apical gland. *Corolla* urceolate-cylindric, slightly 5-angular, fleshy, white in the Malay Peninsula, cream to rose and dark blood red in Sumatra, uniformly deep red or purple in Java and Bali, not rarely with a glaucous-pruinose or waxy surface, always glabrous outside, pubescent inside, (7–)9–11 mm long, 3–4(–5, sometimes –7) mm ϕ below, 2.5–3.5 mm ϕ at the lobes, the latter spreading or slightly recurved, ovate-triangular, obtuse, c. 1.5 mm. *Filaments* white, linear-subulate, white-pubescent

to -villous especially below, c. 3(–4) mm; anther-cells oblong, base obtuse, no spurs or basal apiculus, c. 1 mm; tubules \pm as wide as the cells, up to 1 mm, obliquely cut distally. *Disk* pubescent, or rarely glabrous. *Style* whitish green, slenderly columnar, mostly glabrous, sometimes pubescent to various degree up to the lower $\frac{3}{4}$, 8–10 mm, slightly exerted in full anthesis, stigma a little broadened. *Fruit* globose, apex somewhat flattened and crowned by the inflexed calyx lobes and the conspicuous disk, dark purple to blackish blue, c. 8 mm ϕ , glabrous or pubescent, fleshy. *Seeds* compressedly trigonous-ovoid, testa minutely reticulate, c. 1.5 mm.

Distr. Malesia: Sumatra, Malay Peninsula, Java, Bali.



Fig. 102. *Vaccinium varingiaefolium* (BL.) MIQ. Oblique growth caused by sulphureous gases in the crater of Mt Papandajan, W. Java, c. 2000 m, c. 1 m high.

Ecol. *V. varingiaefollum* forms the main dominant in stands mixed with *Eurya*, *Symplocos*, etc. of the subalpine forest on all (or most) Javanese mountain tops, chiefly above 1800–2000 m, not rarely in form of a belt, growing as a tree in forest with rich humous as well as a shrub in open, extremely stony and rather dry places. It is a pioneer on ashy or volcanic soil of crater ridges, common in the vicinity of solfataras and hot mudwells, and in such localities it descends to 1400 m. It becomes a small and \pm prostrate shrub in high, wind-exposed bare slopes up to 3340 m, growing closely appressed to the ground. As a tree it is almost fire-proof; even when the whole trunk is charred, buds at the base of the stem may still sprout, thus holding its ground even in large numbers on mountains which are continually

subject to bush fires. *V. varingiaefolium* flowers all through the year, though mainly in April–May. Young shoots, also in April–May, are of a brilliant blood red, which contrasts beautifully with the older dark green foliage and is visible from far.

Liter. SEIFRIZ, Bull. Torr. Bot. Cl. 50 (1923) 300; DOCTERS VAN LEEUWEN, Trop. Natuur 16 (1927) 191; SCHRÖTER, Vierteljahresschr. Naturf. Ges. Zürich 73 (1928) Beibl. 15, p. 584, f. 7; DOCTERS VAN LEEUWEN, Tangkoeban Prahoe (Botany) Excursion-guide for the 4th Pac. Sc. Congr., Exc. B 4 (1929) 11; Bull. Jard. Bot. Btzg III, 11 (1930) 28–56, t. 5, 6, 9, 10; Pangrango (1933) 209, t. 20; SCHIMPER-FABER, Pflanzengeogr. (1935) 75, 286, 294, 553, f. 19, 55, 60, 172; STEEN. Trop. Natuur 24 (1935) 142, f. 2, 3 & 5 (phot.); Fl. Mal. I, 4 (1948) XXXIII, f. 21, 24.



Fig. 103. *Vaccinium varingiaefolium* (BL.) MIO. Subalpine brushwood on the crater rim of Mt Tjerimai, Central Java, c. 3000 m, half buried by volcanic ash; small red sprouts burst forth from twigs and branches, but forest will die (VAN STEENIS, 1940).

Pollination (after DOCTERS VAN LEEUWEN). The pollen is often already shed upon the stigma and on the bottom of the corolla before the opening of the flower. The stigma is enlarged as to fit precisely into the mouth of the corolla tube. After flowering the corolla falls away and during this process the anthers and the pollen on the inner side of the corolla can come in contact with the stigma. Self-pollination therefore may readily take place. The flowers are not regularly visited by insects. The nectar is sought by birds as *Oreosterops* in Java and *Zosterops* in Sumatra. All flowers produce fruits, as far as not attacked by caterpillars, which is often the case.

Uses. The berries are a little juicy and edible, and one of the principal sources of food for fruit-eating birds and rats in the mountains of Java. They are apparently not sought by the natives. The stem is used for charcoal. Young leaves are eaten; they have an agreeable, acid taste.

Vern. *Kaju rimbe rimbe*, Sumatra, Eastcoast, *balé katjè*, *beulenkentjen*, *suwagi*, *tjantigi bëtul*, *tj. gèdè*, *tj. wungu*, S, *manarasa*, *manis rëdja*, *mëntigi*, *njampo nangkan*, *patjar gunung*, *tëmigi*, J.

Notes. The change of the colour of the flowers from pure white in the Malay Peninsula through cream to rose and red in Sumatra to deep red and dark purple in Java lead me to suspect that the colour may be based on multiple alleles and that gradual elimination of these has occurred from the East to the West.

V. varingiaefolium is understood here in a broad sense, comprising both the glabrous form (which is predominant in W. Java, Sumatra and the Malay Peninsula) and the pubescent form (predominant in Central and Eastern Java), and the forms with more lanceolate leaves (Central and Eastern Java). The peculiar form with small elliptic leaves, limited to the eastern part of Java, is kept as *var. orientale*. The other *var. calcaratum*, only known from N. Sumatra, corresponds in all characters to the normal form except by the

presence of short spurs on the anthers; these are perhaps due to earlier local hybridisation with a species in N. Sumatra, which possesses such dorsal spurs.

Found as subfossil leaf-impressions in volcanic tuff deposits on Mt Papandajan, W. Java, cf. STEEN. Trop. Natuur 21 (1932) 191, f. 3 & 4.

2. *var. calcaratum* SLEUM. Blumea 11 (1961) 57.

Leaves \pm broadly attenuate or subacuminate, \pm obtuse at the apex. Corolla pink. Anthers long or more shortly 2-spurred dorsally; base of the cells often ending in an obtuse gland-like apiculus. Tubules often narrower than in *var. varingiaefolium*.

Distr. *Malesia*: Sumatra (Atjeh; Eastcoast).

Ecol. In ridge forest and summit scrub, 1850–3450 m.

3. *var. orientale* (HOCHR.) SLEUM. Blumea 11 (1961) 57. — *V. lucidum* (BL.) MIQ. *var. orientale* HOCHR. Candollea 2 (1925) 499. — *V. schimperii* KOORD. Exk. Fl. Java 3 (1912) 15, p.p., f. 4, repr.

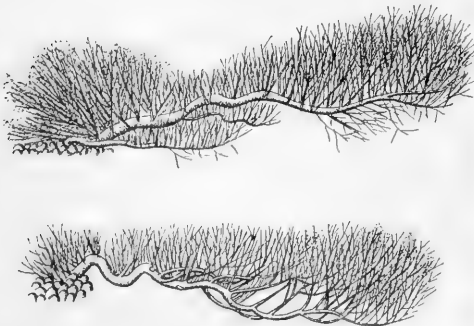


Fig. 104. Sketches of prostrate clipped habit of shrubs in the crater of Mt Papandajan, W. Java, c. 2000 m, through the combined action of wind and sulphureous vapours from solfatara. Above: *Vaccinium varingiaefolium* (BL.) MIQ., below: *Rhododendron retusum* (BL.) BENN. (drawn after photographs).

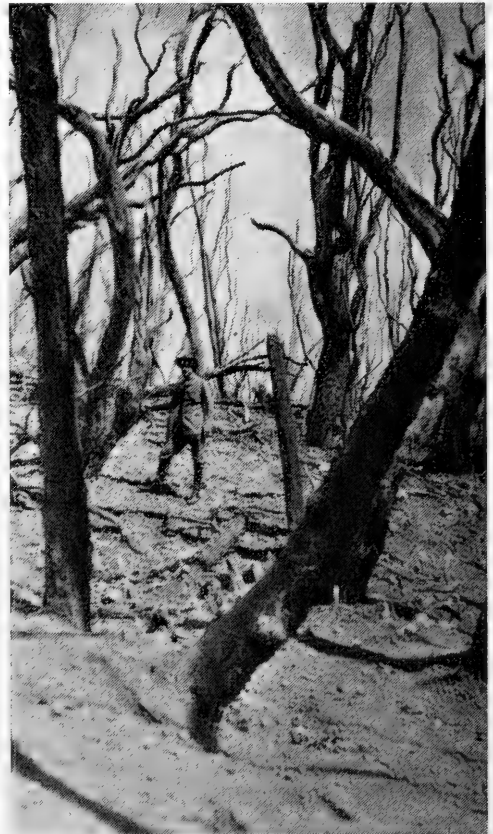


Fig. 105. Dead forest, mainly of *Vaccinium varingiaefolium* (BL.) MIQ. after Kawa Baru, a new vent of Mt Papandajan, W. Java, originated (F. C. VAN HEURN).

from SCHIMPER, *Pflanzengeogr.* (1898) 767, f. 426, sub *V. 'myrtiloides'*.

Leaves more densely (to subimbricately) arranged than in *var. varingiaefolium*, elliptic, 1-1.5(-2) by 0.5-1 cm, with 3-4 pairs of nerves, the reticulation more distinct beneath than in *var. varingiaefolium*. Branchlets and inflorescences \pm densely hairy to subtomentellous, the (glabrous) corolla excepted.

Distr. *Malesia*: E. Java (from Mt Smeru and Mt Ardjuno to the Idjen high-plateau).

Ecol. Forming a mass vegetation of low (up to 2 m), rather small-leaved dense shrubs on bare rocks, barren edges of solfatarae, generally at the upper limit of the vegetation, (1800-)2250-3090 m.

116. *Vaccinium latissimum* J. J. S. Bull. Jard. Bot. Btzg III, 1 (1920) 409, t. 56; SLEUM. *Blumea* 11 (1961) 66.

Shrub or small tree, 2-8(-15) m, glabrous in all parts. Branchlets obtusangular, 3-4 mm ϕ , reddish. *Leaves* scattered, suborbicular or broadly elliptic, sometimes almost obovate, apex very shortly obtusely apiculate-acuminate or mostly \pm rounded, base very broadly attenuate or rounded, sometimes in part in the same specimen subcordate, \pm coriaceous, though rather flexible, with 3 or 4 minute, marginal, remote, impressed glands on each side, entire, edge slightly revolute, very sparsely glandular-muriculate or -punctate on both faces, 9-13 by 5-10 cm, midrib as stout as the petiole below, gradually decreasing distally, flat or a little sunken above, much prominent beneath, nerves 6-7 pairs, the lowest 2 ones from the base, the other ones starting from the midrib at an angle of *c.* 45° in subequal distances, all rather straight and anastomosing, slightly raised above, markedly so beneath, reticulation lax, not much prominent on both faces, or often beneath only; petiole (2-)3-7 by 2-3 mm. *Racemes* mostly from the axils of lower (often fallen) leaves, or slightly supra-axillary, \pm patent, rather densely 8-15-flowered, perulae numerous, membranous, oblong to suborbicular, up to 10 by 5 mm, very early caducous; rachis robust, 0.5-1.5(-2) cm, with several early caducous imbricate basal bracts. Pedicels stoutish, a little curved, *c.* 1.5 cm at anthesis. *Calyx* tube broadly cup-shaped, 2 mm, limb expanded, *c.* 2 mm high, 5-7-lobed to *c.* 2/3, lobes broad-triangular, obtuse, with a broadened marginal gland on top. *Corolla* campanulate, fleshy, white or greenish yellowish white, sometimes reddish, 7-fid to 2/5 or in part a little more, *c.* 8 by 6-8 mm (at the limb), lobes subovate-triangular, obtuse, *c.* 3(-4) by 2 mm. *Stamens* 14, 6-7 mm long; filaments linear, a little wavy, *c.* 3 mm; cells oblong, echinulate, 2-2.5 mm, with 2 dorsal distal erect spurs (1 mm); tubules cylindrical, half as wide as the cells, *c.* 2 mm, obliquely cut distally. *Disk* prominent. *Style* slenderly columnar, *c.* 8 mm. *Fruit* subglobose, crowned by the thick disk, blackish, 5-6 mm ϕ in dry specimens, said to attain *c.* 1 cm ϕ at full maturity when fresh.

Distr. *Malesia*: Central Celebes.

Ecol. In primary and secondary forest, also principal overgrowing on open bare slopes or peat plateaus, 'blukar' and grass vegetation, on quartz, slate, granite or sandy soil, also reported as primary regenerator, locally common, often sterile, (600-)1000-1800 m. *Fl.* Febr.-July, *fr.* April-July.

Vern. *Podon-podon*, Toradja, *palla*, Toradja; Uluway, *lepong-lepong*, *podoh-podoh*, Toradja; Tai, *ohoo*, Rampisch.

117. *Vaccinium contractum* SLEUM. Bot. Jahrb. 71 (1940) 160; *Blumea* 11 (1961) 66.

Shrub, glabrous in all parts. Branchlets greyish. *Leaves* scattered, lanceolate-oblong, apex rather shortly (1.5-2 cm) subcaudate-acuminate, acute, base attenuate and decurrent for 1-2 mm on the petiole, with a small gland on each side at the very base of the lamina or almost on the petiole, and occasionally another marginal gland above at *c.* 8 mm distance from the petiole, \pm coriaceous, somewhat lustrous on both faces, laxly glandular-punctate or -muriculate beneath, 8-11 by 2.5-3.5 cm, entire, the very edge a little revolute, midrib faintly impressed or flat above, prominent beneath, nerves 2 distinct basal and 2-3 upper, less manifest pairs, all high-ascending and anastomosing, slightly prominent above, more distinctly so beneath as is the lax reticulation; petiole 7-8 by *c.* 1 mm. *Flowers* in much abbreviated racemes or almost in fascicles, these rather dense-flowered in the axils of the upper leaves; rachis up to 0.5 cm, subtended by several close, firm and subsistent perulae up to 8 by 4 mm. Pedicels robust, erect, a little winged, 6-10 mm; bracts and bracteoles not seen. *Calyx* tube *c.* 2.5 mm, subglobose-campanulate, limb 5-denticulate, lobes or teeth broadly triangular, each provided with a thick bluntish apical gland. *Corolla* tubular, *c.* 5 mm, rather fleshy, white, very deeply 5-lobed, lobes rather broad. *Filaments* linear, 1.6 mm; anther-cells elongate-oblong, alternately 1.2 and 1.4 mm, no dorsal spurs; tubules as wide as the cells, 0.7 and 1 mm, subobliquely truncate distally. *Disk* conspicuous, 5-gibbous. *Style* thickish, glabrous, \pm as long as the corolla.

Distr. *Malesia*: Central Celebes (Ponáa Mts), 1630 m, once found. *Fl.* Sept.

118. *Vaccinium warburgii* SLEUM. Bot. Jahrb. 71 (1940) 167; *Blumea* 11 (1961) 66.

Shrub or small tree, glabrous in all inner and outer parts. Branchlets subangular. *Leaves* lax, ovate to oblong-ovate, apex for 1-2 cm acuminate or subcaudate, acutish, base rounded to broadly attenuate, rather indistinctly biglandular at the base, subcoriaceous, laxly glandular-subsetulose or -muriculate beneath, entire, the very edge a little revolute, 5-7(-8) by 3-4.5 cm, midrib a little sunken above, well raised beneath, 5-7-plinerved, with some additional pairs of shorter nerves from the higher part of the midrib, all rather steeply curved-ascending and anastomosing, slightly prominent on both faces, reticulation rather lax above, more dense beneath, slightly

though conspicuously raised on both sides; petiole 4–6 by 1 mm. *Racemes* solitary from the upper axils, 4–6(–7) cm, \pm secund, laxly many-flowered; rachis subangular, slender, c. 1 mm ϕ at the base, which bears numerous ovate-acuminate perulae c. 5 mm. Pedicels slender, 4–7 mm; bracteoles not seen. *Calyx* tube subglobose, c. 1.5 mm, limb obsoletely 5-denticulate or wavy, surpassed by the annular glabrous disk. *Corolla* tubular-suburceolate, a little fleshy, white (?), c. 7 by 2 mm, 5-lobed to a little more than halfway, lobes rather broad. *Filaments* linear, 0.8–1 mm; anther-cells elongate, 1 mm, no spurs; tubules as wide as the cells, c. 0.8 mm, with a terminal sub-oblique large pore. *Style* thick-filiform, c. 2 mm. *Disk* glabrous. *Fruit* bluish blackish, subglobular, c. 3 mm ϕ (dry), slightly longitudinally 5-costulate, contracted at the limb; pedicel 1 cm.

Distr. *Malesia*: Central Celebes, twice found.

Ecol. In forest, 2200–3000 m, apparently rare. *Fl.* May.

119. *Vaccinium aucupis* SLEUM. Bot. Jahrb. 71 (1940) 160; *Blumea* 11 (1961) 66.

Shrub or low tree, glabrous in all parts. Branchlets obtusangular, youngest parts reddish when dry. *Leaves* scattered, ample, oblong or subovate-oblong, apex \pm abruptly and shortly (1–1.5 cm) acuminate and often \pm curved, tip bluntish, base broadly attenuate and a little decurrent into the petiole, no basal marginal glands visible, coriaceous, very laxly set with minute appressed glands or glandular hairs beneath, a little lustrous on both faces, entire, the very edge revolute, 11–16 by (4.5–)5–6.5 cm, midrib impressed above, much prominent beneath, nerves 1–2 basal, and 2–3 upper, similarly curved and high-ascending pairs, all slightly sunken above, conspicuously raised and \pm anastomosing beneath, other much shorter nerves or veins much less conspicuous as is the lax reticulation; petiole 7–10 by c. 2 mm. *Racemes* both from the upper and lower axils, 7–12-flowered; rachis angular, rather slender, 1.5–2 cm long, 1–1.5 mm ϕ at the base, which is provided with several small scarious perulae. Pedicels suberect, 0.7–1(–1.2) cm by 0.5 mm, the 2 basal bracteoles minute, subulate, early caducous. *Calyx* tube subsemiglobose to subcylindric, c. 1.7 mm, base \pm truncate, limb 5-denticulate, teeth 0.8 mm, ending in a small bluntish gland. *Corolla* cylindric, 5-lobed to nearly the base, somewhat fleshy, white (?), 4–5 mm. *Filaments* linear, 2 mm; anther-cells elongate-oblong, 1.5 mm, no spurs; tubules as wide as the cells, 1.2 mm, the apical pore suboblique. *Disk* rather bulky, 5-gibbous. *Style* robust, 4–5 mm. Submature *fruit* subglobose, crowned by the prominent disk, c. 3 mm ϕ .

Distr. *Malesia*: SE. Celebes (Mengkok Mts), twice found.

Ecol. In rain-forest, 1400–1500 m. *Fl.* Jan., *fr.* Oct.

120. *Vaccinium minuticalcaratum* J. J. S. Nova Guinea 12 (1914) 160, t. 46; SLEUM. Bot. Jahrb. 72 (1942) 254; KANEH. & HATUS. Bot. Mag. Tokyo

56 (1942) 481; SLEUM. *Blumea* 11 (1961) 67; *ibid.* 12 (1963) 128. — **Fig. 106.**

f. minuticalcaratum.

Shrub or shrub-like tree, (1–)3–8(–16) m, with \pm erect branches and greyish brown bark. Branchlets slightly angular, glabrous. *Leaves* rather lax, oblong- to subovate-elliptic or lanceolate, rarely ovate-elliptic, apex gradually longer or more shortly acuminate or subcaudate, tip subacute, base cuneate to shortly attenuate, rarely subrotundate, a little decurrent into the petiole and provided with a minute impressed gland on each side, coriaceous, \pm stiff, somewhat lustrous, glabrous except the laxly set and very short glandular hairs beneath, (3.8–)5–8(–9.5) by 1.7–3 (–3.3, rarely –5) cm, entire, margin but slightly or not revolute, 7–9-plinerved, main nerves ascending to the top of the lamina and \pm anastomosing, other shorter pinnate ones in 3–4 pairs from the upper part of the midrib more spreading, midrib, nerves and the rather dense reticulation faintly raised above, more conspicuously so beneath; petiole grooved above, 4–6 by 1–1.5 mm. *Racemes* from the upper 2–4 axils, 10–15-flowered, flowers nodding and \pm secund; rachis stoutish, angular, glabrous, 2–3 cm, basal bracts (or perulae) scarious, minute, very early caducous. Pedicels green, rather slender, glabrous, 5–7 mm in anthesis. *Calyx* greenish or cream, tube subsemiglobose, base truncate to rounded, puberulous, 2 by 3 mm, limb subpatent, 2 mm, 5-lobed to c. $\frac{2}{3}$, lobes triangular, with a mostly rather inconspicuous, sometimes hardly visible apical gland, ciliate, subglabrous dorsally. *Corolla* campanulate when fully expanded except the very shortly contracted base, 5-lobed \pm halfway (sometimes or in part lobed but for $\frac{1}{3}$), 7–8(–9) mm, glabrous outside, densely hairy at least in the lower half inside, fleshy, pale or bright red, pink or white, lobes paler, ovate-triangular, obtuse, subcarinate-obtusangular outside, laxly ciliate distally, 3.5–4 mm long, 4–4.5 mm ϕ at the base. *Filaments* linear, base dilated, curved, all over long-hairy, c. 3.5 mm; anther-cells yellow, elongate, base obtuse, 2.5 mm, whether or not with a pair of minute dorsal spurs; tubules much narrower than the cells, c. 1.5 mm, obliquely and irregularly cut or erose and \pm flaring distally, the back wall often ending in 2 irregular minute teeth. *Disk* prominent, glabrous. *Style* robust, whitish villous except the very apex, slightly exerted, 9–10 mm. Immature *fruit* green, subglobular, glabrous, c. 4 mm ϕ ; pedicel 8–15 mm.

Distr. *Malesia*: West New Guinea (Arfak Mts and Wissel Lakes area).

Ecol. In mossy forest, 1770–2000 m. *Fl.* April–May, *fr.* Oct.

Vern. *Korè*, Kapauku.

f. glabrum J. J. S. Nova Guinea 12 (1917) 527; SLEUM. Bot. Jahrb. 72 (1942) 254; *Blumea* 11 (1961) 67; *ibid.* 12 (1963) 128. — *V. minuticalcaratum* J. J. S. *f. latifolium* J. J. S. Nova Guinea 12 (1917) 528; SLEUM. Bot. Jahrb. 72 (1942) 254. — **Fig. 106.**

Calyx tube glabrous, otherwise as in *f. minuticalcaratum*.

Distr. *Malesia*: New Guinea (Arfak and Oranje Mts; Owen Stanley Ra.).

Ecol. In forest edge or undergrowth, occasionally plentiful, (1350-)2350-3225 m.

Vern. *Mëgoi*, Hattam.

121. *Vaccinium quinquefidum* J. J. S. Med. Rijks-herb. n. 25 (1915) 11; Nova Guinea 12 (1917) 529; *ibid.* (1918) t. 218; SLEUM. Bot. Jahrb. 72 (1942) 250; Blumea 11 (1961) 67. — *V. nycteroides* WERNH. Trans. Linn. Soc. II, Bot. 9 (1916) 92; SLEUM. Bot. Jahrb. 72 (1942) 257 ('*nycteroides*').

var. quinquefidum.

Tree or much-branched shrub, 2-3 m. Branchlets rigid, angular, puberulous, \pm densely leaved. *Leaves* on thick leaf-cushions, ovate to oblong-ovate or ovate-lanceolate, apex gradually acuminate or subcaudate for 0.6-1 cm, tip bluntish, base broadly attenuate to nearly rounded, the 2 completely basal glands thick and \pm protruding, coriaceous, stiff, convex above, very laxly glandular-muriculate beneath and whether or not clothed with some short hairs at the margin in the

upper half of the lamina, glabrous for the rest, 1.5-2.7 by (0.6-)0.7-1 cm, entire, edge slightly or not revolute, midrib narrowly sunken above, obtusely prominent beneath, nerves inconspicuous above, rather indistinct as to the 2-3 ascendent pairs beneath, reticulation fine and visible beneath only, or mostly \pm obsolete; petiole finely puberulous, 2(-3) mm. *Racemes* from the upper 3-5 axils, erect, subdensely 10-20-flowered; rachis stoutish, 1.2-2 cm, with several concave small perulae, as the pedicels with fine \pm spreading hairs and some club-shaped ascending or subappressed glands or glandular hairs. Pedicels nodding at anthesis, \pm erect in fruit, rather slender, 7-9 mm; bracteoles not seen. *Calyx* tube semiglobose-campanulate, base rounded, glabrous or hairy, c. 1.5 mm, limb spreading, 2-2.5 mm, deeply 5-lobed, lobes deltoid, glabrous, ciliate, the subacute apex bluntish by a small gland. *Corolla* elongate-ovoid-conical, attenuate distally, obtusely 5-gonous, 5-lobed \pm halfway, \pm patently subdensely hairy outside, especially in the lower half, glabrous inside, white to pink, 9-11(-12) by c. 5 mm below, lobes narrow, erect. *Stamens* 8 or 10; filaments linear, base dilated, wavy, densely hairy or almost villous especially below, c. 4 mm; cells broad-oblong, c. 1.3 mm, no spurs; tubules nearly as



Fig. 106. *Vaccinium minuticalcaratum* J. J. S. *f. glabrum* J. J. S. above Warjori R., 1350 m, Arfak Mts, NW. New Guinea (SLEUMER & ZIECK 4491) (SLEUMER, 1962).

wide as the cells, 0.5 mm, obliquely cut distally, the posticous wall protracted into 2 distinct teeth. *Disk* glabrous. *Style* rather slender, glabrous, 1.1–1.2 cm. *Fruit* subglobose, glabrous, red-greenish, c. 5 mm ϕ when almost ripe, crowned by the suberect calyx lobes.

Distr. *Malesia*: West New Guinea (Mt Carstensz, Wichmann Mts and Star Mts).

Ecol. In summit vegetation, in swamp, locally not rare, 2530–3350 m. *Fl.* Jan.–Febr.

var. oranjense J. J. S. Nova Guinea 12 (1917) 530; SLEUM. Bot. Jahrb. 72 (1942) 250; Blumea 11 (1961) 67.

Inflorescence more densely hairy and glandular, and disk hirsutulous, otherwise hardly different from *var. quinquefidum*.

Distr. *Malesia*: New Guinea (Oranje Mts).

Ecol. In subalpine forest, locally common on forest edges, on sandstone, 3400–3600 m. *Fl.* Febr., Sept.

122. *Vaccinium brachygyne* J. J. S. Med. Rijksherb. n. 25 (1915) 11; Nova Guinea 12 (1917) 528; *ibid.* (1918) t. 217; SLEUM. Bot. Jahrb. 72 (1942) 249; Blumea 11 (1961) 67. — *V. obovalifolium* SLEUM. Bot. Jahrb. 72 (1942) 249.

Shrub or small tree, 2–8 m. Branches erect. Branchlets striate, obtusangular, glabrous, reddish in the youngest parts, subdensely leaved. *Leaves* obovate to elliptic-obovate, apex broadly attenuate and obtuse or \pm rounded, base \pm cuneate into the petiole, the 2 basal glands impressed, though often not much conspicuous, coriaceous, firm, glabrous except the rather sparse appressed muriculate glands or points on the undersurface, entire, flat or but slightly revolute at the margin, (2–)2.5–4.5 (–5) by (0.8–)1.2–2.5 (–2.8) cm, midrib sunken above, prominent beneath, nerves 3–4 pairs, steeply curved-ascending and anastomosing, faintly impressed above, slightly raised beneath, reticulation fine and dense, perceptible beneath only; petiole grooved above, (2–)3–5 (–6) by c. 1 mm. *Racemes* short, (2–)3–6-flowered, from the upper 1–3 axils; rachis angular, glabrous or sparsely glandular-muriculate as are the pedicels, (0.5–)1–1.5 cm, base involucrate initially by several ovate to suborbicular membranous perulae (5–6 mm ϕ), which are rather early caducous. Pedicels stoutish, nodding, 4–7 mm. *Calyx* tube broadly cup-shaped, glabrous, rugulose, 1–1.5 mm, limb spreading, 1–1.5 mm, 5-lobed to nearly the base, lobes deltoid, obtuse, ciliolate, sometimes bearing a minute or rather indistinct apical gland. *Corolla* suburceolate, ventricose in the lower part, gradually attenuate distally, said to be a little angular and fleshy, pale pink, glabrous at both sides, 9–10 (–11) by c. 4 mm, 5-lobed, \pm halfway, lobes narrow, erect or but slightly recurved. *Filaments* linear, broadened and glabrous below, very densely patently hairy above the base, 2–2.5 mm; anthers a little curved, broad-oblong, c. 1.5 mm, no spurs; tubules as wide as the cells, 0.5 mm, broadly obliquely or sublaterally cut distally.

Disk glabrous. *Style* slenderly columnar, 1–1.1 cm, glabrous, finally exerted. *Fruit* globose, c. 3.5 mm ϕ , blackish, soft and wrinkled at full maturity, crowned by the prominent annular disk; pedicel c. 1 cm.

Distr. *Malesia*: New Guinea (Oranje and Wichmann Mts).

Ecol. In forest opening of long standing or in mossy low forest, common locally, 2800–3225 m. *Fl.* Febr., Aug., Oct., fr. Aug.

123. *Vaccinium paradisearum* BECC. *Malesia* 1 (1878) 209; SLEUM. Bot. Jahrb. 72 (1942) 255; Blumea 11 (1961) 67; *ibid.* 12 (1963) 128. — *V. profusum* J. J. S. Nova Guinea 12 (1914) 164, t. 50; KANEH. & HATUS. Bot. Mag. Tokyo 56 (1942) 482. — *V. psittacobium* SLEUM. Bot. Jahrb. 72 (1942) 255. — Fig. 107.

Shrub, rarely treelet, 1–3 (–5) m. Branchlets reddish, glabrous or minutely puberulous in the youngest, thinly greyish corticate and striate in the older parts, subdensely leaved. *Leaves* \pm reflexed, subovate-oblong or mostly -lanceolate, apex for 1–3 cm subcaudate-acuminate, not rarely \pm falcate, tip bluntish, base in general attenuate into the petiole, rarely almost rounded, the basal 2 marginal glands rather small, though well visibly impressed, coriaceous, \pm stiff, glabrous except for scattered glandular hairs or dots on the undersurface of very young leaves, entire, edge slightly



Fig. 107. *Vaccinium paradisearum* BECC. Mt Senenemés, 2600 m, Anggi Gigi Lake, NW. New Guinea (SLEUMER & VINK 4314) (SLEUMER, 1962).

revolute, (2.5-)3.5-7 by (0.7-)1-1.8(-2.5) cm, midrib narrowly sunken above, slightly and obtusely raised beneath, 5-plinerved, nerves faintly raised on both faces or only beneath, sometimes even \pm obscure, reticulation, if any, lax and mostly visible beneath only; petiole (4-)5-7 by 1 mm. *Racemes* from numerous upper axils, suberect or spreading, rather dense together, many-flowered, flowers \pm laxly arranged; rachis greenish, angular, rather slender, though stiff, glabrous, (2-)4-7(-9) cm, perulae not seen, apparently very early caducous. Pedicels pale purple, nodding, slender, glabrous, (5-)6-8(-12) mm; bracteoles not seen. *Calyx* tube campanulate, 1-1.5 mm, glabrous or with a few short glandular hairs, or laxly muriculate at the very base, limb spreading, 1-1.5 mm, deeply 5-lobed, lobes triangular, subacute, glabrous or ciliolate, the apex often penicillate. *Corolla* elongate-urceolate, ventricose below, gradually contracted in the upper part, thin-fleshy, purplish to pink, light pink or white, 1-1.2(-1.3) by 0.25-0.3(-0.4) cm, split \pm halfway 5-lobed, glabrous at both sides except some very short hairs occasionally found along the inner margin of the lobes, the latter narrow, suberect or but slightly divergent, subacute. *Filaments* linear-subulate, villous and purple below, 3.5-4 mm; anther-cells broad-oblong, c. 1.3 mm, no spurs; tubules slightly narrower than the cells, c. 0.4 mm, obliquely cut distally, the back wall extending to a simple or bifid tooth. *Disk* purple, prominent, glabrous. *Style* slenderly columnar, glabrous, 1-1.2 cm. Fresh *fruit* blue at full maturity, globose, 6(-7) mm σ ; pedicel up to 2 cm.

Distr. *Malesia*: New Guinea (Arfak and Weyland Mts; Wissel Lakes region; Mt Antares).

Ecol. In edge of forest and in semi-alpine shrub vegetation, on granite or on clayey or humous soil, 1900-3300 m, locally common. *Fl. fr.* Jan.-Dec.

Vern. *Dennokwanie*, Manikiong, Arfak.

Note. The berries are reported to be eaten by parrots (*Oreopsittacus*, *Charmosyne*). In the Arfak Mts specimens with purplish, pink or white flowers occur in the same place.

124. *Vaccinium megalophyes* SLEUM. Bot. Jahrb. 72 (1942) 253; *Blumea* 11 (1961) 68; *ibid.* 12 (1963) 128.

Shrub or slender tree, up to 13 m, trunk up to c. 25 cm σ , crown fairly small; bark 1 mm, brown, smooth, scaly. Branchlets slender, tips angular and quite glabrous, dark red-brown when dry. *Leaves* lax, oblong-elliptic or elliptic, apex shortly subabruptly and \pm obtusely acuminate, base \pm cuneate to and a little decurrent into the petiole, the pair of marginal glands strictly basal and conspicuous, coriaceous, sparsely glandular-punctate beneath, otherwise glabrous, entire, edge hardly revolute, 5-8(-10) by 2.3-3(-3.5, occasionally -4) cm, midrib impressed above, markedly and obtusely prominent beneath, nerves c. 3 basal and (up to 1.5 cm) suprabasal, rather steeply curved-ascending, and some upper, much shorter, \pm

spreading pairs, all nerves anastomosing and slightly raised above, more distinctly so beneath, reticulation rather dense, faintly prominent above, conspicuous beneath; petiole 4-6 by c. 1 mm. *Racemes* from the upper, partly defoliate axils, \pm patent, sparsely set with club-shaped glandular or muriculate hairs on rachis and pedicels, more densely muriculate on the calyx tube, not properly hairy at all, patently and laxly 10-15-flowered; rachis slender, (1.5-)2-3 cm, eperulate in flowering time. Pedicels slender, 8-11 mm; bracts and bracteoles not seen. *Calyx* tube cup-shaped, c. 1 mm, limb low, \pm spreading, lobes irregularly ovate-deltoid, bluntish, ciliolate, 0.5 mm, no proper apical gland. *Corolla* urceolate-tubular, base swollen in the lower third, gradually attenuate upwards, obscurely 5-angular, somewhat fleshy, glabrous at both sides, pink or white, 8-10 by 3-4 mm (at base), lobes erect, narrow, papillose-ciliolate, 4-5 mm. *Filaments* subulate-linear, woolly above the glabrous base, c. 2 mm; anther-cells broad-oblong, ecalcarate, 0.7-1 mm; tubules broad-cylindric, a little narrowed distally, hardly 0.3 mm, obliquely cut distally. *Disk* glabrous. *Style* slenderly columnar, glabrous, c. 1 cm. Submature *fruit* depressed-globose, 4-5 mm σ , dark red, with a warty or rugose surface, the disk prominent beyond the calyx lobes.

Distr. *Malesia*: New Guinea (Bernhard camp; Idenburg R.; Balim R. valley; near Habbema Lake in the Oranje Mts).

Ecol. Rare substage tree in mossy forest, or frequent in forest openings or in low open (also secondary) forest, on sandy slopes, 1800-2720 m.

Vern. *Dowakka*, Dani.

125. *Vaccinium stenolobum* SCHLTR. Bot. Jahrb. 55 (1918) 177, f. 10; SLEUM. *ibid.* 72 (1942) 257; *Blumea* 11 (1961) 68.

Erect tree, 12-20 m, glabrous in all outer parts. Branchlets erecto-patent, subterete, \pm densely leaved. *Leaves* elliptic or narrow-elliptic, apex shortly acuminate, subacute, base cuneate, coriaceous, entire, margin a little wavy, not properly revolute, 5-8 by 2-3 cm, midrib somewhat sunken above, strongly prominent in the lower part, gradually decreasing upwards beneath, nerves in 1 basal and 4-5 upper pinnate pair(s), anastomosing, reticulation apparently (*l.c.* fig. 10) inconspicuous; petiole 5-8 by 1.5-2 mm. *Racemes* in the upper 2 or 3 axils, close to each other, erecto-patent, laxly 8-14-flowered; rachis subangular, 4-5 cm, eperulate in anthesis. Pedicels rather stoutish, 7-10 mm; bracts and bracteoles not known. *Calyx* tube cup-shaped, base rounded, 2 mm, lobes subpatent, ovate, obtuse, 1 mm, the apical gland very distinct. *Corolla* urceolate, somewhat fleshy, pink, glabrous outside, subdensely short-hairy inside, 9-10 by c. 6 mm, 5-partite to about the middle, lobes first erect, finally spreading, narrow-lanceolate, acute. *Filaments* subulate, densely long patently hairy, c. 4 mm; anther-cells oblong, narrowed towards the base, ecalcarate, 1.5 mm; tubules erect, divergent, c. 1.5 mm as wide as the cells at the base, very obliquely cut apically or

almost laterally, the posticous wall of each tubule extended into a long tooth, the pore narrow-oblong. *Disk* glabrous, prominent. *Style* slenderly cylindrical, glabrous, c. 1 cm.

Distr. *Malesia*: New Guinea (West Ra., Sepik Distr.), mountain forest, 1400–1500 m. Once found. *Fl. Aug.*

Note. The description given above is based on the original diagnosis and figure, the herbarium material being completely lost.

126. *Vaccinium daphniphyllum* SCHLTR, Bot. Jahrb. 55 (1918) 181; SLEUM. *ibid.* 72 (1942) 264; Blumea 11 (1961) 71; *ibid.* 12 (1963) 129. — *V. piroliflorum* J. J. S. Nova Guinea 18 (1936) 115, t. 30, f. 1.

Shrub, terrestrial or epiphytic or sometimes scandent. Branchlets subterete, glabrous, subdensely to laxly leaved. *Leaves* elliptic or oblong-lanceolate-elliptic, apex shortly obtusely acuminate, base cuneate to broadly attenuate, a little widened or swollen at the very base, where the rather thick pair of prominent marginal glands can be easily noticed, coriaceous, very laxly glandular-punctate beneath, glabrous, entire, 7–15.5 by (2.6–)3–6 cm, manifestly 5–7-plinerved, with a few shorter, less steeply ascending nerves coming from the upper part of the midrib, the latter slightly sunken above, rather thick-prominent beneath, nerves anastomosing, slightly raised on both sides, reticulation lax above, more dense and more conspicuously raised beneath; petiole 3–6(–8) by c. 1.5 mm. *Racemes* both from the upper and lower foliate axils, laxly 15–25-flowered, suberect or spreading; perulae ovate-acuminate, 2–4 mm, \pm caducous; rachis angular, rather stoutish, glabrous except some sparse muriculate glands, 4–8(–11) cm. Pedicels stoutish, glabrous, 7–10(–14) mm. *Calyx* tube broadly cup-shaped, subdensely very shortly muriculate, c. 1 mm, limb spreading or finally reflexed, c. 1.5 mm, deeply 5-lobed, lobes deltoid, bluntish, glabrous dorsally, ciliolate, whether or not provided with an apical gland. *Corolla* shortly and broadly urceolate or subcampanulate, conspicuously contracted at the middle or somewhat below, glabrous at both sides, thin-fleshy, light green to white, 5–7 mm long, 3–4 mm σ below, 4–6(–8) mm σ distally, lobes triangular, obtuse, revolute, c. 1.6 mm. *Filaments* linear, wavy, densely long-hairy in the lower, less so in the upper part, c. 2 mm; anther-cells oblong, echinate, 1.5 mm, with 2 dorsal spurs (1–1.5 mm); tubules cylindrical, divergent, nearly as wide as the cells below, \pm transversely cut and flaring distally, 2–2.2 mm, each bearing 2 or 3 short thickly gland-tipped hairs or stalked glands. *Disk* glabrous. *Style* slenderly columnar, glabrous, 5–6 mm. Immature fruit subglobose, c. 5 mm σ , crowned by the prominent disk; pedicel c. 2.5 cm.

Distr. *Malesia*: New Guinea (Rouffaer R. at 175–250 m; Hunstein Ra. in Sepik Distr. and Torricelli Mts at 850–1370 m), in dense thin-stemmed, partly marshy forest. *Fl. Aug.–Sept.*

Vern. *Sele, Wapi.*

127. *Vaccinium convallariiflorum* J. J. S. Nova Guinea 18 (1936) 116, t. 20, f. 2; SLEUM. Bot.

Jahrb. 72 (1942) 264; Blumea 11 (1961) 71.

Large scrambling epiphytic shrub, 1.5 m or more. Branchlets angular, tips puberulous, early glabrescent and greyish corticate below, laxly to subdensely leaved. *Leaves* ovate to oblong-ovate, apex subcaudate-acuminate for c. 2 cm, subacute, base broadly attenuate or mostly \pm rounded, the pair of marginal glands minute, found in some distance from the petiole, coriaceous, laxly set with fine, appressed, dark glandular muriculate hairs beneath, otherwise glabrous, entire, 5–8 by (1.5–)1.8–3 cm, midrib slightly sunken above, obtusely prominent beneath, nerves 2 basal, high curved-ascending, and several shorter pairs from upper part of the midrib, all anastomosing and slightly raised on both faces, reticulation rather obscure above, mostly \pm dense and finely raised beneath; petiole 4–7 by 1 mm. *Racemes* from the upper axils, \pm recurved and secund, laxly 8–12(–15)-flowered; rachis slender, laxly short-pubescent and sparsely glandular-muriculate, as are the pedicels, (1–)1.5–2.5(–3.5) cm, bract subulate, 3–4 mm, persistent for a while, but hardly through the flowering time. Pedicels slender, 1–1.5 cm. *Calyx* tube cup-shaped, subdensely very shortly glandular-muriculate, c. 1.5 mm, limb spreading or finally reflexed, 1.5 mm, 5-lobed to almost the base, lobes ovate-acuminate, apiculate, ciliolate, no apical gland. *Corolla* shortly and broadly campanulate-urceolate, constricted in the lower third initially, thin-fleshy, greenish whitish, glabrous at both sides, 7–8 by 6–8 mm (at the limb), lobes obtuse, reflexed, 1.5–2 mm. *Filaments* broadly linear, densely patently hairy or even lanate below, less so upwards, c. 2 mm; anther-cells oblong, echinate, 1.5 mm, with 2 dorsal \pm spreading spurs (1.5 mm); tubules narrow-cylindric, a little dilated distally, c. 2 mm, subobliquely cut apically, each provided with 2 or 3 stalked glands or thick gland-capitellate hairs in their lower half. *Disk* prominent, glabrous. *Style* thick-filiform, glabrous or with some sparse hairs below.

Distr. *Malesia*: New Guinea (Doormantop and near Bernhard Camp, Idenburg R.).

Ecol. In mossy forest, 1800–2150 m. *Fl. Nov., Febr.*

128. *Vaccinium appendiculatum* SCHLTR, Bot. Jahrb. 55 (1918) 180, f. 12; SLEUM. *ibid.* 72 (1942) 263; Blumea 11 (1961) 68.

Branched high climber, stem (root?) as thick as an arm. Branchlets rather densely leaved, minutely puberulous in the young parts. *Leaves* oblong-elliptic or -ovate, apex subacutely acuminate, base cordate, subcoriaceous, glabrous, entire, margin somewhat recurved, 7–12 by 3.5–5.5 cm, c. 9-plinerved, with several shorter upper nerves from the midrib, all nerves anastomosing; petiole 3–4 by 2 mm. *Racemes* subdensely many-flowered, glabrous; rachis rather slender, 6–10 cm. Pedicels slender, c. 1.3 cm. *Calyx* patelliform, tube c. 2 mm, limb spreading, 5-lobed to almost the base, lobes triangular to semiorbicular, obtusely acuminate, 1 mm. *Corolla* urceolate, distinctly constricted in

the middle, glabrous at both sides, *c.* 7.5 by 4–5 mm, 5-lobed to the upper third, lobes ovate, erect, subacute. *Filaments* subulate, long patent-hairy, *c.* 1.5 mm; anther-cells oblong, *c.* 2 mm, with 2 distinct dorsal spurs (*c.* 1 mm) distally; tubules cylindrical, narrow, slightly widened upwards, provided with several hair-like gland-tipped appendices in the lower half, which are also found on the spurs; pore round. *Disk* glabrous. *Style* columnar, swollen in the upper half, glabrous, *c.* 5 mm.

Distr. *Malesia*: New Guinea (West Ra. in Sepik Distr.), in mountain forest at 1400–1500 m. Once found. *Fl.* Aug.

Note. The description given above is based exclusively on the original description and figure, the herbarium material having been lost completely.

129. *Vaccinium otophyllum* SLEUM. Bot. Jahrb. 72 (1942) 263; Blumea 11 (1961) 68.

Shrub 1–1.5 m. Branchlets shortly soft-tomentose at the youngest parts. *Leaves* densely subimbricately arranged, ovate, apex acuminate, subacute, base deeply cordate and auriculate, lobes 1–1.5 cm ϕ , amplexicaul and imbricate, subsessile, firmly subcoriaceous, rather densely soft-tomentose at the much raised midrib and the lower part of the nerves beneath and on the petiole, glabrous elsewhere besides some glandular points beneath, a little shining especially beneath, entire, 6–8 by 3.5–4.5 cm, nerves 4–5(–6) pairs, the lowest ones from the base, all anastomosing, slightly raised above, more distinctly so beneath as is the dense reticulation; petiole 1–2 by 1.5–2 mm. *Racemes* from the upper axils, (4–)5–12-flowered; rachis stoutish, densely patently short-pubescent, (1–)2–4 cm. Pedicels rather robust, pubescent, 1–1.3(–1.5) cm, bract minute and early caducous; bracteoles 2, subulate, inserted in the lower third, *c.* 2 mm, caducous. *Calyx* broadly campanulate, pubescent at the base, laxly glandular-muriculate or glabrous elsewhere, tube obconical, hardly 1.5 mm, limb spreading, 5-lobed to nearly the base, lobes broadly ovoid-deltoid, acute, 1.5 mm, ciliate, the apical gland subinconspicuous. *Corolla* depressedly subglobose-urceolate, a little constricted in the middle, rather fleshy, glabrous at both sides, green, 5–6 by 6–7 mm, lobes *c.* 1 mm. *Filaments* linear, long-hairy above the glabrous very base, 1.6 mm; anther-cells oblong, granular, *c.* 2 mm, with 2 dorsal, upwards curved papillate spurs (1.6) mm, which are provided with a few gland-tipped hairs (*c.* 1 mm) such as are found also at the base of the tubules, the latter narrow-cylindrical, slightly curved, *c.* 2.2 mm, the pore terminal, almost round, flaring. *Disk* thick-annular, glabrous. *Style* columnar, glabrous, 6 mm.

Distr. *Malesia*: New Guinea (Habbema Lake in Oranje Mts). One collection.

Ecol. In open, very heavily mossed forest of crests, common, at 2860 m. *Fl.* Oct.

130. *Vaccinium cordifolium* STAPEL, Trans. Linn. Soc. II, Bot. 4 (1894) 189, t. 15, f. D 7–11; GIBBS,

J. Linn. Soc. Bot. 42 (1914) 101; MERR. En. Born. (1921) 466; SLEUM. Blumea 11 (1961) 68.

Shrub, 1–2(–3) m, consisting of a few straggling branches or woody stems. Branchlets densely patently greyish or yellowish-brownish tomentose in the younger, glabrescent and grey-corticate in the older parts; young shoots red-tinged. *Leaves* crowded, dense and subimbricate at the tips of the branchlets, ovate, subsessile, apex bluntly attenuate, base deeply cordate, rather slightly or not amplexicaul, coriaceous, dark green and somewhat glossy above, paler and reddish green beneath at maturity, patently short-pubescent on both faces initially, early glabrescent except the basal part of the lamina and the midrib beneath, finally quite glabrous, 2.4–4.5 by 1.5–3(–4) cm, flat, entire, midrib rather flat above, prominent beneath, nerves 6–7(–8) pairs, the lowest 2–3 from the base, upper ones from the midrib, curved-ascending towards the edge, rather indistinctly anastomosing, slightly raised above, more conspicuously so beneath, reticulation dense, finely prominent especially beneath; petiole 2–3 by 1.5–2 mm, pubescent for a long time. Stipule-like perulae in the sterile upper axils subulate, 3–4 mm, subpersistent. *Racemes* from the uppermost axils or subterminal, solitary or rarely in pairs, laxly 5–10 (–12)-flowered, flowers nodding to one side; rachis 2–5(–6) cm and pedicels (0.8–1.3 cm) rather slender, both densely white soft-pubescent; bracts ovate, foliaceous, up to 8 by 2 mm, very early caducous; bracteoles not seen. *Calyx* reddish or purplish, tube widely campanulate, tomentulose, 1–1.5 mm, limb erecto-patent, 5-lobed to nearly the base, lobes ovate-acuminate, with salient subparallel dorsal nerves, laxly pubescent and ciliate, *c.* 3 by 2 mm, no proper apical gland. *Corolla* oval in bud, tubular-urceolate when fully expanded, thin-fleshy, a delicate pink, varying to white, with creamy tips, glabrous at both sides, (10–)12–15 by 5–6 mm, lobes ovate, obtuse, reflexed, 1.5 mm. *Stamens* 10, subequal, not rarely incompletely developed (\varnothing flowers?); filaments linear-subulate, slightly dilated above the base, densely long hairy except the very base, 6–7 mm; cells oblong, *c.* 2 mm, with 2 very short dorsal spurs; tubules cylindrical, much narrower than the cells, *c.* 1.5 mm, divergent, laxly set with short gland-tipped hairs, the pore nearly round, \pm flaring. *Disk* densely clothed with longish erect hairs. *Style* red, columnar, densely subappressedly hairy in the lower $\frac{2}{3}$, 1–1.1 cm. *Fruit* a globose berry, 6–8 mm ϕ , white or greenish red, crowned by the slightly accrescent calyx lobes.

Distr. *Malesia*: Borneo (Mt Kinabalu).

Ecol. In dwarf scrub forest or open ridge jungle, (1525–)2400–2900 m, on granite and serpentine, common. *Fl.* Jan.–Dec.

131. *Vaccinium cercidifolium* J. J. S. Bull. Jard. Bot. Btzg III, 13 (1935) 463; SLEUM. Blumea 11 (1961) 68.

Shrub, terrestrial or thick-stemmed woody climber. Branchlets angular, patently short-pubescent, rather stoutish, laxly to subdensely

leaved. *Leaves* orbicular- or elliptic- or ovate-cordulate, apex blunt to almost rounded, base distinctly though slightly cordate, basal lobes not amplexant, the pair of marginal impressed glands at a short distance from the petiole and rather conspicuous, subsessile, coriaceous, somewhat succulent, flat or but slightly revolute, initially puberulous on both faces, early glabrescent except the base of the lamina beneath, laxly miculate or punctate beneath, entire, (3-)3.5-6 (-7) by 2.5-4(-5) cm, midrib rather flat above, prominent beneath, 7-9-plinerved, with a few additional short pinnate upper nerves, all curved-ascending, slightly raised above, more distinctly so beneath, reticulation rather coarse, more dense beneath, \pm prominent on both sides; petiole 1-2(-3) by c. 2 mm. *Racemes* from the upper axils, patent, equally laxly many-flowered, glabrous in all outer parts, flowers \pm nodding to one side; rachis angular, stout, 4.5-7(-9) cm. Pedicels reddish, stoutish, curved, 0.5-1(-1.5) cm; bracts and bracteoles not seen. *Calyx* cup-shaped, tube 2 mm, limb somewhat spreading, 5-lobed to nearly the base, lobes ovate, obtuse, 1-1.5 mm, the distal part \pm swollen, bearing no proper apical gland nor marginal glands. *Corolla* oblong-urceolate, contracted distally, fleshy, blood red or creamy white, glabrous outside, puberulous at the base inside, 10-12 by 3-4 mm, lobes obtuse, recurved, 1 mm. *Filaments* linear-subulate, wavy, hairy, 3.5-5 mm; anther-cells broad-oblong, echinulate, c. 1 mm, with 2 dorsal spurs (0.3 mm); tubules cylindrical, divergent and forming an almost right angle with the cells, with a few gland-tipped hairs, 0.4-0.5 mm, pore round. *Disk* annular, laxly pubescent. *Style* stoutish, densely appressed-hairy to the lower $\frac{3}{4}$, glabrous for the rest, 9 mm.

Distr. *Malesia*: Borneo (Central Borneo: Mt Batu Tiban, with blood red corollas; Sarawak: Mt Dulit, with creamy white, translucent corollas).

Ecol. In open or shady moss forest, or exposed peak, 1300-1700 m. Fl. Sept.-Dec.

132. *Vaccinium korthalsii* MIQ. Ann. Mus. Bot. Lugd.-Bat. 1 (1863) 40; STEEN. Bull. Jard. Bot. Btgz III, 17 (1948) 388; AMSH. in Back. Bekn. Fl. Java (em. ed.) 7 (1948) fam. 163, p. 4; SLEUM. Blumea 11 (1961) 68. — *Arbutus coriacea* BL. Cat. (1823) 67, cf. Flora 8 (1825) 140. — *Thibaudia coriacea* (BL.) BL. Bijdr. (1826) 860; HASSK. Cat. Hort. Bog. (1844) 161. — *Agapetes coriacea* (BL.) G. DON, Gen. Syst. 3 (1834) 863; DUNAL, in DC. Prod. 7 (1839) 555; MOR. Syst. Verz. (1846) 42; HASSK. Pl. Jav. Rar. (1848) 471, sub *Agapetes floribunda*. — *Epigynium coriaceum* (BL.) KL. Linnaea 24 (1852) 52. — *V. coriaceum* (BL.) MIQ. Fl. Ind. Bat. 2 (1859) 1062; BL. Fl. Jav. Pl. inéd. (1863-83) t. 23; KOORD. Exk. Fl. Java 3 (1912) 19; KOORD.-SCHUM. Syst. Verz. 1 (1912) fam. 233, p. 108; KOORD. Fl. Tjib. 3 (1918) fam. 233, p. 10; J. J. S. in K. & V. Bijdr. 13 (1914) 142; SP. MOORE, J. Bot. 63 (1925) Suppl. 57, non Hook. f. 1852.

Shrub, mostly epiphytic, all over glabrous except the filaments. Branchlets pendent, stout, striate, shining. *Leaves* lax, lanceolate, sometimes oblong

or ovate-lanceolate, rarely elliptic, apex long (sometimes subulate-)caudate-acuminate, the tip subacute, base cuneate to broadly attenuate, with a pair of small, dark, subimpressed marginal glands at some distance from the petiole, coriaceous, fleshy when fresh, often perpendicular, reddish and glabrous when young, dark green at maturity, purplish tinged before falling off, minutely punctulate beneath, entire, margin \pm revolute, 6-10(-12) by 2-3.5(-6.5) cm, 5-plinerved, basal nerves steeply ascending and anastomosing with 3 or 4 pairs of shorter similar nerves from the upper part of the midrib, midrib and nerves slightly though distinctly raised above, mostly much less so beneath, reticulation lax, \pm inconspicuous; petiole reddish, grooved above, 6-15 by 1-1.5 mm. *Racemes* from the upper axils, spreading, shortly peduncled, laxly 6-8-flowered, flowers secund; rachis angular, red, 4-7(-8, sometimes -10) cm. Pedicels stoutish, red, 1-2 cm, bract and bracteoles very early caducous. *Calyx* tube sub-semiglobose or obconical, 2-3(-4) mm long, 5-6 mm ϕ at the base of limb and somewhat contracted there, limb spreading, 2(-3) mm high, shallowly 5-lobed, lobes depressed-ovate, distinctly apiculate by a rather small gland, 1-1.5 mm. *Corolla* sub-globose-conical or conical-cylindric, or ventricose-urceolate, fleshy, white or rose, with a scent of vanilla, c. 12 by 5-6 mm, lobes obtuse, reflexed, c. 1 mm (ciliate in the Sumatran specimens!). *Filaments* subulate, densely hairy below, less so upwards, c. 3 mm; anther-cells oblong, 1.5 mm, dorsal spurs minute or practically absent; tubules erect, cylindrical, much narrower than the cells, c. 2.5 mm, \pm transversely cut apically, the posticous wall of each tubule sometimes extended into 1 or 2 minute, \pm reflexed teeth, laxly provided with clavate glands or gland-tipped hairs or appendices. *Disk* glabrous. *Style* thick, glabrous, c. 1 cm. *Berry* subglobose, 1-1.3 cm ϕ when fresh, fleshy, yellow or orange or greenish yellow with red face initially, finally purplish-blackish, shining, crowned by the large cup-shaped calyx-limb; pedicel 2-2.5 cm. *Seeds* ovoid, often curved, c. 2.5 mm.

Distr. *Malesia*: Sumatra, West Java, Bali.

Ecol. Epiphytic in mixed or depleted rain-forest or high slope forest, sometimes terrestrial on rocks, forest borders, cold solfataras, 600-1500(-2000) m. Fl. March-July, fr. April-Nov.

Vern. *Kilagiday*, *tjantigi*, S.

133. *Vaccinium tentaculatum* J. J. S. in Fedde, Rep. 30 (1932) 175; SLEUM. Blumea 11 (1961) 69.

Shrub, glabrous in all outer parts. Branchlets slender. *Leaves* lax, ovate to elliptic-ovate, apex long caudate-acuminate, the very tip bluntish, base shortly acuminate into the petiole, the basal marginal glands obsolete, subcoriaceous, shining, entire, flat, 4.2-7 by 1.7-2.6 cm, 5-plinerved, midrib and nerves faintly raised above, more distinctly so beneath, reticulation dense, slightly prominent beneath only; petiole 6-8 by 1 mm. *Racemes* laxly several-flowered; rachis slender, c. 3.5 cm. Pedicels slender, c. 2 cm, sometimes sub-

tended by a persistent foliaceous lanceolate bract 1.5 cm long; bracteoles not seen. *Calyx* patellar, low, tube c. 2 mm, limb much spreading, c. 1.5 mm, shallowly 5-lobed, lobes broadly ovate-triangular, apiculate by a small obtuse gland. *Corolla* urceolate, rather fleshy, white with light red at the base, glabrous outside, laxly hairy inside, c. 8 by 3 mm, lobes obtuse, recurved, c. 1.5 mm. *Filaments* linear-subulate, villous by longish patent hairs below, less densely so distally, c. 1.5 mm; anther-cells oblong, c. 0.8 mm, no dorsal spurs; tubules slightly narrower than the cells, cylindrical, erect, \pm divergent, with several gland-tipped hairs in the lower part, apex truncate, the pore a little flaring and provided with several minute teeth-like appendices. *Disk* prominent, glabrous. *Style* glabrous, 6 mm.

Distr. *Malesia*: Moluccas: Central Ceram, 1100 m. One collection.

134. *Vaccinium muriculatum* J. J. S. Nova Guinea 12 (1914) 161, *incl. var. albidum* J. J. S. *l.c.*; SLEUM. Bot. Jahrb. 72 (1942) 259; Blumea 11 (1961) 69; *ibid.* 12 (1963) 128.

Shrub to branched small tree, 1–5 m. Branchlets quite glabrous, shining. *Leaves* scattered, oblong to lanceolate-ovate, apex rather shortly or mostly longer subcaudate-acuminate, \pm curved, tip bluntish, base cuneate to broadly attenuate, rarely almost rounded, the pair of small, marginal glands impressed at end of petiole, coriaceous, glabrous, pale brownish-red when very young, dark green at full maturity, lustrous on both faces, entire, \pm flat, (4–)5–8(–10) by (1.2–)1.5–2.5(–3.5) cm, midrib slightly grooved above, obtusely raised beneath, main nerves in 3(–4) basal and a little suprabasal pairs, steeply ascending, slightly curved and anastomosing, other shorter, more spreading nerves from the upper part of the midrib, all faintly raised or subinconspicuous above, slightly but distinctly prominent beneath as is the rather dense and fine reticulation; petiole 2–5 by 1 mm. *Racemes* from the upper 2–4 axils, suberect or spreading, laxly many-flowered; rachis angular, slender, glabrous, 3–6.5 cm; perulae ovate, thin, 3 mm, early caducous. Pedicels slender, glabrous or with some sparse muriculate glands, 3–6 mm; bracts and bracteoles apparently very early caducous. *Calyx* tube subcampanulate or almost obconical, \pm densely covered with muriculate brownish glands, c. 1 mm, limb spreading, 5-lobed nearly to the base, lobes ovate, obtuse or apiculate by a small distinct gland, ciliate, 1 mm. *Corolla* urceolate, contracted distally, dirty pale rose or white or greenish white, rather thin, glabrous on both sides, 6–7 by 2.5–3.5 mm, lobes subtriangular, obtuse, recurved, c. 1 mm. *Filaments* almost linear, densely hairy especially in the lower part, 2–2.5 mm; anther-cells oblong, c. 1 mm; tubules cylindrical, nearly as wide as the cells, suberect, 0.5 mm, obliquely cut apically, the back wall of each tubule extending into 1 or 2 small teeth, provided with a few short gland-tipped hairs or stalked glands in upper part. *Disk* glabrous. *Style* rather slender, glabrous, (5–)6–7 mm. *Fruit* depressed-

globose, c. 6 mm σ .

Distr. *Malesia*: New Guinea (Vogelkop Peninsula: Tamrau, Netti and Arfak Mts).

Ecol. Epiphytic or terrestrial in forest and forest edge, 1800–2250 m. *Fl. fr.* Jan.–Dec.

135. *Vaccinium elegans* ELM. Leaf. Philip. Bot. 3 (1911) 1093; MERR. En. Philip. 3 (1923) 249; COPEL. f. Philip. J. Sc. 42 (1930) 569, t. 4, f. 1–2; SLEUM. Blumea 11 (1961) 69.

Small tree, 4–10 m, stem 7–30 cm σ . Bark dark brown, coarsely shredded longitudinally. Branchlets slender, glabrous, laxly leaved. *Leaves* lanceolate or oblong, more rarely elliptic-lanceolate, gradually tapering into an acuminate or caudate apex, the very tip bluntish, base cuneate to attenuate, with 1 or 2 pairs of minute impressed marginal glands at some distance from the petiole, entire, sparsely glandular-punctate beneath, glabrous, mature ones shining and deep-green above, much paler green beneath, young ones reddish and pendulous, 3–5.5 by 1.5–2 cm, midrib a little depressed above, prominent beneath, nerves in 1–2 basal and 4–5 upper, more pinnately spreading nerves, all anastomosing, faintly raised above, more distinctly so beneath, reticulation fine and dense, conspicuously prominent on both faces or mostly beneath only; petiole grooved above, 2–3 by c. 1 mm. *Racemes* from the upper 4–6 axils, suberect or somewhat recurved, laxly 8–15-flowered; rachis very slender, glabrous, 3–5 cm, eperulate in flowering time. Pedicels slender, usually recurved, glabrous or very sparsely glandular-hairy, 4–7 mm; bracts and bracteoles not seen. *Calyx* tube broadly cup-shaped, glabrous, 1 mm, limb spreading, 1 mm, lobes broad-ovate, blunt, ciliate, 1 mm, with a callous apical gland. *Corolla* broadly cylindrical-urceolate, glabrous outside, laxly hairy in the lower half inside, whitish, thin, faintly honey scented, 5–6 by c. 2.5 mm, lobes obtuse, recurved, 1 mm. *Stamens* 8–12, mostly 10; filaments linear, broadened towards the base, densely hairy, 2.5 mm; cells oblong-ovoid, 0.5 mm, with 2 short or very short dorsal spurs; tubules nearly as wide as the cells, cylindrical, 0.3 mm, with a few sessile or shortly stalked glands or gland-tipped hairs (which may occur also on the cells), transversely cut apically, the pore round, a little flaring. *Disk* laxly pubescent. *Style* columnar, glabrous, finally somewhat exerted. Immature *fruit* subglobose, green, c. 3 mm σ , crowned by the pubescent disk.

Distr. *Malesia*: Philippines (Mindanao: Mt Apo, Mt Katanglad), twice found.

Ecol. On ridges in the mossy forest, 1980–2370 m. *Fl.* April, Sept.

Vern. *Mandalágong*, Bag.

136. *Vaccinium goodenoughii* SLEUM. Blumea 11 (1961) 69.

High climbing large liana, branches subpendent. Branchlets obtusangular and papillose-puberulous in the youngest, early glabrescent and corticate in the older parts. *Leaves* scattered, lanceolate or oblong-elliptic, apex subcaudate-acuminate for

1–1.5 cm, the very tip bluntish, base \pm broadly attenuate into the petiole, basal pair of marginal glands small and found near the petiole, subcoriaceous, rather firm, glabrous, somewhat lustrous beneath, entire, flat or minutely revolute at the very edge, (4–)4.5–6.5 by (1.5–)2–3 cm, midrib narrowly sunken above, prominent beneath, nerves in 2 basal or slightly suprabasal, high curved-ascendent, and 1–2 upper shorter pairs, all anastomosing and equally raised on both faces, reticulation dense, slightly prominent above, often more distinctly so beneath; petiole rather slender, flattened, grooved above, 3–4 by by c. 1 mm, initially puberulous. *Racemes* from the upper 2 or 3(–5) axils, suberect or more spreading, rather laxly 8–15-flowered, eperulate in anthesis; rachis angular, slender, quite glabrous, 2.5–4(–5) cm. Pedicels rather slender, glabrous, 4–6 mm; bract generally caducous in anthesis, oblong, membranous, 6–8 by 2–3 mm; bracteoles not seen. *Calyx* tube broadly cup-shaped, base rounded, glabrous, shining, 1 mm, limb very low, hardly properly lobed, or wavy, ciliate, with 5 rather thick glands instead of the lobes. *Corolla* tubular-urceolate, gradually narrowed towards the apex, white, membranous, glabrous on both sides, 5–6 mm long, below 3 mm, distally 2 mm ϕ , lobes reflexed, hardly 1 mm. *Filaments* subulate, hairy, c. 2 mm; anther-cells broadly subovate-oblong, 0.8 mm; tubules cylindrical, tube 0.2–0.3 mm, with a few short glandular hairs or here and there with a subsessile gland, obliquely cut apically, back wall of each tubule extended into an erect beak, 0.3–0.4 mm. *Disk* thick, glabrous. *Style* columnar, glabrous, 4–5 mm.

Distr. *Malesia*: NE. New Guinea (Goodenough I.), once found in ridge forest, 1600 m. *Fl.* Oct.

137. *Vaccinium hellwigianum* SLEUM. Bot. Jahrb. 72 (1942) 260; Blumea 11 (1961) 70. — *V. acutissimum* (non F. v. M.) WARB. Bot. Jahrb. 16 (1892) 15; K. SCH. & LAUT. Fl. Schutzgeb. (1900) 488; SCHLTR, Bot. Jahrb. 55 (1918) 182.

Small shrub or treelet, sometimes epiphytic. Branchlets divaricate, rather slender, striate and glabrous, early greyish corticate. *Leaves* lax, ovate-lanceolate to ovate-oblong, apex long and rather gradually caudate-acuminate, tip subsacute or bluntish, base broadly attenuate to almost rounded, provided on each side with one marginal small gland at the very base and another one 1–3 mm higher, subcoriaceous, glabrous, entire, edge slightly revolute, 4–5.5 by 1.2–1.8(–2) cm, midrib slightly or not immersed above, always a little raised beneath, nerves in 2–3 basal and slightly suprabasal, high curved-ascendent pairs, another 2 or 3 shorter, more pinnate, spreading ones from the upper part of the midrib, all anastomosing, mostly rather obscure above, generally slightly raised beneath, reticulation rather fine and dense, only prominent beneath; petiole c. 3 by 0.7 mm. *Racemes* from several upper axils, \pm spreading, 8–12-flowered; rachis slender, glabrous, 2.5–3 cm, eperulate at anthesis. Pedicels rather slender, 4–6 mm; bracts and bracteoles not seen. *Calyx*

tube subcampanulate, base often \pm truncate, rugulose, shining, glabrous, 1–1.5 mm, limb 0.5(–0.7) mm, 5-lobed almost to the base, lobes broadly ovate-deltoid, erect, apex roundish obtuse, whether or not ciliolate, apical gland distinct. *Corolla* subcylindric, gradually narrowed upwards, fleshy, glabrous, 6–7 by 1.5–2 mm, pink to red, lobes obtuse, very short. *Filaments* linear-subulate, hairy, 2 mm; anther-cells oblong, 0.7 mm, no spurs; tubules in all \pm as long as but much narrower than the cells, cylindrical, divergent, obliquely cut apically, pore elliptic, back wall of each tubule protracted into a kind of hollow, obtuse beak, which equals the proper tube of the tubule in length and bears a few stalked or sessile glands. *Disk* glabrous. *Style* slenderly columnar, glabrous, c. 5.5 mm, not exerted. *Fruit* depressed-globose, 5–6 mm ϕ at full maturity, blackish-purplish, crowned by the annular disk and the very short tooth-like and appressed calyx lobes.

Distr. *Malesia*: East New Guinea (Finisterre Mts and Mt Saruwaged-Sattelberg area).

Ecol. In forest, 1400–2300 m. *Fl.* Febr., Oct.

138. *Vaccinium psammogenes* SLEUM. Bot. Jahrb. 72 (1942) 260; Blumea 11 (1961) 70.

Scandent shrub or canopy liana, bark reported to be fibrous. Branchlets slender, dark reddish when dry, glabrous, striate lengthwise. *Leaves* lax, elliptic or subovate-elliptic, apex shortly subabruptly and subacutely or obtusely acuminate for 1–1.5 cm, base generally \pm rounded, marginal gland on each side very close to the petiole and not much conspicuous, subcoriaceous or thin-coriaceous, glabrous, shining on both faces, entire, margin showing here and there a minute glandular, not impressed point, flat or subrevolute on the very edge, 4.5–6 by 2.3–3 cm, midrib faintly sunken above, obtusely prominent beneath, nerves c. 6 pairs, 3–4 of them from and a little from above the base, rather steeply ascending, the other ones from the upper part of the midrib, \pm subparallel to the basal ones, all anastomosing and slightly raised on both faces, reticulation dense and finely raised beneath, not much perceptible above; petiole flattened, 5–6 by c. 1 mm. *Racemes* from the upper 4–6 axils, rather laxly 10–15-flowered; rachis slender, quite glabrous, (3–)4–5 cm, eperulate at anthesis. Pedicels very slender, glabrous, 5–6(–7) mm, bract ovate-acuminate, thin, very early caducous, bracteoles not seen. *Calyx* tube cup-shaped, base truncate, glabrous, 1 mm, limb 0.5–0.7 mm, deeply 5-lobed, lobes deltoid, subsacute, ciliate, small apical gland generally distinct. *Corolla* tubular-urceolate, thin, white, c. 6 by 2 mm, glabrous or papillose outside, short-hairy in the lower part inside, lobes obtuse, reflexed, c. 1 mm. *Filaments* filiform, hairy especially in the lower part, c. 3 mm; anther-cells broad-oblong, c. 0.7 mm, no spurs; tubules cylindrical, erect, c. 1 mm in all, very obliquely cut apically, pore oval, back wall of each tubule extended into a kind of tooth or beak which is \pm twice as long as the proper very short tube of the

tubule, and bears a few stalked or sessile glands. *Disk* much prominent, glabrous. *Style* slender, glabrous, 5 mm, finally a little exerted. *Fruit* globular, c. 5 mm σ , crowned by the very short inflexed calyx lobes and the low disk.

Distr. *Malesia*: East New Guinea (Morobe Distr.: Sattelberg region), 600–1220 m; once found at the Fly R. near the d'Albertis junction at a very low altitude.

139. *Vaccinium longiporum* SCHLTR, Bot. Jahrb. 55 (1918) 178, f. 11; SLEUM. *ibid.* 72 (1942) 259; Blumea 11 (1961) 70.

Erect shrub, 50–90 cm, laxly branched. Branchlets very slender, glabrous, laxly leaved. *Leaves* lanceolate, or rarely elliptic-lanceolate, apex caudate-acuminate, sometimes a little curved, tip bluntish, base broadly attenuate, with a rather conspicuous marginal gland at c. 1 mm from the petiole on each side, subcoriaceous, glabrous, rather glossy on both faces, entire, edge slightly recurved, 5–7 by 1.4–2 cm, 5-plinerved, nerves curved-ascending to the top of the lamina, other shorter nerves, raising more pinnately from the upper part of the midrib, much less conspicuous, all slightly prominent on both faces, reticulation dense, equally, though more finely raised on both sides; petiole slender, c. 3 mm. *Racemes* solitary from the upper 2 axils, laxly 5–10-flowered, flowers nodding to one side; rachis very slender, laxly set with muriculate glands or short gland-tipped, subappressed hairs, otherwise \pm puberulent, 4–6 cm, eperulate. Pedicels slender, showing the indument found on the rachis, 4–7 mm. *Calyx* tube obconical or subcampanulate, glabrous, hardly 1 mm, limb spreading, 1 mm, 5-lobed to nearly the base, lobes ovate-acuminate, ciliate, whether or not provided with a small apical gland. *Corolla* elongate-urceolate, 6–7 mm long, 2.5 mm σ below, 1.5 mm σ distally, glabrous at both sides, membranous, pale pink, lobes ovate, recurved, c. 1 mm. *Filaments* subulate, hairy in the lower dilated half, 2 mm; anther-cells broad-oblong, 0.8 mm, no spurs; tubules gradually narrower than the cells, c. 0.7 mm, divergent, very obliquely cut distally, the upper $\frac{1}{2}$ to $\frac{3}{4}$ of each tubule extending into a tooth-like, erect, shortly bifid end, which bears a few stalked glands and also an apical minute sessile gland, the pore elongate. *Disk* glabrous. *Style* slender, glabrous, 5.5–6 mm.

Distr. *Malesia*: East New Guinea (Finisterre Mts), once found.

Ecol. Terrestrial on rocks, epiphytic on solitary trees, on open slopes, c. 1100 m. *Fl.* July.

140. *Vaccinium acutissimum* F. v. M. Trans. R. Soc. Vict. 1, 2 (1889) 15; WRIGHT, Kew Bull. (1889) 102; SLEUM. Bot. Jahrb. 72 (1942) 259; Blumea 11 (1961) 70.

var. acutissimum.

Shrub or small tree, 2–4 m. Branchlets angular, striate, glabrous, early greyish corticate, subdensely leaved. *Leaves* ovate to oblong- or lanceolate-ovate, apex subabruptly subcaudate-acuminate,

bluntish by a minute apical gland, base very broadly attenuate or mostly rounded, the pair of basal marginal glands thickish, impressed, found rather near the petiole, coriaceous, stiff, bright and pale red when young, laxly glandular-muriculate beneath, otherwise glabrous, 2.3–3 by 1–1.7 cm, entire, edge mostly much revolute in the lower part, midrib strongly impressed above, prominent beneath, nerves 2 basal or somewhat suprabasal, high curved-ascending pairs, and several shorter, \pm pinnate upper pairs, all nerves obscure above, faintly raised beneath as is the rather lax reticulation; petiole (2–)3–4(–5) by 1–1.5 mm. *Racemes* from the upper 2 or 3 axils, close together, suberect, laxly 5–8-flowered, glabrous; rachis angular, stoutish, (2–)3–4 cm, with several ovate-acuminate stiff small perulae. Pedicels curved, rather slender, but firm, 6–10 mm. *Calyx* often shining, tube almost hemispheric, base subtruncate, 1–1.5 mm, limb 5(–6)-lobed nearly to the base, erecto-patent, lobes ovate-triangular, obtuse, ciliate, thick apical gland well visible, c. 1.5 mm, inflexed after anthesis. *Corolla* urceolate, fleshy, glabrous outside, laxly hairy below inside, deep red, paler inside, 5–6 by c. 2.5 mm, lobes obtuse, 1–1.5 mm. *Filaments* linear, dilated towards the base, subdensely hairy below, glabrescent upwards, 1.5 mm; anther-cells oblong, 1–1.3 mm, no spurs; tubules cylindrical, a little narrower than the cells, 0.5–0.7 mm, obliquely cut apically, back wall extending into 1 or 2 \pm short, \pm reflexed teeth and set with a few stalked glands or gland-tipped short hairs, which are sometimes also found on the cells. *Disk* glabrous. *Style* slender, glabrous, finally much exerted.

Distr. *Malesia*: East New Guinea (SE. part of the Main Range: Mts Musgrave, Albert Edward and Scratchley).

Ecol. In forest, on slopes, 2800–3960 m. *Fl.* May–July.

var. pilosistylum SLEUM. Blumea 11 (1961) 70.

A bushy shrub, c. 1 m high, with red flowers. *Disk* hairy and *style* laxly so up to almost the middle, otherwise hardly different from *var. acutissimum*. Similar in habit to *V. cruentum* which, however, has a glabrous disk and style, and no sessile glands or gland-tipped short hairs at the tubules.

Distr. *Malesia*: East New Guinea (Mt Otto), once in alpine grassland on the summit, 3540 m. *Fl.* Aug.

141. *Vaccinium carneolum* SLEUM. Bot. Jahrb. 72 (1942) 262; Blumea 11 (1961) 70.

var. carneolum.

Small tree or shrub, terrestrial and sometimes scandent, or epiphytic, up to 5 m. Branchlets glabrous, obtusangular and longitudinally striate in the youngest, subterete in the older parts. *Leaves* lax, lanceolate to lanceolate-ovate, apex \pm long (1.5–3 cm) caudate-acuminate, the tip bluntish or subacute, base cuneate to rather broadly attenuate into the petiole, lower pair of basal glands at or very near the apex of the petiole,

upper one 5–8 mm higher, \pm coriaceous, firm, glabrous, shining especially above, entire, flat or but slightly revolute at the very edge, (4.5–)5–9 (–10) by (1.5–)2–3(–3.5, rarely –4) cm, midrib a little prominent or impressed above, obtusely raised in the lower part, \pm evanescent upwards beneath, 5–7(–9)-plinerved, with a few upper and shorter nerves from the midrib, all anastomosing and somewhat raised on both faces, or sometimes subobscure above, reticulation fine and dense, raised on both sides or certainly so beneath; petiole 5–7(–8) by c. 1 mm. *Racemes* from the upper 3–5 axils, suberect or spreading, laxly (8–)10–15(–18)-flowered; rachis angular, glabrous or minutely puberulent as are the pedicels, rather slender, (3.5–)5–7(–8) cm, eperulate at anthesis. Pedicels rather slender and curved, 6–8(–11) mm, bracteoles not seen. *Calyx* tube broadly campanulate, base \pm truncate, glabrous or minutely puberulous, sometimes with sparse muriculate glands especially at the base, c. 1 mm, limb \pm patent, 5-lobed almost to the base, lobes ovate, apex rounded, sometimes subtretuse, apical gland conspicuous, \pm glabrous dorsally, ciliolate, 1.5–2 mm. *Corolla* elongate, narrowly subabruptly attenuate for 2–3 mm distally, rather fleshy, glabrous or practically so outside, laxly hairy in the lower part inside, 7–8(–9) by 2.5 mm, white or greenish white, or mostly pink or rose red, lobes obtuse, reflexed, c. 1 mm. *Filaments* linear-subulate, densely hairy, 2.5–3 mm; anther-cells broad-oblong, 0.8(–1) mm, no dorsal spurs; tubules broad-cylindrical, \pm as wide as the cells, 0.5 mm, at a distinct angle with the cells, with some sparse short gland-tipped hairs or sessile glands, obliquely cut apically, back wall of each tubule extending into a short simple or bifid tooth or bristle, which is spreading or reflexed and bears an apical gland. *Disk* glabrous or very laxly pubescent. *Style* slenderly columnar, glabrous, 1–2 mm exerted at full anthesis. *Fruit* globular, c. 6 mm ϕ .

Distr. *Malesia*: East New Guinea (Morobe, Central and Milne Bay Distr.).

Ecol. In mountain forest or on forest edges, 915–2895 m, also in ravines and as secondary growth on old garden clearings, locally abundant. *Fl.* Jan.–Dec.

Vern. *Kez*, Ueli; *Movoi*.

Uses. Timber hard, used as fence stakes and as a piece of wood upon which to beat out bark cloth pubic girdles (Kunimaipa valley).

var. nesophilum SLEUM. *Blumea* 11 (1961) 70.

Leaves slightly smaller than in *var. carneolum*, 4–6.5 by 1.5–2.5 cm, sub-5-plinerved, nerves more spreading. *Corolla* subventricose-urceolate, slightly and gradually narrowed upwards, 7–8 by c. 3 mm.

Distr. *Malesia*: SE. New Guinea (Louisiade Arch.: Misima I., Mt Sisa), in rain-forest, 350 m.

142. *Vaccinium albicans* SLEUM. *Bot. Jahrb.* 72 (1942) 261; *Blumea* 11 (1961) 71; *ibid.* 12 (1963) 129.

KEY TO THE VARIETIES

1. Corolla (8–)9–10(–11) mm. Calyx and pedicel glabrous. 1. *var. albicans*
1. Corolla up to 7 mm.
 2. Calyx and pedicels glabrous
 2. *var. pseudopsammogenes*
 2. Calyx and pedicels laxly short-pubescent
 3. *var. pubens*

1. *var. albicans*.

Dense shrub or bushy treelet, up to 12 m. Branchlets slender, angular, striate, shining, glabrous, sometimes pendent, laxly or subdensely leaved. *Leaves* ovate-elliptic to ovate-lanceolate, sometimes lanceolate-oblong, apex subabruptly shorter or longer subcaudate-acuminate, tip bluntish, base gradually narrowed into the petiole, with a pair of distinct, marginal, impressed glands at the very base, and few to rather many less conspicuous, though markedly impressed glands along the thus subtire or remotely subrenulate margin, coriaceous to subcoriaceous, glabrous and \pm lustrous, edge a little or not revolute, (5–)6–9 (–10) by (2–)2.5–3.5(–4.5) cm, midrib rather flat above, obtusely prominent beneath, nerves 2(–3) basal and 2–3 suprabasal or upper pairs (the latter from up to the middle of the midrib), all steeply curved-ascending and subparallel, anastomosing, slightly raised at both faces, reticulation subdense, faintly visible above, more conspicuous beneath; petiole flattened, 5–7(–8) by c. 1 mm. *Racemes* from the upper 3–5 axils, suberect, generally laxly many-flowered; rachis angular, glabrous, 4–6(–7) cm, eperulate at anthesis. Pedicels rather slender, glabrous, 0.8–1.1(–1.3) cm, bract oblong, thin, 8–12 by 3 mm, very early caducous; bracteoles not seen. *Calyx* tube cup-shaped, glabrous, 1.5 mm, limb \pm spreading, deeply 5-lobed, lobes subdeltoid, obtuse, ciliate, c. 1 mm, apical gland mostly callose. *Corolla* tubular-urceolate, white, sometimes with greenish or pink tinge, membranous, (8–)9–10(–11) by 3–4 mm, glabrous at both sides, lobes obtuse, suberect to reflexed, 1–1.3 mm. *Filaments* subulate, densely hairy, c. 3 mm; anther-cells broad-oblong, c. 1.2 mm, no dorsal spurs; tubules cylindrical, a little narrower than the cells, \pm erect and divergent, 0.5–0.7 mm, with several (rarely but 2 or even 1, hardly recognizable) substipitate glands or short gland-tipped hairs, \pm obliquely cut apically, back wall extending into 1 or 2 short, \pm reflexed teeth. *Disk* glabrous. *Style* columnar, glabrous, equalling the corolla. *Fruit* subglobose, blackish purple when ripe, up to 6 mm ϕ , pedicel up to 1.5 cm.

Distr. *Malesia*: East New Guinea (Main Range: from the Western Highlands to the Owen Stanley Ra., and in the Mt Saruwaged-Sattelberg region).

Ecol. In lower montane forest, also in exposed secondary grass-covered spurs or slopes and in fringes of secondary forest, in *Miscanthus* re-growths, also found on creek side overhanging stream, 1065–2200 m, locally common. *Fl.* Jan.–Dec.

Vern. *Teteve*, Bulolo area.

Note. Fruits said to be not palatable in the Chimbu R. valley, but they are eaten by birds and opossum.

2. *var. pseudopsammogenes* SLEUM. *Blumea* 11 (1961) 71.

Calyx and pedicels glabrous. *Corolla* 6–7 mm, not rarely laxly hairy in the lower half inside. *Stamens* 3–3.5 mm; filaments 2 mm. *Leaves* with few subimpressed or flattish glandular points at least in the lower half of the margin.

Varietal characters possibly due to introgression of *V. psammogenes*.

Distr. *Malesia*: East New Guinea (Morobe and Central Distr.).

Ecol. In regrowth areas and near forest edges, also along stream side, 760–1615 m.

3. *var. pubens* SLEUM. *Blumea* 11 (1961) 71; *ibid.* 12 (1963) 129.

Leaves provided with a few remote distinctly impressed glands along the whole margin. *Calyx* and pedicels laxly subpatently short-hairy. *Corolla* 6–7(–8) mm, laxly hairy all over or at least on the lower half inside. *Stamens* 3–3.5 mm; filaments 2–2.5 mm; tubules very short.

Distr. *Malesia*: New Guinea (Morobe Distr.: Bulolo-Wau area).

Ecol. In grassland or on exposed sunny talus among grasses, 1065–1525 m.

143. *Vaccinium viridiflorum* J. J. S. Nova Guinea 18 (1936) 117, t. 13, f. 1; SLEUM. Bot. Jahrb. 72 (1942) 253; *Blumea* 11 (1961) 71.

Scandent shrub or liana. Branchlets elongate, subterete, densely short-pubescent. *Leaves* lax, ovate, apex subabruptly caudate-acuminate for 1.5–2.5 cm, subacute, base rounded, sometimes in part subcordate in the same specimen, with 1–2(–3) minute glands on each side impressed at the margin at some distance from the petiole, coriaceous, glabrous above, subdensely shortly and patently hairy on the midrib, less densely and still more shortly so on the whole intervenium beneath, though finally \pm glabrescent, moreover sparsely glandular-muriculate beneath, entire, (4.5–)5–8 by (2–)2.5–4 cm, midrib slightly impressed above, markedly prominent beneath, nerves 2–3 basal, high curved-ascending, and a few upper, irregular, more spreading pairs, all \pm anastomosing and faintly raised above, more distinctly so beneath; petiole rugulose, \pm pubescent, 6–8 by 1 mm. *Racemes* from the 2 or 3 uppermost axils, erecto-patent, laxly many-flowered, perulae small, ovate-acuminate, rather early caducous; rachis angular, practically glabrous, 6–8 cm. Pedicels robust, a little thickened distally, glabrous, c. 5 mm. *Calyx* quite glabrous, tube cup-shaped or semiglobose, 2 mm, limb suberect, 1–1.5 mm, 5-lobed to nearly the base, lobes deltoid, obtuse, no apical gland. *Corolla* (immature) narrow-conical, fleshy, glabrous at both sides, green, at least 9 by 3 mm (at the base), lobes apparently short and obtuse. *Filaments* linear-subulate, long patently hairy

except the glabrous very base, c. 4 mm; anther-cells (perhaps not fully developed) minute, oblong, 1 mm, no dorsal spurs; tubules erect, narrow-cylindric, 1 mm, very obliquely cut resulting in an oblong pore, back wall of each tubule extended into 2 teeth-like divergent appendices ending in a terminal capitate gland and thus similar to a gland-tipped hair. *Disk* prominent, glabrous. *Style* cylindrical, glabrous, 8 mm.

Distr. *Malesia*: West New Guinea (Rouffaer R.), in thin-stemmed primary forest at c. 250 m. One collection. *Fl.* Sept.

144. *Vaccinium aitapense* SLEUM. *Blumea* 12 (1963) 128.

Treelet, glabrous in all outer parts. Branchlets subterete, slender. *Leaves* lax, lanceolate-oblong, mostly widest just below the middle, apex caudate-acuminate for 2–3 cm and mostly slightly falcate, subacute, base cuneate, the very base contracted and somewhat revolute for 2–3 mm, the strictly basal gland on each side thickish and a little prominent, subcoriaceous, \pm shining, entire, flat, 5–8 by (1.5–)1.8–2.5(–3) cm, 5–7-plinerved from and from up to 1.3 cm above the base, midrib prominent beneath, basal and subbasal nerves high-ascending and curved, other upper nerves or veins from the midrib few, shorter and less curved, all nerves anastomosing, hardly prominent above in mature leaves, visibly so beneath, reticulation rather dense and slightly raised, especially beneath; petiole slender, 4–5 by c. 1 mm. *Racemes* from several upper, leaf-bearing, and lower, already defoliate axils, erecto-patent, rather many-flowered; rachis slender, 2.5–4 cm, perulae not known. Pedicels slender, 3–4(–5) mm, bract and bracteoles apparently very early caducous. *Calyx* tube broadly cup-shaped, hardly 1 mm, limb spreading, lobes triangular-ovate, ciliolate, 0.5 mm, no apical gland. *Corolla* urceolate-tubular, thin, pink, glabrous at both sides, (3.5–)4 by c. 2 mm, lobes reflexed, 0.5 mm. *Filaments* subulate, villous in the lower third, glabrous otherwise, 2 mm; anther-cells narrow-oblong, papillose, 0.5–0.6 mm; tubules almost as wide as the cells, \pm divergent, very obliquely cut apically, back wall extended into a long beak, c. 1 mm long in all, sometimes or in part with a single stipitate minute gland. *Disk* glabrous, thick, 0.5 mm high. *Style* slender, glabrous, 4 mm, a little exerted at full anthesis.

Distr. *Malesia*: East New Guinea (Sepik Distr.: Aitape), in tall forest, 245 m. One collection. *Fl.* Aug.

Vern. *Wali*, Orne: Wantipi.

145. *Vaccinium simulans* SLEUM. Bot. Jahrb. 71 (1940) 165; *Blumea* 11 (1961) 72; *ibid.* 12 (1963) 129.

var. simulans.

Tree, 10–15(–30) m, 30–60 cm σ , scandent shrub, or occasionally epiphytic. Branchlets stoutish, young parts angular and striate, laxly leaved; axillary buds subglobular, 2–3 mm σ , perulae

broadly ovate or suborbicular, apex rounded-obtuse. *Leaves* oblong-elliptic or mostly subobovate-elliptic, apex very broadly attenuate and obtuse, or rounded, base \pm cuneate, the pair of basal marginal glands remote from the petiole and subinconspicuous, coriaceous, rather stiff, glabrous except the sparse glandular-muriculate hairs beneath, which are reduced to glandular points in mature leaves, a little shining, entire, edge subrevolute, (4-)5-8 by (2-)2.5-4(-4.5) cm, midrib sunken above, thick-prominent and as wide as the petiole beneath, gradually narrowed and less prominent upwards beneath, nerves 1-2 basal and 4-5(-6) more spreading and pinnate upper pairs, all rather steeply ascending, anastomosing and faintly raised on both faces, or not rarely rather inconspicuous or even obscure especially beneath, reticulation lax, mostly but faintly visible; petiole flattened, grooved above, rugulose, (4-)5-8 by 1.5-2 mm. *Racemes* from the upper 4-6 axils, spreading, subdensely many-flowered, flowers \pm second; rachis rather stoutish, angular, glabrous, (4-)5-8(-11) cm, eperulate in flowering time. Pedicels rather robust, glabrous, (1-)1.5-2(-3) mm, bracts and bracteoles not seen. *Calyx* tube subsemiglobose, 1-1.5 mm, limb spreading, deeply 5-lobed, lobes deltoid, obtuse, 1 mm, the apical gland rather small, furthermore provided with a row of several (2 or 3 on each side) marginal sessile, not rarely early caducous glands. *Corolla* urceolate, rather fleshy, white or pink, often with greenish tinge, glabrous outside, very shortly hairy in the lower part inside, 4-5 by 2.5 mm, lobes obtuse, reflexed, almost 1 mm. *Filaments* subulate, villous, 1.8 mm; anther-cells oblong, very granular, 0.6 mm, with 2 short dorsal spurs; tubules divergent, cylindrical, narrower than the cells, 0.5 mm, subobliquely cut apically, with several subsessile dark glands or very short gland-tipped hairs. *Disk* mostly densely hairy, sometimes \pm glabrescent. *Style* thickish, 4 mm, densely subpatently hairy in the lower half. Submature fruit subglobular, c. 4 mm ϕ .

Distr. *Malesia*: Borneo (Mt Kinabalu).

Ecol. A tree in primary forest ridge, or strangler on forest trees as *Horsfieldia*, or climbing and/or epiphytic on high trees as *Shorea*, 1220-1830 (-2750?) m, not rare. *Fl.* March-May.

var. leptopodum SLEUM. *Blumea* 11 (1961) 72. Pedicels more slender, almost filiform, (3-)4-6 mm at anthesis. *Calyx* smaller than in *var. simulans*, its limb lower, more shortly 5-lobed or wavy. *Corolla* 5 mm.

Distr. *Malesia*: Borneo (Mt Kinabalu) with *var. simulans*, 1065-1585 m. *Fl.* June.

146. *Vaccinium mjoebergii* J. J. S. Bull. Jard. Bot. Btzig III, 13 (1935) 461; SLEUM. *Blumea* 11 (1961) 72.

Large epiphytic, \pm climbing shrub. Branchlets rather robust, angular, \pm densely short-pubescent, subdensely leaved; axillary buds subglobular, 2-3 mm ϕ , perulae broadly ovate, obtuse. *Leaves* oblong or obovate-elliptic, apex obtuse to rounded,

base cuneately narrowed into the petiole, the pair of basal marginal glands obscure, coriaceous, glabrous except the very base, which is sometimes pubescent, laxly glandular-muriculate or -punctate beneath, margin entire, \pm revolute, 5-7.2 by 2-3.2 cm, midrib narrowly impressed especially towards the base above, strongly obtusely prominent beneath, nerves 1-2 basal, and 5-6 upper pinnate, suberect to almost spreading pairs, anastomosing, a little raised on both faces, reticulation lax and faintly visible; petiole somewhat flattened, grooved above, puberulous initially, 3-4 by 1-1.5 cm. *Racemes* in the upper 2-4 axils, erect, subdensely 15-25-flowered; rachis rather slender, densely short-pubescent as are the pedicels, 3-3.5 cm, perulae suborbicular to ovate, up to 5 by 4 mm. Pedicels rather robust, curved, c. 1.5 mm. *Calyx* small, tube campanulate, laxly hairy at the base, 1 mm, limb spreading, 1 mm, lobes deltoid, with a rather callous apical gland. *Corolla* urceolate, thin, colour not known, glabrous outside, laxly hairy in the lower half inside, 4(-5) by 2 mm, lobes recurved, very short. *Filaments* linear, dilated below, subdensely hairy, 1.8 mm; anther-cells oblong, 0.5 mm, with 2 short dorsal spurs; tubules cylindrical, as long and wide as or a little longer than the cells, with a few short gland-tipped hairs, \pm transversely cut apically, back wall of each tubule sometimes extended into a minute tooth. *Disk* hirtellous. *Style* c. 2.5 mm, hairy in the lower half.

Distr. *Malesia*: Central Borneo (Mts Batu Tiban and Kemul).

Ecol. In primary forest, 1700-1850 m.

147. *Vaccinium pachydermum* STAPF, Trans. Linn. Soc. II, Bot. 4 (1894) 189; MERR. En. Born. (1921) 467; Sarawak Mus. J. 3 (1928) 543; SLEUM. *Blumea* 11 (1961) 72; *ibid.* 12 (1963) 129; *ibid.* 12 (1964) 343. — Fig. 108.

Erect straggly or compact shrub or small tree, up to 6 m and with bole up to 2 m and 20 cm ϕ , bark fissured, flaky. Branchlets very robust, tips obtusangular and puberulent, older parts terete and glabrous; axillary buds ovoid to suborbicular, perulae ovate, up to 2 mm. *Leaves* laxly to subdensely arranged, oblong- to obovate-elliptic, sometimes ovate, apex rounded or obtuse in general, more rarely shortly broad-attenuate or even subacuminate, base \pm cuneate and decurrent into the upper part of the flattened petiole, with one pair of thickish marginal glands at some distance from the petiole, coriaceous and stiff, glabrous, laxly glandular-muriculate or -punctate beneath, entire, edge slightly recurved especially towards the base of the lamina, (3-)5-10(-12, rarely -15) by 2.5-5(-7, rarely -10) cm, midrib \pm sunken above, much convex-prominent beneath, nerves 2(-3) basal and a little suprabasal, and 2 or 3 equally high curved-ascending though shorter pairs, all anastomosing and slightly raised on both faces, if not \pm obscure above, reticulation lax, sometimes a little raised above and/or beneath, often subinconspicuous; petiole transversely rugose, 5-8(-12) by 2-3(-4) mm. *Racemes*



Fig. 108. *Vaccinium pachydermum* STAPF. Mt Kinabalu, 2450 m, North Borneo (SLEUMER 4701) (SLEUMER, 1963).

from the upper 2-3 (rarely more) axils, \pm spreading, laxly many-flowered, with some small perulae; rachis (as are the pedicels and the calyx) generally subdensely hirtellous to subtomentose, rarely but laxly pubescent (the calyx even glabrescent then!), stoutish, 4-6(-9) cm, flowers \pm secund. Pedicels relatively slender, curved, 6-12 mm, bract lanceolate, \pm glabrous, up to 8 by 3 mm, very early caducous, bracteoles minute, slightly suprabasal, subulate. Calyx tube cup-shaped or semiglobose, green or pinkish, 2 mm, limb much spreading, 2-2.5 mm, 5-lobed almost to the base, lobes ovate-triangular, less pubescent than the calyx tube, ciliate, provided with a small apical gland and/or some sessile marginal glands. Corolla tubular-urceolate, fleshy, pink or white, fragrant, glabrous or sometimes initially laxly pubescent in the lower part outside, laxly hairy in the lower part and again at the top inside, 8-9 by (3-)-4-6 mm, lobes recurved, often flushed pink, 1.5 mm. Filaments linear, densely hairy, c. 3 mm; anther-cells oblong, echinulate, 1.5 mm, with 2 short dorsal spurs, tubules cylindric, as wide as the cells, erect, c. 1 mm, transversely cut apically, set with several gland-tipped hairs. Disk densely hairy. Style slender, hairy in the lower $\frac{3}{4}$, c. 8 mm. Mature fruit depressed-globose, 6-7 mm σ , dark green, finally blue, all over pubescent, crowned by the erect calyx lobes and the prominent disk, pedicel up to 2 cm.

Distr. *Malesia*: Borneo (Mt Kinabalu; Mts

Kalulong, Dulit, Mulu and Murud in Sarawak).

Ecol. In open moss forest, on exposed peak or dry ridge, on barren and stony open places, or in scrub forest, (1200-)1800-3000(-3350) m, with smaller and sometimes glabrescent leaves in high altitudes. Fl. fr. Jan.-Dec.

Vern. *Kongkong bela*, Kenyah: Mt Kalulong.

148. *Vaccinium elliptifolium* MERR. J. Str. Br. R. As. Soc. n. 76 (1917) 104; En. Born. (1921) 467; SLEUM. Blumea 11 (1961) 72; *ibid.* 12 (1963) 129.

Erect shrub or small tree. Branchlets subterete, densely clad with a short tomentum, subdensely to laxly leaved; axillary buds consisting of a few subsubulate perulae, 3-4 mm. Leaves elliptic, or sometimes in part obovate-elliptic in the same specimen, apex obtuse or not rarely minutely emarginate, base broadly attenuate to rounded, basal marginal glands in 2-5 mm from petiole, coriaceous, a little shining, pubescent at the very base and the lower half of the midrib, and laxly glandular-punctate beneath, otherwise glabrous, entire, margin \pm revolute, 2-4 by 1.3-2.5(-3) cm, midrib markedly sunken above, prominent beneath, nerves 3-4 sharply ascending and anastomosing pairs (the lower 1 or 2 from the base), faintly impressed above, raised beneath, reticulation obscure above, very fine, rather dense and mostly well visible beneath; petiole rugose, 2-3 by 1.5 mm. Racemes from the upper 1 or 2 axils, laxly 6-10-flowered; rachis rather slender, \pm densely cinereous-villous as are the pedicels and the calyx tube, 2-3 cm. Pedicels stoutish, c. 5 mm in anthesis, up to 7 mm in fruit, with 2 basal, subsistent, acicular bracteoles, 1-1.5 mm; bract not seen. Calyx tube subglobose-cylindric, c. 1.5 mm, limb erect, deeply 5-lobed, lobes narrow-deltoid, acute, glabrescent, reddish, ciliate and set with a few marginal, yellowish, thickish, partly caducous glands, but no proper apical gland. Corolla urceolate, 7-9 by 3 mm, glabrous outside, somewhat villous inside, carmine, lobes recurved, ovate, obtuse, 1 mm. Filaments subulate, villous, 3 mm; anther-cells oblong, not spurred, 1 mm; tubules stout, as wide as the cells, hardly 0.5 mm, truncate distally, with a few gland-tipped hairs, pore round, its margin subrevolute. Disk hairy. Style villous in the lower $\frac{1}{2}$ - $\frac{2}{3}$, 8-9 mm. Submature fruit ovoid-subglobose, rather densely pubescent, crowned by the erect calyx lobes, said to be green with purplish tinge.

Distr. *Malesia*: Borneo (Mt Kinabalu).

Ecol. In ridge forest, 1220-2285 m. Fl. July.

149. *Vaccinium endertii* J. J. S. Bull. Jard. Bot. Btzg III, 13 (1935) 462; SLEUM. Blumea 11 (1961) 72.

Large shrub, up to 6 m, more or less epiphytic. Branchlets stoutish, young parts a little flattened or obtusely angular, quite glabrous, laxly leaved; axillary buds ovoid-oblongoid, perulae ovate-lanceolate, acute, 5-6 mm. Leaves obovate-elliptic, sometimes almost obovate, apex very broadly attenuate, obtuse, not rarely nearly rounded, base rounded to subcordate, marginal glands at a short

distance from petiole, coriaceous, rigid, glabrous, laxly glandular-muriculate or -punctate beneath, shining above, entire, 4.5–9.5 by 2.5–4.3 cm, 7–9-plinerved, midrib \pm sunken above, strongly prominent beneath, nerves 3(–4) basal and slightly suprabasal, steeply ascending pairs, with a few shorter ones from the upper part of the midrib, all anastomosing and slightly prominent on both faces, reticulation lax, not much conspicuous, raised especially beneath; petiole 4–5 by c. 1.5 mm. *Racemes* axillary, shortly peduncled, laxly 8–15-flowered, flowers secund; rachis angular, quite glabrous, 5–8.3 cm. Pedicels curved, terete, robust, glabrous, 9–12 mm, bracts and bracteoles not seen. *Calyx* glabrous, tube cup-shaped, rugulose, 2 mm, limb subpatent, fleshy, deeply 5-lobed, lobes subdeltoid, 1.5 mm, obscurely or not ciliate, apex blunt by a thickish gland. *Corolla* tubular-urceolate, fleshy, greenish white with red base, glabrous outside, subdensely pubescent in the lower half inside, 10–12 by 3–4 mm, lobes reflexed, obtuse, 1.5 mm. *Filaments* linear, base dilated, almost villous, 3–4 mm; anther-cells oblong, echinulate, 1.5 mm, manifestly 2-spurred dorsally; tubules cylindric, narrower than the cells and at a wide angle with them, 1 mm, nearly transversely cut apically, provided with several gland-tipped hairs. *Disk* pubescent. *Style* columnar, rather densely pubescent to the lower $\frac{3}{4}$, 9–10 mm. *Fruit* globular, c. 8 mm \varnothing (dry).

Distr. Malesia: Central Borneo (Amait, Mt Kemul) and Sarawak (Ulu Mujong).

Ecol. In primary ridge forest, on stony, humus-covered ground, c. 1000 m. *Fl.* Oct.

150. *Vaccinium camiguinense* MERR. Philip. J. Sc. 7 (1912) Bot. 321; En. Philip. 3 (1923) 248; COPEL. f. Philip. J. Sc. 42 (1930) 578; SLEUM. Blumea 11 (1961) 72.

Small glabrous tree. Branchlets 3–5 mm \varnothing , subterete, subdensely leaved; axillary buds oblongoid, 4–6 mm, perulae subulate. *Leaves* oblong to obovate-elliptic, or narrowly oblong-obovate, apex shortly subacuminate-attenuate, obtuse, base gradually attenuate into the very short and broadened petiole, subsessile, with a pair of thick and prominent basal and another much smaller and impressed one at a few mm distance on the margin, coriaceous, rather rigid, glabrous, laxly glandular-muriculate or -punctate beneath, entire, very edge subrevolute, (3.5–)5–8 by (1.5–)2–3.5 cm, midrib sunken above, broadly and obtusely prominent in the lower part, less so upwards beneath, nerves 2–3 basal and somewhat suprabasal, rather straight and steeply ascending pairs, and a few much shorter ones, which leave the midrib at above the middle, all anastomosing and faintly sunken above, \pm prominent beneath, reticulation lax, mostly rather inconspicuous; petiole much flattened, 1–4 by 2–4 mm. *Racemes* from the upper 3 or 4 axils, spreading or suberect, glabrous, subdensely 10–15(–20)-flowered; rachis stoutish, (4–)5–6 cm, perulae ovate, 2 mm. Pedicels robust, curved, c. 1 cm; bract and bracteoles

not seen. *Calyx* glabrous, tube semiglobose, 1.5 mm, limb \pm spreading, 2 mm, 5-lobed almost to the base, lobes ovate-acuminate, subacute, no apical gland. *Corolla* tubular-urceolate, glabrous outside, laxly hairy below inside, c. 7 by 3 mm, lobes short. *Filaments* linear-subulate, subdensely hairy, c. 3 mm; anther-cells oblong, 1.5 mm, with a pair of dorsal spurs (0.3 mm); tubules cylindric, at an angle with and distinctly narrower than the cells, 0.6 mm, with a few sessile and/or shortly stalked glands, apex \pm transversely cut, pore a little flaring. *Disk* hairy. *Style* slender, hairy to the lower $\frac{3}{4}$, c. 6 mm. Submature *fruit* subglobose, glabrous, c. 4 mm \varnothing , crowned by the erect calyx lobes.

Distr. Malesia: Philippines (Mindanao: near the summit of Mt Mahinog on Camiguin).

Ecol. In mossy forest, c. 1000 m. *Fl. fr.* March–April.

Vern. *Manaláli*.

151. *Vaccinium clementis* MERR. J. Str. Br. R. As. Soc. n. 76 (1917) 102; En. Born. (1921) 466; SLEUM. Blumea 11 (1961) 72; *ibid.* 12 (1963) 129; *ibid.* 12 (1964) 343. — **Fig. 109.**

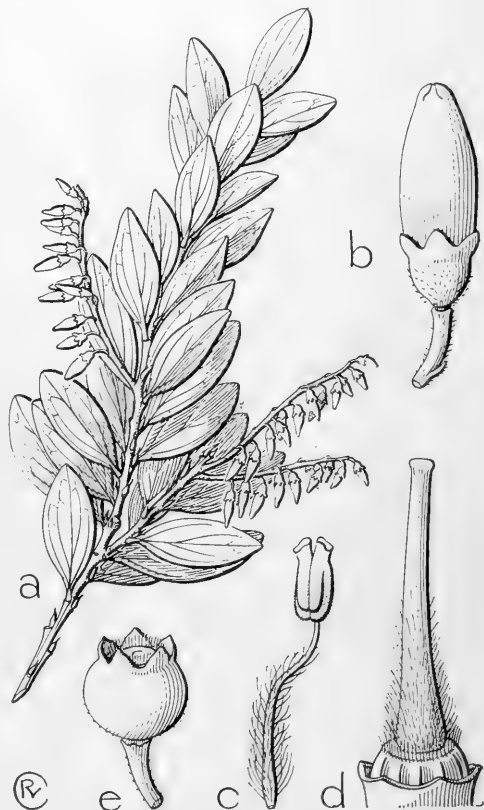


Fig. 109. *Vaccinium clementis* MERR. a. Habit, $\times \frac{2}{3}$, b. flower, late bud stage, $\times 4$, c. stamen, $\times 8$, d. ovary, disk and style, $\times 8$, e. fruit, $\times 4$ (a–e CLEMENS 32470).

Shrub or small tree, up to 12 m, sometimes epiphytic. Branchlets slender, youngest parts red, angular, clothed with a very fine patent puberulence (lens!), subdensely leaved, older parts \pm defoliate, terete, greyish brownish, early covered with a dark thin cork; axillary buds generally present, ovoid-oblongoid, perulae few, subulate, (2-)3(-5) mm. *Leaves* oblong-obovate in general, sometimes elliptic-obovate or more rarely elliptic, variable in shape and size, apex obtusely attenuate to rounded, base gradually cuneate from the middle into the petiole, with a small marginal gland on each side at 2-3 mm from the petiole, coriaceous, rather firm, glabrous, laxly minutely glandular-muriculate or -punctate beneath, entire, edge narrow-cartilaginous, slightly or not revolute, (2-)2.5-3.5(-4) by (0.8-)1.2 cm, 5-plinerved from and from a little above the base, and with 2 or 3 pairs of shorter, more spreading nerves from the upper part of the midrib, the latter mostly sunken above, raised beneath, nerves anastomosing, generally obsolete above, slightly prominent beneath, reticulation lax and mostly perceptible beneath only, not rarely almost inconspicuous on both sides; petiole 1-2 by 1(-1.5) mm. *Racemes* solitary in the upper axils, suberect or spreading, subdensely (3-)5-10(-12, rarely -15)-flowered; rachis angular, slender, finely patent-puberulent as are the pedicels at anthesis, glabrescent, 1.5-3(-4) cm, eperulate. Pedicels stoutish, mostly somewhat recurved, 3-5 mm, bract and bracteoles not seen. *Calyx* tube cup-shaped, base subtruncate or rounded, puberulent, 1.5 mm, limb suberect, deeply 5-lobed, lobes ovate, obtuse, c. 1 mm, with an apical gland and (2-)3 sessile, thick, dark, marginal glands on each side. *Corolla* tubular-urceolate, narrowed upwards, rather fleshy, white or cream, often with pink or purplish tinge, glabrous outside, hairy in the lower half inside, (6-)7-8 by 3-4 mm, lobes recurved, c. 1 mm. *Filaments* alternately 2.5 and 3 mm, subulate, densely hairy or villous; anther-cells broadly oblong-elliptic, 0.6-0.8 mm, with 2 short or sometimes almost obsolete dorsal spurs; tubules cylindrical, 0.3 mm, with a few very short gland-tipped hairs, obliquely cut apically, pore almost round. *Disk* densely hairy. *Style* rather robust, as long as the corolla, densely hairy to the lower $\frac{3}{4}$, glabrous for the rest. *Fruit* globular, 4-5 mm ϕ , blackish at maturity, crowned by the short inflexed calyx lobes and the disk, pedicel up to 1 cm.

Distr. Malesia: Borneo.

Ecol. In ridge jungle or summit vegetation in Sarawak and North Borneo at 600-1830 m, at 700 m in *Agathis* and *Quercus* forest on acid, waterlogged sand in East Borneo; in Brunei found both in stunted heath ('*kerangas*') forest or in low scrubby vegetation on almost bare sandstone rock or knife-edge sandstone ridge at 550-820 m, and gregarious in mossy forest ('elfin woodland') at 1430-1550 m. *Fl. fr.* Jan.-Dec.

Vern. *Obah ribu*, Brunei: Iban.

152. *Vaccinium palawanense* MERR. Philip. J. Sc. 3

(1908) Bot. 373; ELM. Leaf. Philip. Bot. 3 (1911) 1099; MERR. En. Philip. 3 (1923) 251, *p.p.*; COPEL. f. Philip. J. Sc. 42 (1930) 581, t. 5, f. 8-9; SLEUM. Blumea 11 (1961) 73.

var. palawanense.

Small tree or shrub, up to 6 m, sometimes epiphytic. Branchlets angular, laxly puberulent and glandular-muriculate, rather laxly leaved; axillary buds lanceolate to ellipsoid, perulae subulate, c. 3 mm. *Leaves* elliptic- or oblong-oblanceolate, apex shortly and obtusely acuminate or attenuate, base gradually narrowed or cuneate and somewhat decurrent into the petiole, with 1 or 2 pairs of basal marginal glands impressed at some distance from the petiole, coriaceous, glabrous, laxly glandular-punctate beneath, entire, subrevolute especially towards the base of the lamina, (4-)5-7 by 1.5-2(-3) cm, midrib a little sunken above, obtusely prominent beneath, nerves 2 basal or a little suprabasal high-ascending, and a few upper, more spreading and shorter pairs, all anastomosing, mostly slightly prominent on both faces, reticulation lax, less visible than the nerves, or rather obscure above; petiole somewhat flattened, pubescent, initially, 2-4(-6) by 1-1.5 mm. *Racemes* from the upper 3-5 axils, laxly 6-14-flowered; rachis slender, laxly to subdensely short-pubescent as are the pedicels, 3.5-4.5 cm, eperulate at anthesis. Pedicels slender, (4-)5-8 mm, bract and bracteoles not seen. *Calyx* glabrous, tube subsemiglobose, 2 mm, limb spreading, deeply 5-lobed, lobes deltoid-ovate, subacute, 1-1.5 mm, ciliate, provided with a fine apical gland and/or some sessile marginal glands. *Corolla* tubular, glabrous outside, laxly hairy in the lower part inside, 6-7(-8) by c. 2.5 mm, white to light pink or waxy red, fragrant, lobes deltoid, obtuse, reflexed, c. 1 mm. *Filaments* almost filiform, subdensely hairy, 2.5 mm; anther-cells broad-oblong, 1 mm, with 2 dorsal spurs curved upwards (0.5 mm); tubules broad-cylindric, as wide as the cells, 0.6 mm, subobliquely cut apically, with a few gland-tipped hairs or subsessile glands, which may occur also on the cells. *Disk* laxly hairy. *Style* slender, hairy in the lower $\frac{1}{3}$ - $\frac{1}{2}$, 7-8 mm, finally a little exerted.

Distr. Malesia: Philippines (Palawan: Mt Victoria; Mindanao: Mt Apo).

Ecol. On exposed ridges in mossy forest, 1000-1800 m.

Vern. *Iualus, kayaupang*, Bag.

var. foxworthii (COPEL. f.) SLEUM. Blumea 11 (1961) 73. — *V. foxworthii* COPEL. f. Philip. J. Sc. 42 (1930) 580, *p.p.*

Leaves (2.5-)3-4.5 by (1-)1.2-1.5 cm. Rachis, pedicels and *calyx* tube densely yellowish short-pubescent. *Stamens* c. 3 mm.

Distr. Malesia: Philippines (Palawan: once found together with *var. palawanense* on Mt Victoria), 1750 m.

Vern. *Dusóng*.

153. *Vaccinium cornigerum* SLEUM. Bot. Jahrb. 72 (1942) 259; Blumea 11 (1961) 73.

Shrub or small tree, up to 5 m, sometimes epiphytic. Branchlets subterete, youngest parts shortly greyish pubescent to subtomentose, older ones glabrescent and early covered with cork, laxly to subdensely leaved. *Leaves* ovate or elliptic-ovate, rarely more elliptic, apex rather shortly and abruptly obtusely acuminate, base broadly attenuate to almost rounded, the pair of basal marginal glands small, dark, hardly impressed, at 1–2 mm from the petiole, thin-coriaceous, \pm densely pubescent to subhirsutulous initially, glabrescent with age except the midrib and/or the base of the lamina beneath, finally even lustrous above, furthermore laxly glandular-punctate on the undersurface, becoming lustrous at full age above, entire, edge subrevolute in dry specimens, (2.5–)4–6.5 by (1.5–)2–3.5(–4) cm, midrib slightly sunken above, obtusely raised beneath, nerves 2–3 curved-ascending, basal and slightly suprabasal, and in 1–2(–3) upper and shorter, more spreading pairs, all faintly visible above and prominent beneath, reticulation subdense, inconspicuous above, finely raised beneath; petiole subterete, \pm hirsutulous initially, glabrescent, (3–)4–6 by 1–1.5 mm. *Racemes* solitary from the upper axils, laxly 5–10-flowered; rachis slender, (1.5–)2–4 cm, densely patently yellowish hirsutulous or -subvillous as are the pedicels and the calyx tubes. Pedicels rather slender, mostly recurved, (4–)6–9(–11) mm, subtending bract ovate-acuminate, glabrous, 3–4 mm, early caducous; bracteoles not seen. *Calyx* tube campanulate, 1–1.5 mm, limb \pm spreading, c. 2 mm, deeply 5-lobed, lobes deltoid, subacute, much less hairy than the tube, ciliate, the apical gland present, though sometimes less conspicuous. *Corolla* elongate-urceolate, rather fleshy, shell pink with white tip or white, laxly pubescent at the base and/or the tip initially, later glabrous outside, laxly hairy in the lower half inside, (0.9–)1–1.2 cm by c. 4(–5) mm, lobes obtuse, finally reflexed, c. 1 mm. *Filaments* subulate, densely hairy below, more laxly so distally, 4–5 mm; anther-cells oblong to ovate-oblong, granular, 1–1.5 mm, no spurs; tubules cylindrical, much narrower than the cells and at an angle with them, 0.5 mm, with several short gland-tipped hairs, back wall of each tubule extended into 1 or 2 irregular, \pm reflexed teeth. *Disk* subdensely hairy. *Style* rather thick, laxly long-hairy to at least the lower $\frac{2}{3}$, papillose for the rest, 9–10 mm.

Distr. *Malesia*: SE. New Guinea (Owen Stanley Ra. to Mt Simpson and the Daga country).

Ecol. In mossy forest on summits, edge of clearings, narrow ridges or rocky precipices, 1525–1685(–2285) m. *Fl.* Aug.–Dec.

Note. Specimens from Mt Obree, 2285–2470 m, differ slightly by having muriculate glands on pedicels and calyces besides the pubescence, and by deep red flowers; they are reported to cover a great portion of the summit there.

154. *Vaccinium besagiense* J. J. S. Med. Rijksherb. n. 30 (1916) 4, f. 2; Sp. MOORE, J. Bot. 63 (1925) Suppl. 55; SLEUM. *Blumea* 11 (1961) 73.

Erect shrub, 2–3 m. Branchlets angular, striate lengthwise and early corticate, glabrous. *Leaves* subdense, oblong-obovate, apex retuse (1 mm), base gradually cuneate into the petiole, with 1–2 pairs of basal marginal minute impressed glands at some distance from the petiole, coriaceous, glabrous, laxly glandular-punctate or -muriculate beneath, entire, edge a little wavy and revolute in dry specimens, 1.8–3 by 0.6–1.1 cm, midrib rather deeply impressed above, obtusely prominent beneath, nerves 3–4(–5) pairs, the lower 2 from and from a little above the base, the others from the upper part of the midrib, all steeply ascending and anastomosing, hardly perceptible above, faintly raised beneath as is the subinconspicuous reticulation; petiole flattened, 1–2.5 by c. 1 mm. *Racemes* from the upper axils, laxly many-flowered, shortly peduncled, 2–3 cm, flowers nodding; rachis rather slender, angular, laxly short-pubescent as are the pedicels. Pedicels slender, 3–5 mm; bract and bracteoles not seen. *Calyx* tube oboconical, base subtruncate and sparsely pubescent, 1–1.5 mm, limb suberect, deeply 5-partite, glabrous, c. 1.5 mm, lobes ovate-triangular, subacute, ciliate, no apical gland. *Corolla* broadly urceolate, membranous, glabrous outside, laxly hairy inside, 4–5 by c. 3 mm, lobes obtuse, recurved, 0.6 mm. *Filaments* dilated above the base, narrowed distally, densely subpatently hairy in the lower part, laxly so upwards, wavy, c. 2 mm; anther-cells broad-oblong, almost horizontal, echinulate, 0.7 mm, with 2 dorsal spurs (c. 0.5 mm); tubules at a right angle with the cells, slenderly cylindrical, 1–1.3 mm, \pm obliquely cut apically, provided with several gland-tipped patent hairs. *Disk* short-pubescent. *Style* slenderly columnar, hairy in the lower third, glabrous above, c. 3 mm. Submature fruit depressed-globose, c. 3.5 mm ϕ , crowned by the inflexed calyx lobes.

Distr. *Malesia*: S. Sumatra (Bencoolen: Mt Pesagi), 2135 m.

155. *Vaccinium coriaceum* HOOK. f. in Hook. Ic. Pl. (1852) t. 892; WALP. Ann. 5 (1858) 440; STAFF, Trans. Linn. Soc. II, Bot. 4 (1894) 189; GIBBS, J. Linn. Soc. Bot. 42 (1914) 101; MERR. En. Born. (1921) 466; SLEUM. *Blumea* 11 (1961) 73; *ibid.* 12 (1963) 130.

Shrub or small tree. Branchlets angular, tips pubescent, lower parts early glabrescent, greyish, densely to very densely leaved, the persistent leaf-cushions as conspicuous as in the closely related *V. stapfianum*. *Leaves* elliptic or obovate to narrowly oblong-elliptic, sometimes linear-oblong or -obovate, apex blunt or rounded, base attenuate to the petiole, stiff-coriaceous, glabrous, the glandular points beneath mostly inconspicuous, regularly distantly cren(ul)ate by (3–)4–5 impressed crenations on each side up to the top of the blade, edge conspicuously marginate and slightly or not recurved, (6–)7–13 by (3–)4–5 mm, midrib faintly sunken above, rather indistinct beneath, nerves 2–3 basal and suprabasal, high ascending pairs, sometimes a little raised above as is the lax reticulation, \pm obsolete beneath, or inconspicuous

on both faces; petiole *c.* 2 by 0.7 mm, puberulous initially. *Racemes* subterminal, erect, subdensely many-flowered, flowers nodding; rachis rather stoutish, red, patent-puberulous, 2–4(–5) cm. Pedicels rather robust, finely puberulous or glabrous, 2–3(–4) mm, bract foliaceous, membranous to subcoriaceous, smaller than the leaves, generally very early caducous, bracteoles suprabasal, subulate, 1 mm, early caducous. *Calyx* glabrous, shining, tube widely cup-shaped, rugulose, 1 mm, limb suberect, lobes ovate, obtuse or rounded, *c.* 1.3 mm, margin with scattered, sessile, thick, yellowish glands but no single thick apical gland. *Corolla* cylindrical-urceolate, rather fleshy, pink or white, 4.5–5 by *c.* 3 mm, glabrous outside, puberulous in the lower third inside, lobes reflexed, obtuse, 1 mm. *Filaments* subulate-linear, densely hairy, *c.* 1.8 mm; anther-cells broad-oblong, 1 mm, with 2 short dorsal spurs and a few short gland-tipped hairs or subsessile glands; tubules much narrower than the cells, cylindrical, erect, *c.* 1 mm, almost transversely cut apically, pore flaring. *Disk* with very short erect hairs. *Style* slender, laxly hairy at the base, or glabrous, *c.* 4 mm. *Fruit* subglobose, *c.* 4 mm σ .

Distr. *Malesia*: Borneo (Mt Kinabalu).

Ecol. In scrub forest, (2135–)2440–3350 m. *Fl. fr.* Jan.–Dec.

156. *Vaccinium stapfianum* SLEUM. Bot. Jahrb. 71 (1940) 168; *Blumea* 11 (1961) 73; *ibid.* 12 (1963) 130. — *V. buxifolium* HOOK. f. in Hook. Ic. Pl. (1852) t. 891, non SALISB. 1805; WALP. Ann. 5 (1858) 440; STAPP, Trans. Linn. Soc. II, Bot. 4 (1894) 189; GIBBS, J. Linn. Soc. Bot. 42 (1914) 101; MERR. En. Born. (1921) 466.

var. stapfianum

Bushy shrub or small slender tree, up to 7 m, sometimes epiphytic. Branchlets stoutish, subterete, young parts purplish and densely to subimbricately leaved, minutely puberulent, older parts defoliate, with the remaining thick leaf-cushions, glabrescent. *Leaves* obovate to obovate-oblong, or oblong, not rarely narrow-oblong, apex obtuse or short-rounded, sometimes faintly retuse, base broadly attenuate to rounded, with 1 or 2 (occasionally 3) dark minute marginal glands impressed at intervals on each side, remote from the petiole and restricted to the lower half of the lamina, coriaceous, stiff, laxly glandular-muriculate or -punctate beneath, otherwise glabrous, entire, narrowly marginate, \pm revolute in dry specimens, blade often convex above, 0.8–1.5(–2) by 0.4–0.7 (–0.8) cm, midrib slightly sunken above, obtusely prominent beneath, nerves 3–4 pairs from and from above the base, faintly impressed or raised above as is the lax reticulation, mostly inconspicuous beneath; petiole (1–)2 by almost 1 mm. *Racemes* from the uppermost 1–3 axils, erect, \pm secund, dense, many-flowered; rachis stoutish, angular, short-pubescent, 1.5–2.5(–4) cm. Pedicels robust, curved, glabrous, 1–2 mm in anthesis, bract membranous, \pm oblong, up to 6 by 3 mm, very early caducous, as are the 2 basal or slightly

suprabasal minute bracteoles. *Calyx* glabrous, tube broadly cup-shaped, 1–1.5 mm, limb deeply 5-partite, suberect, lobes deltoid, subacute or mostly obtuse, 2 mm, margin with rather numerous, thick, sessile, yellowish glands, but no proper single apical gland. *Corolla* subcylindric-urceolate, slightly 5-angular, a little fleshy, red to pinkish or white, occasionally greenish ivory, with strong sweet scent, glabrous outside, puberulous above the base inside, 5–6 by *c.* 3 mm, lobes obtuse, finally reflexed, 1 mm. *Filaments* linear, dilated above the base, densely hairy or villous, 2–2.5 mm; anther-cells oblong, 1 mm, with 2 generally short, rarely rudimentary dorsal spurs distally, and provided with a few gland-tipped hairs or subsessile minute glands near the spurs; tubules erect, cylindrical, narrower than the cells, 1–1.3 mm, transversely cut distally, pore flaring. *Disk* subdensely erect-pubescent. *Style* rather slender, laxly hairy in the lower half, 5 mm. *Fruit* globose, 3–4 mm σ .

Distr. *Malesia*: North Borneo (Mt Kinabalu).

Ecol. On the open serpentine ridge to the subsummit (mossy) dwarf forest which abuts on to the granite core, (1830–)2440–3600 m. *Fl.* Jan.–Dec.

var. minus SLEUM. *Blumea* 11 (1961) 74; *ibid.* 12 (1963) 130.

Generally epiphytic, rarely terrestrial. *Leaves* more laxly arranged than in *var. stapfianum*, and more distinctly obovate. *Flowers* subsessile, corolla but 2.5–3 mm long. *Stamens* shorter; filaments *c.* 1.3 mm; cells subelliptic, *c.* 0.5 mm; tubules 1 mm.

Distr. *Malesia*: North Borneo (Mt Kinabalu), together with *var. stapfianum*, but generally epiphytic in the ericaceous moss forest, 1525–2440 (–2745) m, locally very common.

157. *Vaccinium horizontale* SLEUM. *Blumea* 11 (1961) 74; *ibid.* 12 (1963) 130. — **Fig. 110.**

Erect terrestrial, or rarely epiphytic shrub. Branchlets acutangular, or even winged at the tips, quite glabrous, finally covered with ashy cork in the older parts; flush bright golden brown. *Leaves* subdense, obovate or elliptic-obovate, apex shortly obtusely attenuate or subacuminate, base cuneate to the petiole, with 2 pairs of impressed glands at 1 or 2 mm from the petiole, coriaceous, light green when dry, shining, glabrous, not punctate underneath, entire, margin \pm revolute especially towards the base, 2.5–3.5(–4) by (1–)1.2–1.6(–2) cm, midrib impressed above, prominent beneath, nerves 2 basal or slightly suprabasal curved-ascending, and 3–4 upper and shorter pairs, all anastomosing, rather obscure above, slightly raised beneath, reticulation rather lax, conspicuous beneath only; petiole flattened, grooved above, 2–3 by *c.* 1 mm. *Racemes* from the upper 1 or 2 axils, laxly 5–8(–12)-flowered; rachis rather slender, angular, glabrous, 3–4.5 cm, eperulate in anthesis. Pedicels rather slender, glabrous, 8–10(–12) mm, bract and bracteoles not seen. *Calyx* glabrous, tube obconical, rugulose,



Fig. 110. *Vaccinium horizontale* SLEUM. Edie Creek near Wau, 1800 m, E. New Guinea (NGF 13486 WOMERSLEY & SLEUMER) (SLEUMER, 1961).

1.5 mm, limb spreading, 5-lobed to $\frac{3}{4}$, lobes deltoid, subacute, glabrous dorsally, densely ciliate, *c.* 1.5 mm, no apical gland. *Corolla* broadly cylindric-urceolate, membranous, shell or coral pink, very sparsely hairy at the base, otherwise glabrous, subdensely white-hairy in the lower half inside, 9–10 by 3–4(–5) mm, lobes obtuse, reflexed, *c.* 1.5 mm. *Filaments* filiform, densely villous below, less so upwards, 4 mm; anther-cells oblong, 1–1.2 mm, echinulate, no dorsal spurs; tubules cylindric, much narrower than the cells, dilated and almost transversely cut apically, 1 mm, with a few patent glandular hairs. *Disk* prominent, glabrous. *Style* cylindric, subdensely \pm patently white-hairy except the glabrous apex, *c.* 9 mm. *Fruit* black.

Distr. *Malesia*: New Guinea (Morobe Distr.: Edie Creek; Central Distr.: Mt Tafa).

Ecol. Epiphytic in mossy forest, or growing horizontally from eroded cliff face, 1615–2300 m. *Fl.* Aug.–Sept.

158. *Vaccinium bancanum* MIQ. *Fl. Ind. Bat. Suppl.* 1 (1860) 587; SCHEFF. *Nat. Tijd.* N.I. 31 (1870) 363; GIBBS, *J. Linn. Soc. Bot.* 42 (1914) 101; MERR. *En. Born.* (1921) 465; DUNSELMAN, *Trop. Natuur* 28 (1939) 73, f. 3; SLEUM. *Blumea* 11 (1961) 74; *ibid.* 12 (1963) 130. — *V. suluense* COPEL. *f. Philip. J. Sc.* 42 (1930) 568. — *V. adenurum* C. E. C. FISCHER, *Kew Bull.* (1932) 293. — Fig. 111, 112.

See for further synonyms under the varieties.

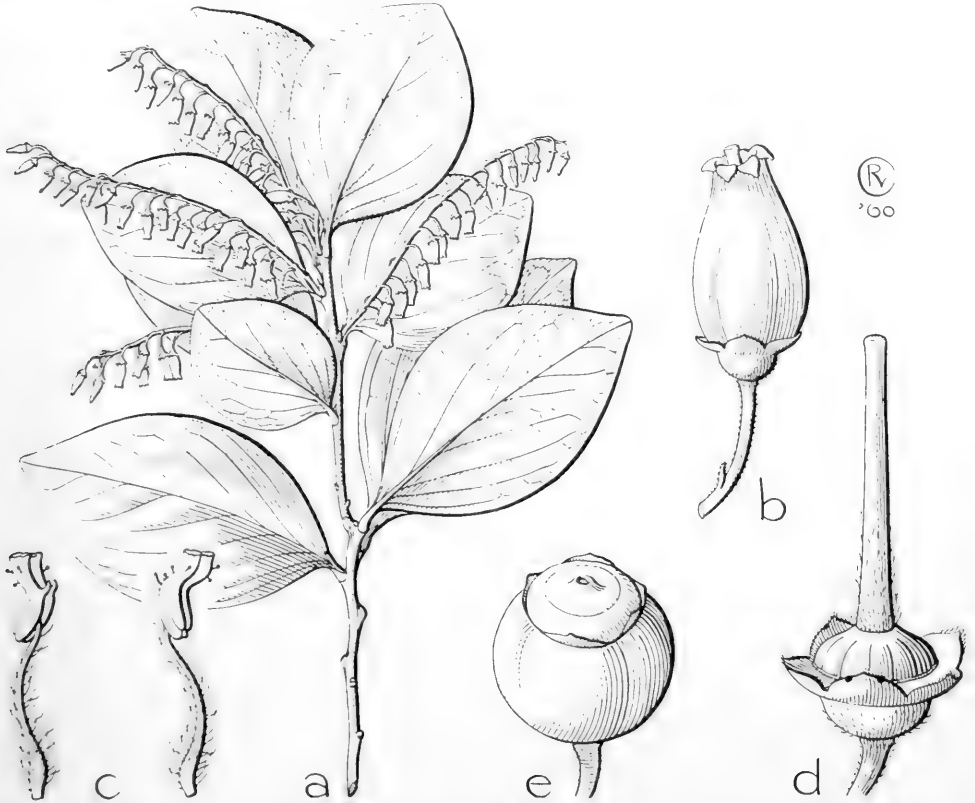


Fig. 111. *Vaccinium bancanum* MIQ. a. Habit, $\times \frac{2}{3}$, b. flower, $\times 4$, c. stamens, $\times 8$, d. ovary, disk and style, $\times 8$, e. fruit, $\times 4$ (a-d BROOKE 10587, e SAN 17352 NICHOLSON).

KEY TO THE VARIETIES

- 1. Calyx lobes very short and obtuse, fleshy, limb often merely wavy, hardly properly lobed. Leaves narrow-elliptic to lanceolate, apex longer or shorter acuminate. 2. *var. kunstleri*
 - 1. Calyx lobes distinct, ovate-deltoid, rather thin.
 - 2. Calyx lobes rarely bearing one marginal caducous gland on each side, or mostly no such glands at all. Leaves in general elliptic or oblong-, rarely subovate-elliptic.
 - 1. *var. bancanum*
 - 2. Calyx lobes bearing a row of several sessile, rather persistent marginal glands on each side.
 - 3. Leaves generally elliptic- to oblong-lanceolate, apex subcaudate-acuminate. Disk glabrous or almost so 3. *var. tenuinervium*
 - 3. Leaves elliptic to obovate- or ovate-elliptic or -oblong, apex shortly obtusely acuminate or attenuate, or rounded. Disk \pm densely hairy 4. *var. kemulense*
1. *var. bancanum*. — Fig. 111, 112.
 Spreading shrub or small tree, 2-4(-6, rarely

-10) m, up to 25 cm ϕ , bark grey. Branchlets angular, glabrous, or with sparse glandular dots. Leaves lax, elliptic to oblong-elliptic, more rarely subobovate-elliptic or oblong- or subovate-lanceolate, apex mostly broadly attenuate or subacuminate, obtuse, base broadly attenuate or cuneate to petiole, with 1 or 2 minute impressed marginal glands on each side at a short distance from the petiole, \pm coriaceous, light to dark green and glossy above, paler beneath, red in young shoots, glabrous, laxly glandular-muriculate or -punctate beneath, entire, edge slightly revolute especially towards the base, (3.5-)4-6(-8) by (2-)2.5-4 cm, midrib slightly impressed above, obtusely prominent beneath, 5-7-plinerved from and from a little above the base, with 3-4 pairs of shorter and more spreading nerves from the upper $\frac{2}{3}$ of the midrib, nerves anastomosing and slightly raised on both faces, or not rarely beneath only, reticulation \pm lax, perceptible to various degree, often beneath only, rarely (sub)inconspicuous on both faces; petiole somewhat flattened, grooved above, 2-4 by 1.5-2 mm. Racemes from the upper 2-4 axils, suberect, the numerous, subsecund flowers laxly arranged; rachis slender, angular,

glabrous or laxly short-pubescent, 4–8 cm, perulæ not seen. Pedicels rather slender, mostly glabrous, sometimes laxly puberulous, (3–)4–6(–10) mm, bract not seen; bracteoles 2, above the base, subulate, 1.5 mm, early caducous. *Calyx* glabrous to densely greyish puberulous, tube depressedly cup-shaped, base rounded, 1–1.5 mm, limb suberect initially, later spreading, c. 1.5 mm, deeply 5-partite, lobes triangular, subacute or bluntish, sometimes ending in a minute gland, always ciliate, bearing no or occasionally 1 pair of marginal subsessile glands. *Corolla* cylindrical-urceolate, rather thin, white to greenish, or white with red flush, or pink, rarely even red, fragrant, glabrous outside, subsensely short-hairy in the lower half inside, (5–)6–7(–8) by 2.5(–3) mm, lobes obtuse, reflexed, c. 1 mm. *Filaments* subulate-linear, \pm densely hairy, 2–3 mm; anther-cells broad-oblong, 0.8–1 mm, base broadly apiculate, whether or not with a pair of short dorsal spurs; tubules cylindrical, \pm as wide and long as, rarely a little shorter than the cells, and mostly at an angle with them, with several stalked or subsessile glands or gland-tipped hairs, \pm transversely cut apically, pore often somewhat flaring. *Disk* laxly hairy or glabrous. *Style* slender, hairy in the lower $\frac{1}{3}$ to $\frac{1}{2}$, finally a little exerted. *Fruit* subglobose, c. 4 mm σ , glabrous or glabrescent, crowned by the \pm erect subacute calyx lobes, becoming red-purple and juicy at full maturity.

Distr. *Malesia*: Sumatra (Westcoast), Lingga, Banka, Billiton, Anambas Is., Borneo.

Ecol. At sealevel on sandy beach, dunes or rocks by sea, also in (often secondary) forest (also 'kerangas' forest) on acid sandy, loamy or marshy soil, or strongly leached laterite ('padang') and in low moss forest, on sandstone rocks in canyon, generally up to 600(–1500) m. *Fl. fr.* Jan.–Dec.

Vern. *Kapayan*, Dusun, *kayánpang*, *kendolu*, *mandjang marieung*, *měmpadang*, *rempadang*, M: Banka, *purai*, Billiton, *kaju těmau*, W. Borneo, *brang kanji*, Borneo: W. Kutei.

2. *var. kunstleri* (K. & G.) SLEUM. *Blumea* 11 (1961) 75. — *V. kunstleri* K. & G. *J. As. Soc. Beng.* 74, ii (1905) 65; RIDL. *J. Str. Br. R. As. Soc. n.* 79 (1918) 92. — *V. breviflos* RIDL. *J. Fed. Mal. St. Mus.* 6 (1915) 9. — *V. bancanum* (non MIQ. *s. str.*) K. & G. *J. As. Soc. Beng.* 74, ii (1905) 64, *p.p.*; RIDL. *Fl. Mal. Pen.* 2 (1923) 209, *p.p.*; BURK. & HENDERS. *Gard. Bull. S. S.* 3 (1925) 390.

Small terrestrial or epiphytic shrub or tree, up to 6 m. *Leaves* narrow-elliptic to lanceolate, apex long- or short-acuminate, tip bluntish, thin-coriaceous, 3.5–6(–7) by (1.3–)1.5–2.5 cm; petiole 2–4 by 1–1.5 mm. Pedicels slender, 2–4 mm. *Calyx* lobes very short and obtuse, fleshy, or calyx limb often merely wavy, hardly properly lobed, no sessile marginal glands present. *Disk* mostly glabrous, rarely laxly hairy.

Distr. *Malesia*: Sumatra (Atjeh; Eastcoast), Malay Peninsula.

Ecol. In the Malay Peninsula generally epiphytic, or terrestrial in forest borders, in Sumatra reported from recently devastated primary forest



Fig. 112. *Vaccinium bancanum* MIQ. *var. bancanum*. Bako National Park near Kuching, Sarawak, on rocks near shore (SLEUMER 4680) (SLEUMER, 1963).

and from near solfataras, 900–1500 m, locally common. *Fl. fr.* Jan.–Dec.

3. *var. tenuinervium* J. J. S. in K. & V. *Bijdr.* 13 (1914) 157, 159; AMSH. in *Back. Bekn. Fl. Java* (em. ed.) 7 (1948) fam. 163, p. 3; SLEUM. *Blumea* 11 (1961) 75. — *V. bancanum* (non MIQ. *s. str.*) CLARKE, in *Fl. Br. Ind.* 3 (1882) 454, *p.p. quoad pl. malacc.*; RIDL. *J. Str. Br. R. As. Soc. n.* 39 (1903) 14; K. & G. *J. As. Soc. Beng.* 74, ii (1905) 64, *p.p.*; KOORD.-SCHUM. *Syst. Verz.* 1 (1912) fam. 233, p. 108; KOORD. *Exk. Fl. Java* 3 (1912) 19; BURK. & HOLTT. *Gard. Bull. S. S.* 3 (1923) 58; RIDL. *Fl. Mal. Pen.* 2 (1923) 209, *p.p.*; HENDERS. *J. Mal. Br. R. As. Soc.* 5 (1927) 255; *Gard. Bull. S. S.* 4 (1928) 280; STEEN. *Arch. Hydrobiol. Suppl.* 11 (1932) 318;

Bull. Jard. Bot. Btzg III, 13 (1933) 53. — *V. micrantherum* STAPF, Trans. Linn. Soc. II, Bot. 4 (1894) 190; MERR. En. Born. (1921) 467; HEINE, in Fedde, Rep. 54 (1951) 245 ('*micranthum*'). — *V. ardisioides* RIDL. J. Fed. Mal. St. Mus. 5 (1914) 37, non WERNH. 1916. — *V. kunstleri* (non K. & G.) RIDL. J. Fed. Mal. St. Mus. 6 (1915) 156. — *V. eburneum* RIDL. J. Fed. Mal. St. Mus. 7 (1916) 45; *ibid.* 10 (1922) 249; HENDERS. Gard. Bull. S. S. 4 (1928) 280. — *V. ardisiiflorum* RIDL. J. Str. Br. R. As. Soc. n. 79 (1918) 91 ('*ardisiflora*'). — *V. wrayi* RIDL. J. Str. Br. R. As. Soc. n. 79 (1918) 92.

Differs from *var. bancanum* by generally narrower, elliptic- or oblong-lanceolate, more distinctly acuminate or subcaudate, often thinner leaves. *Calyx* mostly \pm densely grey-tomentellous, its lobes bearing a string of small sessile or subsessile, yellowish glands all over the margin; these glands later \pm caducous and mostly not present on the ripe fruit. *Corolla* white or pinkish, up to 7 by 4 mm. *Disk* laxly hairy, or mostly glabrous.

Distr. *Malesia*: Sumatra, Malay Peninsula, W. Java, Borneo (apparently not represented in Banka).

Ecol. Like *var. bancanum* a terrestrial or epiphytic shrub or treelet in montane forest or opening forest on acid, sandy or quartzite soil, also in mossy forest, even in subalpine scrub, 600–1500 (–2050) m, not on coastal sands or rocks near sealevel, except in the Bako National Park (near Kuching, Sarawak) where *var. tenuinervium* occurs on very acid sandy soil in open heath 'kerangas' woodland, at 100–120 m. In Sumatra known from dry solfatara fields at c. 900 m, and once found at 200 m on Mt Manalese near Aek Buro (Bila, Eastcoast) in scrub forest.

Vern. *Kelab bulut*, Pahang, *kalek*, Sumatra: Westcoast.

Note. In some Javanese specimens the bract is partly persistent for a longer time than in specimens from Sumatra, Malay Peninsula and Borneo, in which it is (very) early caducous. *Var. tenuinervium* is kept here in a broad sense, based with more emphasis on the marginal glands on the calyx lobes, than on the shape and size of the leaves (which show a rather great variation) as it has been the case in the original description which was based on specimens from W. Java.

4. *var. kemulense* J. J. S. ex SLEUM. Blumea 11 (1961) 76.

Leaves ovate-elliptic, shortly obtusely acuminate, 3–4 by 1.5–2 cm. *Calyx* lobes at least initially with several sessile marginal glands at each side. *Disk* subdensely hairy.

Distr. *Malesia*: Borneo (Mt Kinabalu; Mt Kemul), in forest, 1525–1770 m.

Note. Forms approaching *var. kemulense* are found near solfataras in N. Sumatra and kept under *var. tenuinervium*.

159. *Vaccinium stenanthum* SLEUM. Blumea 12 (1963) 129.

Shrub or small tree, up to 5 m. Branchlets

slender, obtusangular, glabrous. *Leaves* scattered, obovate, apex very broadly attenuate and blunt, or mostly rounded, very broadly cuneate towards the base, the latter rounded, basal glands inconspicuous, coriaceous, firm, laxly minutely glandular-setulose beneath, otherwise glabrous, entire, flat, 3.5–6 (–6.5) by (1.5–)2–4.5 (–5) cm, 5-nerved from the base, with an additional pair of nerves higher from the midrib, all nerves high curved-ascending, hardly or slightly prominently raised above, distinctly so beneath, as is the rather dense coarse reticulation; petiole rugulose, 2–3 by c. 1 mm. Sterile axillary buds subdeltoid or thick-subulate, 0.5–1 (–1.5) mm, rather inconspicuous. *Racemes* erecto-patent, axillary, flowers laxly arranged, glabrous; rachis slender, 3–4 cm, in *fr.* to 8 cm. Pedicels slender at anthesis, 2–3 mm, in *fr.* 7–13 (–15) mm. *Calyx* tube almost turbinate, 2 mm, lobes ovate, blunt, 1 mm, bearing a thickish, apical gland and a row of several minor ones on both sides, ciliolate-fimbriate. *Corolla* narrowly tubular, gradually narrowed in the upper part, rather fleshy, c. 8 by 2–2.5 mm, glabrous at both sides, lobes hardly 1 mm. *Filaments* linear below, narrowed upwards, white-villous to almost the top, c. 4 mm; anther-cells oblong, echinulate, with 2 dorsal spurs, 1 mm; tubules narrower, 0.5 mm, opening roundish and a little dilated, bearing a few stipitate glands. *Disk* thick, 10-lobed, glabrous below, densely white-hairy on top. *Style* columnar, densely subappressedly hairy to the lower $\frac{2}{3}$, glabrous above, c. 7 mm. *Berry* globose, 5–6 mm σ .

Distr. *Malesia*: Borneo (Sarawak, Brunei). Ecol. Both in mossy forest and in extreme 'kerangas' heath forest on hard sandstone ridge, 260–1065 m. *Fl.* June, *fr.* Oct.

160. *Vaccinium luzoniense* VIDAL, Rev. Pl. Vasc. Filip. (1886) 168; CERON, Cat. Pl. Herb. Manila (1892) 105; MERR. Philip. J. Sc. 3 (1908) Bot. 377; En. Philip. 3 (1923) 250; COPEL. f. Philip. J. Sc. 42 (1930) 570, t. 4, f. 3–6; SLEUM. Blumea 11 (1961) 77.

Shrub or small tree, 2–4 m. Branchlets striate, tips reddish, younger parts laxly to subdensely covered with short, patent, bristle-like gland-tipped hairs which are also found on the rachis, and occasionally on the petioles. *Leaves* scattered, elliptic or oblong-elliptic, apex shortly (1–1.5 cm) obtusely acuminate, base broadly cuneate, the pair of basal glands small, though well visible on the slightly widened very base, coriaceous, pale, beneath sparsely glandular-punctulate, otherwise glabrous, entire, flat, or the very margin faintly revolute, 6–9 by 2.5–4 (–4.5) cm, midrib flat or very slightly immersed above, prominent beneath, nerves c. 3 basal and suprabasal, high curved-ascending pairs, and several upper and shorter, more spreading ones, all distinctly raised on both faces as is the subdense reticulation; petiole flattened, grooved above, 5–7 by 1–1.5 mm. *Racemes* from the upper axils, \pm erect, 7–9 (–10) cm, lax-flowered, perulae ovate-acuminate, scarious; rachis angular, rather slender. Pedicels stoutish, a little curved, glabrous or sometimes with

sparse sessile capitate glands, 8–10 mm, with 2 very early caducous subulate bracteoles; bract not seen. *Calyx* tube depressedly cup-shaped, rugulose, mostly with some capitate gland-hairs, 1 mm, limb hardly 1 mm, formed by 5 broad ovoid-deltoid obtuse lobes, each of which ends in a minute apical gland. *Corolla* urceolate-conical, glabrous at both sides, pink or red, 7–8 by 5 mm, very shortly 5-lobed. *Filaments* subulate-linear, laxly patently hairy especially towards the base, 3 mm; anther-cells broad-oblong, 1.2 mm, no spurs; tubules as wide as the cells, *c.* 0.4 mm, obliquely cut apically, the pore gaping widely. *Disk* prominent, glabrous or sometimes bearing some glandular hairs on the inner margin or on the apex of the ovary. *Style* glabrous, almost as long as the corolla. *Fruit* subglobular, blackish at full maturity, *c.* 8 mm ϕ , the upper third belted by the persistent calyx lobes, obscurely 10-ridged. *Seeds* linear, black, rugose, 1 mm.

Distr. *Malesia*: Philippines (Luzon: Mountain Prov.).

Ecol. In forested stream depressions and on ridges in the mossy forest, also on rocky banks by roadsides, 1500–2100 m. *Fl. fr.* April–July.

Vern. *Suliuag*.

161. *Vaccinium tenuipes* MERR. Philip. J. Sc. 3 (1908) Bot. 375; En. Philip. 3 (1923) 251; COPEL. f. Philip. J. Sc. 42 (1930) 571, t. 4, f. 7–8; SLEUM. Blumea 11 (1961) 77; *ibid.* 12 (1963) 130. — *V. sp.*, MERR. Philip. J. Sc. 2 (1907) Bot. 295.

Scandent, epiphytic or terrestrial shrub, up to 3 m. Branchlets slender, densely clad with fine, patent, soft hairs, mixed with longer and stiff, gland-capitellate ones in the younger, early glabrescent and greyish corticate in the older parts, subdensely leaved. *Leaves* ovate to elliptic-ovate, or lanceolate, apex shortly caudate-acuminate, tip bluntish, base mostly \pm rounded, sometimes more broadly attenuate, coriaceous, generally glabrous except some gland-tipped hairs which may be present at the very base and along the margin in the lower part of the lamina, sometimes pubescent all over the whole undersurface, rarely laxly so on both faces initially, moreover sparsely glandular-muriculate or -punctate beneath, basal pair of minute impressed marginal glands at 1–2 mm distance from the petiole, entire, edge slightly to strongly revolute in dry specimens, 3–5 by 1–2.5 cm, midrib and 2 pairs of basal, high curved-ascending, and a few upper and shorter nerves slightly sunken or even faintly raised above, \pm prominent beneath, though not rarely \pm inconspicuous on both faces, reticulation lax above, more dense beneath, not much perceptible; petiole \pm densely pubescent and glandular-setulose, 2–3 by 1 mm. *Racemes* from one or two upper axil(s), (2–)3–5 cm, laxly patently (3–) 5–10-flowered; rachis slender, its indumentum as that of the branchlets. Pedicels slender, 1–2 cm, glabrous at least in the upper part, sometimes glandular-pubescent at or near the base, rarely so for the entire length; bracteoles lanceolate, early caducous, *c.* 1.5 mm; bract not seen. *Calyx* mostly

glabrous, sometimes pubescent, tube broadly cup-shaped, 1.5–2 mm, lobes \pm spreading, triangular-ovate, bluntish, ciliolate, *c.* 1 mm, no apical gland. *Corolla* narrow-conical urceolate, glabrous, varying from white to red-purple, *c.* 10 mm long, below 4–5 mm ϕ , upper half narrowed to *c.* 2 mm ϕ , lobes broadly ovate, 1 mm. *Filaments* subulate-linear, \pm lanate at the broadened basal part, glabrous apically, 4–5 mm; anther-cells broad-oblong, 1.5 mm, not spurred; tubules as wide as the cells, 0.5 mm, obliquely truncate. *Disk* prominent, glabrous or slightly hairy. *Style* stoutish, glabrous or somewhat hairy below, *c.* 1 cm. *Fruit* subglobose, blackish when ripe, *c.* 4 mm ϕ . *Seeds* fusiform, dark brown, almost 2 mm.

Distr. *Malesia*: Philippines (Luzon, Mindoro, Panay, Negros).

Ecol. In primary forest, 600–1500 m; on Mt Pulog in mossy forest at 2600 m. *Fl.* Febr.–Sept. Vern. *Tolog-tolog*, Negros, *likop*, Luzon.

162. *Vaccinium filipes* SCHLTR, Bot. Jahrb. 55 (1918) 176; SLEUM. *ibid.* 72 (1942) 252; Blumea 11 (1961) 77.

Erect epiphytic shrub, 0.6–1 m. Branchlets slender, patent-puberulous initially, glabrescent, laxly leaved. *Leaves* lanceolate to elliptic-lanceolate, long subcaudate-acuminate, subacute, base broadly attenuate to nearly rounded, 2 basal marginal glands minute, impressed, subcoriaceous, flexible, short-hairy on the petiole and the lower half of the midrib on both faces, glandular-punctate beneath, otherwise glabrous, entire, edge slightly revolute, 4.5–6.5 by 1–3.5 cm, midrib a little sunken above, prominent beneath, nerves 2 basal high curved-ascending, and several upper, much shorter pairs, somewhat prominent on both faces as is the fine rather dense reticulation; petiole short-pubescent, 3–5 by *c.* 1 mm. *Racemes* very lax and slender, few-flowered; rachis up to 4 cm. Pedicels subfiliform, glabrous, nodding, 1.5–2 cm, bract and bracteoles not seen. *Calyx* tube broadly cup-shaped, glabrous, rugulose, 1 mm, limb spreading, 5-lobed to almost the base, lobes broad-deltoid, subacute, 0.8 mm. *Corolla* ovoid, laxly glandular-muriculate outside, glabrous inside, blood red, 5–6 by *c.* 4 mm, lobes ovate, subacute, *c.* 1 mm. *Filaments* subulate, hairy, *c.* 1.8 mm; cells oblong, *c.* 0.8 mm, no spurs; tubules very short, transversely cut apically, pore round. *Disk* glabrous. *Style* minutely papillose-puberulous, *c.* 5 mm.

Distr. *Malesia*: East New Guinea (Sepik R. region: Schrader Mts, Hunstein and West Ra.).

Ecol. In mountain forest, 1000–2070 m. *Fl.* Aug.

163. *Vaccinium molle* J. J. S. Nova Guinea 12 (1914) 165, t. 51; *ibid.* 18 (1936) 117; SLEUM. Bot. Jahrb. 72 (1942) 248; KANEH. & HATUS. Bot. Mag. Tokyo 56 (1942) 481; SLEUM. Blumea 11 (1961) 77; *ibid.* 12 (1963) 130.

var. molle.

Lax, few-stemmed shrub, 0.5–2(–3) m, sometimes treelet up to 5 m, with few overhanging

branches. Branchlets rather robust, young parts greyish or yellowish velutinous, densely, sometimes subimbricately leaved. *Leaves* ovate to oblong- or elliptic-ovate, apex shortly attenuate or subacuminate, obtuse to nearly rounded, ending in a minute gland, base shallowly to \pm deeply cordate, lobes not amplexant, with a marginal gland at both sides near petiole, subsessile, coriaceous, (dark green above, yellowish green below in fresh specimens, flush reddish), initially tomentose on both faces, glabrescent above with age, densely and \pm persistently set with soft non-glandular and more laxly with muriculate-glandular hairs beneath, entire, edge \pm revolute in dry specimens, 1.5–4 by (0.7–)1–1.5(–2.7) cm, 7-plinerved from and a little from above the base, 2 or 3 pairs of other upper nerves, all curved-ascending and anastomosing, \pm impressed above, prominent beneath as is the midrib, reticulation rather obsolete; petiole (1)–2–3 by 1–2 mm. *Racemes* from the upper 1–4 axils, solitary, densely (8)–12–20-flowered, secund, densely \pm hirsute and whether or not with scattered sub-clavate glandular hairs; rachis stoutish, 2–5(–6) cm. Pedicels rather robust, (4)–6–8(–10) mm, bract rather narrowly ovate-acuminate, 2–3(–4) mm, very early caducous. *Calyx* tube campanulate, 1.5–2 mm, limb suberect, 5-partite almost to the base, lobes ovate-triangular, obtuse, 1–1.5 mm, apical gland generally distinct. *Corolla* campanulate, creamy or greenish, densely or subdensely hairy and whether or not laxly glandular-hairy outside, glabrous inside, 5–6 mm long, *c.* 3 mm σ below, 5 mm σ at the lobes in dry, 7–8 by 6 mm in fresh specimens, lobes triangular, obtuse, erect or slightly recurved, *c.* 2 mm. *Stamens* 8 or 10; filaments linear, laxly hairy in the lower half, or sometimes subglabrous, papillose above, 2.2–3 mm; cells oblong, 1.2–1.3(–1.5) mm, no spurs; tubules erect, cylindrical, narrower than the cells, 0.8(–1.1) mm, transversely cut distally, pore round, \pm flaring. *Disk* laxly to subdensely hairy. *Style* slender, glabrous, 5–6 mm. *Fruit* subglobose, apex truncate, 5–6 mm σ , purple at full maturity.

Distr. Malesia: West New Guinea (Vogelkop Peninsula).

Ecol. In forest edge, or on open slope or summit, often found together with *Pteridium aquilinum* regrowths on burnt places and apparently rather fire-resistant, on sandy or clayey soil, 1200–2600 m. *Fl. fr.* Jan.–Dec.

Vern. Mambau, Kebar.

var. mollissimum (SLEUM.) SLEUM. *Blumea* 12 (1963) 131. — *V. mollissimum* SLEUM. *Bot. Jahrb.* 72 (1942) 266; *Blumea* 11 (1961) 77.

Rather dense shrub or treelet, 1–3 m, with suberect branches. *Leaves* rather dense, ovate or ovate-oblong, apex subacuminately attenuate, tip subacute or blunt, basesubtruncate-rounded, sometimes in part subcordate in the same specimen. Bract oblong-lanceolate, membranous, up to 13 by 5 mm, generally caducous (sometimes more foliar and \pm persistent during anthesis). *Corolla* narrowly campanulate, 4–5 mm long, 2–2.5 mm σ

below, *c.* 3 mm σ at limb. *Style* 4–5 mm. Other-wise hardly different from *var. molle*.

Distr. Malesia: New Guinea (Wissel Lakes; Central Distr.: Main Range from Western Highlands to Mt Tafa; Morobe Distr.: Wau-Edie Creek-Mt Dickson area).

Ecol. In primary or secondary forest edge and in open hill sides, especially on eroded or moved ground as landslides, steep road cutting or old gold workings, along creeks, locally common especially in secondary vegetation, 1820–2770 m. *Fl. fr.* Jan.–Dec.

Vern. Piepa, Kapauku.

164. *Vaccinium summifaucis* SLEUM. *Bot. Jahrb.* 72 (1942) 251; *Blumea* 11 (1961) 80.

Scandent or epiphytic shrub. Branchlets angular, subpuberulent or glabrous, subdensely leaved. *Leaves* elliptic-oblong, sometimes subovate-elliptic, apex broadly obtusely attenuate to nearly rounded, base broadly attenuate into the petiole, pair of marginal small impressed glands almost at the base, subcoriaceous to coriaceous, rather stiff, glabrous, laxly glandular-punctate beneath, entire, edge subrevolute, 1.8–2.5(–3.5) by 1.1–1.5(–2) cm, midrib a little sunken above, obtusely prominent beneath, nerves 1–2 basal curved-ascending, and 2–3 upper and shorter, more spreading pairs, slightly raised on both faces, reticulation fine and lax, rather inconspicuous above, more visible beneath; petiole 2 by 1–1.5 mm. *Racemes* lax and few-flowered, in the upper 1–3 axils; rachis 1–1.5 cm, pubescent. Pedicels nodding, rather robust, laxly to subdensely set with non-glandular and gland-tipped hairs, which are also more densely found all over the calyx, 9–12 mm, 2 subrabasal minute bracteoles; bract not seen. *Calyx* tube campanulate, 1.5–2 mm, limb \pm spreading, deeply 5-lobed, *c.* 2 mm, lobes deltoid-acuminate, subacute, or obtuse by a terminal gland hidden among the hairs. *Corolla* urceolate, *c.* 6.5 by 3 mm, yellowish tomentose outside except the very base, which is almost glabrous, laxly hairy inside, fleshy, pink, lobes short, obtuse. *Filaments* filiform, rather densely hairy below, glabrescent upwards, 2.5 mm; anther-cells oblong, 2 mm, no spurs; tubules cylindrical, nearly as wide as the cells, 0.8–1 mm, sub-obliquely cut at the top. *Disk* glabrous or sparsely hairy on the inner margin. *Style* columnar, glabrous, 5 mm. *Fruit* globular, glabrous or practically so, 6–7 mm σ .

Distr. Malesia: East New Guinea (Owen Stanley Ra.).

Ecol. In forest, 2040–2440 m. *Fl.* Dec., Jan.

165. *Vaccinium costerifolium* SLEUM. *Blumea* 11 (1961) 77. — *V. varingiaefolium* [non (BL.) MIQ.] MIQ. *Ann. Mus. Bot. Lugd.-Bat.* 1 (1863) 38, *quoad specim. born.*; MERR. *En. Born.* (1921) 467.

Trailing or scandent shrub, sometimes scrambling to a great height, with slender stems. Branchlets terete, 1–4 mm σ , laxly lenticellate, minutely patent-puberulous, often reddish in dry specimens, elongate, laxly leaved. *Leaves* oblong-elliptic or oblong, sometimes elliptic, apex shortly

gradually and obtusely attenuate, base broadly attenuate into the slender petiole, 1 or 2 rather small marginal glands a little above the base on each side, sometimes even with a few other upper ones, thin-coriaceous, glabrous, minutely laxly glandular-muriculate underneath, practically entire, edge but slightly revolute, 5–8 by 2–3.5 cm, upper leaves or those on the lateral branchlets similar in shape but gradually decreasing in size upwards to 1.5 by 0.5 cm and provided with more numerous marginal glands, all leaves sub-5-plinerved by 2 pairs of basal or 0.5–1 cm suprabasal high curved-ascending nerves, and occasionally with one similarly curved nerve which starts from the upper part of the midrib, all impressed above, prominent beneath, reticulation slightly raised on both faces, not rarely rather obscure; petiole rather slender, rugulose, 2–3 mm. *Racemes* from the axils of the younger part of the branchlets, ascending, laxly many-flowered; rachis slender or very slender, angular, minutely patent-puberulous as are the pedicels, eperulate at anthesis, 5–10 cm. Pedicels slender, (3–)4–5(–6) mm, bract lanceolate, 3–6(–8) by c. 2 mm, mostly already caducous at anthesis. *Calyx* densely short-pubescent and more laxly glandular-muriculate, tube cupular, 1–1.5 mm, limb suberect, deeply 5-partite, lobes deltoid, 2–2.5 mm, less densely hairy than the calyx tube, no apical gland. *Corolla* urceolate-tubular, a little contracted distally, membranous, pink to deep purple, sweet-scented, (8–)9–10 by c. 4 mm, puberulous outside and at base inside, lobes obtuse, suberect, c. 1 mm. *Filaments* linear, dilated above the base, densely subpatently hairy below, more laxly so upwards, glabrous distally, c. 3 mm; anther-cells oblong, granular, 1.2–1.3 mm, shortly obtusely 2-spurred dorsally; tubules cylindrical, narrower than the cells, slightly dilated upwards, 1–1.3 mm, subobliquely cut apically, the back of each tubule extended into 1 or 2 very short and recurved teeth. *Disk* prominent, glabrous or laxly hairy. *Style* columnar, glabrous, 0.9–1 cm. *Fruit* subglobose, c. 6 mm \varnothing , laxly pubescent, red, turning black.

Distr. *Malesia*: S. Borneo.

Ecol. In swamp forest or in open 'padang' forest, on acid sandy soil, partly covered by peat, near sealevel, locally not rare. *Fl.* Jan., *fr.* Sept.

166. *Vaccinium adenotrichum* SLEUM. Blumea 12 (1963) 131.

Scandent epiphytic shrub. Branchlets obtus-angular, glabrous. *Leaves* lax, obovate or oblong-obovate, apex \pm rounded, base cuneate to and shortly decurrent on the petiole, basal pair of glands thick, coriaceous, glabrous except scattered glandular hairs or points beneath, entire, somewhat revolute especially towards the base, 6–8.5 by 2.5–5 cm, midrib flattish above, as thick as the petiole and obtusely prominent at the base, gradually decreasing upwards below, nerves 1–2 basal, steeply curved ascending nerves, which meet at the apex of the blade, other upper nerves 6–8 pairs rather straight from the midrib, curved

distally and inarching with the basal nerve(s) before the edge, all slightly raised on both faces, reticulation rather dense, generally a little prominent beneath only; petiole flattened, 5–6 by c. 2 mm. *Racemes* from several upper axils, abbreviate, 5–8-flowered; rachis subdensely or more laxly glandular-muriculate, 0.5–1 cm; perulac ovate to oblong, membranous, ciliolate, 3–8 by 3–5 mm, early caducous. Pedicels stoutish, rather laxly glandular-muriculate below, more densely so and short-hairy upwards, 8–12 mm. *Calyx* all over densely glandular-muriculate and hairy, tube cup-shaped, base rounded, 1.5 mm, lobes triangular, acutish, \pm spreading, 1.5 mm, no apical gland. *Corolla* urceolate, carmine, fleshy, 7–8 by 3–4 mm below, or 2–3 mm at the lobes, at outside glabrous at the very base, otherwise \pm densely glandular-muriculate and above the middle also short-hairy, at the inside glabrous in the lower, densely long-hairy in the upper half, lobes ovate-oblong to oblong, \pm erect, 1.5–2 mm. *Filaments* subulate, densely set with subsetular spreading long brownish hairs, 1.5 mm; anther-cells oblong, manifestly echinulate, 1.5 mm; tubules slightly narrower than the cells, 0.7 mm, obliquely cut apically. *Disk* prominent, glabrous. *Style* thick-columnar, glabrous, 4 mm.

Distr. *Malesia*: New Guinea (Vogelkop Peninsula: S. slope of Tamrau Ra.), once found. Ecol. In riverine forest, 840 m. *Fl.* Nov.

167. *Vaccinium rigidifolium* SLEUM. Blumea 11 (1961) 79.

Shrub. Branchlets robust, densely shortly patent-hairy to subtomtense, densely leaved; axillary buds subglobose. *Leaves* elliptic, more rarely subovate or oblong-elliptic, apex shortly obtusely attenuate, or mostly rounded or nearly so, base \pm rounded, though subabruptly contracted into the petiole at the very base, and provided there with 1 (or 2 distant) thick glands on each side, coriaceous, pubescent on both faces especially along the midrib and edge, and moreover laxly glandular-muriculate on both sides when young, gradually glabrescent, mature ones glabrous, still yellowish hairy in the lower part of the midrib, and glandular punctate on the intervenium beneath, or finally epunctate, entire, edge slightly or not revolute, 3–5(–6.5) by 2–3.3 cm, midrib rather narrowly impressed above, thick as the petiole and much prominent below, gradually decreasing and finally evanescent towards the top of the lamina beneath, nerves 4–5 pairs, lowest ones from the base, upper ones equally curved-ascending and anastomosing, all faintly or not impressed above, but slightly raised beneath, reticulation rather dense and visibly prominent beneath only; petiole much flattened, grooved above, densely hairy, 2–5 by 2–3 mm. *Racemes* from the upper, not rarely rather numerous axils, obliquely spreading, densely many-flowered, flowers nodding densely shortly yellowish hairy or -subtomtense; rachis angular, 4–8 cm by 1.5–2 mm, eperulate at anthesis. Pedicels 2–3 (in *fr.* 3–5 mm) by almost 1 mm, subtending bract not seen, bracteoles early

caducous, at or even above the middle of the pedicels, 1–1.5 mm. *Calyx* tube cupular, 1 mm, limb suberect, deeply 5-partite, lobes ovate-deltoid, 1–1.5 mm, glabrescent distally, with a few sessile, thick, blackish marginal glands sometimes joined into one marginal gland. *Corolla* cylindrical-urceolate, slightly 5-angular, rather fleshy, pink, 6–7 by 2–3 mm below, shortly yellowish hairy initially outside especially below, exclusively so in the lower part inside, finally \pm glabrescent outside, lobes obtuse, reflexed, 1 mm. *Filaments* subulate, dilated below, glabrous at the very base, villous above at the dilated part, more laxly so upwards, c. 2 mm; anther-cells oblong, c. 1.2 mm, no spurs; tubules much narrower than the cells, cylindrical, erect, 1.3–1.5 mm, subobliquely cut apically, back wall of each tubule a little extended, ending in 2 teeth. *Disk* prominent, with erect dense hairs at upper margin. *Style* columnar, laxly to more densely hairy at the base, sparsely so or even glabrous upwards, 4.5–5.5 mm. *Fruit* depressed-globose, glabrescent, 5–6 mm σ , crowned by the laxly hairy disk which is not covered by the calyx lobes.

Distr. *Malesia*: N. Sumatra (Gajo Lands: Mt Lembuh; a similar form with larger leaves and longer petioles from Mts Kemiri and Losir).

Ecol. In ericoid ridge forest or summit scrub, also along stream in mossy forest, (1850–)2700–3500 m. *Fl. fr.* Febr.–March.

168. *Vaccinium brachytrichum* SLEUM. *Blumea* 11 (1961) 78. — *V. foxworthii* COPEL. *f. Philip. J. Sc.* 42 (1930) 580, *p.p.*

Shrub. Branchlets slender, angular, very shortly pubescent, subdensely leaved. *Leaves* elliptic, apex shortly obtusely attenuate or subacuminate, base \pm broadly attenuate and very shortly decurrent into the petiole, a minute marginal subimpressed gland on each side at c. 1 mm from the petiole, thin-coriaceous, firm, glabrous, entire, edge slightly revolute especially towards the base, 2.5–3.5 by (1–)1.2–1.8(–2) cm, midrib a little sunken above, prominent beneath, nerves in 1(–2) basal or slightly suprabasal and 2–3 upper shorter, similarly curved-ascending and anastomosing pairs, mostly not much conspicuous above, slightly raised beneath, reticulation lax, a little prominent beneath only; petiole flattened, (1–)2 mm by 1–1.3 mm. *Racemes* solitary from the uppermost axils, laxly 5–8-flowered, densely short-pubescent or hirtellous in all outer parts; rachis rather slender, 2–3 cm, base included by a few ovate-acuminate perulae (c. 2 mm). Pedicels slender, 3–5 mm, caducously bibracteolate at the base, bract not seen. *Calyx* tube campanulate, 1.3 mm, limb erecto-patent, 1 mm, 5-lobed to almost the base, lobes ovate-acuminate, ciliate, here and there with a minute, marginal, sessile gland, but no apical one. *Corolla* urceolate, 5–6 by c. 2.5 mm, densely short-pubescent all over outside, and in the lower half inside, lobes obtuse, reflexed, 1 mm. *Filaments* subulate, densely hairy, 2.5 mm; anther-cells (perhaps not fully developed due to insects?) broadly ovate-oblong, 0.7 mm, no spurs;

tubules narrower than the cells, c. 0.3 mm, curved inward, subobliquely cut apically, no glandular appendages. *Disk* densely hairy. *Style* slenderly columnar, densely hirsutulous to the lower $\frac{3}{4}$ part, 5 mm. Immature *fruit* globose, short-pubescent, c. 4 mm σ , crowned by the suberect calyx lobes and pubescent disk.

Distr. *Malesia*: Philippines (Palawan: on Mt Capoas), 1000 m. Once found. *Fl. fr.* April.

169. *Vaccinium cuneifolium* (BL.) MIQ. *Fl. Ind. Bat.* 2 (1859) 1062; *Ann. Mus. Bot. Lugd.-Bat.* 1 (1863) 37, *incl. var. acutum* MIQ. *l.c.*; *Bl. Fl. Jav.* *Pl. inéd.* (1863–83) t. 20; KOORD. Minah. (1898) 514; *Exk. Fl. Java* 3 (1912) 19; KOORD.-SCHUM. *Syst. Verz.* 3 (1914) 100; *J. J. S. in K. & V. Bijdr.* 13 (1914) 136, *in text*; SLEUM. *Blumea* 11 (1961) 80. — *Thibaudia cuneifolia* BL. *Bijdr.* (1826) 861; HASSK. *Cat. Hort. Bog.* (1844) 161. — *Agapetes cuneifolia* (BL.) G. DON, *Gen. Syst.* 3 (1834) 863. — *V. ? bancanum* (non MIQ.) KOORD. Minah. (1898) 513.

Shrub or small tree, glabrous in all parts, 1–4 (–7) m. Branchlets angular, subdensely leaved. *Leaves* elliptic to obovate-elliptic, apex broadly obtusely attenuate or subacuminate, not rarely almost rounded, or rarely even slightly retuse, base \pm broadly cuneate into the petiole, with 1 or 2(–3) impressed minute marginal glands on each side, mostly at some distance from the petiole, coriaceous, laxly blackish glandular-muriculate or -punctate beneath, entire, edge \pm recurved, (3–)4–6 by 2–3(–3.5) cm, midrib rather flat above, prominent beneath, nerves 6–7 pairs, basal pair(s) steeply ascending, upper ones more spreading, faintly raised above, more distinctly so beneath, reticulation lax, sometimes rather inconspicuous on both faces as are not rarely also the nerves; petiole a little flattened, 4–6 by 1–1.5 mm. *Racemes* from the upper axils, \pm erect or subpatent, many-flowered; rachis angular, striate, stiff, 4–7 cm, perulae caducous before anthesis. Pedicels rather stoutish, (1–)2–3 mm, bract and bracteoles not seen. *Calyx* tube subsemiglobose, 1 mm, limb spreading, 0.6 mm, 5-lobed almost to the base, lobes ovate-acuminate, subapiculate. *Corolla* subcylindrical-oblong, pale green, not open in anthesis, but apparently early caducous as a whole, c. 5 by 2.5 mm. *Filaments* linear, hardly 1 mm; anther-cells oblong, 0.8–0.9 mm, no spurs; tubules as wide as the cells, c. 0.4 mm, nearly transversely cut apically, muticous. *Disk* annular, not much prominent. *Style* rather slender, c. 2 mm. Immature *fruit* globose, with several longitudinal ribs, 2–2.5 mm σ , crowned by disk and calyx lobes.

Distr. *Malesia*: NE. Celebes (Minahasa: Mt Klatat and other nearby craters).

Ecol. In open secondary forest, grassland or edge of craters, on fertile volcanic sandy soil, locally common, 1000–2000 m. *Fl.* Jan.–July, *fr.* Jan.–Febr.

Vern. *Kemes empung*, Klatat, Ts, *wètēs rintèkl*, Tt, *posi-posi rintek*, Tb.

170. *Vaccinium ambivalens* SLEUM. *Blumea* 12 (1963) 132.

Shrub, 3-4(-5) m. Branchlets obtusangular, glabrous. *Leaves* laxly arranged, elliptic or more rarely partly in the same specimen elliptic-oblong, apex shorter or longer (1-2 cm) obtusely or mostly subacutely acuminate, base cuneate and slightly decurrent on the petiole, the pair of marginal glands small, impressed, found at or in a short distance from the base, coriaceous, laxly appressedly gland-hairy below, glabrous otherwise, entire, flat, 6-9(-12) by (2-)3-5(-5.5) cm, 9-11-plinerved from and from somewhat above the base, midrib slightly impressed above, prominent beneath, nerves high curved-ascending, anastomosing before the edge, slightly though distinctly raised on both faces, reticulation dense, very conspicuous, a little prominent on both faces especially beneath; petioles dorsally compressed, grooved above, 5-8(-9) by 1-1.5 mm. *Racemes* from the penultimate axil, solitary, laxly (4-)5-8-flowered, subsecund; rachis rather slender, laxly glandular-muriculate, finally glabrescent, 1.5-3(-4) cm; perulae membranous, ovate or elliptic-ovate, apiculate, glabrous, very early caducous, 0.7-1 by 0.5-0.7 cm. Pedicels robust, \pm curved, laxly to very laxly glandular-muriculate, 6-10 mm, bract thick-membranous, lanceolate-oblong, *c.* 1 cm, very early going; bracteoles not observed. *Calyx* tube cup-shaped, base rounded, 2-2.5 mm, densely clothed with short hairs and rufescent muriculate glands, lobes erecto-patent, broad-ovate, subacute, ciliate, but laxly hairy and muriculate or glabrous distally, 1.5 mm, no apical gland. *Corolla* urceolate-cylindric, fleshy, white to pink, glabrous at both sides, *c.* 7 by 4 mm, lobes reflexed, 1 mm. *Filaments* linear, laxly very shortly and patently hairy initially below, glabrous upwards, or quite glabrous at full anthesis, 2-2.5 mm; anther-cells oblong, papillose, 1.5 mm; tubules almost half as wide as the cells, 0.8 mm, pore oblique. *Disk* glabrous. *Style* slenderly columnar, glabrous or laxly to subdensely set with spreading hairs, 5-6 mm. Submature *fruit* globular, apex truncate, laxly gland-muriculate and short-hairy, *c.* 7 mm ϕ .

Distr. *Malesia*: West New Guinea (Vogelkop Peninsula: E. part of Tohkiri Ra.; Wandammen Peninsula: Wondiwoi Mts).

Ecol. Terrestrial in mossy *Nothofagus-Myrtaceae* forest at 920-1800 m. *Fl. fr.* March, Oct.

171. *Vaccinium vidalii* MERR. & ROLFE, Philip. J. Sc. 3 (1908) Bot. 374; MERR. EN. Philip. 3 (1923) 252; COPEL. f. Philip. J. Sc. 42 (1930) 582, t. 5, f. 10-11; SLEUM. *Blumea* 11 (1961) 80.

Shrub, 2.5-5(-10) m, sometimes of strangling habit. Branchlets slender, patently hairy at the ultimate obtusangular parts and the petioles, terete and early glabrescent below, greyish corticate, subdensely leaved. *Leaves* oblong-ovate, elliptic-ovate or oblong-lanceolate, mostly widest below the middle, apex rather shortly subcaudate-acuminate, tip bluntish, base broadly attenuate into the petiole, coriaceous, patently hairy at midrib beneath (immature), later glabrous with scattered muriculate glands beneath, not rarely

lustrous on both faces, with several spaced minute, impressed glands along margin at least in its lower $\frac{2}{3}$, thus becoming faintly crenulate, margin slightly revolute (dry), 2.5-4 by (0.8-)1-1.5 cm, midrib \pm strongly impressed above, sharply prominent beneath, nerves 2 basal or slightly suprabasal, high curved-ascending, and 3-4 shorter upper, more spreading pairs, all anastomosing and very little raised above, more distinctly so beneath, reticulation lax and rather indistinct, sometimes quite obsolete; petiole flattened, 2(-3) by 1 mm. *Racemes* from the upper 2 or 3 axils, laxly (3-)4-8-flowered, glabrous; rachis slender, 1-3(-4) cm, eperulate at anthesis. Pedicels slender, 1-1.5 cm, bract and bracteoles not seen. *Calyx* tube semi-globose, base suddenly contracted into a kind of short foot, a little contracted at the limb too, rugulose, *c.* 2 mm, limb low, hardly 0.5 mm, wavy or shortly 5-lobed, lobes obtuse, ciliate, provided with a thick apical gland. *Corolla* urceolate, thin, glabrous at both sides, white in general, sometimes red, (4-)5 by 3(-3.5) mm, lobes deltoid, subacute, reflexed, 0.7-1 mm. *Filaments* subulate-linear, lanate, 1.5 mm; anther-cells broad-oblong, *c.* 1.2 mm, with 2 dorsal spurs set in a nearly right angle (0.5 mm); tubules cylindric, half as wide as the cells, 0.6-0.7 mm, subtransversely cut distally, pore almost round and a little flaring. *Disk* very prominent, densely pubescent. *Style* slenderly columnar, glabrous, 3-4 mm. *Fruit* globose, 4-5 mm ϕ , crowned by the rather bulky disk which surpasses the calyx lobes. *Seeds* brown, *c.* 1 mm.

Distr. *Malesia*: Philippines (Luzon).

Ecol. On exposed ridges in the mossy forest, (300-)850-2000 m.

Vern. *Kamiling, malakaming*, Sbl.

172. *Vaccinium amphoterum* SLEUM. *Blumea* 11 (1961) 81.

Shrub or small tree, 1-6(-12) m. Branchlets erect, not rarely 2-4 closely together at the top of the branches, younger parts subterete, striate and puberulent, older ones early glabrescent and covered with cork. *Leaves* rather densely set, elliptic or subovate-elliptic, apex subabruptly acuminate for 0.5-1 cm, subacute, base \pm broadly attenuate into petiole, with 1 or 2 marginal, deeply impressed glands a little above the base on each side, furthermore with several remote less distinct marginal glands, coriaceous, laxly minutely glandular-muriculate beneath, otherwise glabrous, 3-4.5 by 2-2.5(-2.8) cm, very margin a little revolute, midrib impressed above, at base beneath as thick as the petiole, gradually decreasing upwards, nerves 2 basal or slightly suprabasal and ascending, and 2-3 upper shorter pairs, all curved and anastomosing, minutely sunken above in almost fully grown leaves, prominent beneath, reticulation rather dense, slightly raised beneath only; petiole flattened and grooved above, initially puberulent, 4-7 by *c.* 1 mm. *Racemes* from the upper 2-3 axils, suberect, laxly 6-12-flowered, flowers secund; rachis angular, rather slender, minutely patently puberulous and sparsely glandular-muriculate, 3-5(-6) cm, eperulate at

anthesis. Pedicels rather stoutish, not hairy, very laxly glandular-muriculate below, more densely distally, 7–11 mm, bract oblong, acute, foliaceous, membranous, early caducous or \pm persistent, 8–12 by 2–4 mm; bracteoles not seen. *Calyx* cup-shaped, base rounded, \pm densely clothed with minute non-glandular hairs and muriculate glands, tube 1–1.5 mm, limb 0.5 mm, margin wavy or very shortly obtusely 5-lobed, lobes often merely indicated by the thick, may be penicillate apical glands. *Corolla* tubular-urceolate, a little fleshy, pinkish, glabrous at both sides, 7–8 by 3–4 mm, lobes deltoid, obtuse, hardly 1 mm, finally reflexed. *Filaments* subulate-linear, densely hairy below, glabrous distally, c. 3 mm; anther-cells oblong, 1–1.2 mm, no spurs; tubules erect, cylindrical, slightly narrower than the cells, c. 0.8 mm, obliquely cut distally, the back of each tubule extending into a short tooth. *Disk* depressed, laxly or densely erect-hairy at the inner margin. *Style* columnar, glabrous, c. 7 mm, not exerted. *Fruit* depressed-globose, pubescent and glandular-muriculate, 5–6 mm σ , calyx lobes mostly inflexed.

Distr. *Malesia*: SE. New Guinea (Milne Bay Distr.: slopes of Mt Dayman in Maneau Ra.).

Ecol. In dry edges or ridges of stunted mossy forest, and plentiful there as substage tree or in canopy layer, or frequent shrub in ferny regrowth of the burned mossy forest, 2230–2750 m. *Fl. fr.* May–June.

173. *Vaccinium banksii* MERR. Publ. Gov. Lab. Philip. n. 35 (1906) 54; Philip. J. Sc. 3 (1908) Bot. 372; En. Philip. 3 (1923) 248; COPEL. f. Philip. J. Sc. 42 (1930) 590; SLEUM. *Blumea* 11 (1961) 81.

Shrub, (0.5–)1–7 m, or treelet, trunk up to 20 cm σ breast high. Branchlets erect, angular, youngest parts puberulent and sparsely glandular-muriculate, older ones early glabrescent and corticate, subdensely leaved. *Leaves* elliptic to oblanceolate-elliptic, apex shortly and broadly attenuate or subacuminate, generally obtuse, rarely subacute, base cuneate into the petiole, bearing a conspicuous marginal gland on each side at some distance from the petiole, and several other, often less distinct or rather obscure ones at intervals of c. 5 mm up to the apex, coriaceous laxly glandular-muriculate or -punctate beneath, otherwise glabrous, the very edge a little revolute, (2.5–)3–4(–5) by (0.8–)1–1.6 cm, midrib slightly or not sunken above, obtusely prominent beneath, nerves 2 basal, steeply ascending, and 3–4 upper, shorter and more spreading pairs, all subinconspicuous above, slightly raised beneath as is the rather dense reticulation; petiole 2–3 by 1 mm. *Racemes* from the upper axils, laxly (4–)5–12-flowered, suberect, rather densely patently short-hairy and more laxly glandular-muriculate in all outer parts, the corolla excepted; rachis rather stoutish, eperulate at anthesis, (1.5–)2–3(–4) cm. Pedicels rather robust, 3–5(–6) mm, bract and bracteoles not known. *Calyx* tube broadly cup-shaped to almost patellar, hardly 1 mm, base subtruncate, limb erecto-

patent, deeply 5-lobed, lobes deltoid, blunt or subacute, 1–1.3 mm, dorsally less muriculate than the calyx tube, with a thick apical gland. *Corolla* urceolate, gradually narrowed upwards, rather fleshy, red, glabrous at both sides, 7 by 2.5–3 mm, lobes obtuse, reflexed, c. 1.5 mm. *Filaments* subulate-linear, densely hairy, hardly 1.5 mm; anther-cells broad-oblong, no spurs, 0.8 mm; tubules as wide as the cells, 0.5 mm, obliquely cut apically, the back wall of each tubule extended into a broad acute tooth. *Disk* laxly to subdensely hairy. *Style* thick-columnar, glabrous, c. 6 mm. *Fruit* depressed-globose, c. 5 mm σ , pubescent, crowned by the rather bulky and hairy disk.

Distr. *Malesia*: Philippines (W. Negros: Canlaon volcano).

Ecol. On ridges, in the mossy forest, 1300–2000 m.

Vern. *Dusong*.

174. *Vaccinium crenatifolium* SLEUM. *Blumea* 12 (1963) 133.

Laxly branched shrub, (1.5–)2–4 m, practically glabrous. Branchlets reddish, angular, rather slender, laxly leaved; axillary flower buds globose, perulae ovate. *Leaves* narrowly elliptic or oblong, apex shortly bluntly acuminate, base cuneate to and a little decurrent on the petiole, with regular, 2–3 mm spaced impressed blackish crenations, laxly glandular-muriculate or -punctulate below, 3–5(–5.5) by 1.5–2(–2.7) cm, midrib \pm manifestly impressed above, raised beneath, nerves 2–3 basal and slightly suprabasal and 1 or 2 pairs of upper nerves, all steeply curved-ascending and a little prominent on both faces, or not rarely rather obscure above, reticulation lax, \pm distinctly raised beneath, or sometimes inconspicuous; petiole reddish, rugulose, grooved above, 4–5(–6) by 1–1.5 mm. *Racemes* from the upper 1–3 axils, obliquely erect, subsecund, flowers nodding, rather numerous; rachis angular, rather slender, (1.5–)2–3 cm, no perulae at flowering time. Pedicels \pm robust and curved, 3–5 mm, bracts or bracteoles not seen. *Calyx* green, tube cup-shaped, base subtruncate, 1–1.3 mm, lobes ovate-triangular, ciliolate, the apical gland green, glabrous, rather thick. *Corolla* urceolate-cylindric, dirty reddish, greenish or greenish creamy, often suffused with red, sometimes pink, c. 5 mm long, 2 mm σ (dry), very shortly glandular-muriculate outside in bud, quite glabrous at both sides at anthesis, lobes reflexed, paler or white, hardly 1 mm. *Filaments* glabrous at the very base, slightly dilated above, villous almost to the top, 1.5 mm; anther-cells oblong, angular, echinulate, 0.7 mm; tubules slightly narrower than cells, 0.5 mm, obliquely cut apically. *Disk* yellowish, glabrous. *Style* rather slender, glabrous, 4–5 mm. *Mature fruit* globose, c. 4 mm σ , finally dark blue-purple.

Distr. *Malesia*: NW. New Guinea (Vogelkop Peninsula: crest of the Netti Ra.).

Ecol. In edge of mossy forest, or in more dry (also secondary) thickets along path across mossy crest forest, 1750–1960 m. *Fl. fr.* Nov.–Dec.

Vern. *Itiu*, Kebar.

175. *Vaccinium apophysatum* SLEUM. *Blumea* 11 (1961) 82. — *V. ? vidalii* (non MERR. & ROLFE) LAM & HOLTH. *Blumea* 5 (1942) 224.

Terrestrial much-branched shrub, up to 3 m. Branches terete, robust, with sparse lenticels. Branchlets rather slender, tips puberulous, glabrescent, subdensely leaved. *Leaves* elliptic to oblong, sometimes subobovate-elliptic, apex obtusely attenuate to rounded, base broadly attenuate or almost rounded, subcoriaceous, glabrous, crenulate by 5–8 impressed glands on each side, 1.5–2.5(–3.5) by (0.8–)1–1.5(–2) cm, midrib and nerves slightly raised on both faces, nerves 4–5 pairs, anastomosing, reticulation subinconspicuous; petiole rugulose, 1–2 mm. *Inflorescence* (in young *fr.*) quite glabrous; racemes laxly 3–5-flowered; rachis angular, slender, 1–2 cm. Pedicels rather slender, 6–8(–15) mm, bract and bracteoles not seen. *Calyx* tube campanulate, base suddenly and very shortly, though distinctly contracted into a kind of foot, 5-angular (dry), \pm contracted below the limb, 1–1.5 by *c.* 2 mm, limb erecto-patent, deeply 5-partite, hardly 1 mm, lobes broad-ovate, apex rounded, ciliate, apiculate by a distinct gland. *Corolla* cylindric-urceolate, thin, white, pink or red, glabrous at both sides, 5 by *c.* 2.5 mm, lobes obtuse, reflexed, hardly 1 mm. *Stamens* 8, *c.* 2.8 mm; filaments subulate, subdensely long-hairy, 1.8 mm; cells broad-oblong, *c.* 0.8 mm, no spurs; tubules a little narrower than the cells, obliquely truncate apically, *c.* 0.8 mm. *Style* glabrous, 4 mm. *Disk* glabrous. Submature fruit *c.* 5 mm ϕ .

Distr. *Malesia*: N. Moluccas (Talaud Is.: E. slope of Mt Piapi on Karakelang).

Ecol. On open sunny slope, *c.* 400 m, locally common. *Fl.* May.

176. *Vaccinium woodianum* COPEL. *f. Philip. J. Sc.* 42 (1930) 591; SLEUM. *Blumea* 11 (1961) 82. — *V. banksii* (non MERR. 1906) MERR. *Philip. J. Sc.* 2 (1907) Bot. 255, 293.

Terrestrial shrub, *c.* 1 m. Branchlets rather slender, stiff, angular, glabrous. *Leaves* dense, elliptic to obovate-elliptic, sometimes obovate, apex broadly obtusely attenuate, base \pm cuneate and somewhat decurrent, coriaceous, sparsely glandular-punctate beneath, otherwise glabrous, crenulate by impressed glands, very edge slightly revolute, 2–3(–3.5) by 1–1.5 cm, midrib a little sunken above, strongly obtusely prominent beneath, nerves 2 basal or suprabaasal and 2–3 upper shorter pairs, all curved-ascending and anastomosing, faintly raised on both faces, reticulation hardly prominent or visible beneath; petiole flattened dorsally, 2–3 by *c.* 1 mm. *Racemes* from the uppermost 1 or 2 axils, laxly 3–5-flowered, glabrous in all outer parts; rachis slender, 1–2 cm, eperulate. Pedicels slender, *c.* 7 mm. *Calyx* tube cup-shaped, rugulose, rather shining, 1 mm, limb suberect, deeply 5-lobed, lobes ovate, obtuse, ciliolate, 1 mm, with a distinct apical gland. *Corolla* urceolate, red, glabrous at both sides, 5 by *c.* 2.5 mm, lobes ovate, obtuse, reflexed, *c.* 1 mm. *Filaments* linear, pubescent; anther-cells lanceolate,

no spurs, *c.* 1.5 mm including the tubules, the latter short, obliquely cut apically. *Disk* rather bulky, \pm densely set with short erect hairs. *Style* glabrous, *c.* 4 mm.

Distr. *Malesia*: Philippines (Mindoro: Mt Halcon), 2700 m. Once found.

Vern. *Kátmo*.

Note. In the original collection the flowers are \pm galled.

177. *Vaccinium cumingianum* VIDAL, *Rev. Pl. Vasc. Filip.* (1886) 167; MERR. *Philip. J. Sc.* 1 (1906) Suppl. 112; *ibid.* 3 (1908) Bot. 375; *En. Philip.* 3 (1923) 248; COPEL. *f. Philip. J. Sc.* 42 (1930) 584, t. 6, f. 1–3, *incl. var. tayabasense* COPEL. *f. l.c.* 585; SLEUM. *Blumea* 11 (1961) 82. — *V. microphyllum* (non BL.) F.-VILL. *Nov. App.* (1880) 121, *p.p.* — *V. sp. (aff. V. coriaceo)* VIDAL, *Sinopsis Atl.* (1883) 30, t. 60, f. C. — *V. sp.*, VIDAL, *Phan. Cuming. Philip.* (1885) 21, 123.

KEY TO THE VARIETIES

1. Calyx lobes \pm obscure, only marked by an apical gland.
2. Leaves with 1–2(–3 or –4) remote marginal glands on either side of the lower half of the lamina 1. *var. cumingianum*
2. Leaves glandular-crenulate all along the margin 2. *var. igorotorum*
1. Calyx lobes well developed.
3. Leaves narrow-elliptic or lanceolate, generally 2.5–4 cm long. 3. *var. marivelesense*
3. Leaves elliptic-oblong or narrowly elliptic-obovate, generally 1.5–2 cm long
4. *var. pyriforme*

1. *var. cumingianum*.

Shrub or small tree, 1–7(–10, –15) m, generally terrestrial. Branchlets slender, tips puberulent, subangular, striate, older parts glabrescent and early greyish corticate, subdensely to densely leaved. *Leaves* narrow-elliptic or \pm lanceolate, apex shortly to more longish acuminate (very tip callous and bluntish), base \pm cuneate, provided with 1 or mostly 2(–3–4) spaced small marginal glands in the basal half on each side, subcoriaceous, dull, glabrous, laxly glandular-punctate beneath, entire, edge mostly a little recurved, (1.5–) 2.5–3.5(–4) by (0.5–) 0.7–1.5 cm, midrib narrow and somewhat impressed above, prominent beneath, nerves 1–2 basal, and several upper shorter pairs, all high curved-ascending and anastomosing, faintly or not visible above, slightly raised beneath, reticulation subdense and mostly but slightly conspicuous beneath; petiole reddish, *c.* 2 by 0.5 mm. *Racemes* from the upper 1–2 axils, suberect, laxly (3–)5-flowered, glabrous; rachis slender, (0.5–) 1–2.5(–4) cm, eperulate at anthesis. Pedicels rather stoutish, glabrous or with a few stalked glands below the calyx, (2–)4–6(–12) mm; bract and bracteoles not seen. *Calyx* tube cup-shaped, base rounded, glabrous, 1(–1.5) mm, limb low (0.5 mm) and fleshy, wavy, lobes obscure, marked by an apical gland. *Corolla* tubular-urceolate, thin,

glabrous outside, laxly to subdensely long-hairy in the lower part inside, white, pink or red, 5(-6) by c. 2.5 mm, lobes obtuse, reflexed, hardly 1 mm. *Filaments* subulate-linear, densely hairy, 2-2.5 mm; anther-cells oblong, 1.3-1.5 mm, generally no spurs; tubules cylindric, nearly half as wide as the cells, erect, divergent, 0.8-1 mm, subobliquely cut apically, pore almost orbicular, the back wall sometimes extended into a very short tooth. *Disk* prominent, sparsely to subdensely pubescent. *Style* columnar, glabrous, c. 5.5 mm, finally a little exerted. *Fruit* depressed-globose, 5-6 mm σ , dull and nearly blackish when ripe.

Distr. *Malesia*: Philippines (Luzon).

Ecol. In mountain forest, especially mossy forest, locally common on exposed ridges, (600-)1100-2000 m. *Fl.* Jan.-Dec.

Vern. *Daneodu, gutung, itangan, karang, Ig, daniri*, Tag., *darusarip*, Neg.

2. *var. igorotorum* COPEL. *f.* Philip. J. Sc. 42 (1930) 586; SLEUM. *Blumea* 11 (1961) 83.

Leaves narrow-elliptic, the entire margin distant-glandular-crenulate, generally 2.5-3.5 cm long. *Calyx* lobes \pm obsolete.

Distr. *Malesia*: Philippines (Luzon: Mountain Prov.).

3. *var. marivelesense* COPEL. *f.* Philip. J. Sc. 42 (1930) 586; SLEUM. *Blumea* 11 (1961) 83. — *V. igorotorum* COPEL. *f. ex* ELM. *Leaflet*. Philip. Bot. 9 (1933) 3142, *nom. nud.*

Leaves in shape as in *var. cumingianum*, but generally 2.5-4 cm long, the marginal glands restricted to the lower half of the lamina. *Calyx* lobes distinct, broadly ovate-rounded, ciliate, c. 1 mm.

Distr. *Malesia*: Philippines (Luzon: Bataan, Zambales and Pampanga Prov.).

4. *var. pyriforme* (MERR.) COPEL. *f.* Philip. J. Sc. 42 (1930) 586; SLEUM. *Blumea* 11 (1961) 83. — *V. pyriforme* MERR. Philip. J. Sc. 2 (1907) Bot. 295; *ibid.* 3 (1908) Bot. 373; En. Philip. 3 (1923) 251.

Leaves elliptic-oblong or narrowly elliptic-obovate, glandular-crenulate all along the margin, generally 1.5-2 cm long. *Calyx* lobes well developed.

Distr. *Malesia*: Philippines (Mindoro: Mt Halcon; Panay: Mt Bulilao; Luzon: Albay Prov.: Mt Mayon; Camarines Norte and/or Camarines Sur Prov.).

178. *Vaccinium gracile* J. J. S. *Med. Rijksherb. n.* 25 (1915) 12; *Nova Guinea* 12 (1917) 531; *ibid.* (1918) t. 220; SLEUM. *Bot. Jahrb.* 72 (1942) 254; *Blumea* 11 (1961) 83.

Epiphytic shrub. Branchlets elongate, slender, sparsely set with muriculate glandular hairs and finely patent-puberulous in the youngest parts, early glabrescent; axillary buds ovoid, acute, minute. *Leaves* laxly arranged, ovate, for 3-4 cm narrowly caudate-acuminate, subacute, base broad-

ly attenuate or rounded in general, though shortly contracted into the petiole at the very base, with 2 or 3(-4) spaced pairs of marginal glands in the basal half of the blade, subcoriaceous, flexible, shining, with lax longish, glandular, muriculate, appressed hairs especially at the midrib and nerves beneath, otherwise glabrous, entire, edge slightly revolute, 6.5-10 by 1.8-3.7 cm, midrib narrowly sunken above, prominent beneath, nerves 2-3 basal or slightly suprabasal, high curved-ascending and several upper shorter, more spreading pairs, all anastomosing and slightly raised on both faces as is the dense reticulation; petiole 3-6 by 1 mm, grooved above, initially puberulent. *Racemes* in the upper 3 or 4 axils, very laxly 8-12-flowered; rachis slender, quite glabrous as are the pedicels. 2.5-4.7 cm, eperulate; flowers nodding, on slender pedicels (1.2-1.7 cm) which bear some muriculate subclavate glands distally. *Calyx* glabrous, tube cylindric, base obtuse or truncate, 2.5-3 by 2 mm, limb suberect, low, lobes broadly triangular, exceptionally bearing an apical gland, ciliate, 0.5 mm. *Corolla* elongate-conical or suburceolate, contracted in the upper $\frac{2}{5}$, rather fleshy, fiery red with pale lobes, glabrous outside, pubescent in the lower $\frac{1}{3}$ inside, (1.1-)1.2-1.4 by 0.3 cm below, lobes ovate-triangular, recurved, c. 0.8 mm. *Filaments* linear, dilated and densely hairy below, less pubescent or glabrescent upwards, 3-3.5 mm; anther-cells oblong, c. 1 mm, no spurs; tubules cylindric, as wide as the cells or a little widened upwards, almost transversely cut distally, 0.5 mm. *Disk* laxly pubescent at the inner margin. *Style* columnar, densely subappressed-pubescent below, less so to the lower $\frac{2}{3}$ part.

Distr. *Malesia*: West New Guinea (Hellwig Mts), on peaty soil at 1700 m. Once found. *Fl.* Dec.

179. *Vaccinium tubiflorum* J. J. S. *Nova Guinea* 12 (1914) 166, t. 52 A; SLEUM. *Bot. Jahrb.* 72 (1942) 250; *Blumea* 11 (1961) 83.

Shrub or treelet, c. 3.5 m. Branchlets obtus-angular, glabrous. *Leaves* lax, elliptic, apex broadly attenuate, subacute or rather bluntish, base cuneate and a little decurrent into the broadened petiole, the gland on each side strictly basal, coriaceous, glabrous, sparsely glandular punctate beneath, entire, edge revolute, (3-)4-7 by (1.3-)2-3 cm, midrib obtusely sunken above, prominent beneath, as wide as the petiole below, gradually decreasing upwards, nerves 2 basal or slightly suprabasal, high ascending and 2-3 upper shorter, more spreading pairs, all anastomosing and slightly raised on both faces, reticulation rather dense, rather conspicuously prominent on both sides; petiole 4-6 by 1-1.5 mm. *Racemes* in the upper (1-)2(-3) axils, laxly 2-4-flowered; rachis rather slender, flexuous, glabrous, 0.7-1 cm, eperulate. Pedicels \pm stoutish, very sparsely muriculate, 6-9 mm; bract and bracteoles not seen. *Calyx* tube cup-shaped, base \pm truncate, rather densely gland-muriculate and sparsely minutely hairy especially at the base, 1.5-2 mm, limb suberect, deeply 5-partite, lobes ovate, glabrous on both sides, ciliate, 1 mm, the apical gland \pm

conspicuous. *Corolla* tubular, slightly zygomorphous, rather fleshy, pink, glabrous at both sides, *c.* 2 by 0.5–0.6 cm, lobes ovate-triangular, obtuse, finally recurved, 3–4 mm. *Filaments* subulate-linear, subdensely patently hairy or almost villous, 2.5–3 mm; anther-cells oblong, 1.8–2 mm, no spurs; tubules very short, as wide as the cells, obliquely cut distally, mucous, hardly 1 mm. *Disk* bulky, glabrous. *Style* rather slender, sparsely patent-pubescent especially in the lower half, as long as the corolla or finally a little exerted.

Distr. *Malesia*: NW. New Guinea (Arfak Mts, Anggi Lakes), on moss-covered granite, at 2500 m. One collection. *Fl. April*.

180. *Vaccinium debilescens* SLEUM. Bot. Jahrb. 72 (1942) 257; Blumea 11 (1961) 83.

Shrub or very slender tree, 1–3 m, not rarely epiphytic, glabrous in all outer parts. Branchlets slender, obtusangular, early covered with a thin greyish cork, subdensely leaved. *Leaves* often reflexed, narrowly subovate-lanceolate, apex \pm long attenuate or mostly subcaudate-acuminate, very tip bluntish, base rather broadly attenuate to cuneate, with a pair of small \pm basal marginal glands, and sometimes another remote upper one on each side, subcoriaceous, very laxly glandular-punctate beneath, entire, edge slightly revolute especially towards the base of the lamina, 2.5–3.5 by 0.7–1.2 cm, widest below the middle, midrib narrowly sunken or flat above, prominent beneath, nerves 1(–2) basal or slightly suprabasal, high curved-ascending, and several much shorter and more spreading, often vein-like upper pairs, all anastomosing and faintly sunken above in fully mature leaves, a little raised beneath, reticulation \pm dense, visibly prominent beneath only; petiole 2(–3) by *c.* 0.5 mm. *Racemes* in the upper 1–2 axils, recurved, very laxly (3–)4–5(–6)-flowered, flowers nodding; rachis rather robust, (0.5–)1(–2) cm, eperulate. Pedicels stoutish, curved, (1–)1.2–1.6 cm, swollen at both ends; bract and bracteoles not seen. *Calyx* tube obconical, base truncate, 3 by 3 mm with 5(–7) obtuse wings which extend into the lobes of the low calyx limb, lobes erect, thick, obtuse by a rather conspicuous apical gland, 1 mm. *Corolla* tubular-urceolate, fleshy, glabrous at both sides, green, pink or red, *c.* 7 by 3 mm below, lobes ovate, rounded-obtuse, hardly 1 mm, finally a little spreading or even reflexed. *Filaments* subulate, villous except the very base, 1.5–1.8 mm; anther-cells oblong, 0.8 mm, no spurs; tubules cylindrical at a right angle with and at base, much narrower than the cells, a little widened upwards, 1 mm, subobliquely cut distally, the back wall of each tubule often extending into several minute, irregular teeth-like appendices. *Disk* glabrous. *Style* columnar, somewhat thickened in the upper part, glabrous, as long as the corolla. *Fruit* subglobose, \pm truncate distally, the ribs still visible, crowned by the bulky disk, *c.* 5 mm σ .

Distr. *Malesia*: W. New Guinea (Oranje Mts: Lake Habbema).

Ecol. Common in undergrowth of more open

forest or in very mossy forest of ridge crests, 2900–3225 m. *Fl. fr. Aug.*

181. *Vaccinium minusculum* SLEUM. Bot. Jahrb. 72 (1942) 264; Blumea 11 (1961) 83.

Shrubby small tree, 3 m. Branchlets slender, youngest parts angular and puberulous. *Leaves* rather dense, ovate-lanceolate, apex gradually acuminate, tip blunt, base broadly attenuate, sometimes nearly rounded, with 2 dark minute, spaced marginal impressed glands on each side in the lower third of the blade, occasionally a third almost inconspicuous distant one, subcoriaceous, glossy especially above, glabrous, entire, very edge \pm revolute, 1.2–1.5 by (0.4–)0.5–0.7(–0.8) cm, midrib generally a little sunken above, prominent beneath, nerves 1(–2) basal and slightly suprabasal, high curved-ascending, and several upper shorter, spreading, vein-like pairs, all anastomosing and slightly prominent on both sides as is the rather dense fine reticulation; petiole slender, 1 mm. *Racemes* from the upper 2(–3) axils, laxly 3–4(–5)-flowered, glabrous in all outer parts; rachis slender, 5–7(–10) mm, perulae several, linear-oblong, *c.* 1.5 mm, mostly gone in flowering time. Pedicels slender, curved, 6–10 mm, with 2 slightly suprabasal subulate bracteoles, bract absent at anthesis. *Calyx* tube broadly cup-shaped, almost patellar, rugulose, shining, 1–1.2 mm, limb spreading, 0.5–0.8 mm, deeply 5-lobed, lobes broadly deltoid, ciliolate, provided with a rather conspicuous dark apical gland. *Corolla* subglobose-urceolate, contracted distally, membranous, pinkish white, glabrous at both sides, *c.* 3 mm, lobes very short, recurved. *Filaments* subulate, glabrous at the very base, hairy above up to the middle, glabrous in upper half, 1.5 mm; anther-cells oblong, granular, 1 mm, the 2 dorsal spurs 0.8 mm, at an almost right angle; tubules nearly as wide as the cells, 0.7 mm, subtruncate apically. *Disk* glabrous, shining. *Style* columnar, glabrous, *c.* 3 mm.

Distr. *Malesia*: East New Guinea (Central Distr.: Mt Tafa). One collection.

Ecol. In mossy forest, 2300 m, common. *Fl. May*.

182. *Vaccinium viscifolium* K. & G. J. As. Soc. Beng. 74, ii (1905) 63, *incl. var. minus* K. & G. *l.c.* 64; RIDL. J. Fed. Mal. St. Mus. 4 (1909) 41; *ibid.* 6 (1915) 49; Fl. Mal. Pen. 2 (1923) 207; Dop, in Fl. Gén. I.–C. 3 (1930) 713; SLEUM. Bot. Jahrb. 71 (1941) 452; Blumea 11 (1961) 84. — *V. perakense* RIDL. J. Str. Br. R. As. Soc. n. 79 (1918) 92, in *obs.*; Fl. Mal. Pen. 2 (1923) 207; BURK. & HENDERS. Gard. Bull. S. S. 3 (1925) 390; HENDERS. J. Fed. Mal. St. Mus. 13 (1927) 4; SYMINGTON, J. Mal. Br. R. As. Soc. 14 (1936) 355; FLETCHER, Fl. Siam. En. 2 (1938) 313; SLEUM. Bot. Jahrb. 71 (1941) 452. — *V. teysmannii* (non MIQ.) RIDL. J. Str. Br. R. As. Soc. n. 39 (1903) 15; K. & G. J. As. Soc. Beng. 74, ii (1905) 64; RIDL. J. Linn. Soc. Bot. 38 (1908) 313, *repr.* J. Fed. Mal. St. Mus. 2 (1908) 120; *ibid.* 6 (1915) 156. — *V. decorum* RIDL. *ibid.* 5 (1914) 36; Fl. Mal. Pen. 2 (1923) 207. — *V. subobovatum* FLETCHER, Kew

Bull. (1936) 39, *as to type*; Fl. Siam. En. 2 (1938) 314; SLEUM. Bot. Jahrb. 71 (1941) 453.

var. viscifolium.

Shrub or medium-sized tree, up to 6 m, sometimes epiphytic. Branchlets rather robust, angled and striate lengthwise, glabrous or puberulous, laxly leaved; axillary buds subglobose. *Leaves* obovate in general, sometimes more elliptic or oblong-obovate, rarely broadly oblanceolate, spatulate or almost obovate-rounded, apex obtuse or mostly rounded, rarely attenuate, base \pm cuneate and merging into the petiole, with a thick marginal gland on each side at the base of the blade or at apex of petiole, very coriaceous, firm, glabrous, laxly thick-glandular-punctate beneath, 4-7(-9-10) by (2-)2.5-4(-5-6.5) cm, entire, edge slightly or hardly revolute, midrib rather flat or a little sunken above, broadened below, and \pm flattish or slightly obtusely prominent beneath, nerves 1-2 basal and 2-3(-4-6) shorter upper and more spreading pairs, all curved-ascending and anastomosing, a little prominent on both faces, though not rarely rather inconspicuous especially beneath, reticulation lax, faintly perceptible on both sides, or often obsolete beneath; petiole flattened, 4-8 by 1.5-2(-3) mm, initially puberulous. *Racemes* in the upper 2-5, sometimes already defoliate axils, suberect, subdensely many-flowered; flowers pendulous; rachis rather slender, angular, striate, (2-)3-6(-8-11) cm, eperulate at anthesis. Pedicels rather slender, (3-)4-6 (in *fr.* 6-8-10) mm, whether or not laxly patent-hairy and glandular-muriculate as is the *calyx* tube; the latter campanulate to subsemiglobose, 1-1.5 mm, limb erect, or finally reflexed, deeply 5-partite, lobes c. 1 mm, deltoid, subacute, ciliate, sometimes provided with a minute subglobular, but mostly no apical gland. *Corolla* cylindrical-urceolate, rather thin, deep pink to white, glabrous at both sides, 6-7 by c. 2.5 mm, lobes suberect, narrow, obtuse, 1 mm. *Stamens* 8 or 10; filaments subulate, densely hairy, (3-)4(-5) mm; cells narrow-oblong, c. 1 mm, no spurs; tubules slenderly cylindrical, narrower than the cells, 2-3 mm, as the style finally a little exerted, obliquely cut apically. *Disk* glabrous. *Style* slender, glabrous, 6-7 mm. Submature *fruit* globular, glabrescent, c. 5 mm σ .

Distr. Indochina (S. Annam), S. Siam, and in *Malesia*: Malay Peninsula (including also P. Tioman).

Ecol. Hill and mountain forest, and especially in *Leptospermum* scrub on summits, locally not rare, (300-)900-2100 m. *Fl.* Jan.-Dec.

var. bicalcaratum SLEUM. Blumea 11 (1961) 84.

Leaves shortly (c. 1 cm) and obtusely attenuate at the apex. Anthers with 2 distinct dorsal spurs (1 mm), otherwise hardly different from *var. viscifolium*.

Distr. Malesia: Malay Peninsula (Cameron Highlands near summit of Mt Jasar), in mossy forest. One collection.

183. *Vaccinium loranthifolium* RIDL. J. Str. Br. R. As. Soc. n. 79 (1918) 91; Fl. Mal. Pen. 2 (1923)

208; SLEUM. Blumea 11 (1961) 84.

Small shrub or stunted tree, with thick blackish branches. Branchlets stoutish, angular, densely short-pubescent, striate, early greyish-blackish corticate, laxly leaved; axillary buds subglobose as in *V. viscifolium*. *Leaves* obovate, apex rounded, base broadly attenuate into the flattened petiole, with a pair of distinct basal glands, stiff-coriaceous, subdensely set with glandular or almost resinous dots (as in *V. viscifolium*) beneath, initially with some hairs on petiole and very base of lamina, entire, edge often \pm revolute in dry specimens, 4-6.5 by 2.5-3.5 cm, sub-9-plinerved, midrib slightly raised or flattish above, broadened and rather flat below, \pm evanescent upwards beneath, nerves 4 pairs from and from up to 1 cm above the base, steeply curved-ascending, with 1 or 2 upper, similar, shorter ones, all anastomosing, veins laxly reticulate, visibly raised above or mostly \pm obscure; petiole flattened, red, (5-)6-8 by 1.5-2 mm. *Racemes* in the upper 2(-3) axils, erect, rigid, densely (10-)15-20-flowered, flowers nodding; rachis stout, red, angular, densely shortly and patently hairy, 3-5(-6) cm, peduncle 1-1.5 cm; perulae ∞ , outer ones ovate, inner ones elliptic or obovate, glabrous and rugose dorsally, ciliate, up to 8 by 5 mm, early caducous. Pedicels robust, 1.5-2(-3) mm (in *fr.* 4 mm), reflexed, glabrous, bract oblong, thin, up to 7 by 2.5 mm, early caducous; bracteoles basal, subulate, ciliate, 2 mm, early caducous. *Calyx* tube cup-shaped to broadly obovate, base \pm truncate, rugose, glabrous, 1.5-2 mm, limb a little spreading, thin-coriaceous, pale, deeply 5-partite, lobes broad-ovate to semi-orbicular, 1-1.5 mm, ciliate, apical gland thick, broadly subglobular or mostly \pm broadened on each side to form a callose ribbon. *Corolla* ovoid-urceolate, fleshy, apparently red, glabrous outside, laxly to subdensely hairy at least in the lower part inside, 6-7 by 3(-4) mm, lobes ovate, finally reflexed, c. 1 mm. *Stamens* 8 (or 10); filaments linear-subulate, all over densely hairy up to the connective, 1.5-2 mm; cells narrow-oblong, base truncate, 1.3-1.5 mm, with 2 short, sometimes rudimental dorsal spurs; tubules narrow-cylindrical, erect, half as wide as the cells, 1.2-1.5 mm, obliquely cut distally, pore \pm orbicular, back wall often extended into 2 very short teeth. *Disk* bulky, glabrous. *Style* columnar, glabrous, 5-6 mm. *Fruit* pulpy, subglobose, c. 5 mm σ , crowned by the erect calyx lobes.

Distr. Malesia: Malay Peninsula (Main Range from Mt Kerbau to Mt Batu Brinchang, Mt Siku and Mt Irau).

Ecol. In mossy forest and summit vegetation on open ridges, 1830-2175 m. *Fl.* April-Aug.

184. *Vaccinium scandens* SCHLTR. Bot. Jahrb. 55 (1918) 179; SLEUM. l.c. 72 (1942) 257; Blumea 11 (1961) 84.

High scandent glabrous shrub or liana. Branchlets slender, flexuous, terete, older parts with elliptic lenticels. *Leaves* rather lax, oblong-lanceolate, apex long and \pm gradually caudate-acuminate, \pm falcate, subacute, base cuneate,

with 1 pair of minute, basal or slightly suprabasal, well visible glands, subcoriaceous, flexible, very laxly glandular-punctate beneath, entire, 7–15 by (1–)1.2–3 cm, 5(–7)-plinerved, midrib narrowly sunken in the lower part above, somewhat prominent beneath, nerves 2(–3) basal and up to 1 cm suprabasal pairs, steeply ascending and subparallel to the edge, anastomosing and slightly raised on both faces, as is the rather dense reticulation; petiole 0.5–1(–1.2) cm by *c.* 1 mm. *Racemes* in the upper 2–3 axils, laxly 6–10-flowered, subsecund, often \pm recurved; rachis rather slender, (3–)5–8(–10) cm, eperulate. Pedicels stoutish, 6–8 mm, bract and bracteoles not known. *Calyx* tube tubular-cup-shaped, base subtruncate, 3 mm, limb erect, deeply 5-lobed, 1 mm, lobes ovate, their margin much thinner or translucent, irregularly erose, at apex with a conspicuous rather thick dark gland. *Corolla* (immature) ovoid, fleshy, whitish or reddish green, glabrous at both sides, at least 6 mm long. *Stamens* 10, alternately slightly unequal, at least 4 mm long; filaments subulate, densely hairy, a little longer than the narrow-oblong cells, no spurs; tubules slenderly cylindrical, as long as the cells, apex obliquely cut, pore somewhat widened distally or flaring, the back wall of each tubule extended into 2 short, erect teeth. *Disk* glabrous. *Style* glabrous, as long as the corolla.

Distr. *Malesia*: NE. New Guinea (Sepik Distr.: April R. region, Hunstein Mts), in dense mountain forest, 850–1000 m. *Fl.* Oct., Dec.

185. *Vaccinium littoreum* MIQ. *Fl. Ind. Bat. Suppl.* 1 (1860) 251, 587; J. J. S. in K. & V. Bijdr. 13 (1914) 160; STEEN. *Arch. Hydrobiol. Suppl.* 11 (1932) 318, f. 16, 20 & 23; AMSH. in Back. Bekn. *Fl. Java* (em. ed.) 7 (1948) fam. 163, p. 4; SLEUM. *Blumea* 11 (1961) 85. — *V. hasseltii* MIQ. *Ann. Mus. Bot. Lugd.-Bat.* 2 (1863) 40; K. & G. J. As. Soc. Beng. 74, ii (1905) 66, *excl. syn.*; KOORD. *Exk. Fl. Java* 3 (1912) 18; KOORD.-SCHUM. *Syst. Verz.* 1 (1912) fam. 233, p. 109; HALL. *f. Med. Rijksherb. n.* 12 (1912) 29; MERR. *Philip. J. Sc.* 14 (1919) 248; RIDL. *Fl. Mal. Pen.* 2 (1923) 209, f. 91, *incl. var. sabuletorum* RIDL. *l.c.* 210; BURK. & HENDERS. *Gard. Bull. S. S.* 3 (1925) 390; RIDL. *Kew Bull.* (1926) 71; HENDERS. *Gard. Bull. S. S.* 4 (1928) 280; JOCHEMS. *Trop. Natuur* 18 (1929) 29, f. 8; BURK. *Dict.* (1935) 2217; HENDERS. *J. Mal. Br. R. As. Soc.* 17 (1939) 53. — *V. sabuletorum* RIDL. *Trans. Linn. Soc. II, Bot.* 3 (1893) 315 (*'sabuletrum'*). — *V. bancanum* (non MIQ.) RIDL. *J. Str. Br. R. As. Soc. n.* 33 (1900) 103.

Large terrestrial or epiphytic erect glabrous shrub, or small tree, 1–4(–10) m; bark blackish. Branchlets dark and angled when dry, rather slender, laxly to subdensely leaved, early corticate. *Leaves* elliptic to elliptic-oblong, sometimes \pm ovate or subobovate, apex long or more shortly and often rather abruptly (subcaudate-)acuminate, tip bluntish, base broadly attenuate to cuneately decurrent, with a swollen gland on each side at about the middle of the 'petiolar' part, coriaceous or subcoriaceous, reddish when young, shining,

not glandular-punctate beneath, entire, very edge \pm revolute, 3.5–6(–7) by 1.4–2.5(–3.5) cm, midrib slightly or hardly prominent above, more robust *i.e.* more distinctly raised beneath, nerves 3–5 basal and somewhat suprabasal, slightly curved and steeply ascending or even erect, and several upper shorter and more spreading, \pm vein-like pairs, all anastomosing and generally slightly prominent on both faces or at least beneath, as is the rather dense reticulation; 'petiole' a little compressed and grooved dorsally, 3–6(–8) by *c.* 1 mm. *Racemes* in numerous axils, obliquely ascending, or mostly \pm recurved, the numerous flowers secund, subdense to rather lax; rachis slender, (3–)4–7 cm, peduncle short, eperulate in flowering time. Pedicels slender, 2.5–4 mm, bracts and bracteoles not seen. *Calyx* tube shortly cupular or even patellar, 0.5 mm, limb spreading or finally reflexed, deeply 5-partite, lobes broadly triangular, hardly ciliate, *c.* 1 mm, apical gland distinct. *Corolla* subtubular-urceolate, waxy red, pink or white, glabrous at both sides, 7–8 by *c.* 2.5 mm, lobes triangular, obtuse, reflexed, *c.* 1 mm, sometimes with a tuft of hairs inside. *Stamens* 8 or 10; filaments linear-subulate, rather long hairy, especially at the dilated base, 2.5 mm; cells almost vertical, oblong, 1 mm, very shortly or not 2-spurred dorsally; tubules at \pm right angles to the cells and much narrower, cylindrical, *c.* 3 mm, much obliquely cut apically, back wall of each tubule generally extending into a pair of fine erect beaks or teeth. *Disk* glabrous. *Style* slenderly columnar, glabrous, *c.* 7–8 mm. *Fruit* subglobose, black when fully mature, 6–7 mm ϕ , crowned by the minute calyx lobes and the bulky disk.

Distr. *Malesia*: Sumatra (including also Siberut I.), Malay Peninsula, W. and E. Java; reported from Banka, but not recollected there.

Ecol. In forest near the seashore, ascending from the coast to 2400 m, in mossy forest epiphytic, on sandy or peaty soil, but also known from rather dry limestone rocks or slopes and near solfataras or chalk tuff terraces, locally common. *Fl.* Jan.–Dec.

Uses. Berries said to be edible. The hard timber is used for handles.

Vern. *Gundang-gundang*, Karo, *kaju kalé kuli manih*, Minangkabau, *sae sae batu*, *sae sae na babi*, Tapanuli, *poko padang*, Singapore, *andor na igar*, *semeleoleo*, *simar lojo-lojo*, Toba, *bringin*, Mad.

186. *Vaccinium artum* J. J. S. *Nova Guinea* 18 (1936) 118, t. 31, f. 2; SLEUM. *Bot. Jahrb.* 72 (1942) 252; *Blumea* 11 (1961) 86.

Much branched epiphytic shrub. Branchlets very slender, terete, youngest parts subappressedly yellowish hirsutulous, as are the petioles, or rough by the persistent hair-bases, subdensely leaved. *Leaves* ovate to narrow ovate-elliptic, apex caudate-acuminate, tip acutish or bluntish, base broadly attenuate to almost rounded, with 1 or 2 slightly suprabasal marginal glands on each side, thin-coriaceous, rather firm, often convex or strongly revolute (sometimes up to the midrib) when young, glabrous at full age, entire, 1.5–2.5 by

0.5–0.9 cm, subtriplinerved, midrib narrowly grooved above, a little raised beneath, nerves and veins generally obscure, sometimes faintly visible beneath; petiole 1–2 mm. *Racemes* in the upper 1–3 axils, laxly 4–8-flowered; rachis very slender, hirsutulous, 1–1.5 cm; perulae oblong, glabrous, 2–3 mm, early caducous. Pedicels patent, filiform, a little thickened distally, at base laxly hairy, 1.4–1.6 cm, bract and bracteoles not seen. *Calyx* tube narrowly cup-shaped or subobconical, base truncate, glabrous, 1.5 mm, limb suberect, 0.5 mm, 5-lobed to the base, lobes ovate-deltoid, \pm keeled dorsally, margin paler and membranous, ciliate, keel ending in a small though distinct apical gland. *Corolla* tubular-urceolate, narrowed upwards, fleshy, glabrous at both sides, red, c. 6 by 2 mm, lobes ovate, reflexed, 0.5 mm. *Filaments* sigmoid, linear, laxly long-hairy below, 2 mm; anther-cells oblong, 1 mm, no spurs; tubules short-cylindrical, \pm as wide as the cells, curved, c. 0.4 mm, obliquely cut distally, back wall of each tubule ending in 1–2 short, \pm reflexed teeth. *Disk* glabrous. *Style* columnar, glabrous, 5.5 mm.

Distr. *Malesia*: W. New Guinea (Nassau Mts and Wissel Lakes region).

Ecol. In mossy forest, at 2500 m. *Fl.* Sept.–Oct.

187. *Vaccinium habbema* KOORD. Nova Guinea 8 (1912) 882, f. 1; J. J. S. *ibid.* 12 (1917) 530; SLEUM. Bot. Jahrb. 72 (1942) 258; Blumea 11 (1961) 86.

KEY TO THE VARIETIES

1. Calyx lobes with a small apical gland only.
2. Leaves (2.5–)3–4.5 by 1–1.5 cm.

1. *var. habbema*

2. Leaves 1.2–2 by 0.6–1.1 cm.
2. *var. parvifolium*
1. Calyx lobes both with a thick apical gland and some irregular, small, marginal ones.

3. *var. pluriglandulosum*

1. *var. habbema*.

Shrub, 1–1.5 m. Branchlets shortly yellowish hirsutulous or subvillous in the young parts as are the petioles and the base of the lamina initially, slender, densely leaved, older parts terete, early glabrescent, defoliate and covered with blackish cork. *Leaves* ovate-lanceolate, apex subcaudate-acuminate, tip bluntish, base broadly attenuate, with 2(–3) distant, small, marginal, impressed glands in the lower third of the blade on each side, coriaceous, glabrous at full age, entire, edge \pm recurved, (2.5–)3–4.5 by 1–1.5 cm, midrib narrowly sunken above, markedly prominent beneath, nerves 2 basal or slightly suprabasal, high curved-ascending, and several upper, shorter and more spreading pairs, basal ones but faintly sunken above, all nerves slightly prominent beneath, reticulation dense, minutely raised beneath only; petiole 2–3(–4) by c. 1 mm. *Racemes* from the upper 1–2(–3) axils, laxly and \pm patently 4–6-flowered; rachis slender, glabrous, 1–3(–4) cm, perulae c. 2 mm, early caducous. Pedicels very slender, glabrous, (1–)1.2–1.5 cm, bract and bracteoles not seen. *Calyx* glabrous, tube elongate-

cupular, base shortly subabruptly attenuate, always \pm truncate, 3–4 by 3 mm, limb erect, 5-lobed to the base, lobes ovate-deltoid, 1.5 mm, margin thinner and translucent, sometimes laxly ciliate distally, dorsal keel ending in a distinct, rather small, apical gland. *Corolla* tubular-urceolate, slightly narrowed upwards, fleshy, red, glabrous at both sides, c. 10 by 3 mm, lobes obtuse, recurved, hardly 1 mm. *Filaments* subulate, laxly patently long-hairy in the lower half, glabrous above, 3(–4) mm; anther-cells oblong, 1.2–1.5 mm, no spurs; tubules as wide as the cells, 0.8–1 mm, obliquely cut apically, back wall of each tubule ending in 2(–1) short teeth. *Disk* glabrous. *Style* slenderly columnar, glabrous, almost equalling the corolla.

Distr. *Malesia*: W. New Guinea (Hellwig Mts).

Ecol. In forest or summit vegetation, 2000–2600 m. *Fl.* Nov., Jan.

2. *var. parvifolium* J. J. S. Nova Guinea 12 (1914) 162; SLEUM. Bot. Jahrb. 72 (1942) 258; Blumea 11 (1961) 86.

Leaves ovate to oblong-ovate or lanceolate, 1.2–2 by 0.6–1.1 cm, \pm gradually (and more shortly than in *var. habbema*) acuminate, obtuse, margin faintly crenulate, reticulation less distinct or even obsolete. *Inflorescence* up to 13-flowered.

Distr. *Malesia*: W. New Guinea (Oranje Mts, Mt Goliath), 3200–3450 m.

3. *var. pluriglandulosum* J. J. S. Nova Guinea 12 (1917) 530; SLEUM. Bot. Jahrb. 72 (1942) 258; Blumea 11 (1961) 86.

Differs from *var. habbema* by some irregular small marginal glands besides the thick apical gland on the calyx lobes. *Flowers* purple red.

Distr. *Malesia*: W. New Guinea (Oranje Mts; Mt Wichmann; Kajan Mts), 3000–3200 m.

188. *Vaccinium perrigidum* ELM. *Leafl. Philip. Bot.* 3 (1911) 1094; MERR. *En. Philip.* 3 (1923) 251; COPEL. *f. Philip. J. Sc.* 42 (1930) 561, t. 3, f. 1–4; SLEUM. Blumea 11 (1961) 86.

Epiphytic shrub, glabrous in all outer parts; stems usually few, larger ones up to 5 m long. Branchlets robust, somewhat flattened, striate. *Leaves* lax, elliptic to lanceolate-elliptic, apex rather shortly and subabruptly subcaudate-acuminate, tip blunt, base broadly attenuate into the petiole to almost rounded, with a thick marginal gland at 2–3 mm distance from the petiole on each side, rigidly coriaceous, subglucid on both faces, deep green above, paler beneath, initially laxly glandular-punctate beneath, entire, edge subrevolute in dry specimens, 7–10 by 3–4.5(–6) cm, sub-5–7-plinerved, midrib \pm flat above, obtusely prominent beneath, nerves 1–2 basal or up to 1 cm suprabasal steeply curved-ascending and 1–3 upper shorter pairs, all anastomosing and equally slightly prominent on both faces, reticulation rather lax above, more dense beneath, mostly slightly raised on both sides; petiole flattened, rugose, reddish brown in fresh specimens, narrowly or obscurely grooved above, 1–1.5 cm

by 1.5–2 mm. *Racemes* in the upper 1–2 axils, sub-erect, laxly 8–12-flowered; rachis stout, flattened, smooth, 5–8 cm, eperulate. Pedicels robust, curved, c. 1 cm, bract and bracteoles not seen. *Calyx* turbinate, tube 1–1.5 mm, limb spreading, almost 1 mm, wavy or obscurely lobed to near the base, lobes broadly rounded, ciliate, marked by a thick apical gland. *Corolla* urceolate, waxy white, glabrous at both sides, 9–10(–12) by 4 mm, lobes ovate, reflexed, purplish, c. 1 mm. *Filaments* linear, all over subdensely hairy, 5 mm; anther-cells narrow-oblong, 2 mm, no spurs; tubules as wide as the cells, 1 mm, obliquely cut apically. *Disk* rather bulky, glabrous. *Style* columnar, glabrous, as long as the corolla. *Fruit* subglobose, truncate, c. 9 mm σ (fresh). *Seeds* c. 2 mm.

Distr. *Malesia*: Philippines (Mindanao).

Ecol. On rocky bluffs or ridges in the mossy forest, 1525–1675 m.

Vern. *Balau*, Mbo., *basisir*, Bag.

189. *Vaccinium retivenium* SLEUM. Bot. Jahrb. 71 (1940) 164 (*'retevenium'*); Blumea 11 (1961) 86; *ibid.* 12 (1963) 133.

Shrub or small tree, (1.5–)3–8 m, bark fine grid-cracking, patchy grey-brown and grey; trunk 4–10 cm σ . Branchlets obtusangular in the youngest, terete in the older parts, quite glabrous as is the plant in all its outer parts, dark brown or mostly blackish when dry as are leaves and flowers then. *Leaves* laxly arranged, ovate-elliptic or sometimes more lanceolate, apex for 1.5–3 cm (sub)caudate-acuminate, acute, base broadly attenuate or almost rounded, very base very shortly and abruptly contracted, with 2 or 3 (sometimes 4) marginal spaced glands on each side, in the lower half of the blade, \pm coriaceous, shining, flat, entire, 8–11(–14) by 3–4.5(–6, –7) cm, 7(–9)-plinerved from and from a little above the base, midrib and nerves equally prominent on both faces, rarely beneath only, veins and veinlets rather densely reticulate, \pm distinctly raised beneath; petiole \pm flattened and grooved above, rugulose, 1–2 cm by c. 1.5 mm. *Racemes* in the upper 1–2(–3) axils, obliquely ascending, very laxly and patently 6–8(–10)-flowered; rachis rather slender, (3–)5–7(–11) cm, eperulate. Pedicels relatively slender, gradually swollen distally, often slightly curved, 1.3–1.6(–2) cm by c. 1 mm (at apex) (3 cm and thick in *fr.*), bract and bracteoles not seen. *Calyx* tube narrowly cup-shaped or almost cylindrical, rugulose, shining, base rounded, 4–5 by 4 mm, limb coriaceous, erect, 5-lobed to the base, lobes broad-deltoid, 1 mm, obtuse by a thick apical gland. *Corolla* broad-urceolate to subcampanulate, thick-fleshy, white, c. 6 by 5 mm, glabrous at both sides, lobes sub-erect, c. 2 mm. *Filaments* subulate-linear, densely hairy, c. 1.8 mm; anther-cells oblong, 1.5 mm, very shortly or not 2-spurred dorsally; tubules nearly as wide as the cells, 0.5 mm, a little incurved, apex obliquely cut. *Disk* low, glabrous. *Style* columnar, glabrous, c. 5 mm. *Fruit* subovoid-globose, apex truncate, calyx lobes inflexed, 6–8 by 6–7 mm, greenish pinkish.

Distr. *Malesia*: Borneo (Sarawak: Ulu Baram

and Mt Kalulung; North Borneo: Mt Kinabalu, and Mt Alab in the Crocker Ra.).

Ecol. In mountain forest and moss forest, (1065–)1500–2440 m. *Fl.* Febr.–June, *fr.* June–Oct. Vern. *Kliang batu*, Iban.

190. *Vaccinium angulatum* J. J. S. Nova Guinea 12 (1914) 167, t. 52 B; *ibid.* 12 (1917) 536; SLEUM. Bot. Jahrb. 72 (1942) 249; Blumea 11 (1961) 86.

Shrub 2–4 m. Branchlets subangular, youngest parts glabrous or very laxly glandular-muriculate, not properly hairy. *Leaves* laxly to subdensely arranged, elliptic to elliptic-obovate, apex shortly attenuate or subacuminate, tip mostly obtuse, sometimes \pm rounded, base cuneate into the flattened petiole, with a pair of small, basal, marginal glands, coriaceous, glabrous, minutely punctate beneath, entire, very edge a little revolute, (3.8–)4.5–7(–8) by (2–)2.5–3.5(–5) cm, midrib narrowly impressed above, as thick as the petiole and obtusely prominent in the lower part beneath, nerves 1–2 basal and slightly suprabasal, and 2–3 upper shorter, more spreading pairs, all rather straight-ascending, anastomosing, faintly raised or almost obsolete above, somewhat prominent beneath, reticulation dense and fine, visibly prominent especially beneath; petiole grooved above, 4–6(–8) by 1–1.5 mm. *Racemes* in the uppermost 1 or 2 axils, laxly 5–8-flowered; rachis rather slender, sparsely muriculate or clavate-glandular as are the pedicels, 2–3 cm, perulae oblong, membranous, up to 8 by 3 mm, early caducous. Pedicels \pm nodding, rather robust, (0.8–)1–1.5 cm, bract and bracteoles not seen. *Calyx* tube subdensely glandular-muriculate, obconical, 1.5–2 mm, limb spreading to \pm reflexed, deeply 5-lobed, lobes triangular, acute, glabrous dorsally, 1.5 mm, margin thin and often irregularly erose or almost dented, whether or not ciliate, apical gland subglobose, not rarely early caducous. *Corolla* tubular, slightly 5-angular, the very base \pm abruptly widened or \pm saccate, fleshy, rose red with paler or even white lobes, glabrous at both sides, much accentuated during the anthesis at full maturity, (1.6–)2–2.2 cm by 4–5 mm σ , lobes ovate-triangular, 2–3 mm. *Filaments* linear, dilated below, villous, c. 2 mm; anther-cells oblong, almost 2 mm, no spurs; tubules as wide as the cells, hardly 1 mm, obliquely cut apically. *Disk* glabrous. *Style* slender, glabrous, 1.8 cm. *Fruit* depressed-globose, crowned by the calyx lobes which are passed by the bulky disk, c. 4 mm σ .

Distr. *Malesia*: West New Guinea (Hellwig Mts, the Northwest R. area, and the base of Mt Carstensz).

Ecol. In forest, (1090–)1675–2600 m. *Fl.* Dec., Jan.

191. *Vaccinium angiense* KANEH. & HATUS. Bot. Mag. Tokyo 56 (1942) 480, f. 5; SLEUM. Blumea 11 (1961) 86; *ibid.* 12 (1963) 133.

Shrub or treelet, 2–3(–5) m. Branchlets short, angular, glabrous, tips reddish, older parts early covered with greyish blackish cork. *Leaves* lax, elliptic, apex very broadly attenuate and often

obtuse or sometimes in part even rounded, base broadly attenuate, with a minute or sometimes subinconspicuous marginal gland on each side at some distance from the petiole, \pm coriaceous, rather stiff, laxly glandular-punctate beneath, otherwise quite glabrous, entire, edge a little revolute towards the base of the lamina, 2.5–3.5 by 1.2–1.8 cm, midrib narrow and a little sunken above, as thick as the petiole and obtusely prominent in the lower part, nerves 2 basal or slightly suprabasal and 1–2 upper pairs, all high curved-ascending and anastomosing, rather obsolete above, faintly raised beneath, reticulation inconspicuous; petiole 2–4 by 1 mm. *Racemes* both axillary and ramiflorous, laxly 8–10(–12)-flowered; rachis angular, quite glabrous, 3–4(–5) cm, eperulate at anthesis. Pedicels rather slender, glabrous, 5–6 mm (in *fr.* 7–9 mm). *Calyx* cup-shaped, glabrous, tube 1 mm, limb low, deeply 5-lobed, lobes broad-deltoid, obtuse, 0.5 mm, mostly without a small apical gland. *Corolla* urceolate, pink to pinkish cream, glabrous, 5–6 mm in all, lobes almost whitish, ovate, obtuse, 1 mm. *Filaments* linear, dilated at base, densely hairy below the middle, c. 1.5 mm; anther-cells oblong, c. 1.5 mm, no spurs; tubules cylindric, erect, slightly narrower than the cells, c. 0.8 mm, nearly transversely cut apically, pore a little flaring. *Disk* glabrous. *Style* slender, glabrous, 5 mm. Submature *fruit* globose, 4–5 mm ϕ , calyx lobes inflexed.

Distr. *Malesia*: NW. New Guinea (Arfak Mts).

Ecol. In *Nothofagus* forest undergrowth or forest edge, rarely on burnt open summit, 1950–2300 m. *Fl. fr.* Jan.–Dec.

Vern. *Menokwan*, Manikiong.

192. *Vaccinium cruentum* SLEUM. *Blumea* 11 (1961) 87; *ibid.* 12 (1963) 134.

Much branched erect, sometimes tree-like shrub, up to 5 m. Branchlets slender, tips subdensely pubescent, older parts deeply longitudinally striate and glabrescent, reddish in dry specimens, finally greyish corticate, laxly to subdensely leaved. *Leaves* oblong-elliptic, sometimes subovate-oblong, with the apex for 0.3–0.8 cm obtusely acuminate, and the base broadly or more narrowly attenuate, or sometimes ovate to ovate-elliptic and the base truncate or rounded, with a conspicuous \pm prominent marginal basal gland close to the petiole, coriaceous, bright red and densely to more laxly pubescent all over both faces when young, glabrescent but persistently and \pm densely hairy at the midrib, more laxly and \pm caducously hairy and glandular-muriculate beneath, entire, slightly or not revolute, (1.8–)2–3 by (0.8–)1–1.5(–1.8) cm, midrib impressed above, obtusely prominent beneath, nerves 1–2 basal and 3–4 upper, more spreading pairs, all anastomosing, slightly raised beneath only as is the rather dense reticulation; petiole pubescent, 2–3 by c. 1 mm. *Racemes* from the upper axils, subdensely 6–15-flowered, shortly subdensely whitish pubescent, the corolla excepted; rachis rather slender, (1–)2–3 cm. Pedicels stoutish, (4–)5–8 mm, bract oblong or lanceolate, acute, membranous, up to 8 by 4 mm,

early caducous; bracteoles not seen. *Calyx* cup-shaped, tube c. 2 by 3 mm, limb c. 1 mm, 5-lobed almost to the base, lobes deltoid, obtuse by a large apical gland. *Corolla* subcylindric-urceolate, blood red or dark crimson or almost magenta (deep pink in more shady places), fleshy, glabrous at both sides, (7–)8(–9) mm by 3–4 mm ϕ below, c. 2.5 mm ϕ at apex, lobes obtuse, reflexed, 1 mm. *Filaments* subulate from a dilated base, \pm densely long-hairy in the lower third, glabrous above, 2.5(–3.5) mm, alternately subunequal; anther-cells oblong, granular, base obtuse, c. 1 mm, no spurs; tubules cylindric, erect, slightly narrower than the cells, 0.5 mm, subobliquely cut apically, back wall of each tubule into a distinct erect or reflexed tooth. *Disk* glabrous or set with a few, sometimes more numerous hairs. *Style* rather slender, glabrous, 7–8 mm. *Fruit* globose, pubescent, blackish at full maturity, (5–)6–8 mm ϕ .

Distr. *Malesia*: East New Guinea (Eastern and Southern Highlands: Mt Wilhelm and Mt Otto; Mt Giluwe).

Ecol. In mossy forest, on edge of low mossy forest with grassland, or in alpine shrubbery, 2800–3745 m, locally not rare. *Fl. fr.* July–Sept.

Vern. *Dinohgubol*, Chimu: Masul, *dingding*, Wahgi: Minj, *longeba*, Mairi: Mondo, *t'lampso*, Mendi.

193. *Vaccinium alvarezii* MERR. *Philip. J. Sc.* 4 (1909) Bot. 304; *En. Philip.* 3 (1923) 247; *COPEL. f. Philip. J. Sc.* 42 (1930) 562, t. 3, f. 5–6; *SLEUM. Blumea* 11 (1961) 87. — *V. turbinatum* MERR. *Philip. J. Sc.* 10 (1915) Bot. 54; *En. Philip.* 3 (1923) 252.

var. alvarezii.

Shrub or treelet, c. 3 m, usually epiphytic. Branchlets stoutish, tips angular, quite glabrous, reddish when dry. *Leaves* lax, oblong-obovate or narrowly obovate-elliptic, sometimes elliptic, apex shortly gradually or subabruptly, obtusely attenuate or subacuminate, not rarely \pm obtuse, base cuneate or \pm decurrent, with a basal or \pm suprabasal, thick, marginal gland and sometimes 1–2 minute upper ones on each side, coriaceous, \pm stiff and shining, entire, edge somewhat revolute (dry), glabrous except sparse glandular hairs or points beneath, 5–8(–10) by (2–)2.5–4(–5.5) cm, midrib narrowly sunken at base, apically flattish or even \pm raised, nearly as wide as the petiole and obtusely prominent at base beneath, nerves 2(–3) basal or slightly suprabasal, high ascending, and a few upper, shorter and more spreading pairs, all anastomosing and \pm faintly raised above, markedly prominent beneath, reticulation rather dense, finely prominent beneath only; petiole transversely rugose, (4–)5–7 by 1.5–2(–2.5) mm. *Racemes* from the upper axils, solitary or rarely in pairs, ascending, 10–15(–20, –25)-flowered; rachis rather robust, angular, mostly quite glabrous, rarely papillose-puberulous, 3–5(–9) cm. Pedicels stoutish, glabrous or rarely papillose-puberulous, 0.7–1.5 cm (in *fr.* 2 cm); bract and bracteoles not seen. *Calyx* glabrous, tube campanulate, 1 mm, limb spreading, deeply 5-

lobed, lobes broadly ovate or obtusely triangular, 1.5–2 mm, ciliolate, all or partly \pm distinctly gland-apiculate. *Corolla* subventricose-cylindric or barrel-shaped, white, pink or red, glabrous at both sides, 10–11 by *c.* 5 mm, lobes erect, ovate, obtuse, 1.5–2 mm. *Filaments* linear, white-villous, 4–5 mm; anther-cells oblong, verruculose, 2.5 mm, no spurs; tubules cylindric, divergent, a little narrower than the cells, *c.* 0.6 mm, subobliquely cut apically. *Disk* prominent, glabrous. *Style* glabrous, as long as the corolla. *Fruit* depressed-globose, truncate at the apex, crowned by the bulky disk which protrudes beyond the persistent calyx lobes, 5–6 mm ϕ . *Seeds* fusiform, black, *c.* 1.5 mm.

Distr. *Malesia*: Philippines (Luzon).

Ecol. In primary forest, (100–)300–2000 m. Vern. *Dungál*.

var. moisenae COPEL. f. Philip. J. Sc. 42 (1930) 564; SLEUM. *Blumea* 11 (1961) 88.

Calyx tube, disk and internal surface of the corolla short-pubescent.

Distr. *Malesia*: Philippines (Luzon: Isabela Prov. on Mt Moises), at 900 m. One collection.

194. *Vaccinium cavendishioides* SLEUM. *Blumea* 11 (1961) 88; *ibid.* 12 (1963) 134.

Shrub, 2 m, sometimes scandent or treelet up to 5(–10) m. Branchlets reddish, slender, obtus-angular, glabrous, early corticate, laxly to subdensely leaved. *Leaves* elliptic or lanceolate-oblong-elliptic, apex shortly or very shortly obtusely acuminate or attenuate, occasionally shortly subcaudate-acuminate, base broadly or more narrowly attenuate, the marginal gland on each side minute, impressed, strictly basal, subcoriaceous or thin-coriaceous, glabrous, entire, edge very narrowly cartilaginous and pale, flat, 3–5.5 (–7.5) by (1.3–)1.5–2.5 (–3.5) cm, midrib slightly impressed above, obtusely prominent beneath, nerves *c.* 3 basal and a little suprabasal, and several upper equally curved-ascending pairs, all anastomosing and not much prominent on both faces, reticulation slightly raised beneath only; petiole compressed dorsally, 3–4 (–5) by *c.* 1 mm. *Racemes* in the upper 4–6 axils, ascending or more spreading, minutely papillose-puberulous, glabrescent except the rachis, 12–18-flowered; rachis angular, rather slender, 2.5–5 cm, eperulate at anthesis. Pedicels slender, 3–5 (–6) mm, bract membranous, ovate to ovate-oblong, ciliolate, 3–6 by 2–3 mm, caducous before anthesis, bracteoles subulate-linear, ciliolate, hardly 1 mm, very early caducous. *Calyx* tube cup-shaped, base subtruncate, 1–1.2 mm, limb subpatent, 5-partite almost to the base, lobes subovate-deltoid, 0.5–0.7 mm, bluntish, ciliolate, sometimes with an apical gland. *Corolla* urceolate, slightly constricted distally, thin, dull reddish or pink with creamy lobes, or pure white, or yellowish greenish, glabrous at both sides, (4–)5 by *c.* 2 mm (6 by 2.5–3 mm fresh), lobes obtuse, reflexed, 0.7 mm. *Filaments* subulate-linear, densely hairy below, 2 mm; anther-cells broad-oblong, 0.7–0.8 mm, no spurs; tu-

bules cylindric, almost as wide as the cells, 0.4–0.5 mm, obliquely cut apically, back wall of each tubule extending into 1 or 2 short erect teeth. *Disk* prominent, glabrous. *Style* glabrous, rather slender, *c.* 5 mm, finally exserted. *Fruit* globular, *c.* 4 mm ϕ , purplish-blackish.

Distr. *Malesia*: NW. New Guinea (Vogelkop Peninsula).

Ecol. In primary or secondary forest, or along edge of *Castanopsis-Araucaria* forest, in 'ladang' shrubbery or fern scrub, not rarely steep slopes, on limestone rocks, on clayey or sandy ground, 275–1350 m, very common locally. *Fl. fr.* Jan.–Dec.

Vern. *Gobijr*, Maibrat, *bomantinbur*, *mambao*, *Kebar*, *obaire*, *Framo*, *kedjari*, *Teminabuan*, *audawatene*, Arguni.

195. *Vaccinium dictyoneuron* SLEUM. *Blumea* 12 (1963) 136.

KEY TO THE VARIETIES

1. Calyx tube glabrous.

2. Leaves (4–)4.5–7.5 by 2.5–4 (–5) cm.

1. *var. dictyoneuron*

2. Leaves 2.5–3.5 (–4) by 1–2 (–3) cm.

2. *var. oreophilum*

1. Calyx tube \pm densely glandular-muriculate and hairy 3. *var. koëbrense*

1. *var. dictyoneuron*.

Erect glabrous shrub, 2–4 m, tips of branchlets reddish and shining; axillary buds ovoid, acutish, 2 mm. *Leaves* subdensely arranged, elliptic, apex shortly, not rarely rather abruptly obtusely acuminate, base broadly attenuate to and a little decurrent on the petiole, coriaceous, firm, entire, pair of basal marginal glands small, (4–)4.5–7.5 by 2.5–4 (–5) cm, (7–)9–11-plinerved from and a little from above the base and 1–2 pairs of upper nerves, all slightly impressed above and raised beneath, veins and veinlets rather densely reticulate and prominent on both faces or at least beneath; petiole slightly depressed, grooved above, blackish (dry), 5–8 by 1.5–2 mm. *Racemes* in several upper axils, obliquely suberect, perulae ovate to oblong, 6–10 by *c.* 4 mm, early going; rachis 3–4.5 cm, stoutish. Pedicels robust, 8–10 mm (in *fr.* 10–15 mm), bract lanceolate, very early caducous. *Calyx* tube obconical, base \pm truncate, finally constricted below the limb, 2 mm, lobes ovate-deltoid, ciliolate, 1–1.5 mm, no apical gland. *Corolla* urceolate-cylindric, fleshy, pink to light carmine, glabrous also inside, 8 (–9) by *c.* 3 mm, lobes 1.5 mm, reflexed. *Filaments* linear, base slightly dilated and glabrous, otherwise densely short-hairy almost to the top, 3.5–4 mm; anther-cells oblong, slightly echinulate, 1.9–2.2 mm; tubules a little narrower than the cells, 0.7–0.9 mm, obliquely cut at apex. *Disk* prominent, glabrous. *Style* slenderly columnar, (7–)8–9 mm. *Fruit* subglobose, truncate, purplish at maturity, 6–7 mm ϕ , calyx lobes curved inwards.

Distr. *Malesia*: NW. New Guinea (Arfak Mts around the Anggi Lakes).

Ecol. In forest edge or undergrowth, often sterile, 1900–2000 m. *Fl. fr.* Oct.–Jan.

2. var. oreophilum SLEUM. *Blumea* 12 (1963) 136.

Differs from the type variety by smaller leaves, 2.5–3.5(–4) by 1–2(–3) cm, petioles c. 5 mm, slightly shorter and less densely flowered racemes. *Calyx* lobes not rarely provided with an apical gland. Compact, much branched shrub, (1–)2–3 m.

Distr. *Malesia*: NW. New Guinea (Arfak Mts around the Anggi Gigi Lakes).

Ecol. In low *Nothofagus* forest or forest edge, or in devastated subsummit relict forest, 2200–2400 m, locally plentiful. *Fl. fr.* Jan.

3. var. koëbrense SLEUM. *Blumea* 12 (1963) 137.

Differs from *var. oreophilum* by a short-pubescent and \pm densely glandular-muriculate calyx tube. Shrub, 0.4–3 m.

Distr. *Malesia*: NW. New Guinea (Arfak Mts: Mt Koëbré Ridge between Anggi Lakes and from Mt Mundi).

Ecol. In forest edge or in open, regularly burnt summit scrub, 1900–2300 m. *Fl. fr.* Jan.–Febr. Vern. *Menokwan*, Manikiong.

196. Vaccinium irigaense MERR. *Philip. J. Sc.* 10 (1915) Bot. 52; *En. Philip.* 3 (1923) 249; *COPEL. f. Philip. J. Sc.* 42 (1930) 576, t. 5, f. 3–5; SLEUM. *Blumea* 11 (1961) 88.

Glabrous shrub, 4–8 m. Branchlets angular, striate, brownish, shining, rather stoutish, laxly to subdensely leaved. *Leaves* oblanceolate, or elliptic-oblanceolate, for c. 1 cm abruptly subcaudate-acuminate, tip bluntish, base cuneately tapering into petiole, marginal basal glands 1(–2) minute, at a short distance from the petiole on each side, thin-coriaceous, very sparsely glandular-dotted underneath, shining, entire, very edge \pm recurved, 4.5–6 by 1.5–2.5(–3) cm, sub-5(–7)-plinerved, a few upper, much shorter and more spreading nerves or veins, all anastomosing and slightly raised on both faces as is the \pm dense reticulation; petiole flattened, shallowly grooved above, 5–7 by 1–1.5 mm. *Racemes* in the upper 3–4 axils, \pm many-flowered, suberect, spreading or occasionally recurved; rachis stoutish, angular, 5–6 cm, eperulate. Pedicels rather robust, 5–7 mm, bract and bracteoles not seen. *Calyx* tube campanulate-obconical, base subtruncate, rugulose, 1–1.5 mm, limb suberect, 1 mm, 5-partite nearly to the base, lobes broad-ovate to subdeltoïd, blunt or subacute, ciliate, occasionally some lobe with a small apical gland. *Corolla* 7(–8) mm, cylindrical below and c. 3 mm ϕ , subabruptly contracted to c. 1.5 mm ϕ in the upper third, glabrous at both sides, red, lobes slightly spreading, oblong, obtuse, whitish, 1 mm. *Filaments* linear and densely hairy below, almost filiform and glabrous upwards, 3.5–4 mm, alternately a little unequal; anther-cells oblong, 1 mm, no spurs; tubules as wide as the cells, very short, curved, 0.5 mm, obliquely cut or subtransversely truncate apically. *Disk* bulky. *Style* rather slender, 7(–8) mm, finally somewhat exerted. *Immature fruit* globose, c. 6 mm ϕ , crowned by the conspicuous disk and the erect calyx lobes.

Distr. *Malesia*: Philippines (Luzon: Camarines Sur & Sorsogon Prov.; Catanduanes; Biliran I.).

Ecol. On ridges in mossy forest, 530–1000 m. Vern. *Dalupáan*, Bik.

197. Vaccinium fraternum SLEUM. *Blumea* 11 (1961) 89.

Much-branched, glabrous treelet, 4–6 m. Branchlets slender, reddish, shining, subdensely leaved. *Leaves* narrow-elliptic or oblong-, more rarely subovate-elliptic, apex (sub)caudate-acuminate for 1–1.5 cm, tip bluntish, base \pm broadly attenuate or cuneate into the petiole, marginal gland on each side small, basal or \pm suprabasal, coriaceous, very laxly or hardly visibly glandular-punctulate beneath, entire, 3.5–6 by (1.5–)1.8–2.5(–3.2) cm, midrib very narrowly impressed above, broad and obtusely prominent below, nerves 1–2 basal or slightly suprabasal and 2–3(–4) upper pairs, all curved-ascending and anastomosing, subinconspicuous above, minutely raised beneath, reticulation rather dense, visibly raised beneath only; petiole (fresh red) rather slender, dorsally compressed and grooved, 3–5 by c. 1 mm. *Racemes* in the upper 1–2(–3) axils, erect or a little recurved, subdensely 10–15-flowered, flowers subsecund; rachis rather slender, (3–)4–6 cm, perulate. Pedicels stoutish, (4–)5–6(–7) mm, bract narrow-oblong, acuminate, 6–10 by 2–4 mm, partly persistent during anthesis, bracteoles not seen. *Calyx* tube sub-campanulate-obconical, base attenuate and \pm truncate, rugulose, 1.5 mm, limb spreading, rather low, c. 0.5 mm, deeply 5-lobed, lobes very broadly ovate or depressed-semiorbicular, ciliate, apical gland rather thick. *Corolla* subcylindric-urceolate, thin, greenish white, glabrous at both sides, c. 7 by c. 2.5 mm, lobes ovate, finally reflexed, c. 1 mm. *Filaments* subulate-linear, densely long hairy in the lower $\frac{2}{3}$, glabrous above, c. 2.5 mm; anther-cells oblong, 1–1.2 mm, no spurs; tubules as wide as the cells below, narrowed upwards, very obliquely cut at apex, 0.5–0.6 mm, back wall of each tubule protracted into an erect distinct tooth. *Disk* thick, glabrous, surpassing the calyx lobes. *Style* slenderly columnar, glabrous, c. 6 mm.

Distr. *Malesia*: East New Guinea (Milne Bay Distr.: E. slopes of Goodenough I.).

Ecol. In open low forest of crests, 1700 m, frequent. *Fl.* Oct.

198. Vaccinium claoxylon J. J. S. *ic. Bog.* 4 (1910) 71, t. 321; MERR. *En. Born.* (1921) 466; SLEUM. *Blumea* 11 (1961) 89; *ibid.* 12 (1963) 134; *ibid.* 12 (1964) 343. — *V. sp.* near *V. teysmannii*, STAPP, *Trans. Linn. Soc. II, Bot.* 4 (1894) 190.

Shrub or small tree, rarely up to 10 m, generally terrestrial, occasionally epiphytic. Branchlets robust, tips angular, glabrous. *Leaves* lax, broadly elliptic or subovate- or obovate-elliptic, apex shortly attenuate, obtuse, rarely almost rounded, base rarely rounded, generally gradually spatulate-attenuate into a short petiole 2–6 mm (E. Borneo) or subsessile (Mt Kinabalu), with a thick basal gland on each side, stiff-coriaceous, glabrous, laxly dark glandular-punctate beneath (remains of glandular muriculate hairs which are found on young leaves), entire, flat, (6–)8–13(–14) by (3–)4–

7.5(–8.5) cm, midrib robust, convex-prominent and as wide as the petiole below (fresh red), nerves (5)–6–7(–8) pairs, the lowest ones from and a little from above the base, the upper ones pinnately arranged and subparallel to each other, all curved-ascending and anastomosing, slightly raised above, more distinctly so beneath, reticulation dense and prominent on both sides. *Racemes* from the upper, defoliate axils, erecto-patent, secund, densely many-flowered to near the base, glabrous; rachis angular, stiff, 6–13 cm, perulae early caducous. Pedicels robust, (1)–1.5–2(–2.5) mm, bract and bracteoles not seen. *Calyx* tube cup-shaped, base truncate, 1–1.5 mm, limb erect, 5-partite to the base, lobes ovate-triangular, blunt, 1.2–1.5 mm, with numerous, small, thick, sessile glands and some very fine ciliate hairs along the margin. *Corolla* subtubular-urceolate, glabrous at both sides, rather fleshy, whitish to pink, sweet scented, 6–7(–8) by *c.* 2.5 mm, lobes ovate, finally reflexed, 1 mm. *Stamens* 10, almost as long as the corolla (exserted when corolla lobes are reflexed), alternately slightly unequal; filaments linear, dilated above the base, laxly to subdensely long-hairy in the lower $\frac{2}{3}$, glabrous above; anther-cells oblong, free from the base, slightly granular, no spurs, *c.* 1.3 mm including the very short tubules, the latter almost as wide as the cells, obliquely cut at apex. *Disk* prominent, glabrous. *Style* columnar or slightly obconical at the base, as long as the corolla, densely set with long, appressed hairs in the lower $\frac{2}{3}$, glabrous above. *Fruit* subglobular, wrinkled, *c.* 4 mm \varnothing , obscurely lengthwise 10-ribbed, crowned by the inflexed calyx lobes.

Distr. Malesia: Borneo.

Ecol. In submontane (also mossy) forest or scrub, wooded ridges, 700–1550 m, on Mt Kinabalu up to 2985 m, locally not rare. *Fl. fr.* Jan.–Sept.

199. *Vaccinium halconense* MERR. Philip. J. Sc. 2 (1907) Bot. 294; *ibid.* 3 (1908) Bot. 377; En. Philip. 3 (1923) 249; COPEL. *f.* Philip. J. Sc. 42 (1930) 578, t. 5, f. 6–7; SLEUM. Blumea 11 (1961) 89.

Tree-like shrub, usually terrestrial, sometimes epiphytic or scandent, 3–15 m. Branchlets reddish brown, rigid, angular, glabrous. *Leaves* rather laxly arranged, oblong-elliptic, occasionally subovate-elliptic or -oblong, apex mostly shortly attenuate or subacuminate, obtuse, sometimes almost rounded, base \pm cuneate into the broadened petiole, with a basal or slightly suprabasal marginal gland on each side, coriaceous, rather stiff, glabrous, laxly glandular-punctate beneath, entire, edge a little recurved, 6–9(–11) by 2–3.5(–4) cm, midrib narrowly sunken above, as wide as the petiole and obtusely prominent in the lower part, nerves 2(–3) basal or slightly suprabasal and 2–3 upper and shorter, similarly steeply curved-ascending and anastomosing pairs, mostly faintly immersed above and hardly prominent or even subinconspicuous beneath, reticulation lax to subdense, a little raised on both faces, sometimes rather obscure; petiole flattened, 3–5(–6) by 2–3

(–4) mm. *Racemes* in the upper axils, suberect, rather laxly to subdensely 10–15-flowered, subdensely short-yellowish pubescent the corolla excepted; flowers pendulous; rachis angular, 3–6(–7) cm, eperulate. Pedicels rather slender, 6–10 (in *fr.* –12) mm, bract subulate, 3 mm, early caducous, bracteoles not seen. *Calyx* tube campanulate to semiglobose, 1–1.5 mm, limb suberect, 1.5–2 mm, deeply 5-partite, lobes ovate-acuminate, bluntish, sometimes less densely hairy than the tube, ciliate, no distinct apical gland visible, but with several small marginal yellow glands, these caducous in later stages. *Corolla* broadly tubular-urceolate, (5)–6–7 by 2.5–3 mm, thin, white, glabrous outside, laxly hairy inside, lobes suberect, obtuse, 1 mm. *Filaments* linear, densely hairy, 2 mm; anther-cells oblong, 1.3 mm, with 2 minute dorsal spurs; tubules cylindrical, half as wide as the cells, transversely cut at apex, 0.5 mm, no glandular appendages. *Disk* bulky, pubescent. *Style* columnar, as long as the corolla, densely pubescent. *Fruit* globose, glabrescent, *c.* 8 mm \varnothing (fresh), crowned by the persistently hairy calyx lobes. *Seeds* polyedric-elongate, 1.5 mm.

Distr. Malesia: Philippines (Luzon, Mindoro, Negros, Mindanao).

Ecol. In mossy forest, on exposed ridges, 1200–2135 m. *Fl. fr.* Jan.–Dec.

Vern. Ayusin, Sbl., tagilumboy, Magamai, yagomun-nag dako, Negros.

200. *Vaccinium roseiflorum* J. J. S. in Gibbs, Arfak (1917) 173; SLEUM. Bot. Jahrb. 72 (1942) 257; Blumea 11 (1961) 90.

Small tree. Branchlets slender, minutely puberulous. *Leaves* lax, elliptic, apex shortly, \pm abruptly and obtusely acuminate, base subacutely attenuate, with 1 or 2 small marginal glands on each side 2–3 mm above the base, coriaceous, glabrous, rather dull, entire, edge a little revolute, 2.4–4 by 1.3–2.2 cm, midrib narrowly impressed above, slightly raised beneath, nerves 1 or 2 basal or \pm suprabasal, curved-ascending and anastomosing pairs, faintly sunken above and hardly prominent beneath, and a few upper, less perceptible pairs, reticulation 0; petiole slender, semiterete, 2–3 mm. *Racemes* in the upper 1–2 axils, ascending, secund, laxly 7–9-flowered; rachis slender, 3–4 cm, densely puberulous and more laxly muriculate-glandular as are pedicels and calyx, eperulate. Pedicels rather slender, 5–7 mm, bract and bracteoles not seen. *Calyx* tube cupular, 1.5 mm, limb deeply 5-partite, lobes ovate-triangular, subacute *c.* 1.2 mm, with a row of small, sessile, marginal, sometimes early caducous glands, and ciliate towards the apex, mostly also with an apical gland. *Corolla* suburceolate-cylindric, rather fleshy, pink glabrous at both sides, 6–7 by 2.5–3 mm, lobes semiorbicular, *c.* 1.2 mm. *Filaments* linear, narrowed upwards, villous in the lower $\frac{3}{4}$, *c.* 2 mm; anther-cells oblong, curved, echinulate below, 1 mm, no spurs; tubules suberect, 0.4 mm, obliquely cut at apex, back wall of each tubule extended into 1–2 very short, \pm recurved teeth. *Disk* glabrous. *Style* slender, glabrous, *c.* 5 mm.

Distr. *Malesia*: NW. New Guinea (Arfak Mts near the Anggi Lakes), one collection.

Ecol. On edge of forest-patch, at c. 2135 m. *Fl. Dec.*

201. *Vaccinium leptocladum* SLEUM. *Blumea* 11 (1961) 90.

Very slender, epiphytic shrublet, youngest branchlets hardly 1 mm σ , angular and patently puberulous, older ones glabrescent, c. 2 mm σ , laxly to subdensely leaved. *Leaves* narrowly oblong or mostly obovate-oblong, apex obtuse or rounded, base cuneate, subcoriaceous, glabrous, no basal marginal glands, entire, minutely revolute at the very edge, (7-)8-10 by 2.5-3 mm, nerves 2-3, basal or slightly suprabasal, high ascending pairs, a little raised on both faces as is the midrib, reticulation subdense, not much prominent on both sides; petiole slender, c. 1 mm. *Racemes* from 1 or 2 upper axils, either reduced to 2 flowers on a slender peduncle, 3-5 mm long (pedicels slender, glabrous, 4-6 mm), or even to a solitary flower on a 2-3 mm long peduncle (pedicel 5-7 mm), bract and bracteoles not seen. *Calyx* all over subdensely pubescent, tube broad-campanulate, 0.5 mm, limb suberect, deeply 5-lobed, lobes deltoid, c. 1 mm, bluntish, edge ciliate and set with several thickish subsessile glands. *Corolla* ovoid-urceolate, inflated below, abruptly contracted distally, 3.5-4 mm, by c. 2.5 mm, glabrous outside, puberulous in the lower $\frac{1}{4}$ inside, red, lobes hardly 1 mm. *Filaments* linear-subulate, villous, 1.5 mm; anther-cells broad-oblong, no spurs, c. 0.8 mm including the equally wide and very short, obliquely truncate tubules. *Disk* laxly hairy. *Style* filiform, hairy in the lower half, c. 4 mm.

Distr. *Malesia*: SE. Borneo (Mt Kutei), in forest at 1600 m. One collection. *Fl. Oct.*

202. *Vaccinium phillyroides* SLEUM. *Bot. Jahrb.* 71 (1940) 163; *Blumea* 11 (1961) 90; *ibid.* 12 (1963) 135. — *V. sp.* near *V. varingiaefolium*, STAPP, *Trans. Linn. Soc. II, Bot.* 4 (1894) 189.

Scandent, large, terrestrial or epiphytic shrub in the crown of large trees. Branchlets slender, divaricate, ultimate parts obtusangular, lower ones subterete, minutely puberulous, subdensely to more laxly leaved. *Leaves* lanceolate or ovate-lanceolate, apex gradually or subcaudately acuminate, often a little curved, tip bluntish, base cuneately narrowed, with one small marginal gland 2-3 mm above the petiole, subcoriaceous, rather laxly minutely glandular-muriculate beneath, otherwise glabrous, entire, narrowly marginate, hardly or not revolute at the edge, 2.2-3(-3.5) by 0.5-0.8(-1) cm, midrib generally slightly sunken above, prominent beneath, nerves 2 basal or up to 3 mm suprabasal, high curved-ascending, and 1-2 upper and shorter, mostly spreading pairs, all anastomosing and either a little raised on both faces, or sometimes subobscure above, reticulation dense and minutely raised in immature, almost obscure in fully mature leaves; petiole 1-2 mm. *Racemes* a few from the upper axils, ascending, laxly 6-8(-10)-flowered; rachis angular, puberulous

as are the pedicels, (1.5-)-2.5-4 cm, eperulate. Pedicels slender, reddish, 5-7 mm, bract and bracteoles not seen. *Calyx* tube cup-shaped or semiglobose, puberulous, 1-1.5 mm, limb subpatent, deeply 5-partite, lobes ovate-acuminate, 1-1.5 mm, subglabrous dorsally, with a marginal row of small, sessile, brownish glands. *Corolla* tubular, rather fleshy, red to carmine, glabrous at both sides, 8-9 by 2.5 mm, slightly contracted at apex and 5-lobed for c. 1 mm. *Filaments* linear to filiform, with lax longish white hairs, alternately 6 and 7 mm; anther-cells oblong, 1 mm, no spurs; tubules \pm as wide as the cells, 0.2-0.3 mm, obliquely cut distally. *Disk* densely white-hairy. *Style* columnar, c. 8 mm, densely hairy in the lower part, glabrescent towards the top. *Fruit* globose, c. 5 mm σ , short-pubescent, with a densely pubescent disk included by the incurved calyx lobes.

Distr. *Malesia*: Borneo.

Ecol. In montane rain-forest or jungle ridge, 700-1830 m. *Fl. fr. Oct.-March.*

203. *Vaccinium amplexicaule* J. J. S. Bull. Jard. Bot. Btzg II, 8 (1912) 52; Nova Guinea 12 (1914) 159, t. 45 C; SLEUM. *Bot. Jahrb.* 72 (1942) 263; *Blumea* 11 (1961) 90.

Shrub, c. 0.5 m. Branchlets puberulous, densely leaved. *Leaves* ovate, shortly obtusely acuminate, base deeply cordate-auriculate and \pm conduplicate, lobes rounded and amplexicaulous, with a marginal gland on each side at a short distance from the petiole, coriaceous, puberulous at the base above, glabrous elsewhere, glandular-punctate beneath, entire, 2.8-3.5(-4.3) by 2-2.8 cm, 7-9-plinerved, and 2-3 pairs of nerves higher up, all \pm impressed above, hardly or not prominent beneath, reticulation obsolete; petiole puberulous, 2-3 by 2 mm. *Racemes* from the upper axils, 10-13-flowered; rachis angular, puberulous, 2-2.7 cm. Pedicels spreading, terete, puberulous, c. 1 cm by 1.5 mm; bract and bracteoles not seen. *Calyx* glabrous, campanulate, c. 4 by 6 mm, tube 1.5 mm, limb spreading, lobes broadly subovate-triangular, acute, ciliate, 2.5 by 4 mm. *Corolla* shortly campanulate-urceolate, obtusely 5-angled, fleshy, glabrous at both sides, white, 6-7 by 8 mm, lobes broadly triangular, obtuse, revolute, 2(-2.5) mm, reflexed. *Filaments* linear, base dilated, curved and long-hairy above the base, straight and less hairy distally, c. 2.7 mm; anther-cells oblong, base protracted into an obtuse apiculus, c. 2 mm, with 2 dorsal spurs (0.7 mm); tubules narrow-cylindrical, c. 1.5 mm, the pore almost round. *Disk* puberulous. *Style* terete, faintly hirtellous below, glabrous upwards, c. 4.5 mm.

Distr. *Malesia*: West New Guinea (Oranje Mts: Mt Goliath), 3200 m, on humus and moss-covered rocks in sunny places, rare. Once found. *Fl. March.*

Note. Described as having no stipitate glands on anther-cells and tubules which, however, possibly are present, to conclude from the many characters which connect *V. amplexicaule* with *V. otophyllum*, *V. daphniphyllum*, *V. convallariiflorum* and *V. appendiculatum*.

204. *Vaccinium hooglandii* SLEUM. Blumea 11 (1961) 91.

Glabrous shrub or treelet, not rarely epiphytic. Branchlets angular, early greyish corticate, striate, densely leaved below, subimbricately so towards the tips. *Leaves* ovate, apex shortly obtusely acuminate or attenuate, base deeply cordate and auriculate, lobes rounded and \pm amplexicaulous, red with glaucous bloom when young, green at full age, coriaceous, entire, lower ones 5–8(–9) by 3–5(–6) cm, upper ones gradually decreasing in size, to 2.5 by 1.5–2 cm, margin hardly revolute, midrib flat or faintly sunken above, prominent beneath, nerves 7–8 pairs, 3–4 of which from the base, anastomosing and subimpressed above, slightly raised beneath, reticulation dense, somewhat prominent beneath only; petiole (1–)2–3 by 1.5–2 mm. *Racemes* from the uppermost axils, short, occasionally almost reduced to fascicles, mostly densely, rarely more laxly 5–10(–12)-flowered; rachis c. 1 cm. Pedicels rather robust, curved, 0.8–1.3 cm, bract lanceolate, ciliate distally, c. 6 by 2 mm, rather early caducous; bracteoles not seen. *Calyx* broadly campanulate, tube 1.5–2 mm, limb spreading, thick-fleshy, 5-partite to the base, lobes broadly deltoid, the apex obtuse and occasionally ciliate, 1.5–2 by 2.5 mm, no apical gland. *Corolla* subglobose-urceolate, slightly contracted below the lobes, fleshy, pink, c. 5 by 4 mm, glabrous outside, hairy in the upper part inside, lobes obtuse, subreflexed, 1 mm. *Filaments* linear, villous in front, glabrous at the back, c. 1 mm; anther-cells oblong, no spurs, c. 1.5 mm including the very short, equally wide and obliquely cut tubules, showing a knob or small gland between them. *Disk* annular, glabrous, 3.5 mm. *Fruit* globose, apex truncate and crowned by the bulky disk, c. 6 mm ϕ , finally blackish.

Distr. *Malesia*: East New Guinea (Western Highlands around Mt Hagen).

Ecol. Terrestrial in forest edge of the lower montane rain-forest, or epiphytic in crown of tal *Nothofagus* forest, 1980–2195 m. *Fl.* April–August.

205. *Vaccinium schoddei* SLEUM. Blumea 12 (1963) 135.

Lax treelet or (sometimes scandent) glabrous shrub; stems apparently few, slender, terete, branched distally. *Leaves* rather densely arranged, in part subimbricate, ovate, shortly attenuate or subacuminate towards the mostly blunt apex, base auriculate, lobes amplexicaulous, c. 1 cm ϕ , the pair of basal glands close to the petiole and rather inconspicuous, coriaceous, (3–)4–8 by (2–)2.5–4(–5) cm, entire, hardly revolute, 7–9-plinerved, and 3–4 upper irregular pairs of nerves, all in-arching along the edge, slightly impressed above as is the midrib, prominent below, veins and veinlets densely reticulate, raised on both faces, or certainly beneath; petiole (and midrib) reddish, 2–4(–5) by 1.5–2 mm. *Racemes* from the upper 1–3 axils, subsecund, few- to many-flowered, reddish all over; rachis angular, (1–)2–4(–5) cm; perulae, bracts and bracteoles not seen. Pedicels curved, robust, 0.8(–1.5) cm. *Calyx* tube obconical,

base truncate, shining, purplish and pruinose as is the corolla in dry specimens, 2–2.5 by 3.5 mm, lobes erecto-patent, deltoid, ciliolate, 2–2.5 mm, no apical gland. *Corolla* urceolate-cylindric, fleshy, green suffused with red, or crimson when fresh, 11–12 by 4–5 mm, laxly hairy at the stamens inside, glabrous otherwise, lobes 1 mm. *Filaments* glabrous and dilated at the very base, gradually attenuate and villous upwards, c. 3.5 mm; anther-cells oblong, almost smooth, 1.2 mm; tubules nearly as wide as the cells, 0.8 mm, obliquely cut apically. *Disk* glabrous. *Style* slenderly columnar, glabrous, 1 cm. Submature *fruit* globose, 5–6 mm ϕ , calycine lobes erect.

Distr. *Malesia*: East New Guinea (Southern and Western Highlands).

Ecol. In upper montane *Nothofagus* forest, alpine shrubberies or summit grassland, 2700–3520 m. *Fl.* July–August.

Vern. *Kund*, Enga, *orsar*, *wanegamp*, Mendi, *argilmai*, Hagen.

206. *Vaccinium stellae-montis* SLEUM. Blumea 11 (1961) 91.

Shrub, 0.3–3 m. Branchlets terete, laxly short-hairy, 2–3 mm ϕ . *Leaves* dense, elliptic to oblong-elliptic, apex rounded and retuse for 0.5–1 mm, base broadly attenuate to almost rounded, with a small marginal gland at the very base, coriaceous, glabrous except the midrib which is laxly hairy in its lower part above, lustrous above, entire, very laxly glandular-punctate beneath, 1.5–2.3 by (0.8–)1–1.5 cm, midrib slightly or hardly impressed above, a little prominent beneath, nerves 2–3 pairs, high ascendent, the upper pair sometimes \pm obscure, all faintly or not sunken above, slightly raised beneath, reticulation not much conspicuous; petioles subterete, hairy, 3–4(–5) by 0.5–1 mm. *Racemes* from the upper 2–3 axils, (2–)3(–4)-flowered, glabrous; rachis slender, (0.5–)1–1.5 cm, base included by a few reduced perulae; flowers nodding. Pedicels as thick as the rachis, 0.8–1.1 cm, bract and bracteoles subulate, 1–1.5 mm, very early caducous. *Calyx* tube turbinate, rugulose, red, 1.5–2 mm, limb spreading, c. 1 mm, 5-lobed nearly to the base, lobes broadly deltoid, very blunt, ciliolate. *Corolla* almost subglobose-urceolate, deep pink at the tube, white at the inside of the lobes, rather fleshy, inside hairy all over, 0.8–1.2 cm long, 6–8 mm ϕ , contracted to 3–4 mm ϕ distally, lobes suberect, obtuse, 1.5 mm. *Filaments* narrow-linear, slightly dilated at the base, subdensely hairy below, more laxly so upwards, glabrous distally, c. 4.5 mm; anther-cells oblong, echinulate, curved, 1.5 mm; tubules as wide as the cells, hardly 0.5 mm, apex obliquely cut, almost muticous. *Disk* glabrous. *Style* columnar, glabrous, 6 mm.

Distr. *Malesia*: Central New Guinea (Star Mts: Mt Antares, Mt Sirius), in alpine shrub vegetation, 3050–3300 m. *Fl.* July.

207. *Vaccinium lageniforme* J. J. S. Bull. Jard. Bot. Btzg II, 8 (1912) 53; Nova Guinea 12 (1914) 158,

t. 45 B; SLEUM. Bot. Jahrb. 72 (1942) 249; Blumea 11 (1961) 92.

Shrub, 1 m. Branchlets terete, glabrous. *Leaves* lax, obovate, apex rounded, base spatulate-contracted, with a marginal basal gland on each side near to the petiole, coriaceous, glabrous, entire, edge much revolute, 6.5–7.5 by 3–3.5 cm, midrib slightly sunken above, prominent beneath, nerves 2 basal or a little suprabasal, and a few upper, equally curved-ascending pairs, faintly impressed above, ± obsolete beneath, as is the reticulation; petiole compressed dorsally, 6–7 by c. 2 mm. *Racemes* from the upper axils, laxly 3–5-flowered, flowers ± spreading, glabrous; rachis 0.7–1 cm, eperulate. Pedicels robust, c. 1 cm, with 2 minute, tooth-like suprabasal bracteoles; bract not seen. *Calyx* tube broadly cup-shaped, c. 2 mm, limb spreading, 2 mm, deeply 5-partite, lobes semiorbicular, ciliolate, 1–1.5 mm. *Corolla* subglobular-urceolate, thick-fleshy, carmine, inside below laxly hairy, c. 8 by 8 mm, lobes slightly reflexed, triangular, obtuse, 2 mm. *Filaments* linear, laxly patently (hispid-)hairy, 2.5 mm; anthers bifid slightly over halfway; cells oblong, 1.5 mm, no spurs; tubules erect, nearly as wide as the cells, 1.5 mm, obliquely cut at the narrowed end. *Disk* glabrous. *Style* thick-lageniform, or more bottle-like, glabrous, 3.5 mm, c. 2 mm ø at base.

Distr. *Malesia*: New Guinea (Oranje Mts: base of Mt Goliath), on swampy, humous sunny places, not common. One collection. *Fl.* April.

208. *Vaccinium crassistylum* SLEUM. Blumea 11 (1961) 92; *ibid.* 12 (1964) 344.

Small scrambling shrub or treelet. Branchlets slender, drooping, quite glabrous. *Leaves* lax, ovate to lanceolate-ovate, apex (sub)caudate-acuminate for 1–2 cm, subacute, base broadly attenuate to rounded, with a rather thick supra-basal marginal gland and a few less distinct spaced upper ones, coriaceous, almost white when young or tinged with pink, glabrous, ± glossy, edge very narrowly cartilaginous, 3–8 by 1.5–3 cm, midrib ± immersed above, prominent beneath, nerves 2 basal, 1–2 upper, equally high curved-ascending and anastomosing, and a few uppermost, much shorter and vein-like pairs, all faintly sunken or subobscure above, slightly raised beneath, reticulation rather dense, generally visibly raised beneath only; petiole 3–4 by c. 1 mm. *Racemes* from the upper 2–5 axils, laxly 3–5(–7)-flowered, glabrous, shortly peduncled; rachis very slender, 1–1.5(–2) cm, eperulate. Pedicels filiform, 1.5(–1.8) cm (c. 2 cm in fruit), sometimes subtended by an acicular bract. *Calyx* broadly cupular, tube c. 1.5 mm, limb erect, 0.6–1 mm, 5-lobed, -dented or -way to almost the base. *Corolla* subglobose, shortly 5-lobed, rather fleshy or waxy, white or greenish, glabrous at both sides, c. 4 by 4–5 mm. *Filaments* broadly subulate, densely hairy, 1.5 mm; anther-cells ovate-oblong, 1 mm, no (or rather indistinct) spurs; tubules slightly narrower than the cells, cylindrical, 0.6 mm, pore oblique. *Disk* glabrous. *Style* thick-columnar, glabrous, 3

mm. *Fruit* depressed-globose (submature), said to be deep red, crowned by the bulky disk surpassing the calyx lobes, c. 4 mm ø.

Distr. *Malesia*: East New Guinea (Eastern and Western Highlands).

Ecol. In the lower montane *Nothofagus* forest, climbing over *Rhododendron*, or along edge of *Castanopsis* forest, 1600–2590 m. *Fl. fr.* Aug.–Nov.

Vern. *Kap-kap*, Minj.

209. *Vaccinium brevipedunculatum* J. J. S. Nova Guinea 18 (1936) 119, t. 32; SLEUM. Bot. Jahrb. 72 (1942) 252; Blumea 11 (1961) 92.

Much branched, epiphytic shrub, up to 2 m. Branchlets slender, drooping, subdensely leaved, younger parts densely covered with short, almost hispid and ± spreading hairs as are the petioles, peduncles and the lower part of the midrib on both faces or above only; axillary buds minute, subulate. *Leaves* ovate-elliptic to -lanceolate, apex subcaudate-acuminate, subacute, base broadly attenuate to nearly rounded, obtuse, with a minute marginal gland on each side at 2–3 mm distance from the petiole, coriaceous, glabrous (except the midrib), laxly glandular-punctate beneath, entire, edge ± revolute (dry), 1.6–3 by 0.7–1.4 cm, midrib narrowly immersed above, slightly raised beneath, pair of basal ascending nerves faintly raised on both sides, as are the few upper nerves and the reticulation; petiole 1–2 mm. *Racemes* from some of the upper axils, abbreviate, umbel-like, (1)–2–3-flowered; peduncle c. 2 mm, bearing some small ovate-acuminate perulae. Pedicels spreading, ± filiform, mostly with a few patent hairs in the lower part, rarely hairy all over, apex swollen and with a few muriculate glands, 1.1–1.7(–2.2) cm; bract and bracteoles not seen. *Calyx* coriaceous, glabrous, tube cup-shaped, at base abruptly contracted, 1.5 mm, limb erect, 0.5 mm, 5-lobed to the base, lobes broadly ovate-triangular, bluish, ciliolate. *Corolla* broadly conical-urceolate, fleshy, glabrous at both sides, white, light red, or pink with white lobes, 4(–5) by c. 2.5 mm, lobes recurved, 0.5 mm. *Filaments* subulate-linear, laxly patently hairy, c. 1.5 mm; anther-cells oblong, c. 1 mm, no spurs; tubules erect, nearly as wide as the cells, 0.5 mm, obliquely cut at apex. *Disk* prominent, glabrous. *Style* robust, glabrous, 3.5 mm. *Fruit* said to be purplish black.

Distr. *Malesia*: West New Guinea (Mt Doorman; Bernhard camp, Idenburg R.).

Ecol. High epiphyte in mossy forest, 900–2000 m. *Fl.* March, Nov.

210. *Vaccinium longepedicellatum* SLEUM. Blumea 11 (1961) 93. — *V. ardisioides* WERNH. Trans. Linn. Soc. II, Bot. 9 (1916) 90, non RIDL. 1914; SLEUM. Bot. Jahrb. 72 (1942) 252.

Shrub. Branchlets slender, terete, laxly leaved, young parts covered with a thin indument of appressed, short, whitish hairs, as are the petioles. *Leaves* lanceolate, apex gradually and long attenuate-acuminate, straight or a little curved, subacute, base rather broadly attenuate, with a

minute basal gland on each side at 2–3 mm from the petiole, coriaceous, glabrous, laxly glandular-punctate beneath, entire, flat, 3–3.8 by 0.8–1 cm, midrib impressed above, strongly raised beneath, nerves 1–2 basal, high curved-ascending, and c. 4 upper and shorter pairs, all anastomosing, faintly impressed or mostly inconspicuous above, slightly raised beneath, reticulation rather dense and distinct beneath only; petiole 2–3 by c. 1 mm. *Racemes* from the upper axils, lax, 10–15-flowered, suberect, glabrous; rachis slender, 4–6 cm, perulae small. Pedicels slender, \pm thickened upwards, 1.2–1.5 cm, each from a thickened cushion-like part of the rachis. *Calyx* tube campanulate, for 1 mm stalk-like contracted at base, c. 3 mm, shining, limb suberect or \pm spreading, lobed to near the base, lobes ovate, bluntnish, ciliolate, 1–1.5 mm, slightly keeled dorsally, the end of the keel \pm gland-like protruding. *Corolla* depressedly subglobose-urceolate, apex contracted into a short apiculus (1 mm), lower part subglobose, fleshy, glabrous on both sides (red?), 5(–6) by 3 mm, lobes 1 mm. *Filaments* subulate, densely hairy in lower half, filiform and glabrous above, c. 2.2 mm; anther-cells obovate, not spurred, 1 mm including the tubules, these very short, as wide as or slightly wider than the cells, obliquely cut at apex. *Disk* glabrous. *Style* glabrous, 4 mm.

Distr. *Malesia*: West New Guinea (Mt Carstensz), once collected at 2530–3350 m.

211. *Vaccinium retusifolium* J. J. S. in Fedde, Rep. 30 (1932) 176; SLEUM. *Blumea* 11 (1961) 93.

Shrub or tree, up to 6 m; bark scaling, reddish-brown. Branchlets rather robust, angular, puberulent, subdensely leaved. *Leaves* oblong-obovate or narrow-elliptic, apex obtuse and retuse for c. 1 mm, base \pm cuneate and decurrent into the broadened petiole, on each side with 1 or 2 marginal glands at some distance from the petiole, coriaceous, glabrous except the very base, with lax muriculate glands beneath, entire, edge narrowly revolute, 1.4–2.7(–3.6) by 0.6–1.6 cm, midrib faintly and narrowly immersed above, obtusely prominent beneath, nerves 3–4 steeply ascending pairs, the lowest from the very base, the upper from the lower half of the midrib, all obscure or minutely raised above, slightly prominent beneath and anastomosing, reticulation dense and finely raised beneath only; petiole initially puberulent, 1–2(–3) by c. 1 mm. *Racemes* from the upper 1–3 axils, laxly greyish patent-puberulous the corolla excepted, sometimes tardily glabrescent, but never becoming strictly glabrous, laxly 8–11-flowered; rachis rather slender, 1.5–2.5 cm, with some small ovate-triangular perulae. Pedicels \pm secund, 4–6 mm; bract and bracteoles not seen. *Calyx* tube campanulate, 2 mm, limb \pm spreading, 5-lobed to near the base, lobes triangular, subacute, ciliate, c. 1.5 mm. *Corolla* broadly tubular-urceolate, rather fleshy, glabrous outside, laxly hairy especially in the lower part inside, dark pink to bright red, 10–11(–12) by c. 4 mm, lobes broadly triangular, obtuse, c. 1.5 mm. *Filaments* linear, dilated above the base, densely patent hairy, c.

5 mm; anther-cells oblong, 1.5 mm, no spurs; tubules very short or almost 0, as wide as the cells, \pm transversely cut apically. *Disk* pubescent. *Style* robust, mostly subdensely, sometimes sparsely patent hairy, 1 cm. *Fruit* subglobose, c. 5 mm ϕ , crowned by the puberulent disk, blue-black, rather sweet.

Distr. *Malesia*: Moluccas (Buru and Central Ceram).

Ecol. In primary forest, on limestone, 1475–3000 m, locally very common. *Fl.* Febr.–March, July–Aug.

212. *Vaccinium xerampelinum* SLEUM. *Blumea* 12 (1963) 134. — Fig. 113.

Treelet or shrub, 3–4 m. Branchlets obtus-angular, laxly leaved, patent hairy at tips, otherwise glabrous; buds subglobose, 1–1.5 mm. *Leaves* elliptic-oblong, apex broadly attenuate and blunt, base cuneate and \pm decurrent, pair of basal marginal glands slightly prominent, coriaceous, dark glandular-punctate beneath, entire, not or but slightly revolute, 3–5.5 by 1.5–2.5 cm, basal and somewhat suprabasal plinerves in 2–3 (–4) pairs, steeply ascending, other shorter nerves or veins from the midrib several, irregular, short, all not much or hardly distinct above, more visibly raised beneath, reticulation rather dense, slightly prominent beneath only; petiole flattened, 3–5 by 1.5–2 mm. *Racemes* from the upper 1–3 axils, erect, rather many-flowered, subsecund; rachis angular, shining, 3–8 cm, perulae not known. Pedicels mostly somewhat curved, stoutish, (5–)6–8 (–10) mm; no subtending bracts or bracteoles. *Calyx* tube almost cup-shaped, base \pm truncate, 1.5–2 mm, lobes subpatent, ovate, obtuse, ciliolate, 1.5 mm, no apical gland. *Corolla* cylindrical-urceolate, waxy-fleshy, purple, pruinose, 12 by 6–8 mm (fresh), 7–8 by c. 3 mm (dry), lobes ovate, reflexed, paler than the tube, c. 1 mm. *Filaments* purplish, villous and dilated just above the base, narrow-linear and gradually glabrous upwards, 2.5 mm; anther-cells broad-oblong, angular, echinulate, 1.2 mm; tubules equally wide, 0.6 mm, obliquely cut distally, back-wall extended into 1–2 acute teeth; pollen blackish purple. *Disk* prominent, glabrous. *Style* slenderly columnar, glabrous or laxly hairy in the lower third, more densely and partly longer hairy for the rest, 6–7 mm, slightly exerted.

Distr. *Malesia*: NW. New Guinea (crest of the Nettoti Ra., Vogelkop Peninsula).

Ecol. In mossy *Xanthomyrtus-Podocarpus-Nothofagus* crest forest, at 2100 m. *Fl.* Dec.

213. *Vaccinium brassii* SLEUM. *Bot. Jahrb.* 72 (1942) 251; *Blumea* 11 (1961) 93.

var. brassii.

Tree, 8–12 m, with erect branches. Branchlets angular, the youngest parts sharply so and puberulent, older ones glabrous and more obtuse, very early covered with greyish cork. *Leaves* lax to subdense, oblong to elliptic-oblong, apex rather shortly acuminate and acutish, base \pm broadly cuneate or attenuate, rarely subrotundate,



Fig. 113. *Vaccinium xerampelinum* SLEUM. Mt. Nettoti, 1900 m, NW. New Guinea (VAN ROYEN & SLEUMER 7985, type) (SLEUMER, 1961).

on each side with 2 marginal glands, the lower near the petiole, the upper at 1-2 mm above the basal, subcoriaceous, rather stiff, dull bluish green above and pale green underneath (fresh), laxly appressedly glandular-muriculate beneath, otherwise glabrous, entire, edge narrowly cartilaginous, slightly or not revolute, 2-3(-3.5) by 1-1.5(-2) cm, midrib \pm immersed above, \pm prominent beneath, nerves 2 basal or slightly superbasal, rather straight, and 2 upper shorter, more curved pairs, all \pm steeply ascending and anastomosing, faintly impressed or subinconspicuous above, distinctly raised beneath, reticulation rather dense and fine, \pm visibly raised beneath only; petiole and nerves reddish (fresh), dark when dry, flattened, (2-)3-4 by 1-1.5 mm. *Racemes* from the upper 2-3 axils, suberect or somewhat drooping, finely and laxly white-pu-

berulous at rachis and pedicels, densely so on calyx, 8-12-flowered; rachis stoutish, angular, (2-)3-5 cm, eperulate at anthesis. Pedicels robust, 8-10(-12) mm, to 20 mm in fruit, thickened distally; bract and bracteoles not seen. *Calyx* purple-grey, tube campanulate, 2-2.5(-3) mm, limb \pm spreading, 1.5-2 mm, deeply (5-)6-8-lobed, lobes subovate-deltoid, obtuse, pubescent also at the tips inside. *Corolla* broadly cylindric or slightly urceolate at full anthesis, sometimes subcampanulate, fleshy, pink to dull red, 7-8 by 5-6 mm, glabrous outside (occasionally sparsely puberulent at the lobes), laxly hairy inside, lobes 6-8, deltoid, obtuse, reflexed, 1.5-1.7 mm. *Stamens* mostly 12, alternately 5 and 5.5 mm; filaments linear-subulate, densely hairy especially below, 3.5-4 mm; anther-cells oblong, \pm curved, 1.8-2 mm, no spurs; tubules cylindric, \perp as wide as the

cells, \pm divergent, 0.5 mm, obliquely cut at apex, the elliptic pore flaring and often with 1–2 minute teeth by an extension of the back wall of each tubule. *Disk* densely hairy. *Style* columnar, laxly hairy nearly to the top, \pm as long as the corolla. *Fruit* subglobose, (5–)6–7 mm ϕ , fleshy and dull glaucous purple when ripe, shortly greyish hairy, crowned by the inflexed calyx lobes and the disk.

Distr. *Malesia*: East New Guinea (Wharton Ra.; Mt Albert-Edward).

Ecol. In more open montane forest, 2840–4000 m, locally common. *Fl.* June–Sept.

var. madarum SLEUM. Bot. Jahrb. 72 (1942) 252; *Blumea* 11 (1961) 93.

Racemes elongate, flowers more laxly arranged. Pedicels and tubules slightly longer than in *var. brassii*. *Calyx* glaucous-pruinose, not hairy. *Disk* densely hairy. *Style* glabrous.

Distr. *Malesia*: East New Guinea (Wharton Ra.: at the Murray Pass), together with *var. brassii*, at 2840 m.

214. *Vaccinium leptomorphum* SLEUM. *Blumea* 11 (1961) 93.

Epiphytic, weak shrub, branches c. 1 m. Branchlets slender, subterete, patently short-pubescent in the young, glabrescent in the older parts. *Leaves* lax or more dense, ovate, apex subcaudate-acuminate for 0.5–1 cm, blunt, base broadly attenuate to \pm rounded, marginal gland on each side small, at 1–2 mm from petiole, subcoriaceous, very laxly glandular-punctate beneath, otherwise glabrous, 2.5–3.5 by (0.7–)0.9–1.4 cm, entire, edge distinctly revolute especially in lower half, midrib impressed above, not much prominent beneath, nerves 1–2 basal or \pm suprabasal, high curved-ascending and a few upper shorter, \pm pinnate and vein-like pairs, all subinconspicuous above, slightly raised beneath as is the rather dense reticulation; petiole puberulous, (2–)3–4 by 0.5 mm. *Racemes* from the upper 1–2 axils, laxly 2–3-flowered; rachis very laxly hairy, slender, 0.5–1 cm, eperulate. Pedicels slender, 1.2–1.5 cm, 1.5 cm in fruit, laxly hairy distally. *Calyx* laxly hairy at the tube below, less so at the limb, tube campanulate, 1.5 mm, limb subpatent, 5-lobed almost to the base, 1.5 mm, lobes deltoid, bluntish, ciliate. *Corolla* tubular-urceolate, attenuate towards the limb, pinkish white, thin, glabrous outside, laxly hairy in the lower third inside, 9–10 by c. 3 mm, lobes ovate, reflexed, c. 1 mm. *Stamens* 8; filaments subulate-linear, subdensely patently hairy, 2.5 mm; anther-cells ovate-oblong, 0.8 mm, no spurs; tubules c. 0.3 mm, as wide as the cells, occasionally with a minute sessile gland, obliquely cut at apex, back wall of each tubule extending into a very short reflexed tooth. *Disk* laxly pubescent. *Style* columnar, 7.5 mm, laxly patently hairy in the lower $\frac{3}{4}$, papillose above. Submature *fruit* globose, laxly pubescent, c. 3 mm ϕ .

Distr. *Malesia*: NE. New Guinea (E. slopes of Goodenough I.), in mossy forest at 1600 m. *Fl.* Oct.

215. *Vaccinium capillatum* SLEUM. *Blumea* 11

(1961) 94; *ibid.* 12 (1963) 135. — *V. minuticalcaratum* J. J. S. *f. capillatum* SLEUM. Bot. Jahrb. 72 (1942) 254.

Tree or treelet, 2–8(–16) m; bark 2 cm, scaly, brown; wood red brown. Branchlets rather slender, angular, quite glabrous. *Leaves* lax to subdense, elliptic or oblong-elliptic, apex subcaudate-acuminate for 1–2 cm, subacute, base attenuate or subcuneate, marginal gland on each side next to petiole (occasionally another gland at a short distance), coriaceous, glabrous, laxly glandular-punctate beneath, entire, (4–)5–10 by (2–)2.2–3 cm, flat or a little recurved at the very edge, midrib narrowly impressed above, prominent beneath, nerves 2–3 basal or slightly suprabasal and 1–2 upper, shorter, similarly curved-ascending, and a few uppermost very short and \pm spreading pairs, all anastomosing and somewhat raised above, more distinctly so beneath, as is the dense reticulation; petiole (4–)5–7 by c. 1 mm. *Racemes* solitary from the upper 1–2 axils, suberect, rather densely (5–)8–15-flowered; rachis rather robust, glabrous as are the pedicels, (2–)2.5–5 cm. Pedicels stoutish, 9–12 mm; subtending bracts lanceolate, thin, 1.5–2 by c. 0.4 cm, not rarely already gone at anthesis. *Calyx* subdensely short-pubescent, tube campanulate, 1.2 mm, limb subpatent, 1.5 mm, 5-lobed to nearly the base, lobes deltoid, subacute, ciliate. *Corolla* tubular-urceolate, rather thin, glabrous or very laxly short-hairy outside, laxly hairy in the lower half inside, white or pink, c. 9 by 3–4 mm, lobes narrowly ovate, obtuse, reflexed, 1 mm. *Filaments* linear-subulate, subdensely hairy, 2.8–3 mm; anther-cells oblong, 1.5 mm, with 2 very short spurs; tubules slightly narrower than the cells, 0.8 mm, subobliquely cut at apex, back wall of each tubule protracted into an erect, short tooth. *Disk* markedly 10-lobed, rather densely pubescent at the inner margin. *Style* rather slender, c. 8 mm, subpatently hairy in the lower $\frac{3}{4}$. Submature *fruit* subglobose, truncate at both ends, pubescent on top, c. 4 mm.

Distr. *Malesia*: West New Guinea (Balim R. valley and Lake Habbema area).

Ecol. In old secondary forest, on poor sandy soil, locally abundant, 1800–3225 m. *Fl.* fr. June–Dec.

Vern. *Wattaraa*, Dani.

216. *Vaccinium reticulato-venosum* SLEUM. *Blumea* 11 (1961) 94; *ibid.* 12 (1963) 135.

Shrub or slender tree, occasionally scandent on tree trunks up to 12 m. Branchlets slender, terete below, tips angular, papillose-puberulous, laxly leaved; axillary buds ovoid-subulate, minute. *Leaves* ovate to elliptic, more rarely sublanceolate-ovate, apex \pm abruptly caudate-acuminate for 1.5–2 cm, subacute, base broadly attenuate to rounded, with 2(–3) marginal minute glands on each side, remote from the petiole in the lower $\frac{1}{4}$, subcoriaceous, flexible, glabrous or very laxly papillose-puberulous at the midrib beneath, furthermore very laxly glandular-punctate all over the intervenium beneath, entire, \pm revolute at the very edge, 4–7(–8, –10) by 2–3(–3.5) cm, midrib

± impressed above, prominent beneath, nerves 2-3 basal and slightly suprabasal, high-curved ascendent and 1-2 upper, shortly, equally curved pairs, the uppermost few nerves rather straight and vein-like, all distinctly anastomosing and ± raised on both faces, as is the dense reticulation; petiole transversely rugose, puberulous initially, rather slender, 2-3(-4) mm. *Racemes* from a few upper axils, laxly 5-8-flowered; rachis slender, (2-)2.5-4 cm, perulae few, ovate-acuminate, c. 2 mm, patent-puberulous as are the pedicels, the latter slender, 1-1.5 cm, with a few glandular-muriculate hairs below the calyx. Bract oblong, c. 3 mm, usually gone before anthesis, bracteoles oblong-acuminate, c. 2 by 1 mm, at or above the middle of the pedicel, not rarely persistent for some time. *Calyx* tube campanulate, sparsely muriculate, 1.3-1.5 mm, limb subpatent, 1.5-2 mm, 5-lobed to almost the base, lobes ovate-deltoid, a little keeled dorsally and slightly thickened distally (no proper apical gland), glabrous, ciliate. *Corolla* tubular-urceolate, gradually attenuate upwards, thin, glabrous outside, laxly hairy in the lower third inside, 10(-11) by 3 mm (below), brilliant red, lobes ovate, reflexed, 1 mm. *Filaments* subulate, densely hairy below, glabrescent upwards, 2.5 mm; anther-cells oblong, c. 1 mm, no spurs; tubules as wide as the cells, hardly 0.3 mm, apex transversely cut. *Disk* subdensely pubescent. *Style* subappressedly white-hairy all over, c. 9 mm. *Fruit* blackish purple, c. 4 mm ø.

Distr. *Malesia*: East New Guinea (Hindenburg Ra. E. and S. Highlands; Wau-Salamaua area; Owen Stanley Ra.: Musa Mts; N. slopes of Mt Dayman).

Ecol. In *Castanopsis* or *Nothofagus* forest, 1400-3090 m. *Fl. fr.* Jan.-Oct.

217. *Vaccinium pilosilobum* J. J. S. Bot. Jahrb. 68 (1937) 213; SLEUM. Blumea 11 (1961) 97.

Scandent shrub. Branchlets slender, obtus-angular, glabrous or nearly so. *Leaves* lax, ovate to oblong-ovate, apex for 2-3 cm caudate-acuminate, tip bluntish, base shallowly cordate, rounded to subtruncate, with 1(-2) marginal, conspicuously impressed glands at 1-2 mm from petiole, coriaceous to subcoriaceous, laxly glandular-punctate beneath, glabrous, entire, edge ± revolute, (5-)6-10 by (2.5-)3-5 cm, nerves 3-4 pairs from and ± from above the base, curved and high ascendent, and a few upper, shorter ones, all anastomosing and prominent above, less distinctly so beneath, reticulation dense, finely raised on both surfaces; petiole transversely rugose, (5-)6-11 by 1-1.5 mm. *Racemes* from the upper axils, 5-10-flowered; rachis subglabrous or with sparse minute, clavate hairs, (0.4-)1-3 cm. Pedicels slender, glabrous or laxly muriculate, 0.8-1.2 cm, in fruit stoutish, 1-1.3 cm. Bract foliaceous, ovate-oblong, acuminate, red, ciliate, up to 2.7 by 1.4 cm, caducous before full anthesis; bracteoles suprabasal, subulate, ciliate, 1-2 by c. 1 mm. *Calyx* tube campanulate, base nearly rounded, laxly or at the base more densely finely hairy and muriculate, c. 2 by 2.5 mm, limb spreading or finally re-

flexed, deeply 5-partite, lobes ovate-acuminate, long-ciliate, 1(-1.5) mm. *Corolla* tubular, membranous, with 5 wings decurrent from the lobes, pink at the tube, whitish at the lobes, c. 2.5(-3) cm long, 4-5(-7) mm ø, lobes ± densely short-hairy, deltoid, subacute, 2-3 mm. *Filaments* linear-subulate, densely patent-hairy to subvillosus except at base, alternately 8 and 9 mm; anther-cells elongate-oblong, echinulate, base ± obtuse, 2-2.3 mm, no spurs; tubules much narrower than the cells, erect, cylindrical, 0.5-0.8 mm, truncate at apex, pore round, slightly flaring. *Disk* densely erect-hairy, prominent. *Style* filiform, glabrous, 2.5-3 cm, slightly exserted. *Fruit* globose, c. 5 mm ø.

Distr. *Malesia*: Central Celebes.

Ecol. Montane forest, (1550-)2500-3000 m.

Fl. fr. June.

218. *Vaccinium sclerophyllum* SLEUM. Blumea 11 (1961) 96.

Small, densely branched shrub. Branchlets slender, angular, patently puberulous. *Leaves* dense, narrowly oblong-obovate to obovate, apex obtuse or mostly a little retuse, base cuneate, with 1-2 minute, impressed marginal glands on both sides, remote from petiole, coriaceous, rigid, entire, edge much revolute, 1.2-2.5 cm long, 0.5-0.8(-1.1) cm wide in the partly revolute state of dry specimens, sparsely glandular-muriculate beneath, otherwise glabrous, midrib slightly impressed above, obtusely prominent beneath, nerves 1 basal and 2-3 suprabasal pairs, curved-ascending, faintly raised above, more distinctly or sometimes subinconspicuous beneath, veins laxly reticulate, visible on both faces or beneath only; petiole subterete, c. 2 by 0.7 mm, on a thick leaf-cushion. *Racemes* from the upper 1(-2) axils, glabrous, (3-)4-6-flowered; rachis ± slender, c. 1 cm, eperulate. Pedicels slender, nodding, c. 6 mm. *Calyx* tube cup-shaped, base rounded, 1.5-2 mm, limb erecto-patent, deeply 5-lobed, lobes deltoid, 1-1.5 mm, bluntish. *Corolla* tubular, rather fleshy, c. 2 cm by 3(-4) mm, faintly 5-angular, blood red, glabrous at both sides, lobes deltoid, obtuse, c. 2 mm. *Filaments* filiform, densely hairy, alternately 4 and 5 mm; anther-cells subquadrate, 1 mm, no spurs; tubules very short, as wide as the cells, 0.3 mm, subobliquely truncate apically. *Disk* subdensely and shortly white-hairy. *Style* filiform, glabrous, c. 2 cm.

Distr. *Malesia*: E. Central Celebes (Subdiv. Poso: Mt Lumut), at c. 2200 m. One collection. *Fl. Sept.*

219. *Vaccinium bartlettii* MERR. Pap. Mich. Ac. Sc. 19 (1933) 183; SLEUM. Blumea 11 (1961) 96. — *V. lucidum* (BL.) MIO. var. *pumilum* J. J. S. Med. Rijksherb. n. 9 (1916) 30.

Shrub, up to 3 m, sometimes epiphytic. Branchlets slender, patent-puberulous on the younger, glabrescent, finely and densely verruculose in the older parts; bark grey, longitudinally fissured. *Leaves* dense, elliptic or subovate-elliptic, not rarely obovate or subrhombic, apex obtuse to rounded, base ± broadly cuneate or sometimes almost round-

ed, no basal marginal glands visible, subcoriaceous, glabrous, but laxly glandular-punctate beneath, shining especially above, entire, edge slightly recurved, 0.7–1.2 by 0.4–0.6(–0.7) cm, midrib slightly immersed above, raised beneath, nerves 2–3 basal and suprabasal pairs, ascending to the apex and anastomosing, finely raised on both faces as is the rather dense reticulation; petiole slender, puberulous, (1–)2 mm. *Racemes* axillary, abbreviate, (2–)3–5(–8)-flowered; rachis (including peduncle, 0.5–1 cm) very slender, glabrous or puberulous, 1.5–2 cm, with a few ovate-acuminate perulae (1–2 mm). Pedicels very slender, glabrous, \pm curved, 5–7(–9) mm. Bracts subulate (2 mm), early caducous; bracteoles rudimentary. *Calyx* glabrous, tube turbinate-campanulate, base truncate, c. 2 mm, limb patent or reflexed, its lobes deltoid, ciliate normally and laxly caducously glandular-muriculate along the edge. *Corolla* elongate, tubular-urceolate, much narrowed in the upper third or half, intensely red or dark red brown, somewhat fleshy, glabrous outside, \pm densely hairy in the lower third inside, 8–9 by 2.5–3 mm (below), lobes finally reflexed, obtuse, 1 mm. *Filaments* linear-subulate, alternately 4–4.5 and 2.5–3 mm, long-hairy to the lower $\frac{3}{4}$ or more; anther-cells broadly obovate-oblong, no spurs, 1–1.3 mm, tubules as wide as the cells, very short or practically 0, apex truncate. *Disk* sparsely erecto-pubescent. *Style* almost filiform, glabrous below, papillose-puberulous in the upper half, not properly hairy, c. 8 mm. *Fruit* subglobose, c. 4 mm ϕ , finally blackish.

Distr. Malesia: N. half of Sumatra (Atjeh, Eastcoast and Westcoast Res.).

Ecol. In ridge forest, open facies of the mossy forest, or in open mountain heath or scrub, in scattered groups, (1350–)1800–3000 m, locally common. *Fl.* Jan.–Dec.

220. *Vaccinium acrobacteatum* K. SCH. in K. Sch. & Laut. Nachtr. (1905) 339; SCHLTR, Bot. Jahrb. 55 (1918) 175; SLEUM. Blumea 11 (1961) 97; *ibid.* 12 (1963) 135. — *V. torricellense* SCHLTR, Bot. Jahrb. 55 (1918) 175; SLEUM. *ibid.* 72 (1942) 249. — *V. tiariforme* J. J. S. Nova Guinea 18 (1936) 115. — *V. lageniforme* (non J. J. S.) KANEH. & HATUS. Bot. Mag. Tokyo 56 (1942) 481. — *V. papuanum* J. J. S. Bull. Jard. Bot. Btzg II, 8 (1912) 51; Nova Guinea 12 (1914) 162, t. 48; *ibid.* 18 (1936) 118; SLEUM. Bot. Jahrb. 72 (1942) 253; Blumea 11 (1961) 50. — *V. adenanthum* SLEUM. Bot. Jahrb. 72 (1942) 268. — **Fig. 114.**

Terrestrial or mostly epiphytic, erect or pendulous shrub or small tree, much branched, (0.5–)1.5–2(–5) m. Branchlets robust, obtusangular, tips purple red, glabrous, early corticate; sterile buds subglobose. *Leaves* obovate to obovate-subspathulate, oblong- or elliptic, rarely sub-orbicular-obovate, apex broadly attenuate and obtuse to rounded, or \pm retuse, base \pm cuneate into and a little decurrent on the stout petiole, red when young, a pair of minute dark marginal glands near the petiole, coriaceous to subcoriaceous, shining above, laxly glandular-muriculate beneath,



Fig. 114. *Vaccinium acrobacteatum* K. SCH. Edie Creek, 1900 m, E. New Guinea (NGF 13939 WOMERSLEY & SLEUMER) (SLEUMER, 1961).

glabrous, entire, edge \pm recurved especially towards the base of the lamina, (2.4–)4–9 by (1–)2–5.5 cm, midrib narrowly immersed in the lower part above, much narrower than the petiole and slightly prominent or evanescent beneath, nerves 1–2(–3) basal and 1–2(–3) upper pairs, all rather steeply ascending and straight below, \pm curved distally, \pm inconspicuous above, \pm raised beneath, reticulation lax and conspicuously raised but in fully mature leaves, otherwise rather obsolete; petiole red, \pm flattened, transversely rugose, (2–)3–5(–7) by 1.5–2(–3) mm. *Racemes* axillary, suberect, laxly subsecondly (3–)5–8(–10)-flowered, all over laxly, in the calyx tube mostly densely set with short muriculate glandular hairs, glabrescent, rarely glabrous; rachis stoutish, angular, (1–)4–5(–7) cm; perulae few, ovate to sub-orbicular, 3–4 by 3 mm, subcoriaceous, early caducous. Pedicels rather robust, (0.3–)0.5–1.5(–1.8) cm. Bract ovate-oblong, firmly membranous, glabrous, ciliate, 0.6–1(–2) by 0.2–0.5 cm, \pm early caducous, or a few upper ones persisting till fruiting time, green, suffused with red; bracteoles subulate, early caducous. *Calyx* tube broadly cup-shaped, base subtruncate, 1.5–2 mm, generally laxly to subdensely glandular-muriculate, rarely glabrous, limb \pm expanded, 1.5 mm, lobed halfway, lobes broad-ovate or semi-orbicular, obtuse, ciliate, without apical gland. *Corolla* broadly urceolate, fleshy, reddish, pink or nearly white, darker at the lobes, sparsely to subdensely set with stalked or muriculate glands outside, glabrescent at anthesis, glabrous or very laxly hairy below inside, 6–8(–10) by 3–4(–5) mm, lobes sub-orbicular, 1–1.5 mm, finally reflexed, densely papillose inside. *Filaments* linear, laxly patently hispid-hairy below, 2.5–3 mm; anther-cells oblong, 1.5–2 mm, no spurs; tubules short-cylindric, gradually narrowed upwards, apex obliquely cut,

0.5–1 mm, back wall of each tubule \pm extended into a bifid tooth. *Disk* glabrous. *Style* columnar or somewhat thickened in the middle, glabrous, 5–8 mm. *Fruit* depressed-globose, crowned by the bulky disk, 6–7 mm σ , glabrescent, reddish to dull purplish.

Distr. Malesia: throughout New Guinea.

Ecol. Epiphytic or terrestrial in the lower and montane (*Agathis* and *Nothofagus*) forest and in mossy bush, 500–2000(–2400) m, rare in lowland riverine forest at 200–500 m. Forming scrubs on poor sandy soil or locally dominant as a tree in secondary forest in the Bele and Balim R. valley at 1600–2200 m. *Fl. fr.* Jan.–Dec.

Vern. *Djeggeba*, Chimbu: Masul, *ronbug*, Wahgi: Minj, *kerandegug*, Hagen: Togoba, *barau*, Mairi: Watabung, *erikai*, Wapi: Wigote.

221. *Vaccinium nitens* SLEUM. *Blumea* 11 (1961) 97.

Small tree, 6–7 m, trunk 15 cm σ . Branchlets \pm robust, with sparse club-shaped glands on youngest, glabrous on older parts; sterile flower buds subglobose. *Leaves* obovate-elliptic, apex broadly attenuate, obtusely subacuminately contracted for 3–5 mm or almost rounded, base cuneate and somewhat decurrent, a pair of rather small marginal glands distant from petiole, thin-coriaceous, glossy, laxly glandular-muriculate beneath, entire, very edge \pm revolute, (4–)5–7 by 2.5–4 cm, midrib \pm impressed in the lower part above, as thick as the petiole, convex and prominent at base beneath, nerves 2–3 basal or \pm suprabaasal and (2–)3–4 upper subparallel pairs, all ascending and rather straight below, curved upwards, \pm raised on both faces, reticulation subdense, \pm prominent above, more distinctly so beneath; petiole flattened, grooved above, transversely rugose, 2–5 by 1–2 mm. *Racemes* from the upper and lower defoliate axils, spreading, laxly many-flowered, subsecund; rachis thickish, angular, laxly or mostly subdensely clad with glandular hairs or very slender club-shaped brownish glands, as are the pedicels and the calyx tube, not hairy, 5–8 cm, eperulate. Pedicels rather slender, 5–6(–7) mm. Bracts not known; bracteoles subulate, basal, early caducous. *Calyx* tube broadly campanulate, 1 mm, limb \pm spreading, deeply 5-lobed, lobes deltoid, glabrous dorsally, ciliolate at the apex. *Corolla* tubular-urceolate, thin, white, sweet-scented, glabrous at both sides, (6–)7 by c. 2.5 mm, lobes obtuse, reflexed, hardly 1 mm. *Filaments* subulate, laxly hairy but for the wider base, alternately 2.5 and 2 mm; anther-cells broad-oblong, 0.5–0.6 mm, no spurs; tubules cylindrical, slender, \pm divergent, 1 mm, apex obliquely cut. *Disk* glabrous. *Style* columnar, glabrous, 6 mm.

Distr. Malesia: Philippines (Mindoro: Mt Yagaw).

Ecol. On steep rocky slope in virgin forest, 2500 m. *Fl.* July.

Vern. *Bak haw sa ell*.

222. *Vaccinium apiculatum* SLEUM. *Blumea* 11 (1961) 95; *ibid.* 12 (1963) 135.

Shrub or tree-like shrub, up to 8 m. Branchlets

suberect, rather robust, angular, glabrous, early corticate. *Leaves* dense, elliptic or oblong-elliptic, apex shortly acuminate and tipped by a minute apical gland, base attenuate or cuneate, marginal gland on each side conspicuously impressed at 0–2 mm from petiole, more rarely with another marginal gland, coriaceous, glabrous, crenulate in upper third by small glands, (2–)2.2–3 by 1–1.5 cm, midrib \pm impressed below, \pm flat upwards above, prominent beneath, nerves 1–2 basal and 1–2 suprabaasal or from the upper part of the midrib subcurved-ascending and anastomosing pairs, hardly prominent above, more distinctly so beneath, veins laxly reticulate, mostly slightly raised beneath only; flush reddish; petiole \pm flattened, 1–2(–3) by c. 1 mm. *Racemes* from upper 1–2(–3) axils, erect, densely 8–12-flowered, flowers pruinose when dry; rachis robust, angular, glabrous, 1.5–2.5 cm, eperulate at anthesis. Pedicels stoutish, curved, glabrous, 2–4 mm. Bracts oblong, acuminate, up to 7 by 3 mm, early caducous; bracteoles basal, subulate, very early caducous. *Calyx* coriaceous, tube campanulate, glabrous, 1.5 mm, limb erect, 5-parted almost to the base, lobes ovate-triangular, (1–)1.5–2 mm, ciliate. *Corolla* urceolate, slightly 5-angular, rather fleshy, glabrous at both sides, pink, 7–8 by 3 mm (below), lobes paler obtuse, reflexed, c. 1 mm. *Filaments* subulate, densely hairy below, more laxly upwards, 2–2.5 mm; anther-cells oblong, 1.2–1.5 mm, on spurs; tubules cylindrical, narrower than the cells, somewhat divergent and curved, c. 1 mm, apex obliquely cut. *Disk* glabrous. *Style* columnar, glabrous, (5–)6–7 mm. Submature *fruit* subglobose, c. 4 mm σ .

Distr. Malesia: E. New Guinea (Southern and Western Highlands: Mt Hagen, Mt Sugarloaf, Mt Giluwe).

Ecol. In montane cloud forest at the upper forest limit, or in alpine grassland or shrubbery, 3140–3650 m. *Fl.* July, Aug.

Vern. *Monge mandimand*, Enga, *tingukil*, Mendi.

223. *Vaccinium tomicipes* J. J. S. Bot. Jahrb. 68 (1937) 212; SLEUM. *Blumea* 11 (1961) 95.

Epiphytic shrub, 0.5 m. Branchlets slender, tips angular, patent-puberulous and laxly clavate-glandular, older parts glabrescent and with dark cork. *Leaves* ovate, apex gradually acuminate, obtuse, base rounded to subcordate, basal marginal gland on each side distant from petiole, subcoriaceous, ciliolate and very laxly glandular-muriculate at both faces initially, glabrescent, edge entire, recurved, 0.8–1.3 by 0.4–0.7 cm, 3–5-plinerved, midrib and basal nerves slightly, other upper nerves or veins but faintly raised above, \pm inconspicuous beneath, no reticulation; petiole puberulous, 1–1.5 mm. *Flowers* solitary, axillary, each on a very slender sparsely muriculate or glabrous peduncle, 6–8(–10) mm, swollen at the articulation with the equally very slender pedicel (10–15 mm), with a few scarios ovate-oblong glabrous perulae (1–2 mm) at and a little above the base. *Calyx* obconical, tube 5-angled, laxly muriculate, 2 mm, limb expanded, lobes obtusely broad-

triangular, 0.8 mm. *Corolla* suburceolate-cylindric, but slightly contracted distally, sparsely or very sparsely glandular-muriculate outside, with a hairy ring or 5 longitudinal tufts of hairs above the base inside, thin-fleshy, white or pinkish, *c.* 6 by 2–2.5 mm, lobes reflexed, 0.8 mm. *Filaments* linear, villous in the lower $\frac{2}{5}$, *c.* 2 mm; anther-cells broad-oblong, echinulate, 0.8 mm, no spurs; tubules narrow-cylindric, *c.* 1 mm, pore strictly apical, slightly widened and denticulate at the margin. *Disk* glabrous. *Style* glabrous, *c.* 5 mm.

Distr. *Malesia*: SW. Central Celebes (Lati-modjong Ra.: Mts Pokapindjang and Batu Toding), three collections.

Ecol. In rain-forest, 2400–2600 m. *Fl.* May–June.

224. *Vaccinium ligustrifolium* J. J. S. in Gibbs, Arfak (1917) 174; SLEUM. Bot. Jahrb. 72 (1942) 252; Blumea 11 (1961) 96.

Shrub or small tree. Branchlets angular, slender, minutely puberulous in the youngest parts, glabrescent below. *Leaves* ovate-elliptic or elliptic, apex gradually attenuate and obtuse, base attenuate, a small marginal gland on each side at *c.* 1.5 mm from petiole, coriaceous, glabrous, entire, edge narrowly cartilaginous, hardly revolute, 1.8–3.3 by 0.8–1.6 cm, midrib shallowly immersed above, \pm raised beneath, nerves and reticulation inconspicuous; petiole puberulous, glabrescent, 1.5–3.5 by *c.* 1 mm. *Racemes* axillary, *c.* 4-flowered; rachis glabrous, rather stoutish, *c.* 7 mm. Perulae, bracts and bracteoles not seen. Pedicels rather robust, glabrous, *c.* 5 mm. *Calyx* patently pubescent, tube campanulate, 1.5 mm, limb subpatent, lobes triangular, acute, ciliate, hardly 1 mm. *Corolla* narrowly urceolate, glabrous outside, laxly hairy inside, rather fleshy, pink, *c.* 7.5 by 3 mm (below), lobes ovate-triangular, obtuse, reflexed, 1.2–1.5 mm. *Filaments* linear, dilated and almost villous above the base, laxly hairy upwards, glabrous distally, 3 mm; anther-cells oblong, 1 mm, no spurs; tubules as wide as the cells, *c.* 0.3 mm, apex obliquely cut. *Disk* erecto-pubescent at the inner margin. *Style* columnar, glabrous, 6 mm.

Distr. *Malesia*: West New Guinea (Vogelkop Peninsula: Arfak Mts, Anggi Lakes), in edge of forest at 2135 m. One collection. *Fl.* Dec.

225. *Vaccinium jagori* WARB. in Perk. Fragm. Fl. Philip. (1905) 174; MERR. Philip. J. Sc. 1 (1906) Suppl. 112; *ibid.* 3 (1908) Bot. 337; En. Philip. 3 (1923) 250; COPEL. f. Philip. J. Sc. 42 (1930) 592, t. 6, f. 4–5; SLEUM. Blumea 11 (1961) 98. — *V. angustilimbium* MERR. Philip. J. Sc. 12 (1917) Bot. 294; En. Philip. 3 (1923) 248.

Shrub or small glabrous tree, up to 7 m. Branchlets stoutish, angular, early covered with striate greyish cork. *Leaves* narrowly elliptic to broadly obovate-oblong or -elliptic, apex shortly and obtusely attenuate, acuminate or apiculate or \pm rounded, base cuneately narrowed and \pm decurrent, basal or \pm suprabasal marginal gland on each side distinct, other less distinct spaced glands

over the entire margin, coriaceous, glabrous, glandular-punctate beneath, often dark when dry, shining, 5–8 by (1–)1.5–3(–4) cm, very edge \pm recurved, midrib flattish or slightly raised above, obtusely prominent beneath, nerves 2–3 basal and several subparallel, equally steeply ascending upper pairs, all anastomosing and slightly to \pm indistinctly prominent above, more markedly raised beneath, reticulation rather dense, not much conspicuous; petiole flattened, 2–3(–4) by *c.* 2 mm, transversely rugose. *Racemes* from the upper 1–3 axils, 8–12(–20)-flowered; rachis stoutish, angular, 3–5 cm, eperulate at anthesis. Pedicels rather robust, often nodding, 4–5 mm, in *fr.* 8 mm. Bract or bracteoles not seen. *Calyx* tube short-campanulate, base truncate, 1 mm, limb \pm spreading, deeply 5-lobed, lobes ovate-triangular, obtuse, ciliate, tip \pm thickened, but without proper gland, 1–1.3 mm. *Corolla* cylindrical-urceolate, fleshy, glabrous at both sides, (8–)10 by 4 mm, usually red, but varying to white, lobes ovate, \pm recurved, *c.* 1 mm. *Filaments* linear, densely hairy, *c.* 3 mm; anther-cells broadly oblong, 1 mm, no spurs; tubules as wide as the cells, 0.5 mm, apex obliquely cut, no appendages. *Disk* glabrous. *Style* columnar, glabrous, (8–)10 mm. *Fruit* globular, black when ripe, 5–6 mm \emptyset , the calyx lobes not exceeding the disk, which is about 3 mm \emptyset . *Seeds* numerous, slender, black, *c.* 1.5 mm.

Distr. *Malesia*: Philippines (Luzon).

Ecol. On exposed ridges in primary forest or in the moss forest, (300–)1000–2000 m.

Vern. *Gutmó, multamut, Ting., darikidik*, Neg.

226. *Vaccinium sylvaticum* ELM. Leaf. Philip. Bot. 3 (1911) 1095; MERR. En. Philip. 3 (1923) 251; COPEL. f. Philip. J. Sc. 42 (1930) 588; SLEUM. Blumea 11 (1961) 98. — *V. mearnsii* ELM. Leaf. Philip. Bot. 3 (1911) 1098; MERR. En. Philip. 3 (1923) 250.

Shrub or stunted tree, terrestrial or epiphytic, 2–10 m; stems several, ascending; branches ascending and spreading, covered with smooth, greyish, mottled bark. Branchlets rather stoutish, angular, practically glabrous. *Leaves* lax, oblanceolate to oblong, or \pm elliptic, apex \pm shortly subcaudate-acuminate, tip bluntish, base \pm cuneate, with a basal or \pm suprabasal, marginal, impressed gland and a number of upper spaced ones, the upper ones resembling faint crenulations, coriaceous, glabrous, shining, very edge \pm revolute, (5–)6–10 by (2–)2.5–4 cm, sub-5-plinerved, midrib narrowly immersed above, obtusely prominent beneath, nerves 1–2 basal or \pm suprabasal, high curved-ascending and a few upper, shorter, more spreading and vein-like pairs, all anastomosing and \pm raised on both faces as is the dense reticulation; petiole flattened, 6–10 by 1.5–2 mm. *Racemes* from the upper 3–4 axils, \pm ascendent, finely patent-puberulous, subdensely 8–15-flowered; rachis stoutish, 3–8 cm, eperulate towards anthesis. Pedicels \pm robust, 4–5(–7) mm. Bracts and bracteoles not known. *Calyx* tube cup-shaped, 1 mm, limb \pm spreading, deeply 5-lobed, lobes

deltoid, subobtuse, ciliate, 1 mm. *Corolla* suburceolate, gradually tapering from the inflated base to the minutely 5-lobed apex, thin-fleshy, glabrous at both sides, red, or red with white lobes, 7-8 by 3.5 mm (below). *Filaments* linear, sparsely to subdensely hairy, 2.5-3 mm; anther-cells oblong, c. 1.2 mm, no spurs; tubules cylindric, nearly as wide as the cells, c. 0.4 mm, apex subobliquely truncate. *Disk* prominent, densely hairy. *Style* glabrous, c. 8 mm. Immature *fruit* subglobose, c. 7 mm σ . *Seeds* oblong, compressed, reddish brown, 1.5 mm.

Distr. *Malesia*: Philippines (Mindanao).

Ecol. On forested ridges, 1000-1250 m. *Fl. fr.* Aug.-Sept.

Vern. *Mangobibas*, *taupol*, Bag.

227. *Vaccinium gjellerupii* J. J. S. Nova Guinea 12 (1914) 163, t. 49; SLEUM. Bot. Jahrb. 72 (1942) 253; KANEH. & HATUS. Bot. Mag. Tokyo 56 (1942) 480; SLEUM. Blumea 11 (1961) 98; *ibid.* 12 (1963) 136.

Erect glabrous shrub or treelet, (0.5-)1-3(-6) m. Branchlets angular, rather slender; buds subglobose. *Leaves* lax to subdense, elliptic or lanceolate-elliptic, apex shortly and gradually attenuate or subacuminate, subacute or mostly blunt, base attenuate to subcuneate and \pm decurrent, 1(-2) pairs of basal and 1-2 upper, less distinct glands, spaced in the lower third of the blade, coriaceous, rather rigid, with some sparse glandular points beneath, glossy, entire, edge mostly distinctly revolute (dry), 3.5-6.5(-7.5) by (1-)1.5-2.5(-3) cm, midrib \pm impressed above, obtusely prominent beneath, nerves 1-2 basal and slightly suprabasal, high curved-ascendent and 1-2 upper, shorter and more spreading pairs, all anastomosing, \pm raised above as is the dense, fine reticulation, \pm indistinct below; petiole \pm flattened, grooved above, 4-6(-7, -10) by 1-1.5 mm. *Racemes* from the upper 2-3 axils, ascendent, finally spreading to recurved, laxly 8-15(-20)-flowered, subsecund; rachis \pm slender, angular, 3-6 cm, eperulate at anthesis. Pedicels stoutish, \pm curved, 0.7-1.3(-2) cm. Bracts and bracteoles not known. *Calyx* tube cup-shaped, rugulose, c. 1.5 mm, limb \pm spreading, hardly 1 mm, deeply 5-lobed, lobes ovate-deltoid, subacute, ciliolate, sometimes bearing an apical gland. *Corolla* elongate-urceolate, fleshy, pink to bright red or light carmine, glabrous at both sides, (8-)9-10 by 3-4 mm below, 2-3 mm σ distally, lobes whitish, ovate, obtuse, reflexed, 1 mm. *Filaments* subulate, wavy, densely hairy in the lower $\frac{3}{4}$, c. 2.5 mm; anther-cells oblong, cchinulate, 1-1.2 mm, no spurs; tubules cylindric, as wide as the cells, erect, 0.5-0.6 mm, apex obliquely cut, back wall of tubules extended into 1-2 very short teeth. *Disk* prominent, glabrous. *Style* whitish, slenderly columnar, glabrous, finally exserted. *Fruit* globose, c. 5 mm σ , crowned by a much prominent disk which exceeds the calyx lobes.

Distr. *Malesia*: West New Guinea (Vogelkop Peninsula: Arfak Mts, Anggi Lakes).

Ecol. In shrubberies near lake shore, or under-

growth in *Nothofagus* forest or in forest edge on humous covered granite, scattered, 1840-2300 m. *Fl. fr.* Jan.-Dec.

228. *Vaccinium laurifolium* (BL.) MIQ. Fl. Ind. Bat. 2 (1859) 1061; Ann. Mus. Bot. Lugd.-Bat. 1 (1863) 39; O. Ktze, Rev. Gen. Pl. 2 (1891) 384; KOORD. Exk. Fl. Java 3 (1912) 18; KOORD.-SCHUM. Syst. Verz. 1 (1912) fam. 233, p. 109; J. J. S. in K. & V. Bijdr. 13 (1914) 166; KOORD. Fl. Tjib. 3 (1918) fam. 233, p. 11; DOCTERS VAN LEEUWEN, Pangrango (1933) 206, t. 13; MALM, in Fedde, Rep. 34 (1934) 284; AMSH. in Back. Bekn. Fl. Java (em. ed.) 7 (1948) fam. 163, p. 4; SLEUM. Blumea 11 (1961) 98. — *Thibaudia laurifolia* BL. Bijdr. (1826) 859; HASSK. Cat. Hort. Bog. (1844) 161.



Fig. 115. *Vaccinium laurifolium* (BL.) MIQ. as a hemi-epiphyte, height c. 5 m, along road above Trètès, 1500 m, N. Slope of Mt Ardjuno, E. Java

— *Thibaudia floribunda* BL. Bijdr. (1826) 859, non H. B. K. 1818; HASSK. Cat. Hort. Bog. (1844) 161. — *Agapetes laurifolia* (BL.) G. DON, Gen. Syst. 3 (1834) 862; DUNAL, in DC. Prod. 7 (1839) 555. — *Agapetes floribunda* (BL.) G. DON, Gen. Syst. 3 (1834) 862; DUNAL, in DC. Prod. 7 (1839) 555; MOR. Syst. Verz. (1846) 42; HASSK. Pl. Jav. Rar. (1848) 470; ZOLL. Syst. Verz. 2 (1854) 137. — *Thibaudia rosea* JUNGH. Nat. Geneesk. Arch. N.I. 2 (1845) 35; HASSK. Flora 5 (1847) 524; WALP. Ann. 1 (1849) 475. — *Epigynium laurifolium* (BL.) KL. Linnaea 24 (1851) 49. — *Epigynium floribundum* (BL.) KL. l.c. — *V. teysmannii* MIQ. Fl. Ind. Bat. 2 (1859) 1062; Ann. Mus. Bot. Lugd.-Bat. 1 (1863) 38; KOORD. Junghuhn Gedenk. (1910) 185; Exk. Fl. Java 3 (1912) 13, p.p.; HALL. f. Med. Rijksherb. n. 12 (1912) 29; KOORD. Fl. Tjib. 3 (1918) fam. 233, p. 11; SP. MOORE, J. Bot. 63 (1925) Suppl. 55; HOCHR. Candollea 2 (1925) 500. — *V. floribundum* (BL.) MIQ. Fl. Ind. Bat. 2 (1859) 1060, non H. B. K. 1818. — *V. zollingeri* MIQ. Fl. Ind. Bat. 2 (1859) 1061; KOORD. Nat. Tijd. N.I. 62 (1902) 232. — *V. cyrtodon* MIQ. Fl. Ind. Bat. 2 (1859) 1061. — *V. euanthum* BL. Fl. Jav. Pl. inéd. (1863–83) t. 24. — *Agapetes polyantha* ('MIQ.') NIEDENZU, Bot. Jahrb. 11 (1889) 224, 246. — *V. blumeanum* NIEDENZU, l.c. 153 in text, 200, 224, 244. — *V. polyanthum* O. KTZE, Rev. Gen. Pl. 2 (1891) 385, incl. var. *viridiflorum* O. KTZE et var. *bicolor* O. KTZE, l.c. — *V. fastigiatum* SP. MOORE, J. Bot. 63 (1925) Suppl. 56. — Fig. 115.

See for further synonyms under the varieties.

KEY TO THE VARIETIES

1. Calyx lobes without an apical gland.
 2. Rachis and pedicels glabrous or almost so.
 3. Pedicels (rather robust) 4–7(–15) mm at anthesis **1. var. laurifolium**
 3. Pedicels 1–2(–3) mm at anthesis.
 4. Pedicels robust. Corolla 6 mm.
 3. **var. robustum**
 4. Pedicels slender. Corolla 5 mm.
 5. **var. pensile**
 2. Rachis and pedicels (sometimes also calyx tube) laxly to densely set with glandular (muriculate) or non-glandular hairs.
 5. Hairs non-glandular, whitish, short, ± spreading **4. var. trichodes**
 5. Hairs glandular, club-shaped or muriculate, brownish.
 6. Pedicels slender **2. var. ellipticum**
 6. Pedicels rather robust **6. var. sarawakense**
1. Calyx lobes provided with a thick apical gland.
 7. **var. glanduligerum**

1. var. laurifolium.

Shrub or treelet, 3–5(–12) m, terrestrial or epiphytic; trunk up to 30 cm ø. Branchlets robust, ± angular by the decurrent petioles, dark red, glabrous; flush a brilliant brick red. Leaves narrowly to broadly elliptic or ovate-, sometimes obovate-elliptic, rarely ovate, apex mostly shortly, rarely more longish attenuate or acuminate, tip subacute or bluntish, or almost rounded, base ± broadly attenuate or cuneate and a little decur-

rent, (1–)2 pairs of marginal glands, ± coriaceous, glabrous and shining, entire, very edge revolute especially below, (4–)5–11(–12) by 2.3–6(–7.5) cm (in suckers up to 18 by 12 cm), midrib rather narrow and somewhat immersed above, as wide and red as is the petiole and strongly prominent beneath, nerves (5–)6–7(–8) spreading pairs (the lowest 1–2 ± from the base), subparallel and anastomosing, slightly raised or ± flat, or ± indistinct above, slightly prominent beneath, reticulation ± lax and ± raised beneath only; petiole broadened, ± distinctly grooved above, 3–10 by 1–2 mm. Racemes from numerous upper axils, usually secund, ∞-flowered, suberect or spreading, glabrous; rachis stoutish, angular, (3–)5–8(–9) cm, with several caducous suborbicular small perulae. Pedicels ± robust, 4–7(–15) mm, in fr. 15 mm; bracts ± elliptic, obtuse or subacute, membranous, 0.6–1(–1.4) cm, early caducous; bracteoles subulate, basal, up to 2 mm, early caducous. Calyx tube obconical-subcampanulate, c. 1.5 mm, limb ± spreading, deeply 5-lobed, lobes triangular, ± acutish, reddish, laxly ciliolate, 0.7–1.3(–1.5) mm. Corolla urceolate-cylindric, rather fleshy, white to pink, sometimes red, glabrous at both sides, sometimes (Sumatra) laxly hairy inside, 7–8(–10) by 2–3 mm, lobes ovate-triangular, obtuse, recurved, c. 1.3 mm. Stamens 10, alternately 4–4.5 and 5–5.5 mm; filaments subulate-linear, red and densely hairy below, c. 2.5 mm; anther-cells oblong, ± curved, 1–1.5 mm, whether or not with 2 dorsal spurs; tubules narrow-cylindric, 0.5–0.8 mm, at apex subobliquely cut, pore ± flaring, back wall of tubules often extended into 1(–2) irregular, erect or ± horizontally reflexed minute teeth, no glandular appendages. Disk glabrous. Style rather slender, glabrous, finally ± exserted. Berry globose, finally purplish to deeply bluish purple, 5–6 mm ø, crowned by the inflexed calyx lobes.

Distr. *Malesia*: Sumatra (typical only in S. Sumatra), Java, Bali, Lombok and Sumbawa (Mt Bantulanteh).

Ecol. In open parts or along edges of the montane and subalpine forest generally epiphytic, often near old solfataras, on humid sandy soil, terrestrial on more dry and stony ground in summit shrub vegetation, mostly remaining sterile at 800–2000 m, flowering abundantly between 2000 and 3000 m, common. Fl. fr. Jan.–Dec., with a pronounced flowering season in May, and fruiting season in January.

Pollination. After DOCTERS VAN LEEUWEN (l.c. 207) nectar is secreted on a yellow disk which runs round the base of the style and rests upon the ovary. The flowers are very fragrant, with a scent of sour apples (after others: hyacinth-like). When the corolla opens the stigma reaches to about two thirds of the corolla tube, and the anthers are somewhat higher. In bud the rather dry pollen is shed already, and collects at the bottom of the corolla tube, and partly also on the stigma. When the corolla falls off, more pollen may be shed on the stigma. As a matter of fact self-pollination is readily effected and is apparently the common

mode of fertilization, although visiting insects have been observed too.

Dispersal. The fruits are greedily eaten by birds, as this is the case with other widely distributed species of *Vaccinium*, especially *V. varingiaefolium*.

Galls. Flowers of *V. laurifolium* and its varieties are not rarely attacked by a gall-midge (cf. DOCTERS VAN LEEUWEN, Zoocecidia, 1926, 440, f. 830). This gall develops in the corolla, the calyx remaining unaltered. It develops into a hard cylindrical, sometimes curved gall (c. 8 by 2 mm) which bears a small pinnacle. Inside, the stamens form a softer wall, on which rudiments of the anthers are to be seen. *V. cyrtodon* MIQ. was based on a specimen with such galled flowers.

The young shoots are subject to a fungus-disease: the whole shoot changes into a pink cylindrical gall bearing rudimentary leaves. On the leaves also fungus-galls often develop: at the upper side they appear as round brightly green specks with a pink centre, at the underside the black apothecia of the fungus (*Anhella tristis*, described by RACIBORSKI, Paras. Alg. & Pilze Javas, 2nd part, Batavia, 1900, p. 10) are formed.

Uses. The fruits are rather acid and are not palatable to man. The timber is very hard; due to the small dimension it is only used for handles and rice stampers.

Vern. *Batel, ki asahan, ki pĕdĕs, ki sĕndok, ki sireum, tjantigi, t. areuj, t. gĕdĕ, S, kĕmatas, soro genen, J, kaju katjang, k. sĕmbar bos, M.*

2. *var. ellipticum* (BL.) SLEUM. *Blumea* 11 (1961) 100. — *Thibaudia elliptica* BL. *Bijdr.* (1826) 859. — *Agapetes elliptica* (BL.) G. DON, *Gen. Syst.* 3 (1834) 862; DUNAL, in *DC. Prod.* 7 (1839) 555. — *Gaylussacia elliptica* ZOLL. & MOR. in *Zoll. Nat. Geneesk. Arch. N.I.* 2 (1845) 9, repr. *Flora* 30 (1847) 601. — *V. javanicum* HOOK. *IC. Pl.* 8 (1848) t. 740; WALP. *Rep.* 6 (1847) 413. — *Epigynium ellipticum* (BL.) KL. *Linnaea* 24 (1851) 49. — *V. ellipticum* (BL.) MIQ. *Fl. Ind. Bat.* 2 (1859) 1060, *excl. descr. et cit. p.p.*; *Ann. Mus. Bot. Lugd.-Bat.* 1 (1863) 39, *p.p.*; HALL. *f. Med. Rijks-herb. n. 1* (1910) 36; J. J. S. in K. & V. *Bijdr.* 13 (1914) 162; HOCHR. *Candollea* 2 (1925) 500; AMSH. in *Back. Bekn. Fl. Java* (em. ed.) 7 (1948) fam. 163, p. 4. — *V. laurifolium* (BL.) MIQ. *var. arborescens* O. KTZE, *Rev. Gen. Pl.* 2 (1891) 384. — *V. teysmannii* [non (BL.) MIQ.] KOORD. *Exk. Fl. Java* 3 (1912) 13, *p.p.*; KOORD.-SCHUM. *Syst. Verz.* 1 (1912) fam. 233, p. 111, *p.p.*

Habit and leaves as in *var. laurifolium*. Rachis relatively slender, laxly set, as are the pedicels, with short crisp glandular club-shaped or muriculate brown hairs, especially below the calyx. Pedicels slender, (2-)3-5 mm. *Calyx* limb short, sometimes merely undulate, lobes 0.5-0.7(-1.2) mm, ciliate. *Corolla* thin, (5-)6-7(-10) mm. Anther-cells with 2 distinct dorsal spurs; tubules slender, \pm double as long as the cells.

These characters distinguish the so-called *V. ellipticum* from typical *V. laurifolium* in W. Java. In Sumatra no specimens with the full set of

'*ellipticum*' characters are known; the same can be said from many specimens in Central and East Java, where true *V. ellipticum* is rather rare, and glabrescent forms become more frequent.

Distr. *Malesia*: Sumatra (not typical), Java (especially in its western part).

Ecol. As in *var. laurifolium*. but possibly more frequent at lower altitudes from (600-)900-2000 m, but once collected at 3000 m (on Mt Welirang, E. Java).

3. *var. robustum* (RIDL.) SLEUM. *Blumea* 11 (1961) 101. — *V. robustum* RIDL. *J. Fed. Mal. St. Mus.* 8 (1917) 57.

Leaves as in *var. laurifolium*, but sometimes more distinctly acuminate. *Inflorescences* glabrous, stouter (more woody) than in *var. laurifolium*. Pedicels robust, generally much recurved, (1-)2(-3) mm, in *fr.* 3-4 mm. Apical glands of the calyx lobes, if any, inconspicuous. *Corolla* rather thin, c. 6 by 2.5-3 mm. *Stamens* c. 3 mm; anther-cells with a pair of dorsal knobs, but no proper spurs; tubules as long as or mostly shorter than the cells.

Distr. *Malesia*: Sumatra (Tapanuli; West-coast).

Ecol. In mountain forest and summit regions, 1900-2800 m.

4. *var. trichodes* SLEUM. *Blumea* 11 (1961) 101.

Leaves elliptic-oblong, generally subacutely acuminate for 1-2 cm, 10-15 by (4-)5-6 cm. Branchlets, rachis and pedicels subdensely set with whitish, short, spreading, non-glandular hairs. Pedicels rather robust, (1-)2-3 mm at anthesis. *Calyx* laxly hairy, with a few glandular muriculate hairs at the base, lobes subacute, short, no apical gland. *Corolla* rather thin, white, glabrous, c. 8 by 2.5 mm. *Stamens* very similar to those of *var. ellipticum*.

Distr. *Malesia*: Central Sumatra (Mt Sago near Pajakumbuh), in mountain forest at 1400-1600 m.

5. *var. pensile* (SP. MOORE) SLEUM. *Blumea* 11 (1961) 102. — *V. pensile* SP. MOORE, *J. Bot.* 63 (1925) *Suppl.* 55.

Large tree. *Leaves* oblong-oblongeolate, apex obtuse, subcuneate towards the base, 4-6 by 1.3-1.8 cm. *Inflorescence* glabrous. Pedicels slender, 2-3 mm, with a few club-shaped glandular or muriculate brown hairs especially below the calyx. *Calyx* lobes hardly 1 mm. *Corolla* thin, white, sweet-scented, c. 5 by 2 mm. Anther-cells c. 0.9 mm, with 2 short dorsal spurs; tubules rather slender, c. 1.3 mm.

Distr. *Malesia*: S. Sumatra (Mt Dempo), at 1525 m. One collection.

6. *var. sarawakense* (MERR.) SLEUM. *Blumea* 11 (1961) 102. — *V. sarawakense* MERR. *J. Str. Br. R. As. Soc. n. 76* (1917) 105; *En. Born.* (1921) 467. — *V. hosei* MERR. *J. Str. Br. R. As. Soc. n. 76* (1917) 106; *En. Born.* (1921) 466. — *V. ellipticum var. macrocalyx* J. J. S. in *MS.*; MERR. *En. Born.* (1921) 466, *nom. nud.*

Leaves oblong-elliptic or mostly elliptic, apex shortly obtusely acuminate or attenuate, or sometimes almost rounded. Rachis and pedicels rather robust, \pm densely clad with brownish glandular-muriculate hairs. *Flowers* as in *var. laurifolium*, the dorsal spurs mostly distinct, sometimes rather obscure.

Distr. *Malesia*: Borneo.

Ecol. In mountain forest, 800–1525 m.

7. *var. glanduligerum* SLEUM. *Blumea* 11 (1961) 101; *ibid.* 12 (1963) 137.

Differs from *var. laurifolium* by a thick gland found at the apex of all (or most of the) calyx lobes; anther-cells provided with a pair of distinct dorsal spurs.

Distr. *Malesia*: Sumatra (Atjeh; Eastcoast), and Borneo (Sarawak).

Ecol. In Sumatra in mountain forest, flat forest ridges with old solfatara fields, or subalpine shrub vegetation, 1100–1850 m; in Sarawak epiphyte in *kerangas* forest at 300 m.

229. *Vaccinium turfosum* SLEUM. *Blumea* 11 (1961) 102; *ibid.* 12 (1963) 137. — *V. sp.*, RAPPAUD, Nova Guinea n.s. 10 (1959) t. Vc, at right below (phot.).

Shrub up to 5 m, glabrous except the hairy filaments and calyx lobes. Branchlets rather slender, early covered with cork; buds subglobose. *Leaves* narrow-ovate or subelliptic- or oblong-ovate, apex subabruptly (sub)caudate-acuminate for 1–1.5 cm, subacute, base rounded, or contracted at the very base, with a marginal gland on each side next to the petiole, coriaceous, somewhat shining, entire, edge a little revolute, (3.5–)4–6(–7) by 1.5–2(–2.3) cm, midrib faintly impressed above, slightly prominent beneath, nerves 2–3 basal or a little suprabasal, high curved-ascending and anastomosing, and a few (or sometimes no) shorter upper pairs, subinconspicuous above, hardly perceptible beneath, reticulation lax, \pm obsolete; petiole 4–6(–8) by *c.* 1 mm. *Racemes* from the upper 2 or 3 axils, obliquely ascending, 12–20-flowered, flowers subsdense and secund; rachis angular, \pm robust, 3–6(–8) cm, eperulate at anthesis. Pedicels \pm slender, 5–9(–12) mm, finally recurved. Bracts and bracteoles not known. *Calyx* tube subsemiglobose-campanulate, rugulose, 1–1.5 mm, limb spreading or lastly reflexed, deeply 5-partite, lobes deltoid, acute, ciliate, penicillate distally, *c.* 1.3 mm. *Corolla* urceolate-tubular, membranous, opal- or milk-white, glabrous outside, exclusively hairy at the lobes inside, 12–13(–14) by 4(–5) mm, slightly narrowed below the lobes, the latter obtusely deltoid, suberect or finally reflexed, *c.* 1.5 mm. *Filaments* subsubulate, linear, alternately 3–4 and 4–5 mm, densely longish subpatent-hairy; anther-cells oblong, 1.3 mm, no spurs; tubules slightly narrower than the cells, cylindrical, apex obliquely cut, 0.8 mm, back wall of each tubule not rarely extended in 1–2 suberect, often unequal teeth. *Disk* prominent, glabrous. *Style* slender, as long as the corolla, or finally \pm exerted, glabrous or mostly laxly hairy at the base. *Fruit* globose, *c.* 6 mm ϕ , crowned by

the bulky disk which exceeds the calyx lobes.

Distr. *Malesia*: West New Guinea (Wissel Lakes).

Ecol. In secondary (*Dacrydium*) forest in open peaty or sandy places, 1750–2300 m, rather common locally. *Fl.* Jan.–Dec.

Vern. *Koglè, korrè*, Kapauku.

230. *Vaccinium gracilipes* SLEUM. *Blumea* 11 (1961) 103.

Erect glabrous treelet; trunk *c.* 10 cm ϕ . Branchlets slender, subterete. *Leaves* lax, lanceolate-oblong or -elliptic, apex subabruptly to gradually caudate-acuminate for 1–1.5 cm, tip acutish, base cuneate, a small marginal gland on each side at 2–3(–4) mm from petiole, thin-coriaceous, glabrous, sparsely minutely glandular-punctate beneath, entire, very edge \pm revolute, 4–7(–8) by (1.5–)2–3 cm, midrib very narrowly sulcate above, narrowly and obtusely prominent beneath, nerves 2–3 basal and slightly suprabasal, high curved-ascending and 2–3 upper shorter, subparallel pairs, all anastomosing and minutely raised above, more distinctly so beneath, reticulation dense, slightly raised beneath only; petiole \pm slender, subterete, 7–9(–11) by *c.* 1 mm. *Racemes* from the upper 2–5 axils, very slender, patent or recurved, laxly many-flowered, secund; rachis (5–)6–9 cm, slender, eperulate. Pedicels \pm filiform, 10–15(–17) mm. Bract and bracteoles not known. *Calyx* tube obconical, hardly 1 mm, limb *c.* 0.5 mm, spreading, wavy or shallowly 5-lobed, lobes broadly deltoid, bluntish, not ciliate. *Corolla* urceolate-ventricose, contracted below the lobes, thin, pure white, very scented, glabrous outside, short-hairy below inside, 6–7 by 3–4 mm (in the middle), lobes ovate, obtuse, 0.7 mm, lastly reflexed. *Filaments* subulate, densely hairy or subvillos, *c.* 2.5(–3) mm; anther-cells oblong, 1 mm, no spurs; tubules narrower than the cells, elongate-cylindric, 1.2–1.5 mm, apex obliquely cut, back wall of each tubule extended into 2 erect teeth, 0.3 mm long. *Disk* prominent, glabrous. *Style* slender, glabrous, *c.* 7 mm, finally \pm exerted.

Distr. *Malesia*: N. Sumatra (Atjeh: Gajo Lands).

Ecol. On bank of stream in thinned forest, 1200 m. *Fl.* Febr.

Vern. *Ronkènil*, M.

231. *Vaccinium pseudocaudatum* SLEUM. *Blumea* 11 (1961) 103.

Treelet, 3–4 m, trunk *c.* 5 cm ϕ . Branchlets slender, innovations minutely puberulous, glabrous, striate and early corticate otherwise. *Leaves* lax, oblong-lanceolate, apex for 1–1.5(–2) cm subcaudate-acuminate, tip subacute or bluntish, base cuneate, basal gland on each side minute, as are sometimes a few other hardly perceptible spaced ones in upper third of blade, coriaceous, very laxly glandular-punctate beneath, otherwise glabrous, rather glossy, entire, edge very narrowly marginate, hardly revolute, 5–7(–8) by (1.5–)2–2.5 cm, midrib slightly sulcate above, obtusely prominent below, nerves 3 basal

and up to 1 cm suprabasal, high curved-ascending pairs, anastomosing, hardly raised above, more distinctly so beneath, reticulation subdense, mostly \pm obsolete or perceptible beneath only; petiole compressed and grooved dorsally, 6-8 (-10) by *c.* 1 mm. *Racemes* from the upper 5-12 axils, subdensely 10-15-flowered, patent or recurved; rachis rather slender, subdensely minutely patent-pubescent or -puberulous as are the pedicels and the calyx, (2-)3-5 cm, eperulate at anthesis. Pedicels stoutish, 3-4(-5) mm, curved, in *fr.* 6-8 mm. Bracts not seen, bracteoles basal, subulate, 1 mm, early caducous. *Calyx* tube obconical-campanulate, base not rarely very shortly contracted and subtruncate, 1 mm, limb suberect, deeply 5-parted, hardly 1 mm, lobes deltoid, subacute, ciliate at apex, sometimes ending in a minute gland. *Corolla* urceolate, membranous, white, glabrous on both sides, 6(-7) by 2.5 mm, lobes ovate, obtuse, reflexed, 0.7 mm. *Filaments* narrowly subulate-linear, long hairy but for the lower $\frac{1}{4}$, 2.5 mm; anther-cells oblong, 0.8 mm, no dorsal spurs; tubules narrowly cylindrical, slightly narrower than the cells, erect, 1.5 mm, apex obliquely cut, back wall of each tubule shortly \pm irregularly 2-dentate. *Disk* prominent, \pm densely set with erect, white hairs. *Style* rather slender, glabrous, *c.* 6 mm. Immature *fruit* subglobose, 3 mm ϕ , laxly pubescent, crowned by the erect calyx lobes and the pubescent disk.

Distr. *Malesia*: Philippines (Mindanao).

Ecol. Near creek along the edge of grassland, at 670 m, perhaps also growing at higher altitude. *Fl.* Febr., Dec.

232. *Vaccinium benguetense* VIDAL, Rev. Pl. Vasc. Filip. (1886) 168; MERR. Philip. J. Sc. 3 (1908) Bot. 376; *ibid.* 5 (1910) Bot. 372; En. Philip. 3 (1923) 248; COPEL. *f.* Philip. J. Sc. 42 (1930) 566, t. 3, f. 9-11; SLEUM. *Blumea* 11 (1961) 104.

Glabrous shrub or tree, 4-10 m. Branchlets rather slender, subterete, early striate and greyish corticate; buds small, subglobose. *Leaves* lax, oblong to narrow-elliptic, apex \pm abruptly (sub-)caudate-acuminate, tip blunt, base cuneate, 1(-2) marginal glands near or mostly a little remote from the petiole, coriaceous, \pm shining, entire, margin narrowly cartilaginous and a little or hardly revolute, 5-10 by 1.5-3(-4.8) cm, 5-plinerved from about the base, and with a few upper and shorter, similarly curved-ascending pairs of nerves, all minutely raised above, markedly so beneath, reticulation dense; petiole 6-8(-12) by 1.5(-2) mm, grooved above. *Racemes* axillary, \pm spreading, (8-)12-20-flowered; rachis \pm slender, 3-5(-8) cm, eperulate at anthesis. Pedicels stoutish, (3-)4-6 mm, in *fr.* 7-10 mm. Bracts and bracteoles not known. *Calyx* tube campanulate, 1-1.3 mm, limb low, *c.* 0.5 mm, rather fleshy, wavy, lobes shortly and broadly triangular-ovate, often rather obscure, obtuse, not ciliate, sometimes (and then not rarely but in part) ending with a small gland. *Corolla* urceolate, thin, glabrous outside, subdensely short-hairy in the lower half inside, red, pink or white, *c.* 6 by 3 mm,

lobes ovate, finally reflexed, 1 mm. *Filaments* subulate, sigmoid, densely hairy at the base, 2-2.5 mm; anther-cells oblong, 1 mm, no spurs; tubules slenderly cylindrical, \pm half as wide as the cells and at a \pm sharp angle, 2-2.5 mm, apex very obliquely cut, back wall ending in 1 or 2 erect teeth. *Disk* much prominent, glabrous. *Style* columnar, glabrous, as long as the corolla, or finally \pm exserted. *Fruit* globose, finely rugulose, *c.* 6 mm ϕ ; disk rather low.

Distr. *Malesia*: Philippines (Luzon; Panay).

Ecol. On forested slopes and in ravines, 500-1600 m. *Fl.* Jan.-Dec.

Vern. *Balabasang*, Ting., *dusonug*, *lusung*, Ig., *talubutub*, If.

233. *Vaccinium caudatum* WARB. in PERK. Fragm. Fl. Philip. (1905) 173; MERR. Philip. J. Sc. 3 (1908) Bot. 376; En. Philip. 3 (1923) 248; COPEL. *f.* Philip. J. Sc. 42 (1930) 565, t. 3, f. 7-8; SLEUM. *Blumea* 11 (1961) 104; *ibid.* 12 (1963) 137. — *V. sp.*, VIDAL, Phan. Cum. Philip. (1885) 123.

Shrub or tree, sometimes epiphytic, glabrous. Branchlets slender, subangular, early striate and greyish corticate. *Leaves* lax, lanceolate or ovate-lanceolate, apex for 1.5-2 cm caudate-acuminate, curved, tip blunt, base cuneately narrowed, 1 pair of small marginal glands remote from petiole, \pm thinly coriaceous, glabrous, \pm shining and often glaucescent above, mostly rather dull and sparsely glandular-punctate beneath, entire, very edge narrowly marginate, hardly revolute, (3-)4-6 by (1-)1.3-2 cm, midrib faintly immersed above, raised beneath, nerves 2 basal and a few upper shorter, more spreading pairs, all steeply ascending and anastomosing, but slightly prominent on both faces, reticulation dense, rather obsolete above, finely raised beneath, if visible at all; petiole flattened, slender, grooved above, 5-6(-8) by *c.* 0.5 mm. *Racemes* from the upper 3-6 axils, laxly 10-20-flowered, spreading or somewhat recurved, flowers subsecund; rachis very slender, 3-5 cm, eperulate at anthesis. Pedicels slender, (4-)5-6 mm. Bracts and bracteoles not seen. *Calyx* tube shortly obconical-campanulate, base obtuse, 1 mm, limb low, membranous, \pm spreading, finally reflexed, deeply 5-parted, lobes broadly deltoid, subacuminate or subacute, not ciliate, sometimes ending with a minute apical gland, 0.5-0.8 mm. *Corolla* urceolate, membranous, white, glabrous at both sides, 5(-6) by *c.* 2.5 mm, lobes obtuse, recurved, *c.* 1 mm. *Filaments* dilated below, subfiliform above, sigmoid, hairy at the base, 2.5 mm; anther-cells oblong, 0.7 mm, no spurs; tubules erect, slightly narrower than the cells, elongate-cylindrical, *c.* 2.5 mm, apex very obliquely cut, pore elliptic, back wall of each tubule divided into 2 often irregular short teeth, which may end in a very minute gland. *Disk* low. *Style* slenderly columnar, 5-6 mm, finally \pm exserted. *Fruit* globose, rugulose, 4-5 mm ϕ .

Distr. *Malesia*: Philippines (Luzon; Mindoro; Panay; Leyte; Mindanao).

Ecol. In damp primary forests at low altitudes, mostly below 500 m. *Fl.* Jan.-Dec.

234. *Vaccinium steinii* SLEUM. Bot. Jahrb. 72 (1942) 255; Blumea 11 (1961) 105.

Shrub. Branchlets terete, glabrous. *Leaves* ovate-elliptic, apex for 1.5–2 cm caudate-acuminate, sub-falcate, tip bluntish, base cuneate, thin-coriaceous, glabrous, ± glossy on both faces, 5–8.5 by 2.5–4 cm, entire, edge ± revolute, midrib sometimes ± sunken, prominent beneath, nerves 1 basal and 4–5 upper subpinnate pairs, minutely raised or sub-inconspicuous above, ± prominent beneath, reticulation ± dense, minutely prominent beneath only; petiole 5–6 mm. *Racemes* from the upper axils, 10–12-flowered; rachis rather robust, puberulous, 2–2.5 cm. Pedicels slender, puberulous c. 4 mm. *Calyx* tube short-campanulate, sub-glabrous, c. 1.3 mm including the limb, limb 5-lobed to 1/3, lobes broadly ovate-deltoid, obtuse. *Corolla* urceolate, thin, glabrous, 4.5 mm, very shortly 5-lobed, lobes rounded-obtuse and reflexed. *Filaments* subulate, villous below, glabrescent distally, c. 2 mm; anther-cells oblong, ± curved, 0.9 mm, tubules as wide as the cells, 0.3 mm, apex obliquely cut, back wall of each tubule extended into an acute distinct tooth. *Disk* glabrous. *Style* slenderly columnar, glabrous, 4 mm, finally ± exerted.

Distr. *Malesia*: NW. New Guinea (Waigeu I.: Majalibit Bay), one collection.

Note. Description translated from original diagnosis; type †.

235. *Vaccinium blepharocalyx* SCHLTR, Bot. Jahrb. 55 (1918) 176; SLEUM. *ibid.* 72 (1942) 256; Blumea 11 (1961) 105.

Erect, much-branched shrub, 1–1.5 m, epiphytic. Branchlets slender, subterete, glabrous. *Leaves* subdensely arranged, narrow-oblong to lanceolate, long caudate-acuminate, base cuneate, subcoriaceous, ± flexible, glabrous, entire, 4–7 by 1.3–2 cm; petiole 3–5 mm. *Racemes* from the upper axils, laxly 6–12-flowered, glabrous; rachis rather robust, up to 6 cm. Pedicels slender, 7–8 mm. Bract and bracteoles not known. *Calyx* low, cup-shaped, c. 3 mm, lobes short, semiorbicular, apex obtuse, ciliate. *Corolla* broadly urceolate or ventricose, rather thin, c. 4 mm, glabrous outside, puberulous towards the base inside, pale pink (fresh), blackish (dry), lobes 0.8 mm. *Filaments* subulate, subvillous; anthers as long as the filaments; anther-cells oblong; tubules short, apex obliquely cut. *Disk* glabrous. *Style* columnar, ± swollen in the middle, glabrous, c. 4 mm.

Distr. *Malesia*: East New Guinea (Sepik Distr.: Hunstein Mts), in montane forest at 1300–1400 m. Once found; type †. *Fl.* March.

Note. Description translated from original diagnosis and key characters mentioned by me in Bot. Jahrb. 72 (1942) 245.

236. *Vaccinium sparsum* SLEUM. Blumea 11 (1961) 105; *ibid.* 12 (1963) 137.

Small tree, c. 4 m. Branchlets obtusangular, glabrous. *Leaves* lax, elliptic or subovate-elliptic, apex for 1–1.5 cm subabruptly acuminate, acute, base broadly attenuate, shortly contracted, provided at the base with a small gland on each side,

coriaceous, sparsely appressedly glandular-hairy beneath, entire, ± glossy, 5–7 by (2.5)–3–4 cm, midrib narrowly sulcate above, much prominent beneath, nerves 3 basal and up to 1 cm suprabasal and a few upper, shorter, vein-like pairs, all sub-erect-ascending and anastomosing, ± raised above, more so beneath, reticulation dense, ± prominent on both faces, especially beneath; petiole grooved above, ± flattened, 4–6 by 1–1.5 mm. *Racemes* from the upper 2–3 axils, obliquely spreading, laxly 6–10-flowered; rachis rather robust, 1–1.5 mm ø at base, glabrous, angular. Pedicels stoutish, distally with the same glandular muriculate hairs as are found on the calyx, c. 1 cm by 0.5 mm. Bracts and bracteoles not known. *Calyx* tube cup-shaped, rugulose, 2 mm, limb erecto-patent, 1.5 mm, deeply 5-lobed, lobes depressed-ovate, obtuse, ciliate, 1 mm. *Corolla* broadly urceolate, thick-fleshy, pink, glabrous at both sides, c. 9 by 4–5 mm, lobes obtuse, subreflexed, c. 2 mm. *Filaments* subulate, 4 mm, densely hairy except for the dilated and glabrous base; anther-cells oblong, 1.6–1.8 mm, no spurs; tubules cylindrical, a little divergent, almost half as wide as the cells, apex obliquely cut, 0.5–0.6 mm. *Disk* glabrous. *Style* thickish, glabrous, 6–7 mm.

Distr. *Malesia*: East New Guinea (Mt Wilhelm), in edge of forest on a high bank of creek, at 2700 m. One collection. *Fl.* July.

237. *Vaccinium striicaule* SLEUM. Bot. Jahrb. 72 (1942) 256; Blumea 11 (1961) 105. — *V. blepharocalyx* (non SCHLTR) LANE-POOLE, For. Res. Papua (1925) 130. — *V. longiporum* (non SCHLTR) DIELS, Bot. Jahrb. 62 (1929) 487.

var. striicaule.

Shrub or small tree, up to 5 m. Branchlets angular, glabrous or puberulous, striate, rather slender, early covered with greyish cork; buds ovoid, acute. *Leaves* lax, ovate-oblong to lanceolate, apex shortly or mostly rather long (1–2 cm) caudate-acuminate, tip subacute or bluntish, base broadly attenuate to nearly rounded, pair of marginal glands strictly basal, coriaceous to subcoriaceous, glabrous, reddish when young, somewhat shining, entire, very edge ± recurved, 3.5–5 (–6) by (1–)1.3–2 (–2.5) cm, midrib impressed above, markedly prominent beneath, nerves 2 (–3) basal and slightly suprabasal, curved-ascending and 2–3 upper, shorter subparallel pairs, all anastomosing and faintly sulcate or rather obsolete above, raised beneath, reticulation dense, finely prominent or obsolete; petiole ± flattened, puberulous initially or glabrous, 3–4 by 1–1.5 mm. *Racemes* from the upper 2–3 axils, suberect, subdensely 8–12-flowered; rachis stoutish, angular, glabrous or mostly finely puberulous, (2–)3–4 cm, eperulate at anthesis. Pedicels stoutish, glabrous, 6–8 mm, curved. Bracts and bracteoles not observed. *Calyx* tube cup-shaped, base rounded, rugulose, glabrous, 2 mm, limb low, c. 1 mm, spreading, deeply 5-lobed, lobes broadly deltoid, obtuse or subacuminate, densely ciliate. *Corolla* rather broadly urceolate, fleshy, deep pink to purple, 6 (–7) by c. 3 mm, glabrous at both sides

or \pm hairy below inside, lobes ovate, obtuse, recurved, *c.* 0.7 mm. *Filaments* subulate-linear, patently hairy especially below, 2.5–3 mm; anther-cells oblong, 0.8–1(–1.2) mm, no spurs; tubules cylindrical, narrower than the cells, 0.4–0.6 mm, \pm curved, at apex obliquely cut, pore \pm flaring, back wall of each tubule extended into 1 or 2 irregular, often reflexed teeth. *Disk* glabrous. *Style* columnar, glabrous, 6–7 mm, finally \pm exserted. *Fruit* globose, blackish, *c.* 5 mm ϕ , disk remaining uncovered by the calyx lobes.

Distr. *Malesia*: East New Guinea (Minj-Nona Divide and Mt Saruwaged-Sattelberg area).

Ecol. On edge of grassland and forest, in mossy bush, 2300–3300 m. *Fl.* Jan., March, Oct.–Nov.

var. pubiflorum SLEUM. Bot. Jahrb. 72 (1942) 257; *Blumea* 11 (1961) 106.

Distinct from *var. striicaule* by a short pubescence on calyx, corolla and disk.

Distr. *Malesia*: East New Guinea (with *var. striicaule* on Mt Saruwaged), 3000–3300 m, once found.

var. adenodes SLEUM. *Blumea* 11 (1961) 106; *ibid.* 12 (1963) 137.

Shrub, 1.5–5 m. *Calyx* lobes, at least in part, provided with a distinct apical gland and *corolla* sometimes slightly larger, otherwise hardly different from *var. striicaule*.

Distr. *Malesia*: New Guinea (Southern, Western and Eastern Highlands, and Morobe Distr.).

Ecol. At the upper limit of the montane cloud (*Nothofagus*) forest, in forest edge, heath-like vegetation and tussock grassland swamps, also on limestone ridge, 2140–3600 m. *Fl.* July.

Vern. *Lohn*, *Enga*, *mengip*, *pfito*, *Mendi*, *kuruwagi*, *lalibu*.

Note. Specimens of *var. adenodes* with hairy rachis and calyces found on Mt Giluwe seem to indicate hybrids with *V. cruentum* from the same place.

238. *Vaccinium gracillimum* J. J. S. Med. Rijks-herb. n. 25 (1915) 12; *Nova Guinea* 12 (1917) 530; *ibid.* (1918) t. 219; SLEUM. Bot. Jahrb. 72 (1942) 254; *Blumea* 11 (1961) 106.

Glabrous shrub, 0.5–1 m. Branchlets slender. *Leaves* lax, lanceolate-ovate, apex for 2–3 cm caudate-acuminate, acute, base broadly cuneate to nearly rounded, a pair of small or minute glands on each side at some distance from the petiole, firmly subcoriaceous, sparsely muriculate-glandular beneath, otherwise glabrous, \pm shining, entire, edge \pm reflexed, 3.5–6 by 0.9–1.9 cm, 5 (or sub-7)-plinerved, nerves \pm impressed above, raised beneath, anastomosing, reticulation dense, raised on both faces in young leaves, later \pm obsolete above; petiole slender, dorsally compressed and grooved, minutely verruculose, 2–3 by 0.8 mm. *Racemes* from the upper 3–5 axils, spreading, very laxly 8–11-flowered; rachis very slender, 3.5–4.5 cm, eperulate. Pedicels subfiliform, thickened at the apex, 1.2–2 cm. Bract and bracteoles not known. *Calyx* tube campanulate, very base \pm abruptly contracted, 2 mm, limb

suberect, 1 mm, deeply 5-parted, lobes triangular, subacute, not ciliate. *Corolla* 7 mm, urceolate, 3–4 mm ϕ below, tube-like contracted 1 mm ϕ in upper $\frac{2}{5}$, fleshy, pale pink, lobes ovate, recurved, 0.5 mm. *Filaments* subulate-linear, densely hairy in lower half, sigmoid, 1.8 mm; anther-cells oblong, 0.8 mm, no spurs; tubules as wide as the cells, 0.3 mm, apex obliquely cut, back wall of each tubule extending into 2 very short teeth. *Disk* prominent. *Style* columnar, glabrous, 5.5 mm.

Distr. *Malesia*: West New Guinea (Oranje and Helligw Mts).

Ecol. In summit shrub vegetation, 1520–1900 m. *Fl.* Dec.

239. *Vaccinium rubroviolaceum* SLEUM. *Blumea* 11 (1961) 106.

Weak shrub up to 3 m. Branchlets very slender, densely short-hairy, glabrescent and early corticate. *Leaves* lax, lanceolate, apex caudate-acuminate and subfalcate, bluntish, base broadly attenuate or rounded, basal marginal gland small, at *c.* 2 mm from petiole, subcoriaceous, very laxly glandular-muriculate or -punctate beneath, entire, 3–4.5 by 0.5–0.9(–1) cm, midrib impressed above, \pm prominent beneath, nerves 1 basal and 2–4 upper pairs, faintly sulcate or obscure above, \pm raised beneath, sometimes subinconspicuous, no reticulation; petiole slender, subterete, (2–)3(–4) mm, pubescent initially. *Racemes* from upper 1–3 axils, suberect, laxly (4–)5–8-flowered, glabrous; rachis very slender, (0.5–)1–4 cm. Pedicels very slender, \pm horizontally spreading, (1.3–)1.5–1.8 cm, \pm thickened below the calyx. Bract and bracteoles not seen. *Calyx* tube obconical, rugulose, 2.5–3 mm, limb suberect, about 2 mm, deeply 5-lobed, lobes subdeltoid, subacute, and paler margin ciliolate. *Corolla* narrowly urceolate, fleshy, red-purplish, glabrous at both sides, *c.* 9 by 2.5 mm (below), lobes *c.* 1 mm. *Filaments* subulate, 2.3 mm, from 0.3–0.8 mm above base densely long-hairy; anther-cells oblong, 0.9 mm, no spurs; tubules as wide as the cells, 0.2–0.3 mm, subobliquely truncate distally. *Disk* bulky, glabrous. *Style* thickish, glabrous, 9 mm. Submature *fruit* subglobose, *c.* 4 mm ϕ , dark purple, crowned by the erect calyx lobes.

Distr. *Malesia*: Central New Guinea (Mt Antares in the Star Mts), in semi-alpine vegetation with scattered trees at 3000 m. Once found. *Fl.* July.

Imperfectly known

Vaccinium sumatranum JACK, Mal. Misc. 2 (1822) 18, repr. HOOK. J. Bot. 1 (1834) 370; MIQ. Fl. Ind. Bat. 2 (1859) 1063; *ibid.* Suppl. 1 (1861) 251; COPEL. f. Philip. J. Sc. 47 (1932) 96, *nota*; MERR. J. Arn. Arb. 33 (1952) 249; SLEUM. *Blumea* 11 (1961) 106.

Branchlets smooth, red-brown. *Leaves* elliptic-ovate, entire, glabrous, coriaceous. *Racemes* axillary, shorter than the leaves. *Flowers* 4-merous. *Corolla* oblong-ovate, 4-lobed, lobes recurved. *Stamens* 8. *Ovary* 4-locular.

Distr. *Malesia*: Sumatra, Bencoolen, collected by JACK on Mt Bungo (or Bungsu, Bengkoh, Sugarloaf Mt), 1034 m, between Mt Kaba and the coast, not yet recollected there.

Note. The short description and the lack of type or topotype material do not allow to associate *V. sumatranum* with any other described species, though it is apparently close to *V. lauri-*

folium (BL.) MIQ. and possibly conspecific with it.

Excluded

Vaccinium? corymbiferum MIQ. Fl. Ind. Bat. Suppl. 1 (1861) 588; SLEUM. Blumea 11 (1961) 107 = *Pyrus granulosa* BERTOL.; cf. STEEN. Blumea 12 (1963) 14 (*Rosaceae*).

11. AGAPETES

D. DON in G. DON, Gen. Syst. 3 (1834) 862; CLARKE in Hook. f. Fl. Br. Ind. 3 (1881) 443; AIRY SHAW, Kew Bull. (1935) 24; SLEUM. Bot. Jahrb. 70 (1939) 97; *ibid.* 71 (1941) 406, 409; AIRY SHAW, Kew Bull. (1948) 77, 103; *ibid.* (1958) 468, *incl. sect. Pseudagapetes* AIRY SHAW, *l.c.* 511; SLEUM. Nova Guinea, Bot. n. 1 (1960) 1-7; Blumea 12 (1964) 344, *non* RIDL. Fl. Mal. Pen. 2 (1923) 204 (= *Vaccinium* L.). — *Paphia* SEEM. J. Bot. 2 (1864) 77; Fl. Vit. (1866) 147, t. 28; BAILEY, Queensl. Fl. 3 (1900) 923; SCHLTR, Bot. Jahrb. 55 (1918) 182; A. C. SMITH, J. Arn. Arb. 36 (1955) 286. — *Pentapterygium* KLOTZSCH, Linnaea 24 (1851) 47; K. & G. J. As. Soc. Beng. 74, ii (1905) 60; RIDL. Fl. Mal. Pen. 2 (1923) 205. — **Fig. 116-119.**

Shrubs, often climbing, or epiphytic and with the stem much thickened at the base. *Leaves* spirally (in Mal.), glandular-toothed sometimes entire, \pm coriaceous. *Flowers* axillary, rather large and \pm fleshy, showy, solitary or in few-flowered fascicles or abbreviate corymbs. Pedicels thickened towards apex, almost always articulate with the calyx. Bracts and bracteoles small. *Calyx* tube adnate to ovary, subcylindrical or subglobose, whether or not with 5 prominent angles, ribs or wings alternating with the sepals, persistent, \pm deeply 5-lobed. *Corolla* mostly tubular, rarely elongate-urceolate, shortly 5-lobed, often 5-angled or \pm prominently lengthwise 5-ribbed, mostly bright coloured. *Stamens* 10, equal or nearly so; filaments linear, equal; anthers equal or sometimes slightly alternately unequal, anther-cells broad-oblong, mostly granular, (in Mal.) not spurred on the back, extending into 2 long narrow free tubules, which open by apical later introrse pores or slits. *Disk* an annular cushion. *Ovary* 5-celled; style filiform to columnar, often exserted; stigma truncate or subcapitate. *Fruit* baccate, 5-celled, in Mal. rarely 5-winged, crowned by the calyx and the disk. *Seeds* numerous, ellipsoid; testa reticulate.

Distr. About 95 *spp.*, the bulk of which is found from Sikkim, Bhutan, SE. Tibet to Assam, Burma, W. Yunnan, N. Tonkin and Siam; 2 *spp.* in NE. Australia (Cape York Peninsula), 1 *sp.* in New Caledonia, 1 *sp.* in Fiji; in *Malesia*: 11 *spp.*, of which 1 in the Malay Peninsula, the rest in the eastern half of New Guinea. Fig. 116.

Ecol. Predominantly in the upper rain-forest or moss forest, mostly epiphytic, in the Malay Peninsula at 1220-2030 m, in New Guinea at 1300-3600 m (and perhaps still higher), in general rare. The thickened, fleshy stems and roots apparently are capable to store water. The fleshy purplish or blackish berries may be eaten by birds *etc.*, but this has not yet been confirmed by observations.

KEY TO THE SPECIES

1. Pedicel continuous with the calyx. Calyx limb elongate, 1.2-1.5 cm high, at anthesis \pm longer than the calyx tube 1. *A. scortechinii*
1. Pedicel manifestly articulate with the calyx. Calyx limb rather (sometimes very) low, at anthesis as long as or mostly shorter than the calyx tube.
2. Corolla laxly to densely pubescent outside at least in the upper half or along the angles.
3. Leaves (1-)1.2-1.4(-1.8, -2) by 0.6-0.9(-1.2) cm. Filaments \pm longer than the anthers (including tubules) 2. *A. helenae*
3. Leaves at least (3-)3.5 by 2 cm. Filaments shorter than the anthers (including tubules).

4. Corolla urceolate, 0.8–0.9 cm long. Stamens up to 0.9 cm long 3. *A. sclerophylla*
 4. Corolla tubular or inflate-tubular, (1–)1.2–3 cm long. Stamens at least 1.2 cm long.
 5. Filaments up to 4.5 mm long. Leaves ovate or elliptic-ovate.
 6. Leaves (3–)3.5–5 by (2–)2.5–3.3 cm; petiole 2 mm 4. *A. rubrocalyx*
 6. Leaves (7–)8.5–10 by (3–)3.5–4.5 cm; petiole 5 mm 5. *A. carrii*
 5. Filaments (7–)9–10(–14) mm. Leaves oblong 6. *A. brassii*
 2. Corolla glabrous.
 7. Filaments distinctly longer than the anthers (including tubules). Leaves elliptic or mostly obovate-elliptic or obovate, (1–)1.3–2(–5) by 0.7–1.4(–2) cm 7. *A. vitis-idaea*
 7. Filaments mostly much shorter than the anthers (including tubules), rarely as long. Leaves lanceolate-ovate or ovate to elliptic, generally (much) larger.
 8. Branchlets, undersurface of the leaves, and petioles at least initially patent-pubescent. (Corolla (3–)3.5–4 cm.) 8. *A. costata*
 8. Branchlets, leaves and petioles glabrous from the beginning.
 9. Calyx limb manifestly, suberect-tubular or but slightly spreading, c. 3 mm high in all (including lobes of 2 mm). (Corolla 3.5–4 by 0.6–0.7 cm.) 9. *A. alberti-eduardi*
 9. Calyx limb (very) low and \pm spreading, 0.5–1.5 mm high (including lobes which are more tooth-like).
 10. Corolla 3.5–4 by c. 1 cm 10. *A. viridiflora*
 10. Corolla 2–2.7(–3) by 0.3–0.5 cm 11. *A. stenantha*

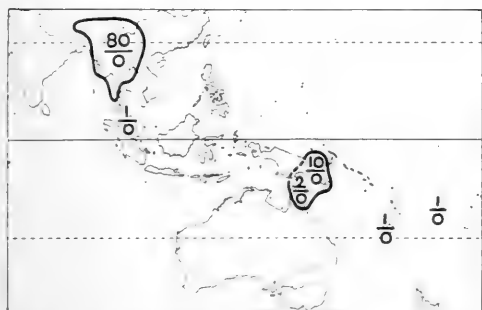


Fig. 116. Distribution of *Agapetes*. The number above the hyphen indicates the number of endemic species, that beneath the hyphen the number of non-endemic species in each island or district.

1. *Agapetes scortechinii* (K. & G.) SLEUM. Bot. Jahrb. 70 (1939) 105; AIRY SHAW, Kew Bull. (1958) 512; SLEUM. Nova Guinea, Bot. n. 1 (1960) 3; Blumea 12 (1964) 344. — *Pentapterygium scortechinii* K. & G. J. As. Soc. Beng. 74, ii (1905) 60; RIDL. J. Fed. Mal. St. Mus. 4 (1909) 41; Fl. Mal. Pen. 2 (1923) 205; BURK. & HOLTT. Gard. Bull. S. S. 3 (1923) 75; HENDERS. J. Mal. Br. R. As. Soc. 5 (1927) 255; Mal. Nat. J. 6 (1950) 258. — Fig. 117, 118f-g.

A sprawling woody climber, sometimes epiphytic, rooting adventitiously, up to 6 m; stem 2–3 cm σ . Branchlets subterete, initially short-pubescent, early glabrescent. Leaves scattered, ovate to ovate-rounded, apex blunt or rarely subacute, base broad and rounded, or sometimes cordate, thick-coriaceous, glossy green above, paler and dull below, with a faint, early disappearing puberulence on both faces, shining especially above, laxly set with dark glandular and somewhat impressed points (the bases of \pm early fallen subsetose brownish hairs) underneath, entire, edge much recurved when dry, (2.5–)4–7.5 by (2–)2.5–4(–5) cm, midrib strong, \pm deeply immersed above, obtusely prominent below, nerves

4–5 pairs, the lower 2 basal or subbasal and more conspicuous than the higher ones, all curved, whether or not \pm sulcate on the upper surface and prominent beneath, reticulation mostly indistinct, but sometimes \pm raised beneath; petiole reddish, rugose as the lower part of the midrib above, 6–12 by c. 2 mm. Flowers red or pink, c. 2.5 cm long, (1–)few(–5) together in an axillary or subterminal fascicle or a short-axed corymb, sparsely grey-pubescent and with many setulose gland-tipped hairs, sometimes glabrescent. Pedicel reddish, thick, much broadened and nearly cup-like below the calyx, continuous with the latter, 1.5–2.5 cm, with 2 narrow ovate-acuminate bracts 3–4 by 1 mm at base. Calyx reddish, 5-angular or shortly 5-winged, tube \pm conical, inflated at base, narrowed distally, 0.8–1 by 1.5–1 cm, limb tubular, \pm erect, subcoriaceous, 1.2–1.5 cm high, 5-lobed to $\frac{1}{2}$ – $\frac{2}{3}$, lobes broad, acute, 5–6 mm wide at base. Corolla elongate-urceolate, the lower third included by the calyx lobes, fleshy, glossy carmine red outside, dull (almost glaucous-)carmine inside, base whitish, densely set outside with rufous, crisp, gland-tipped hairs in the upper half, glabrous inside, c. 2.6 by 1.3 cm in fresh specimens, dropping together with the stamens very early, lobes (2 mm) reflexed. Filaments laxly rufous-pubescent, 3–4 mm; anther-cells narrow-oblong, very granular, 5–6 mm; tubules bent aside, narrow, (4–)5–6 mm, opening by slits in the upper part. Style columnar, glabrous, 2 cm. Disk glabrous. Fruit subglobose, winged, red, waxy, shiny, crowned by the large calyx limb. Seeds compressed ovate-ellipsoid, 1–1.5 mm.

Distr. *Malesia*: Malay Peninsula (Main Range from Cameron Highlands to Frazer's Hill).

Ecol. In summit forest or heath scrub, local, 1220–2030 m. Fl. June–Sept.

2. *Agapetes helenae* (F. v. M.) F. v. M. ex SLEUM. Bot. Jahrb. 70 (1939) 99; Nova Guinea, Bot. n. 1 (1960) 3. — *Vaccinium helenae* F. v. M. Trans. R. Soc. Vict. n.s. 1, 2 (1889) 16. — *Paphia helenae* (F. v. M.) SCHLTR, Bot. Jahrb. 55 (1918) 182. — Fig. 118h.



Fig. 117. *Agapetes scortechinii* (K. & G.) SLEUM. on summit of Mt Jasar, 1700 m, Cameron Highlands, Malaya (SLEUMER 4669) (SLEUMER, 1963).

Small shrub. Branchlets obtusangular by decurrent leaf-cushions, erect, stiff, tips with short spreading hairs, older parts glabrous, early covered with greyish cork. *Leaves* elliptic- or oblong-ovate, sometimes suborbicular, apex blunt, base \pm rounded, coriaceous, firm, initially finely pubescent, finally glabrous, rather shining, laxly gland-dotted beneath, entire, margin cartilaginous, sometimes slightly recurved, 1(-2) by 0.6-0.9(-1.2) cm, midrib and c. 3 pairs of curved-ascending nerves a little sulcate above, \pm obscure beneath, reticulation invisible; petiole thickish, pubescent, 2(-3) mm. *Flowers* solitary or rarely in twos in the upper axils. Pedicels robust, angular, rather densely set with whitish spreading short hairs as is the calyx, 1.2-1.5 cm by 1 mm, with 2 ovate-acuminate bracts (3 mm). *Calyx* tube broad-cylindric, base obtuse or rounded, 5-6 by 3-4 mm, limb somewhat spreading, 3 mm high, 5-lobed to $\frac{2}{3}$, glabrescent. *Corolla* cylindric, a little narrowed towards the base, slightly 5-angled, fleshy, probably red, at both sides initially subdensely clad with spreading, whitish, rather short hairs except the \pm glabrous base, subglabrescent, 3.5-4 cm by 5-6 mm including the finally reflexed narrow-deltoid lobes, c. 4 mm. *Stamens* c. 2.8 cm; filaments c. 1.5 cm, pubescent in the middle third; anther-cells but slightly granular, c. 5 mm; tubules rather wide, 8-9 mm, opening by slits more than halfway. *Style* slender, glabrous, finally exerted. *Disk* glabrous.

Distr. *Malesia*: East New Guinea (Owen Stanley Ra.: Mt Victoria). One collection.

3. *Agapetes sclerophylla* SLEUM. Bot. Jahrb. 70 (1939) 104; Nova Guinea, Bot. n. 1 (1960) 3. — Fig. 118a.

Stiff, scandent, sparsely branched shrub, also epiphytic, 1-2 m. Branchlets subterete, tips puberulous, older parts early glabrous and covered with cork. *Leaves* ovate or oblong-ovate, apex rather shortly (1-2 cm) subcaudate-acuminate, \pm acute and subfalcate, base broadly rounded, slightly inequilateral, coriaceous, rigid, dark green, glabrous except some very short, appressed, reddish-brown, glandular hairs or their bases beneath, entire, (5-7)-12 by (3-3.5)-6.5 cm, midrib and nerves \pm strongly impressed above, prominent beneath, 3 pairs of main nerves from or from above the base, the outer pair immediately along the margin and much less distinct, all curved-ascending to the apex, inarching with higher nerves and veins, reticulation rather coarse, raised on both faces, or faintly impressed above, prominent beneath; petiole short-pubescent initially, early rugose or corky, 5-6(-8) by 1.5-2 mm. *Flowers* (1-)-2-3 from upper axils, but said to be borne on old wood also. Pedicels dark red when fresh, rather robust, glabrous or with sparse short-stalked reddish glands, more densely so immediately below the calyx, 1-1.5(-2) cm. Bracts small. *Calyx* tube obconical, base subtruncate, distinctly 5-ribbed, laxly white-hairy, 5-6 mm long, limb completely 5-lobed, lobes deltoid, acute, 2 mm. *Corolla* urceolate, \pm 5-angular, \pm fleshy, pale red at the tube, cream or white at the lobes, laxly whitish hairy at least in the upper part and predominantly

so at the angles, moreover with lax brown, sub-appressed, glandular hairs all over outside, glabrous inside, 8–9 by 5–6 mm including the suberect lobes, 1 mm. *Stamens* nearly as long as the corolla; filaments glabrous, 2–2.5 mm; anther-cells very granular, \pm recurved at base, 3–3.5 mm; tubules narrow, 2–2.5 mm, dehiscing by slits nearly to the base. *Disk* glabrous. *Style* 8 mm.

Distr. Malesia: SE. New Guinea (Main Range: Murray Pass, and in a slightly differing form near Mt Victoria).

Ecol. Locally common as forest undergrowth or epiphyte, 2840–2900 m. *Fl.* Jan., July.

4. *Agapetes rubrocalyx* SLEUM. Bot. Jahrb. 70 (1939) 102; Nova Guinea, Bot. n. 1 (1960) 4.

var. rubrocalyx.

Scandent or creeping shrub or shrublet. Branchlets very slender, terete, very shortly pubescent at the tips. *Leaves* elliptic-ovate, apex broadly acuminate, or attenuate and \pm obtuse, with minute apical gland, base rounded or broadly attenuate, coriaceous or subcoriaceous, glabrous, entire, (3–)3.5–5 by (2–)2.5–3.3 cm, midrib faintly impressed above, obtusely prominent beneath, nerves \pm prominent beneath only, in 1–2 high curved-ascending pairs from or from above the base and 2(–3) shorter pairs higher up, all anarching, reticulation lax and faintly raised beneath; petiole initially pubescent, c. 2 mm. *Flowers* solitary in upper axils. Pedicels stoutish, glabrous, (4–)5–6 mm. Bracteoles minute. *Calyx* tube subturbinate, slightly 5-ribbed, reddish or purplish, with sparse, very short, stalked gland-hairs, 7 mm long including lobes, these broadly subovate-deltoid, \pm spreading, 2–3 mm. *Corolla* cylindrical, white with reddish tinge at base, rather fleshy, densely white-hairy outside, glabrous inside, 2–2.3 by c. 0.4 cm including the short lobes. *Filaments* glabrous, 4.5 mm; anther-cells 7–8 mm, but slightly granular, tapering to the slender tubules (9–10 mm), slits 3 mm. *Style* glabrous, 2.5 cm. *Disk* glabrous.

Distr. Malesia: New Guinea (Mt Saruwaged area: Ogeramngang), at 1830 m. Once found. *Fl.* Febr.

var. pilicalyx SLEUM. Nova Guinea, Bot. n. 1 (1960) 4; Blumea 12 (1964) 344.

Differs by a densely hairy, not-glandular calyx, and a smaller, more inflated corolla (10–)12–16 (–18) by 8–11 mm, the laxly long-haired or glabrous connective, shorter filaments (2.5 mm), cells (4 mm), tubules (5–7 mm) and style (10–15 mm). *Fruit* broadly obovoid, truncate, purplish brown, c. 1 by 0.6 cm. *Seeds* pale brown, 1 mm.

Distr. Malesia: New Guinea (Morobe Distr.: Matap, 1525–1830 m; Western Highlands: Nonaminj Div. and Kubor Ra., 3250 m).

5. *Agapetes carrii* SLEUM. Bot. Jahrb. 70 (1939) 103; Nova Guinea, Bot. n. 1 (1960) 4. — **Fig. 118b.**

Scandent shrub. Branchlets terete, slender, glabrous at tips. *Leaves* lax, ovate, apex acutely subcaudate-acuminate for 1–1.5 cm, base rounded, or rarely subcordate, subcoriaceous, pale brown

when dry, dull, glabrous except some sparse glandular points beneath, entire, (7–)8.5–10 by (3–)3.5–4.5 cm, midrib and nerves slightly prominent on both faces, nerves 3 subbasal pairs, the 2 inner ones more distinct, all curved-ascending to the apex, reticulation rather lax and but slightly raised on both sides; petiole c. 5 by 1 mm. *Flowers* solitary in upper axils. Pedicels slender below, laxly hairy, with some stalked glands at apex, 1.5–2 cm. *Calyx* tube turbinate-obconical, \pm distinctly 5-ribbed, laxly white-pubescent, 5–6 mm long including the limb, the latter 5-lobed nearly to the base, lobes subpatent, broad-triangular, subacute, 1.5 mm. *Corolla* cylindrical, 5-angular, rose red, tipped cream when fresh, \pm fleshy, all over densely short-hairy outside, glabrous inside, 18–20 mm when fully developed including the short lobes, c. 6 mm wide. *Stamens* nearly as long as the corolla; filaments glabrous, c. 2 mm; anther-cells 6–7 mm, markedly granular; tubules narrow, 9–10 mm, splitting nearly to the base. *Disk* glabrous. *Style* slender, c. 17 mm.

Distr. Malesia: New Guinea (Owen Stanley Ra.: Mt Victoria), in forest near and above the 'Gap', 2135–2440 m. Twice found. *Fl.* Dec.-Jan.

6. *Agapetes brassii* SLEUM. Bot. Jahrb. 70 (1939) 103; Nova Guinea, Bot. n. 1 (1960) 4. — **Fig. 118c.**

Small, slender, almost unbranched, subscaudent shrub, c. 60 cm. Branchlets terete, smooth, glabrous. *Leaves* oblong, apex gradually shortly (1.5–2 cm) subcaudate-acuminate, very tip bluntish, base broadly cuneate to nearly rounded, slightly unequal, subcoriaceous to coriaceous, \pm shining above, glabrous, but with sparse blackish glandular points all over beneath, entire or minutely remotely denticulate, 7–10 by 2–3.5 cm, midrib and nerves impressed above, slightly but distinctly raised beneath, 1–2 pairs of basal nerves, another 1–2 pairs from 5–10 mm above the base, other nerves or veins from the upper half of the midrib less distinct, reticulation subinconspicuous; petiole 4–5 by 1.5 mm. *Flowers* solitary in upper axils. Pedicels bibracteolate, articulate in the middle, glabrous or pubescent in upper part, 1.7–2 cm. *Calyx* tube narrow-obconical, markedly 5-ribbed, red, laxly white-hairy, 7–8 mm including limb, the latter 5-lobed to the base, but 1 mm high. *Corolla* tubular, pink, green tipped, rather fleshy, \pm densely shortly white-hairy outside, glabrous inside, 2.6–3 cm by c. 0.5 mm including triangular lobes, 2 mm. *Stamens* as long as the corolla; filaments glabrous, (7–)9–10(–14) mm; anther-cells slightly granular, c. 1 cm; tubules slender, 7–8 mm, opening by slits half their length. *Disk* glabrous. *Style* slender, equalling the corolla.

Distr. Malesia: New Guinea (Central Distr.: Mt Awormange, Mt Tafa), in forest on mossy ground, at 2300–2835 m. *Fl.* Jan.-May.

7. *Agapetes vitis-idaea* SLEUM. Nova Guinea, Bot. n. 1 (1960) 4; Blumea 12 (1964) 344. — **Fig. 118j.**

Terrestrial, semiprostrate or subscaudent shrublet, 10–50 cm. Branchlets angular at the tips, light brown, terete and glabrous below, laxly set with squamular leaflets below, early covered with

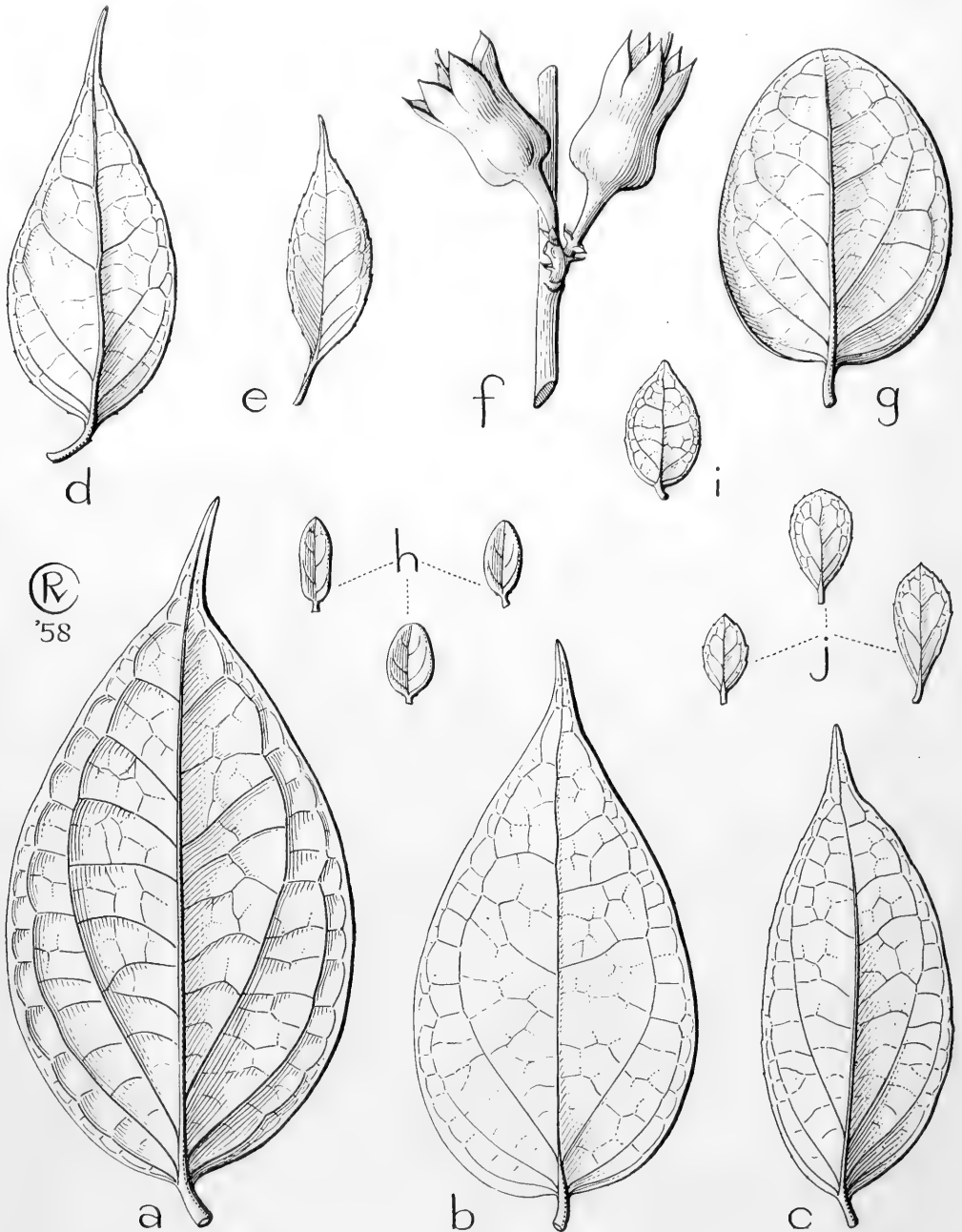


Fig. 118. Leaf surfaces of *Agapetes* spp., all $\times \frac{2}{3}$. — a. *A. sclerophylla* SLEUM., undersurface. — b. *A. carrii* SLEUM., undersurface. — c. *A. brassii* SLEUM., undersurface. — d. *A. alberti-eduardi* SLEUM., undersurface, e. *ditto*, upper surface. — f. *A. scortechinii* (K. & G.) SLEUM., submature fruit, g. *ditto*, undersurface. — h. *A. helenae* F. v. M., upper surface. — i. *A. costata* C. H. WRIGHT, undersurface. — j. *A. vitis-idaea* SLEUM., undersurface (a BRASS 4566, b CARR 13708, c BRASS 4109, d-e BRASS 4380, f BURKILL 797, g WRAY 210, h MACGREGOR anno 1889, j GILLIARD *s.n.*, obtuse leaf, and NGF 5189 WOMERSLEY, two acute leaves).

a thin cork. *Leaves* mostly obovate-elliptic or obovate, or elliptic, apex mostly blunt or rounded or shortly acuminate and subacute, base cuneate, thinly coriaceous, glabrous except some scattered redbrown glandular hairs or their point-like bases, subserrate-crenulate, (1-)1.3-2(-2.5, -5) by 0.7-1.4 (-2) cm, midrib slightly immersed above, prominent beneath, nerves 2 basal pairs and 2-3 from upper part of midrib, rather obscure above, visibly raised beneath, and arches connected with the rather dense reticulation, the latter \pm prominent beneath; petiole stoutish, \pm flattened, 1(-2) mm, on a thickish cushion decurrent along the twig. *Flowers* 1(-2) in the axils of the upper normal or lower reduced (squamular) leaves. Pedicels glabrous, red, 5-7 mm. Bracteoles \pm half-way. *Calyx* tube turbinate, 5-ribbed or-winged, red or brownish red, glabrous or with sparse shortly stalked glands, 3-4 mm long, limb 2 mm high, 5-lobed nearly to the base, lobes deltoid, subacute. *Corolla* tubular, slightly 5-angled, white, or pink with white tips, or cream suffused with pink, glabrous or with a stalked suffused gland here and there at the angles, (1.3-)-1.5-1.7(-2) cm, 4-5(-6) mm σ , including lobes 1.5-2 mm. *Stamens* as long as the corolla; filaments glabrous, 8-10 (-11) mm; anther-cells much recurved at base, granular, 2 mm; tubules as wide as the cells, c. 4 mm, slits almost to the base. *Disk* glabrous. *Style* glabrous, 1.5-1.8 cm.

Distr. *Malesia*: East New Guinea (Eastern and Western Highlands; Finisterre and Saruwaged-Cromwell Mts).

Ecol. On ridge crests and in alpine thickets, 1585-3720 m. *Fl.* April-Sept.

8. *Agapetes costata* C. H. WRIGHT, Kew Bull. (1899) 102; SLEUM. Bot. Jahrb. 70 (1939) 101; Nova Guinea, Bot. n. 1 (1960) 5. — *A. filicicola* SLEUM. Bot. Jahrb. 70 (1939) 102. — **Fig. 118i.**

Terrestrial or epiphytic shrub, rarely over 5 m. Branchlets terete, greyish, subpatent-pubescent in the younger reddish parts, glabrescent and early corticate. *Leaves* ovate to lanceolate-ovate, apex shortly or more longish acuminate, blunt or nearly so, base mostly rounded or broadly attenuate, subcoriaceous, \pm stiff, lower part of midrib above with lax rather longish white hairs as are margin, midrib and nerves beneath at least in young leaves, glabrescent, furthermore beneath with lax short glandular subsetulose caducous hairs or finally glandular-punctulate, edge minutely glandular-crenulate or -dented, very edge \pm recurved (dry), 1.5-4.5 by 0.8-1.5 cm, midrib slightly impressed above, prominent beneath, nerves c. 5 pairs, lower 2 curved-ascending from or \pm from base, other ones higher up and more spreading, all inarching, whether or not impressed above, raised beneath as is the lax reticulation; petiole red, \pm slender, hairy, 2-3 mm. *Flowers* from the upper axils 1-2(-3) in fascicles. Pedicels red, stoutish, glabrous or laxly patently white-hairy, bibracteolate at or slightly above the base, 1.2-1.8 cm. *Calyx* narrow-obconical at anthesis, becoming inflated later, red,

manifestly 5-ribbed, glabrous, (8-)9-10 by 3-4 mm including limb, the latter low, 5-lobed to base, lobes ovate-deltoid, acute, 1.5-2 mm. *Corolla* cylindrical, 5-angled, \pm fleshy, glabrous, pale green or greenish white, (3-)3.5-4 by 0.5-0.6 cm including the deltoid, erect lobes, 2-2.5 mm. *Stamens* \pm as long as the corolla; filaments linear, glabrous, 12-15(-16) mm; anther-cells granular, (6-)8-9 mm, \pm unequal; tubules rather broad, (9-)12-14 mm, splitting in the upper $\frac{1}{2}$ to $\frac{2}{3}$. *Style* slender, glabrous, equalling the corolla. *Disk* glabrous. Submature still green *fruit* oblong-ellipsoid, 5-ribbed, 9-10 by 6-7 mm, sepals inflexed.

Distr. *Malesia*: New Guinea (Main Range from Murray Pass and Mt Albert Edward to Mt Scratchley).

Ecol. Apparently common and gregarious, in forest borders, both terrestrial and epiphytic, also on trunks of grassland tree ferns, 2480-3680 (-3960) m. *Fl.* June-July.

9. *Agapetes alberti-eduardi* SLEUM. Bot. Jahrb. 70 (1939) 100; Nova Guinea, Bot. n. 1 (1960) 5. — **Fig. 118d-e.**

Small tree, 4-5 m, with stiff, somewhat scandent branches. Branchlets obtusangular, glabrous. *Leaves* \pm narrowly ovate-oblong to lanceolate-oblong, apex shortly subcaudate-acuminate, very tip bluntish, base broadly attenuate to nearly rounded, coriaceous, brittle, brown and \pm dull when dry, glabrous, very sparsely set with blackish points underneath, distinctly denticulate by callose, blackish, subsetulose glands, 4.5-8 by (1.5-)2-3 cm, midrib much impressed above, prominent beneath, nerves 5-6(-7) pairs, lower 2-3 ones \pm basal and high curved-ascending, the other higher ones more straight and spreading, all inarching near the edge, slightly impressed above, a little raised beneath, reticulation obscure; petiole rugulose, glabrous, (6-)8-10 by 1 mm. *Flowers* blackish red when dry, glabrous, 2-3 in the upper axils. Pedicels stout, 1.5-2 cm. Bract minute, bracteoles in upper third or even close to the calyx. *Calyx* urceolate, tube at anthesis 5-6 by c. 3 mm, limb suberect-tubular or but slightly spreading, c. 3 mm high, acutely 5-lobed to $\frac{2}{3}$. *Corolla* cylindrical, base red, upper part greenish yellow, very shortly 5-lobed, 3.5-4 by 0.6-0.7 cm. *Stamens* c. 3 cm; filaments glabrous, c. 5 mm; anther-cells granular, (8-)9-12 mm; tubules \pm slender, 1.5-1.6 cm, slits nearly to the base. *Disk* glabrous. *Style* slender, equalling the corolla. *Fruit* ellipsoid or subglobose, shining, purple-black, fleshy, c. 1.5 by 1.1-1.2 cm (fresh), suberect, calyx limb not much accrescent.

Distr. *Malesia*: East New Guinea (Central Distr.: Mt Albert Edward), common in forest or shrubberies at 3350-3600 m. *Fl.* June.

10. *Agapetes viridiflora* (SCHLTR.) SLEUM. Bot. Jahrb. 70 (1939) 99; Nova Guinea, Bot. n. 1 (1960) 5. — *Paphia viridiflora* SCHLTR, Bot. Jahrb. 55 (1918) 183, f. 13.

Scandent, much branched and densely leaved, epiphytic shrub, up to 10 m. Branchlets subterete,

glabrous. *Leaves* elliptic, apex obtusely attenuate or subacuminate, base broadly attenuate, coriaceous, stiff, glabrous, laxly set with dark glandular points beneath, \pm indistinctly crenulate or dented by very short callose, blackish, glandular bristles, 3.5–6 by 1.7–2.5 cm, midrib broadened at base, \pm flat above, prominent beneath, nerves 4–5 pairs of which 2 basal or \pm suprabasal and curved-ascending, the higher ones more spreading, all obscurely anastomosing and \pm raised on both faces, reticulation indistinct; petiole 0.5–1(–1.2) by 1 mm. *Flowers* green, blackish when dry, glabrous, in 3–6-flowered fascicles. Pedicels stout, bibracteolate \pm at base, c. 2 cm. *Calyx* tube broadly cylindrical, obscurely 5-ribbed, base truncate, c. 4 by 3 mm, limb barely 1 mm high, shortly 5-dented. *Corolla* subcylindrical, \pm dilated towards the mouth, 3.5–4 by c. 1 cm, lobes erect, 3–4 mm. *Stamens* \pm as long as the corolla; filaments glabrous, 5–6 mm; anther-cells subequal, slightly granular, 10–12 mm; tubules 16–18 mm, slits \pm halfway. *Style* glabrous, slender, \pm exserted. *Disk* glabrous.

Distr. *Malesia*: East New Guinea (Dischore Mts in Waria R. region), in mossy forest at c. 1300 m. One collection. *Fl.* June.

11. *Agapetes stenantha* (SCHLTR) SLEUM. Bot. Jahrb. 70 (1939) 99; Nova Guinea, Bot. n. 1 (1960) 5. — *Paphia stenantha* SCHLTR, Bot. Jahrb. 55 (1918) 184. — *A. obtusata* SLEUM. *ibid.* 70 (1939) 99. — *A. brevicuspis* SLEUM. *l.c.* 101. — **Fig. 119.**

Scandent or subscandent robust shrub, 2–5 m, occasionally climbing up to 20 m, with flexuous, not rarely drooping branches. Branchlets glabrous, tips obtusangular. *Leaves* ovate-elliptic to elliptic-oblong, rarely ovate or ovate-oblong, apex shortly acuminate, very tip mostly obtuse or subacute, base mostly broad-attenuate, sometimes \pm rounded, coriaceous, laxly set with very short, bristle-like, blackish, glandular caducous hairs or punctulate by their bases, at edge minutely and \pm regularly dented by thick, subsetose, black, \pm impressed glands, 4–10 by 2–4.5 cm, midrib \pm



Fig. 119. *Agapetes stenantha* (SCHLTR) SLEUM. a. Habit, $\times \frac{2}{3}$, b. stamens, back and front view, $\times 2$, c. ovary and disk, $\times 2$ (a–c BRASS 22272).

impressed above, strongly raised beneath, nerves 3-4 basal or suprabasal pairs, high curved-ascending to apex, anastomosing, higher less distinct spreading nerves or veins from upper part of midrib, all \pm prominent above, more so beneath, reticulation very lax, \pm raised beneath or on both faces; petiole red, rugulose, often \pm flattened, (4-)6-10(-12) by 1-1.5 mm. *Flowers* in (1-)2-3-flowered fascicles in the upper axils, glabrous. Pedicels bibracteolate at base, 1.3-1.8 (-2.3) cm. *Calyx* tube broadly obconical or subcylindric, mostly faintly, sometimes more distinctly 5-ribbed, base truncate, 3-4(-5) by 3-4 mm including the low limb 0.5-1.5 mm high, lobes or teeth often minute. *Corolla* tubular to tubular-ventricose, whether or not \pm dilated upwards, \pm fleshy, initially green or greenish yellow, often

suffused with dull red, or later plain red, dark red to blackish when dry, 2-2.7(-3) by 0.4-0.6 cm σ below, 0.6-0.7 cm σ in upper third, lobes 2 mm, finally reflexed. *Stamens* \pm as long as corolla; filaments glabrous, 2-3(-4) mm; anther-cells granular, 0.8-1 cm; tubules (1-)1.2-1.5 cm, slits long. *Style* slender, glabrous, as long as corolla or \pm exserted. *Disk* glabrous. *Fruit* globose, apex truncate, said to be white, c. 1.5 cm σ (fresh).

Distr. *Malesia*: East New Guinea (Morobe Distr.: Waria R. region and Dishore Mts to Mt Maneao and Goodenough I. in Milne Bay Distr.).

Ecol. In mossy forest or forest margin, both terrestrial and epiphytic, on slopes, locally common, 1300-2865 m. *Fl.* Jan.-Dec.

Note. Rather variable in the form and size of the corolla and the length of the stamens.

12. DIMORPHANTHERA

F. v. M. in Wing's South. Sc. Rec. n.s. 2 (1886) *in text*, repr. Bot. Centralbl. 26 (1886) 163; Trans. R. Soc. Vict. n.s. 1, 2 (1889) 19; Descr. Not. 9 (1890) 63; WARB. Bot. Jahrb. 18 (1893) 203; J. J. S. Nova Guinea 12 (1914) 146; WERNH. Trans. Linn. Soc. II, Bot. 9 (1916) 89; J. J. S. Nova Guinea 12 (1917) 514; *ibid.* (1918) t. 208 & 209; SCHLTR, Bot. Jahrb. 55 (1918) 184; COPEL. *f.* Philip. J. Sc. 47 (1932) 100 (key), 105; J. J. S. Nova Guinea 18 (1936) 100; SLEUM. Bot. Jahrb. 70 (1939) 108; Nova Guinea, Bot. n. 7 (1961) 73-102; Blumea 12 (1963) 137; *ibid.* 12 (1964) 344. — *Agapetes* D. DON *subg.* *Dimorphanthera* (F. v. M.) DRUDE, in E. & P. Pfl. Fam. 4, 1 (1889) 55. — *Agapetes* (*non* D. DON) KOORD. Nova Guinea 8 (1912) 875, *in text*. — **Fig. 120-126.**

Trees up to 10 m, shrubs, large lianas, or epiphytic, stem base and roots not rarely thickened. *Leaves* spiral, petioled, entire or with minute crenations or teeth ending in a callous caducous setular hair or gland, \pm coriaceous, plinerved \pm from the base, with a basal, thickened, marginal gland on each side near the petiole. *Flowers* mostly large and showy, in (1-)few-many-flowered axillary or rami-cauliflorous fascicles or short racemes. Buds of inflorescences subglobular-ovoid, with numerous, concave, early caducous perulae. Pedicels \pm distinctly articulate at both ends. Bracteoles 2, subbasal, mostly small. *Calyx* tube adnate to the ovary, cylindrical to semiglobose, very rarely with 5 angles or ribs alternating with the lobes. *Corolla* tubular to campanulate, 5-lobed. *Stamens* (8-)10, alternately unequally long and dimorphous; *major stamens*: filaments linear, dorsifixed; anther-cells oblong, mostly granular, at base not rarely beaked, sometimes bearing a small anchor-like appendage, or a tuft of hairs, at apex extending into a \pm ear-shaped tubule splitting introrsely; connective often produced at apex into 2 processes; processes fixed in the gap between the tubules or fixed behind them, sometimes in various degree adnate to the back of the tubules (except at the tip); *minor stamens*: in all parts shorter than the major stamens. *Disk* annular. *Style* slender, often exserted; stigma truncate or minutely lobed. *Fruit* baccate, 5-celled, (sub)globular, ∞ -seeded, with the persistent calyx limb. *Seeds* ellipsoid, small; testa reticulate.

Distr. *Malesia*: about 65 *sp.*, 2 in the Philippines, 1 in the Moluccas (Buru, Ceram, Ambon), 1 in New Ireland, the rest in New Guinea including also Waigeu, Japen, Goodenough and Normanby Is. — **Fig. 120.**

Ecol. Predominantly in the upper (moss) forest or forest edge with grassland, 1300-3560 m, rarely

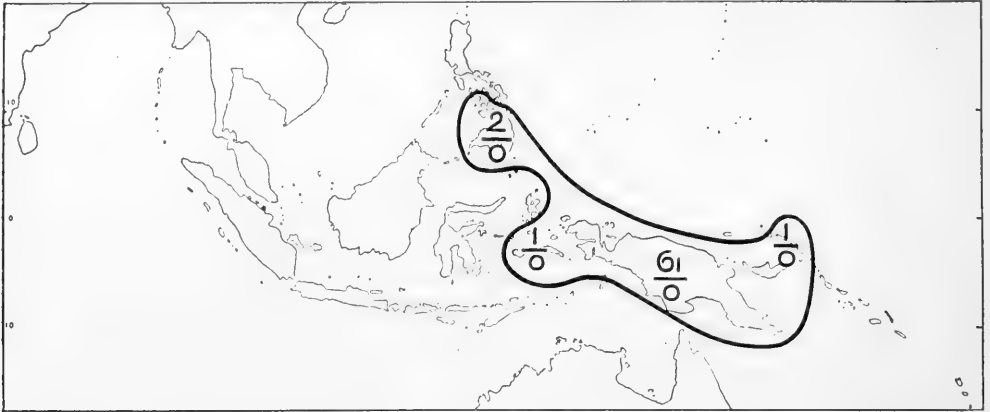


Fig. 120. Distribution of *Dimorphanthera*. The number above the hyphen indicates the number of endemic species, that below the hyphen the number of non-endemic species in each island or district.

in low country upwards of 75 m. The highest altitude is reached by *D. alpivaga*, a small shrub in the alpine savannah of Mt Carstensz at 3700–4300 m. A few *spp.* are found both epiphytically in patches of mossy forest and terrestrial in adjacent grassland.

Pollination. According to BECCARI the flowers of at least certain species are visited by honey sucking birds (*Amblyornis inornata* SCHLEG., *Myzomela rosenbergii* SCHLEG.). Remains of an apparently sugar containing liquid can be found sometimes in the flowers of recently collected material: corolla and stamens are then glued together. Possibly the disk functions as a nectary; it is also not certain whether pollination really is performed exclusively by birds, when they feed on the flowers.

Dispersal. The berries of many (perhaps all) species are soft, purplish to blackish and palatable at full maturity, are up to 1.5 cm ø, and regularly eaten by birds.

Uses. In New Guinea the flowers are occasionally used for ornamental purposes by Papuans, as can be observed from the colour picture published by E. TH. GILLIARD in Nat. Geogr. Mag. (1951) 669, which probably shows *D. amoena*.

KEY TO THE SPECIES

1. Calyx tube conspicuously 5-winged or -ribbed. (Corolla tubular.) 1. *Sect. Pteridosiphon*.
2. Leaves 22–28 by 9–13 cm. Pedicels *c.* 10 mm. Corolla *c.* 2.6 cm 1. *D. macleaniifolia*
2. Leaves 8–13 by (2.5–)3.5–5.5 cm. Pedicels 15–20(–25) mm. Corolla 1.8–2.2 cm 2. *D. umbellata*
1. Calyx tube terete and smooth, not winged or ribbed.
3. Corolla at anthesis clearly dilated distally, *i.e.* narrowly to widely campanulate or suburceolate-campanulate, lobes *c.* $\frac{1}{2}$ – $\frac{1}{4}$ (– $\frac{1}{5}$) as long as the total corolla. 2. *Sect. Dimorphanthera*.
4. Processes of the major stamens \pm connate or very closely parallel, free from the tubules, and fixed in the gap between the generally (much) divergent tubules.
5. Calyx and corolla (and disk) glabrous.
6. Leaves entire. Rachis *c.* 1.5 cm. Anther-cells plus tubules of the major stamens *c.* 7 mm. 3. *D. tridens*
6. Leaves finely crenulate. Rachis 2.5–3 cm. Anther-cells plus tubules of the major stamens 5 mm. 4. *D. declinata*
5. Calyx and corolla \pm densely shortly grey-pubescent.
7. Disk glabrous or but very sparsely and shortly pubescent. Corolla 3–3.5 cm 5. *D. magnifica*
7. Disk \pm densely hirtellous or tomentellous. Corolla up to 2 cm.
8. Corolla 1–1.3(–1.5) cm. Anther-cells plus tubules of the major stamens 3.5 mm 6. *D. breviflos*
8. Corolla 1.5–2 cm. Anther-cells plus tubules of the major stamens 5–6(–7) mm 7. *D. kempteriana*
4. Each of the two processes of the major stamens ligular, fixed to the back of and free or \pm connate with and \pm equalling the tubule, or \pm evanescent upwards, or indistinct.
9. Pedicels (very) slender, (1.6–)2–2.5(–3) cm, 2–3 times as long as the (pubescent) corolla. 8. *D. intermedia*
9. Pedicels more stoutish in general and $\frac{1}{2}$ –1 $\frac{1}{2}$ (–2) times as long as the corolla.
10. Corolla glabrous, or sparsely puberulous distally.

11. Flowers in abbreviate racemes up to 5 cm long. Corolla (white) sparsely puberulous distally.
9. *D. albiflora*
11. Flowers in very short racemes or in fascicles. Corolla quite glabrous.
12. Major stamens 4 mm 10. *D. mindanaensis*
12. Major stamens at least 6 mm.
13. Corolla widely (open) campanulate, 1.5-2(-2.5) cm.
11. *D. amblyornidis* var. *moorhousiana*
13. Corolla shortly suburceolate-campanulate, (0.8-)1-1.3 cm 12. *D. dekokkii*
10. Corolla short-pubescent all over.
14. Corolla densely to more laxly clothed with yellowish or subferruginous, stoutish hairs.
13. *D. apoana*
14. Corolla subdensely clothed with fine, whitish or greyish hairs.
15. Corolla shortly suburceolate-campanulate, (0.8-)1-1.3 cm . 12. *D. dekokkii* var. *pubiflora*
15. Corolla \pm widely (open) campanulate, exceeding 1.5 cm.
16. Calyx and pedicel subdensely grey-pubescent. (Cells plus tubules of the major stamens c. 4.5 mm.) 14. *D. steinii*
16. Calyx and pedicel very laxly pubescent or mostly glabrous.
17. Cells plus tubules of the major stamens c. 8 mm. 15. *D. pulchra*
17. Cells plus tubules of the major stamens (4-)5-6(-6.5) mm.
11. *D. amblyornidis* var. *amblyornidis*
3. Corolla at anthesis strictly tubular (rarely slightly dilated distally in 29. *D. brevipes*), lobes up to c. $\frac{1}{5}$ as long as the total corolla. 3. *Sect. Trochilanthe*.
18. Processes of the major stamens free from the tubules at least in the upper third.
19. Flowers in distinct racemes; rachis 2-6 cm.
20. Corolla outside finely short-pubescent to subtomentose all over.
21. Rachis, pedicels and calyces velutinous or subtomentose.
22. Style with lax, long, appressed hairs. (Leaves entire, 10-18 by 2-3.5 cm.) . . 16. *D. velutina*
22. Style glabrous.
23. Leaves entire. Stamens 13-16 and 10-12 mm 17. *D. amoena*
23. Leaves denticulate by small callose glands. Stamens 9-10 and 7.5 mm 54. *D. calodon*
21. Rachis, pedicels, and calyces laxly and very shortly pubescent, or glabrous.
24. Cells of the major stamens provided with a basal anchor-like appendage . 35. *D. anchorifera*
24. Cells of the major stamens without a trace of such appendage.
25. Corolla (minutely papillose puberulous) 2.3 cm 18. *D. latifolia*
25. Corolla 3-4.5 cm.
26. Corolla hirsute-tomentose. Cells plus tubules of the major stamens 15-16 mm.
19. *D. hirsutiflora*
26. Corolla subdensely short-pubescent. Cells plus tubules of the major stamens up to 12 mm.
27. Cells plus tubules of the major stamens 11-12 mm 20. *D. brassii*
27. Cells plus tubules of the major stamens 8 mm 21. *D. wollastonii*
20. Corolla outside glabrous or sparsely pubescent at the lobes only.
28. Leaves (ovate, 7-plinerved) up to 25 by 14 cm. Major stamens 15 mm 18. *D. latifolia*
28. Leaves 12-20 by 4.5-8 cm. Major stamens 11-12 mm.
29. Leaves elliptic, 5-7-plinerved. Rachis 3.5-4 cm 22. *D. racemosa*
29. Leaves subovate- or lanceolate-oblong, 7(-9)-plinerved. Rachis 2-2.5 cm.
30. Pedicels 10-13 by 0.7-1 mm. Calyx tube 3 by 3 mm 23. *D. eymae*
30. Pedicels 8-10 by c. 2 mm. Calyx tube (4-)5 by 4-5 mm 43. *D. doctersii*
19. Flowers in abbreviate racemes or fascicles (clusters) or solitary; rachis rarely up to 1.5 cm.
31. Connective processes papillose or laxly muriculate, certainly not properly hairy.
32. Corolla membranous, red, (1.8-)2(-2.3) cm. Cells plus tubules of the major stamens 5-6 mm.
24. *D. cornuta*
32. Corolla rather fleshy, greenish to white. Cells plus tubules of the major stamens 7-8 mm.
33. Corolla 2.5 cm 25. *D. torricellensis*
33. Corolla 1-1.3 cm 26. *D. brachyantha*
31. Connective processes laxly to densely hairy or even hirsutulous at least in the lower part, mostly so to or almost to the top.
34. Corolla outside subdensely or rarely more laxly short-hairy to subtomentose all over.
35. Corolla 1.3-1.8(-2) cm. Cells plus tubules of the major stamens up to 8(-9) mm.
36. Leaf margin entire or subentire, i.e. minutely or shallowly and remotely denticulate or subserrate-crenulate.
37. Calyx and pedicels quite glabrous 27. *D. gracilis*
37. Calyx and pedicels (the latter at least partly) shortly pubescent or tomentulose.
38. Calyx (and the entire inflorescence and young leaves) tomentulose 28. *D. vestita*
38. Calyx laxly to subdensely short-pubescent. (Leaves glabrous from the beginning.)

39. Corolla rather subcampanulate-dilated distally. Connective processes (hairy and) surpassing the tubules. 29. *D. brevipes*
39. Corolla strictly tubular. Connective processes a little shorter than the tubules.
40. Stamens alternately 7 and 5 mm; connective processes with subsetular, \pm appressed hairs below, \pm glabrescent distally. 30. *D. crassifolia*
40. Stamens alternately 9–10 and 7–8 mm; connective processes subdensely with spreading fine whitish hairs all over.
41. Corolla glabrous inside. Disk glabrous. Bracteoles inserted at the base of the pedicel. 31. *D. nigropunctata*
41. Corolla laxly hairy inside. Disk hairy. Bracteoles inserted 6–10 mm above the base of the pedicel 32. *D. thibaudifolia*
36. Leaf margin regularly and markedly serrate-denticulate or -crenulate.
42. Calyx rounded at the base. Pedicel and calyx glabrous 40. *D. denticulifera* var. *pubens*
42. Calyx \pm truncate at the base. Pedicel and calyx subdensely hairy 33. *D. robbinsii*
35. Corolla (2.2–)2.5–4.5 cm. Cells plus tubules of the major stamens at least 9 mm, mostly longer.
43. Calyx tube cup-shaped, at anthesis rounded at the base.
44. Cells plus tubules of the major stamens 16–18(–20) mm 34. *D. clemensiae*
44. Cells plus tubules of the major stamens up to 14 mm.
45. Cells of the major stamens provided with a basal anchor-like appendage, 12–14 mm including the tubules 35. *D. anchorifera*
45. Cells of the major stamens without a trace of a basal appendage.
46. Cells plus tubules of the major stamens 9–10 mm. Corolla 2–2.3 cm 36. *D. beccariana*
46. Cells plus tubules of the major stamens (11–)12–13 mm. Corolla 3–3.5(–4) cm. 20. *D. brassii*
43. Calyx tube broadly cylindric or obconical, markedly truncate or even apophysate at the base.
47. Corolla finely subdensely pubescent. Leaves glabrous.
48. Corolla white, 2.2–2.5(–2.7) cm 37. *D. forbesii*
48. Corolla red, 3–3.5(–4) cm 38. *D. splendens*
47. Corolla hirsutulous or velutinous. Leaves pubescent at the midrib and nerves beneath.
49. Leaves entire 49. *D. collinsii* var. *montis-wilhelmi*
49. Leaves rather regularly denticulate by minute blackish callose teeth 39. *D. alpina*
34. Corolla outside generally quite glabrous, at most pubescent at the lobes.
50. Base of calyx tube rounded at anthesis.
51. Leaves regularly and rather densely serrate-crenulate or -denticulate.
52. Leaves (7–)10–14(–20) by (2.5–)3–4(–5.5) cm. Corolla 1 $\frac{3}{4}$ –2 cm. 40. *D. denticulifera* var. *denticulifera*
52. Leaves 2.5–3.5 by 1–1.5(–1 $\frac{3}{4}$) cm. Corolla 2 $\frac{3}{4}$ –3 cm 41. *D. leucostoma*
51. Leaves remotely denticulate or subcrenulate, or entire.
53. Cells of the major stamens provided with a distinct anchor-like basal appendage. 42. *D. meliphagidum*
53. Cells of the major stamens without such an appendage.
54. Leaves 7(–9)-plinerved from and from above the base. Cells plus tubules of the major stamens 10–12 mm 43. *D. doctersii*
54. Leaves 5–7-plinerved from and from above the base. Cells plus tubules of the major stamens 7–9 mm.
55. Corolla (white) 1.8–2 cm. Stamens alternately 8–9 and 6.5–7 mm. (Calyx quite glabrous.) 44. *D. womersleyi*
55. Corolla 2.8–3 cm. Stamens alternately 12–15 and 10–13 mm.
56. Calyx laxly short-hairy. Leaves subcaudate-acuminate for 3–4 cm. Corolla white. 45. *D. longifolia*
56. Calyx glabrous. Leaves broadly and for *c.* 1.5 cm acuminate or attenuate. Corolla light to dark red.
57. Leaves ovate, base rounded to subcordate, 5–9 by 3–5.5 cm 46. *D. ovatifolia*
57. Leaves elliptic- or lanceolate-oblong, 9–16(–19) by (3.5–)4–6(–8, –10) cm (Corolla 1.5–1.8 cm) 47. *D. peekelii*
50. Base of calyx tube \pm rectangularly truncate, sometimes slightly apophysate.
58. Leaves laxly to subdensely set with blackish setular glands or points on both faces. 48. *D. kalkmanii*
58. Leaves laxly to very laxly glandular-punctulate beneath only.
59. Cells plus tubules of the major stamens 13–15 mm. (Corolla 2.8–3.5 cm.) 49. *D. collinsii* var. *collinsii*
59. Cells plus tubules of the major stamens up to 11 mm.
60. Corolla (2.8–)3–3.5 cm. (Leaves shallowly and rather remotely subdenticulate-crenulate.) 50. *D. elegantissima*

60. Corolla up to 2.5 cm.
 61. Calyx tube including limb *c.* 8 mm. (Leaves entire or minutely callose-denticulate.)
 51. *D. megacalyx*
61. Calyx tube including limb up to 6 mm.
 62. Leaves lanceolate (subcoriaceous, denticulate), 7–9.5 by 1.5–2 cm . 53. *D. lancifolia*
 62. Leaves oblong to elliptic or ovate-elliptic, 7.5–14 by 3–8.5 cm.
 63. Leaves coriaceous or mostly subcoriaceous, markedly denticulate or subserrate-crenulate. Calyx lobes 1–1.5 mm 40. *D. denticulifera* var. *denticulifera*
 63. Leaves thick-coriaceous, very slightly crenulate or almost entire. Calyx lobes very short, hardly 0.5 mm, often a mere apiculus. 52. *D. militaris*
18. Processes of the major stamens merely indicated at the back of the tubules by a very slightly or not thickened, mostly quite glabrous line, or not perceptible at all.
 64. Corolla pubescent or glandular-muriculate to various degree outside at least in the upper half.
 65. Leaves manifestly and regularly denticulate by callose, subsistent, bristle-like glands. Corolla 2.8–3 cm 54. *D. calodon*
 65. Leaves entire or practically so. Corolla *c.* 1.5 cm.
 66. Filaments of the major stamens *c.* 1.5 mm. Calyx and corolla laxly with subappressed, thickish, glandular, obtuse and yellowish hairs 55. *D. prainiana*
 66. Filaments of the major stamens 3–4.5 mm. Calyx and corolla laxly to subdensely clothed with fine and short, non-glandular hairs.
 67. Leaves coriaceous, ovate to oblong-ovate, 6–10 by 3–5.5 cm; petiole *c.* 2 mm. Pedicels 8–13 mm 56. *D. vonroemeri*
 67. Leaves various; petiole (2.5–)4–7 mm. Pedicels 15–20 mm.
 68. Leaves coriaceous, lanceolate or ovate-, sometimes oblong-lanceolate, 8.5–16 by 2.6–4.8 cm.
 57. *D. parviflora*
 68. Leaves subcoriaceous, subovate- to oblong-elliptic, 5–7(–7.5) by (2–)2.5–3.5(–4) cm.
 58. *D. vaccinioides*
64. Corolla glabrous or practically so (*i.e.* sometimes with some sparse hairs at or near the apex, especially in bud).
 69. Leaves 1.5–4.5 (very rarely in part in the same specimen –7) cm long.
 70. Corolla 1.5–2 cm.
 71. Leaves 0.4–0.9(–1) cm wide 59. *D. parvifolia*
 71. Leaves (1–)1.2–2.5 cm wide.
 72. Calyx tube including limb *c.* 7 mm long. 60. *D. alpivaga*
 72. Calyx tube including limb 4–5 mm long.
 73. Cells plus tubules of the major stamens 5 mm. Leaves stiff-coriaceous . 61. *D. obtusifolia*
 73. Cells plus tubules of the major stamens 4 mm. Leaves coriaceous to subcoriaceous.
 62. *D. myzomelae*
70. Corolla (2.8–)3–3.5 cm.
 74. Leaves 1–1.5(–1.7) cm wide. Pedicels pubescent at anthesis 41. *D. leucostoma*
 74. Leaves 0.4–0.8(–1) cm wide. Pedicels glabrous at anthesis 63. *D. microphylla*
69. Leaves at least 6 cm long, mostly much longer.
 75. Calyx 4.5–5.5 mm long in all, tube cup-shaped to subobconical, base rounded or attenuate (narrowed-truncate than at the very base), limb 1.5 mm. Pedicels rather slender. Bracteoles minute 64. *D. wrightiana*
 75. Calyx (7–)8 mm long in all, tube broad-cylindric to obconical, base markedly truncate, limb 3–4 mm. Pedicels very robust. Bracteoles large, at anthesis \pm including the pedicels at least halfway 65. *D. dryophila*

1. Section Pteridosiphon

WERNH. Trans. Linn. Soc. II, Bot. 9 (1916) 89; SLEUM. Bot. Jahrb. 70 (1939) 108; Nova Guinea, Bot. n. 7 (1961) 80.

Calyx conspicuously 5-winged or -ribbed, the wings or ribs alternating with the calyx lobes. Corolla tubular.

1. *Dimorphanthera macleanifolia* WERNH. Trans. Linn. Soc. II, Bot. 9 (1916) 89 (*'macleaniaefolia'*); SLEUM. Bot. Jahrb. 70 (1939) 114; Nova Guinea, Bot. n. 7 (1961) 80.

Shrub. Branchlets glabrous. Leaves ovate to elliptic, apex shortly subacutely acuminate, base \pm rounded and sometimes suboblique, coriaceous, glabrous, laxly minutely glandular-punctate be-

neath, entire, 22–28 by 9–13 cm, 5–7-plinerved from and from up to 5 cm above the base, midrib and nerves \pm deeply impressed above, strongly raised beneath, reticulation \pm lax, raised on both faces, especially above; petiole *c.* 10 by 3 mm. Flowers in few-flowered fascicles from old wood, outside rather densely covered with fine hairs. Pedicel stoutish, *c.* 10 mm. Bracteoles basal,

subulate, minute. *Calyx* tube subcylindric-obconical, base truncate, *c.* 4 by 3–4 mm, strongly 5-winged, wings still marked in the limb, the latter suberect, *c.* 2 mm, shortly 5-lobed or -dented (0.5 mm). *Corolla* tubular, rather thin and apparently red, short-pubescent outside, *c.* 2.6 cm by 5–6 mm, lobes *c.* 3 mm. *Stamens* 11 and 10 mm; *major stamens*: filaments puberulous dorsally, *c.* 4 mm; cells plus tubules 7.5 mm, base incurved and with a minute appendix; tubules \pm divergent, *c.* 3 mm; connective obscure, no trace of any hairs. *Disk* deeply sunken, glabrous. *Style* very slender, glabrous, *c.* 2.5 cm.

Distr. Malesia: West New Guinea (on Utakwa R. at base of Mt. Carstensz), 640–760 m. One collection.

Note. It is not beyond doubt whether the detached flowers and leaves belong together.

2. *Dimorphanthera umbellata* WERNH. *Trans. Linn. Soc. II, Bot. 9* (1916) 90; SLEUM. *Bot. Jahrb. 70* (1939) 114; Nova Guinea, *Bot. n. 7* (1961) 80.

Shrub. Branchlets slender, tips glabrous. *Leaves* subovate-oblong to lanceolate, apex subcaudate-acuminate, 1.5–2 cm, subacute, base broadly attenuate, coriaceous, glabrous, very laxly glandular-punctate beneath, entire, edge not or faintly revolute, 8–13 by (2.5–)3.5–5.5 cm, 5–

plinerved from and from a little above the base, midrib and nerves slightly impressed above, markedly raised beneath, reticulation rather lax, raised beneath only; petiole 8–10 by 2–3 mm, somewhat flattened. *Flowers* in abbreviate, 4–6-flowered, almost fascicle-like racemes, \pm densely and very shortly pubescent; rachis slender, 0.5–1 by 0.1 cm. Pedicels slender, 1.5–2(–2.5) cm. Bracteoles basal, subulate, 1–2 mm. *Calyx* strongly winged, wings *c.* 1 mm high (dry), tube broadly cylindrical, *c.* 4 by 3–4 mm, base abrupt, limb suberect or \pm spreading, *c.* 2 mm, minutely 5-denticulate. *Corolla* tubular, 1.8–2.2 cm, \pm 5-angular, the angles corresponding to the wings of the calyx tube, thin, apparently red, densely short-pubescent outside, lobes 2–3 mm. *Stamens* 9–10 and 8–9 mm; *major stamens*: filaments slightly short-hairy upwards, 3 mm; cells plus tubules 7–8 mm, former beaked at the base inward; tubules 3.5–4 mm, \pm divergent; connective obscure, indicated merely by some short hairs. *Disk* deepened, glabrous. *Style* very slender, glabrous, 2.2–2.5 cm, exserted to 4–5 mm at full anthesis.

Distr. Malesia: West New Guinea (ascent from Utakwa R. to Mt Carstensz), at 1675 m. One collection.

2. Section *Dimorphanthera*

SLEUM. Nova Guinea, *Bot. n. 7* (1961) 80. — *Dimorphanthera sect. Cyclosiphon* WERNH. *Trans. Linn. Soc. II, Bot. 9* (1916) 90; SLEUM. *Bot. Jahrb. 70* (1939) 109. — *Dimorphanthera sect. Brachychone* SCHLTR, *ibid.* 55 (1918) 185. — *Dimorphanthera subsect. Brachychone* (SCHLTR) SLEUM. *ibid.* 70 (1939) 109.

Calyx tube \pm terete or smooth, not winged or ribbed. *Corolla* much dilated distally, *i.e.* campanulate or more rarely widely urceolate at full maturity, rather deeply 5-lobed to ($\frac{1}{5}$ –) $\frac{1}{4}$ – $\frac{1}{2}$ of the total length of the corolla.

3. *Dimorphanthera tridens* J. J. S. Nova Guinea 18 (1936) 100, t. 22, f. 1; SLEUM. *Bot. Jahrb. 70* (1939) 114; Nova Guinea, *Bot. n. 7* (1961) 80.

Climbing shrub up to 6 m, tips subangular, glabrous. *Leaves* elliptic to ovate or ovate-oblong, apex shortly acutely or obtusely acuminate, base broadly attenuate to rounded, basal glands distinct, coriaceous, glabrous, very laxly minutely blackish punctate beneath, 5–7-plinerved, entire, nerves slightly raised or subimpressed above, distinctly prominent beneath, reticulation obscure, 7–13(–15) by 3–5(–7) cm; petiole robust, blackish (dry), 4–9 by 1.5(–2) mm. *Racemes* from defoliate axils and/or old wood, 10–12-flowered, glabrous; rachis *c.* 1.5 cm. Pedicels \pm slender, (15–)20 mm. *Calyx* tube cup-shaped or subcylindric-semiglobose, subangular, 2 mm, limb much dilated and \pm spreading, subentire, 2 mm high, *c.* 5 mm ϕ . *Corolla* narrowly campanulate at full maturity, bright red or pink, (1.8–)2–2.2(–2.5) cm, 0.4–0.5 mm ϕ at base, 1–1.3 cm across limb, lobes deltoid, 4–5 by 7–8 mm. *Stamens* 8 (or 10), 8 and 6.5 mm; *major stamens*: filaments above the base \pm densely set with short and \pm spreading hairs, *c.*

3.5 mm, extending into a single subhirsute free connective as long as the tubules; cells plus tubules *c.* 7 mm; cells broad-oblong, much narrowed at the base into a short, subacute and curved, spur-like appendage; tubules divergent, widely ear-shaped, 2.5 mm. *Disk* glabrous. *Style* *c.* 2.3 cm.

Distr. Malesia: New Guinea (lower course of the Mamberamo R.), in primary forest at 75–100 m. *Fl.* July, Aug., Nov.

4. *Dimorphanthera declinata* SLEUM. *Blumea* 12 (1963) 137.

Scandent glabrous shrub. Branchlets terete, purplish brownish. *Leaves* lax, elliptic-oblong, apex shortly subabruptly, acutely or obtusely acuminate, base broadly attenuate to \pm rounded, coriaceous, with scattered, minute, glandular hairs beneath, at margin regularly crenulate, 2–5 mm spaced impressed glands, 8–13 by 4–6 cm, (5–)7-plinerved from and from up to 3 cm above the base, nerves impressed above, prominent beneath, no reticulation; petiole flattened, 4–6 by *c.* 2 mm. *Racemes* from several upper axils, 8–10-

flowered, purplish (dry); rachis angular, 2.5–3 cm. Pedicels robust, 10–20 by 1 mm; bracteoles basal or up to 5 mm above the base. *Calyx* tube cup-shaped, base almost rounded, 2–3 mm, limb spreading, 5-lobed almost to the base, lobes ovate-acuminate, apiculate, *c.* 2 mm. *Corolla* widely campanulate, fleshy, glabrous at both sides, pink, *c.* 2 cm, 2–2.5 cm across limb, lobes broadly triangular, obtuse, 5 mm. *Stamens* 7 and 6 mm; *major stamens*: filaments greyish pubescent upwards, *c.* 4 mm; cells obovate-oblong, base attenuate, 5 mm long including the narrowly auriculate, *c.* 1.5 mm long tubules; processes hirsutulous, \pm connate, as long as the cells. *Disk* prominent, glabrous. *Style* slender, glabrous, *c.* 2.5 cm.

Distr. Malesia: East New Guinea (Western Highlands in Lai valley near Wapenamanda). One collection.

Ecol. In *Miscanthus* regrowth at 1980 m. *Fl.* July.

Vern. Poro, Enga.

5. *Dimorphanthera magnifica* SLEUM. Nova Guinea, *Bot. n.* 7 (1961) 80.

Shrub, scrambling to 15–20 m. Branchlets obtusely subtriangular and \pm densely pubescent in the youngest parts, glabrescent. *Leaves* elliptic-ovate to ovate-oblong, apex \pm abruptly and shortly subacutely acuminate, base broadly attenuate to rounded, basal glands indistinct, coriaceous, glabrous above, subdensely pubescent at midrib and nerves beneath, laxly so on the intervenium which bears some sparse glandular points, or glabrescent, entire, 7(–9)-plinerved, nerves faintly immersed or flat above, prominent beneath, reticulation obscure, (8.5–)12–18 by (3–)4.5–7 cm; petiole initially pubescent, 9–13 by *c.* 2 mm. *Racemes* axillary, 6–10-flowered, laxly short-pubescent; rachis rather robust, 2.3 cm. Pedicels stoutish. Bracteoles in the lower third. *Calyx* tube subcylindric, subangular (dry), shortly and \pm abruptly attenuate at base, rather swollen above, 5–6 by 3–4 mm, limb \pm spreading or suberect, 2–3 by 7–8 mm, lobes very broadly ovate, subacuminate or apiculate, *c.* 1 mm. *Corolla* narrowly campanulate when fully expanded, tube reddish pink, tips white, 3–3.5 cm, *c.* 6 mm \varnothing at base, 2.5–3 cm across limb, thin-fleshy, laxly pubescent outside, lobes 6–10 by 5–9 mm. *Stamens* 8 and 10(–11) mm; *major stamens*: filaments glabrous at the base, hirsutulous upwards, *c.* 5 mm; cells plus tubules 7–8 mm, cells connate at base into a curved appendix *c.* 1 mm long; tubules ear-shaped, thick, \pm divergent, 2.5 mm; processes connate, hirsutulous, as long as the tubules. *Disk* glabrous or very sparsely and shortly hairy. *Style* \pm slender, glabrous, not exerted.

Distr. Malesia: NE. New Guinea (E. slopes of Goodenough I. in Milne Bay Distr.), common, at 1570–1600 m in mossy oak forest. One collection. *Fl.* Oct.

6. *Dimorphanthera breviflos* SLEUM. Nova Guinea, *Bot. n.* 7 (1961) 81; *Blumea* 12 (1963) 138.

Shrub, 0.5–2 m, epiphytic or scandent. Branchlets obtusangular and \pm densely yellowish pubescent in young, subterete and glabrous in older parts. *Leaves* \pm lax, elliptic-oblong or -lanceolate, attenuate at both ends, apex shortly subcaudate and subacute, thin-coriaceous, glabrous above, initially pubescent on midrib and nerves beneath, glabrescent, laxly subsetular-punctate beneath, basal glands visible, entire, 5-plinerved, midrib and nerves slightly impressed above, conspicuously prominent beneath, reticulation obscure; petiole initially pubescent, (4–)5–8 by *c.* 2 mm. *Racemes* axillary, not rarely found in the axils of uppermost 3 or 4 \pm reduced leaves and forming a pseudoterminal corymb, 8–15-flowered, subdensely greyish pubescent, or glabrescent on rachis and pedicels; rachis slender, *c.* 1.5 cm. Pedicels 15–20 by $\frac{1}{2}$ mm, bracteoles 5–7 mm above base. *Calyx* tube semiglobose, *c.* 1.5 mm long, limb spreading, wavy, indistinctly obtusely 5-lobulate, 1 mm high. *Corolla* campanulate, deep pink to carmine, subdensely yellowish or greyish pubescent outside, 1–1.3(–1.5) cm long, 0.3–0.4 cm \varnothing at base, *c.* 1 cm across limb, lobes subtriangular, 3–4 mm. *Stamens* 5 and 6 mm; *major stamens*: filaments hirsutulous apically, 3 mm; cells oblong, 3.5 mm including the tubules, base obtuse; tubules \pm divergent, *c.* 1.5 mm; processes connate, hirsutulous, as long as the tubules. *Disk* densely yellowish hirtellous. *Style* slender, glabrous, *c.* 1.4 cm, conspicuously exerted at full anthesis.

Distr. Malesia: N. New Guinea (Japen I. and Cycloop Mts), 1100–1250 m.

7. *Dimorphanthera kempteriana* SCHLTR. *Bot. Jahrb.* 55 (1918) 187, f. 14, E-J; SLEUM. *ibid.* 70 (1939) 115; Nova Guinea, *Bot. n.* 7 (1961) 81; *Blumea* 12 (1963) 138. — *D. intermedia* DIELS, *Bot. Jahrb.* 62 (1919) 487, non J. J. S. 1914. — *D. dielsiana* J. J. S. Nova Guinea 18 (1936) 100. — *D. profusa* J. J. S. *l.c.* 101, t. 22, f. 2.

Small slender shrub, or often large climber on tall forest trees, not properly epiphytic, although adventitious roots are produced from the stem, with sparse long, pendent, profusely flowering branches. Branchlets angular and \pm densely hairy in younger, subterete and glabrescent in older parts. *Leaves* narrow-elliptic or oblong to ovate-lanceolate, apex mostly shortly subcaudate-acuminate, subacute, base mostly attenuate, rarely \pm rounded, basal glands not much conspicuous, coriaceous, initially short-hairy, especially beneath, glabrescent and \pm glossy later, laxly and very shortly glandular-subtubulose or -punctate beneath, entire, 7–15(–24) by 2.5–5(–8) cm, 5-plinerved, midrib and nerves \pm impressed above, \pm prominent beneath, reticulation obscure; flush pinkish brown (fresh); petiole initially pubescent, 6–10(–15) by 2(–2.5) mm. Very short *racemes* or clusters from defoliate axils, rarely axillary, (5–)8–15-flowered, shortly grey-pubescent; rachis 1–2.5 cm. Pedicels reddish, \pm slender, 1.5–2(–3) cm, bracteoles in lower third or \pm halfway. *Calyx* tube subobconical to semi-

globose, reddish (fresh), 2–3(–4) mm, limb spreading, 2 mm, shallowly 5-dented. *Corolla* campanulate, 5-lobed to $\frac{1}{3}$, thin-fleshy, subdensely greyish puberulous, red to pale pink, 1.5–2 cm, c. 5 mm ϕ at base, c. 1.5 cm across limb. *Stamens* (8–)9–10 and (6–)7–8 mm; *major stamens*: filaments hirsutulous distally, c. 5 mm; cells oblong, confluent at base into a short beak, 5–6(–7) mm including the ear-shaped, divergent, 2 mm long tubules; processes connate, hairy, \pm equalling the tubules. *Disk* tomentellous. *Style* slender, c. 2.5 cm, \pm exserted, glabrous or papillate apically, very rarely \pm pubescent. *Fruit* subglobose, top truncate, pubescent, 7–8 mm ϕ .

Distr. *Malesia*: New Guinea (widespread, in the Vogelkop and Wandammen Peninsula and the Main Range from the Wissel Lakes region to Mt Victoria, also in the Finisterre Mts, Hydrographers Ra. and Mt Saruwaged-Sattelberg area).

Ecol. In dense primary and secondary (*Castanopsis*, *Agathis*, and *Nothofagus*) forest, (650–)1000–2300(–3000) m, locally not rare. *Fl.* Jan.–Dec.

Vern. *Korè*, Kapauku.

8. *Dimorphanthera intermedia* J. J. S. Nova Guinea 12 (1914) 149, t. 39 A; SLEUM. Bot. Jahrb. 70 (1939) 115; Nova Guinea, Bot. n. 7 (1961) 82.

Large liana climbing to tree-tops. Branchlets obtusangular and glabrous distally, terete below, 6–10 mm ϕ in flower-bearing parts. *Leaves* lax, ovate to elliptic, apex gradually shortly obtusely acuminate, base obtuse to rounded, \pm basal glands \pm distinct, coriaceous, glabrous, sparsely punctate beneath, 5–7-plinerved from and from up to 1.5 cm above base, 6–13 by 3–6 cm, midrib and nerves slightly sulcate above except base of midrib, prominent beneath, reticulation \pm inconspicuous or none; petiole 6–10 by c. 2 mm. *Flowers* 4–8 per fascicle, usually from defoliate axils or old wood. Pedicels (very) slender, glabrous, 1.6–3 cm. *Calyx* tube subcylindric, minutely muriculate or glabrous, rugulose, base truncate to rounded, c. 2.5 mm, limb subpatent, shortly 5-lobed, 1.5 mm, lobes apiculate. *Corolla* campanulate, orange-red (fresh), short-hairy, c. 1 cm, c. 8 mm ϕ at limb, lobes triangular, c. 3 mm. *Stamens* 5 and 4.2 mm; *major stamens*: filaments sparsely patently hairy in the apical part, 2.5 mm; cells narrow-oblong (each cell ending in a basal tooth), divergent, 3.5–4 mm including the ear-shaped, c. 2 mm long tubules; processes visible as a small, laxly to subdensely hairy, narrow ribbon on the back of each tubule, free in its uppermost part as a minute tooth, or \pm evanescent towards the apex of the tubules. *Disk* puberulous. *Style* filiform, glabrous, 1.2–1.4 cm.

Distr. *Malesia*: SE. New Guinea (Upper Fly R.). Twice found. *Fl.* Aug.

9. *Dimorphanthera albiflora* SCHLTR, Bot. Jahrb. 55 (1918) 186; SLEUM. *ibid.* 70 (1939) 116; Nova Guinea, Bot. n. 7 (1961) 82.

Scandent shrub. Branchlets quite glabrous. *Leaves* rather dense, narrow-elliptic, apex acu-

minate, base cuneate, coriaceous, glabrous, 3-plinerved, nerves prominent beneath, 8–14 by 2.8–3 cm; petiole robust, 10–15 mm. *Racemes* abbreviate, sessile, densely 10–15-flowered, up to 5 cm. Pedicels c. 1 cm. *Calyx* cup-shaped, c. 4 by 4 mm, glabrous, limb very shortly 5-dented. *Corolla* campanulate, 5-lobed to $\frac{1}{3}$, white, c. 1 cm, 7 mm across limb, sparsely puberulous towards the apex outside, lobes erect, triangular, bluntish. *Stamens* 6.5 and 5 mm; filaments glabrous; cells obovate; tubules divergent; processes glabrous, as long as the tubules and fixed behind them. *Disk* glabrous. *Style* slender, glabrous. (Copied from original diagnosis.)

Distr. *Malesia*: NE. New Guinea (Schradler Mts), in mountain forest at c. 2070 m. Once found; type \dagger . *Fl.* May.

10. *Dimorphanthera mindanaensis* MERR. Philip. J. Sc. 20 (1922) 418; En. Philip. 3 (1923) 252; COPEL. f. Philip. J. Sc. 47 (1932) 92; SLEUM. Bot. Jahrb. 70 (1939) 116; Nova Guinea, Bot. n. 7 (1961) 82.

Glabrous shrub. Branches and branchlets rather stout. *Leaves* ovate to elliptic, apex shortly acuminate, base acute to rounded, thick-coriaceous, rather shining, 5(–7)-plinerved from and from above the base, reticulation lax, 4–8 by 2.5–4.5 cm; petiole \pm stout, 4–8 mm. *Flowers* fascicled in uppermost axils. Young flower buds enclosed by numerous sparingly pubescent perulae, c. 1 cm ϕ . Pedicels up to 1 cm. *Calyx* c. 3.5 mm, shallowly 5-lobed, lobes broadly ovate, shortly and abruptly acuminate. *Corolla* somewhat widened upwards, glabrous, 0.8–1 cm, lobes ovate, 3 mm. *Stamens* glabrous, alternately 4 and 3 mm. *Style* 1.2 cm. (Copied from original diagnosis.)

Distr. *Malesia*: Philippines (Mindanao: Mt Malindang and Mt Lipa). Twice found; type \dagger .

Ecol. In mossy forest at c. 1700 m.

11. *Dimorphanthera amblyornidis* (BECC.) F. v. M. in Wing's South. Sc. Rec. n.s. 2 (1886) *in text*, repr. Bot. Centralbl. 26 (1886) 164; K. SCH. & LAUT. Nachtr. (1905) 339, *in text*; J. J. S. Ic. Bog. 4 (1913) 177, *in text*; Nova Guinea 12 (1914) 148; SLEUM. Bot. Jahrb. 70 (1939) 114; Nova Guinea, Bot. n. 7 (1961) 82; Blumea 12 (1963) 138. — *Agapetes amblyornidis* BECC. Malesia 1 (1878) 208. — *D. arfakensis* J. J. S. Nova Guinea 12 (1914) 149, 152, t. 41; SLEUM. Bot. Jahrb. 70 (1939) 118; KANEH. & HATUS. Bot. Mag. Tokyo 45 (1942) 476. — *D. moorhousiana* (non F. v. M. s. str.) SCHLTR, Bot. Jahrb. 55 (1918) 186. — *Agapetes moorhousiana* (non F. v. M. s. str.) LANE-POOLE, For. Res. Papua (1925) 130; WHITE & FRANCIS, Proc. R. Soc. Queensl. 38 (1927) 252; *ibid.* 39 (1928) 68. — **Fig. 121–122.**

var. amblyornidis.

Terrestrial shrub, mostly climbing up to 30 m into the crown of tall trees, sometimes epiphytic. Branchlets subangular and slightly pubescent or glabrous at the tips. *Leaves* lax, lanceolate or



Fig. 121. *Dimorphanthera amblyornidis* (BECC.) F. v. M. var. *amblyornidis*. Mt Nettoti, 1750 m, Kebar valley, NW. New Guinea (VAN ROYEN & SLEUMER 7412) (SLEUMER, 1961).

ovate-lanceolate to oblong-elliptic, apex gradually acuminate or attenuate, subacute, base \pm cuneate, basal glands not much conspicuous, coriaceous, glabrous, sparsely glandular-punctate or -muri-culate beneath, 5-7-plinerved from and \pm above the base, entire, 5-15 by 1.5-5.5 cm, nerves and midrib \pm impressed above, prominent beneath, reticulation subinconspicuous; petiole rugose, 6-10 by 1.5-2 mm. *Inflorescences* in (3-)5-8(-20)-flowered, much abbreviated racemes or clusters from foliate and/or defoliate axils, or from old wood. *Perulae* not seen. *Pedicels* \pm stoutish,

glabrous or laxly pubescent, 1.5-2(-3) cm, bracteoles \pm above the base. *Calyx* green or suffused with red, tube semiglobose to obconical, base mostly rounded, sometimes obtuse, glabrous or sparsely short-pubescent outside, c. 2.5 mm, limb \pm expanded, 2 mm, wavy and very shortly 5-dented or merely apiculate. *Corolla* \pm bell-shaped, pink to deep rose red or scarlet, subdensely short-pubescent, inside glabrous, thin-fleshy, 1.5-2(-2.5) cm, c. 4 mm ϕ at base, c. 1.5 cm across limb, lobes subdeltoid, bluntish, c. 4 by 5-7 mm. *Stamens* 7-8 and 5-6.5 mm; *major stamens*: filaments \pm densely set with shorter or more coarse hairs upwards, 3-4 mm; cells narrow-oblong, shortly bifurcate at base, i.e. each cell ending in a sharp point, or cells confluent into one acumen, (4-)5-6(-6.5) mm including the broadly ear-shaped, much divergent tubules \pm as long as the cells; processes extending as a narrow, short ribbon on the back of the lower part of each cell, adnate or sometimes ending in a minute free tooth, often merely indicated by some hairs and evanescent upwards, or hardly visible at all. *Disk* sparsely very short-hairy, or puberulent, or \pm glabrous. *Style* slender, glabrous, \pm exerted at full anthesis. *Fruit* subglobose, c. 7 mm ϕ , turning purplish at maturity.

Distr. Malesia: NW. and SE. New Guinea (various places in Vogelkop Peninsula, and again in Morobe Distr. to Milne Bay Distr., not yet known from Central New Guinea).

Ecol. In mountain forest or forest edge, 400-1900 m, rather common locally. *Fl.* Jan.-Dec. *Vern. Mengaam*, Hattam.

var. moorhousiana (F. v. M.) SLEUM. Nova Guinea, Bot. n. 7 (1961) 83; *Blumea* 12 (1963) 138. — *D. moorhousiana* F. v. M. in Wing's South. Sc. Res. n.s. 2 (1886) in text, repr. Bot. Centralbl. 26 (1886) 163; J. J. S. Nova Guinea 12 (1914) 148; SP. MOORE, J. Bot. 61 (1923) Suppl. 28; COPEL. f. Philip. J. Sc. 47 (1932) 88; SLEUM. Bot. Jahrb. 70 (1939) 117. — *Agapetes moorhousiana* F. v. M. in Wing's South Sc. Rec. n.s. 2 (1886) in text, repr. Bot. Centralbl. 26 (1886) 163; Descr. Not. 8 (1886) 46. — Fig. 122.

Different mainly by a quite glabrous *corolla*. *Disk* mostly glabrous, as are the pedicels and the calyx.

Distr. Malesia: SW. New Guinea, a common species in E. New Guinea, once in W. New Guinea (Fak Fak), 600-1280 m.

Vern. Biliki, Pernambata: Hydrographers Ra.

12. *Dimorphanthera dekokkii* J. J. S. Bull. Jard. Bot. Btzg II, 8 (1912) 55; Nova Guinea 12 (1914) 147, t. 38 B, 148; SLEUM. Bot. Jahrb. 70 (1939) 116; Nova Guinea, Bot. n. 7 (1961) 83; *Blumea* 12 (1963) 138; *ibid.* 12 (1964) 344.

See for further synonyms under the varieties.

KEY TO THE VARIETIES

1. Corolla glabrous outside.
2. Corolla pinkish to violet, sometimes almost blackish red 1. *var. dekokkii*

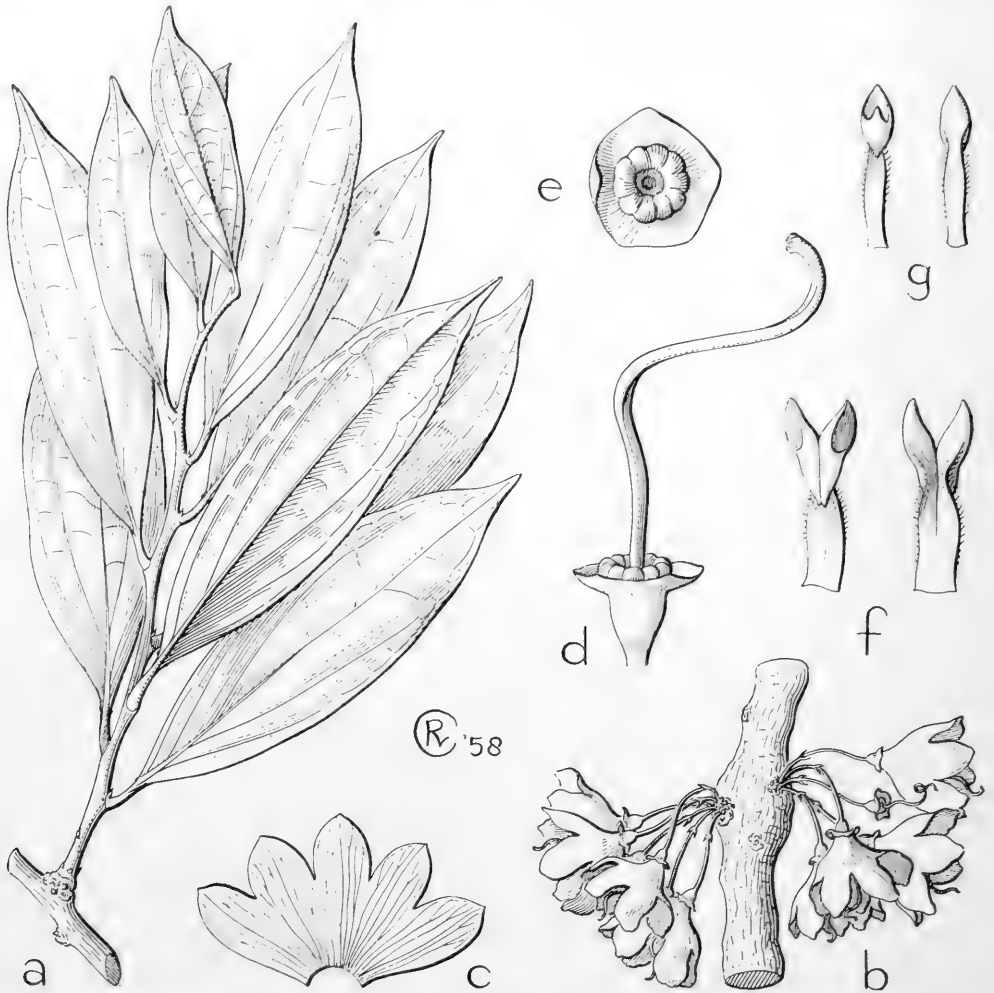


Fig. 122. *Dimorphanthera amblyornidis* (BECC.) F. v. M. var. *moorhousiana* (F. v. M.) SLEUM. a. Habit $\times \frac{2}{3}$, b. inflorescence, $\times \frac{2}{3}$, c. corolla, expanded, $\times 1\frac{1}{3}$, d. ovary, disk and style, $\times 3\frac{1}{3}$, e. disk, $\times 3\frac{1}{3}$, f. major stamens, front and back view, $\times 3\frac{1}{3}$, g. minor stamens, front and back view, $\times 3\frac{1}{3}$ (a-g FORBES 784).

2. Corolla white, or cream, or pale green

2. var. **chlorocarpa**

1. Corolla subdensely pubescent outside, dark red. 3. var. **pubiflora**

1. var. **dekockii**.

Epiphytic or terrestrial, scrambling shrub, up to 3 m. Branchlets obtusangular, glabrous. Leaves ovate-oblong, or oblong-lanceolate, apex subcaudate-acuminate (2–3 cm), subacute, base \pm cuneate, basal glands \pm obscure, coriaceous, glabrous, sparsely punctate or muriculate beneath, finely and remotely denticulate by \pm impressed glandular, early caducous hairs, or subentire, 6.5–14(–17) by 2.5–6(–7) cm, midrib and nerves

impressed above, raised beneath, reticulation obscure; petiole (8–)10–13 by 2–3 mm. Perulae ∞ , ovate to orbicular, pubescent or subglabrous, up to 1–2 by 1 cm. Inflorescences 8–10(–15, –20)-flowered clusters or very abbreviate racemes; rachis stout, obconical, to 1 cm. Pedicels stoutish, 0.8–1.2(–1.5) cm; bracteoles (4–5 by 1.5 mm) at or \pm above base. Calyx green or suffused with red, narrowly cup-shaped, tube subcylindric, \pm 5-angled, base obtuse or truncate, 3–4 mm, 4–5 mm ϕ , limb suberect, 2–2.5 mm, lobes subovate-acuminate, \pm apiculate, (1–)1.5–2 mm. Corolla shortly suburceolate-campanulate (or widely urceolate), rather fleshy, pinkish to violet-, sometimes almost blackish red, (0.8–)1–1.3 cm long,

c. 5 mm σ at base, c. 1 cm halfway, c. 0.8 cm σ at base of lobes; lobes suberect or \pm reflexed, deltoid, 2-3 by c. 3 mm. *Stamens* (6-7) and (5-6 mm); *major stamens*: filaments sparsely ciliate to subdensely hairy distally, 2.5-3.5 mm; cells oblong, base \pm contracted into a beak, sometimes bearing a tuft of short hairs, c. 5 mm including the rather narrow, divergent, 2-2.5 mm long tubules; processes a dark glabrous ribbon mostly shorter than, rarely as long as the tubule and free at the tip. *Disk* glabrous. *Style* \pm stoutish, glabrous, c. 1.2 cm, generally exerted at full anthesis. *Fruit* subglobose, apex truncate and crowned by the calyx lobes, blackish red, c. 7 mm σ (dry).

Distr. Malesia: New Guinea (Cycloop Mts; in Main Range from the Oranje and Star Mts; Mt Antares, Mt Sirius, to the Western Highlands, once found at Bernhard Camp on Idenburg R.).

Ecol. In openings of (mossy) forest or in subalpine shrubberies, or in undergrowth of *Quercus* forest, locally common, 1250-3600 m. *Fl.* Jan.-Dec.

Vern. *Rambau*, Enga.

2. var. *chlorocarpa* (SLEUM.) SLEUM. Nova Guinea, Bot. n. 7 (1961) 83; Blumea 12 (1963) 138; *ibid.* 12 (1964) 344. — *D. chlorocarpa* SLEUM. Bot. Jahrb. 70 (1939) 116.

Differs by a white, or cream, or pale green corolla. *Fruit* green (perhaps not fully ripe?). *Leaves* in specimens from altitudes above 3000 m smaller, shortly acuminate or even obtuse.

Distr. Malesia: New Guinea (Central, Southern and Western Highlands: Telefomin, Yaki R. valley, Mt Sugarloaf, Mt Giluwe, Mt Hagen; Mt Saruwaged area, and Mt Shungol in Morobe Distr.).

Ecol. Climber in open secondary or mixed riverine forest, or terrestrial in alpine shrubbery, (850-1900-3650 m).

Vern. *Por, poro*, Enga, *walya, wela*, Mendi.

3. var. *pubiflora* SLEUM. Nova Guinea, Bot. n. 7 (1961) 83.

Corolla subdensely pubescent outside, dark red. *Leaves* \pm ovate, 4-7 by 2-4 cm.

Distr. Malesia: Central New Guinea, in fire induced grassland and subalpine shrub vegetation of Mt Antares (Star Mts) and the Doma Peaks, 3000-3520 m. *Fl.* July.

13. *Dimorphanthera apoana* (MERR.) SCHLTR, Bot. Jahrb. 55 (1918) 185, *in text*; MERR. En. Philip. 3 (1923) 252; COPEL. f. Philip. J. Sc. 47 (1932) 89, t. 7, f. 6-7, t. 8, f. 1-4; SLEUM. Bot. Jahrb. 70 (1939) 115; Nova Guinea, Bot. n. 7 (1961) 83. — *Vaccinium apoanum* MERR. Publ. Gov. Lab. Philip. n. 29 (1905) 39; Philip. J. Sc. 3 (1908) Bot. 372; ELM. Leaf. Philip. Bot. 3 (1911) 1091. — *Vaccinium calelanum* ELM. l.c. 1096.

Epiphytic, often dense shrub with numerous stems from the same root cluster, 2-3 m, or climbing up to 6 m. Branchlets reddish brown, subangular and mostly glabrous at the tips,

rarely pubescent. *Leaves* subdense, elliptic, rarely subovate -or lanceolate-oblong, apex shortly and \pm bluntly attenuate or subacuminate, base broadly attenuate to almost rounded, basal glands \pm obscure, coriaceous, glabrous above, laxly caducously glandular-muriculate or punctate beneath, entire, 5(-7)-plinerved from and somewhat from above the base, the outer pair of nerves \pm obsolete, the others faintly impressed above, prominent beneath, reticulation subinconspicuous, (6-7)-11(-14) by (2-)-2.5-4(-6) cm; petiole stout, pubescent initially or glabrous, 0.5-0.8(-1) cm. *Inflorescences* (3-)-5-7-flowered, sessile clusters. Perulae broad-oblong to suborbicular, densely subferruginous-hairy all over or at least at apex, up to 1 by 0.6 cm. Pedicels robust, glabrous, (6-)-8-10 mm, in *fr.* 10-15 by 1 mm. Bracteoles below or halfway ovate, sharply acuminate, fibrillate, 2 mm. *Calyx* tube cylindrical, subangular, glabrous, dark green, 3-5 by 3(-4) mm, base truncate, limb erect, 1 mm, broadly and shortly 5-dented. *Corolla* campanulate, 9-10(-13) mm, densely and \pm coarsely subferruginous-hairy in bud, laxly and yellowish so at full anthesis, deep to pale red, lobes subacuminate, 2-3 mm, finally revolute. *Stamens* 4-5 and 3-4 mm; *major stamens*: filaments linear, glabrous or with a few hairs distally on back and margin, 1.5-2 mm; cells oblong, base ending in an obtuse beak, c. 2 mm; tubules flaring, 1 mm, divergent; processes a sparsely hairy ribbon on the back of the cells, adnate or free at the tip, \pm as long as the tubules. *Disk* glabrous. *Style* slender, glabrous, reddish, c. 1.5 cm. *Fruit* subglobular, truncate, blackish and fleshy, 8-9 mm σ . *Seeds* c. 1 mm, brown.

Distr. Malesia: Philippines (Mindanao; Negros; Panay).

Ecol. In mossy forest, often on exposed ridges or in summit vegetation, 1200-2350 m. *Fl.* Jan.-Dec.

Vern. *Kalumping, tagima*, Bagob.

14. *Dimorphanthera steinii* SLEUM. Bot. Jahrb. 70 (1939) 117; Nova Guinea, Bot. n. 7 (1961) 84; Blumea 12 (1963) 139.

Shrub, occasionally apparently large and scrambling. Branchlets subterete, glabrous or finely pubescent at the tips. *Leaves* lax, narrowly oblong, sometimes subovate-oblong, gradually acuminate, attenuate at base, subcoriaceous to coriaceous, \pm stiff, glabrous, laxly brownish punctate beneath, entire or faintly glandular-denticulate, (8-)-10-12(-15) by (2.5-)-3-4 cm, 5-plinerved from and a little from above the base, midrib and nerves faintly to distinctly impressed above, prominent beneath, veins laxly reticulate or hardly visible underneath; petiole robust, 0.8-1.2 cm. *Racemes* from foliate or defoliate axils, few-flowered, shortly grey-pubescent; rachis rather stoutish, 1-1.5 cm. Pedicels \pm robust, red, 1.5-2.2 cm. Bracteoles at or above the base. *Calyx* purplish red, tube semiglobose, (3-)-4 by 4 mm, limb much spreading, 2-3 mm, shortly obtusely 5-lobed or -dented. *Corolla* broadly campanulate, red or pink, \pm fleshy, 1.7-2 cm long, 2-2.5 cm across limb, lobes obtuse, 5-6 mm. *Stamens*

6(-7) and 5 mm; *major stamens*: filaments patently hairy in the middle, *c.* 3 mm; cells oblong, base apiculate, 2.5 mm; tubules widened and much divergent, *c.* 2 mm; processes a dark, dorsal, entirely adnate ribbon in the lower part of the tubules, sparsely hairy, evanescent upwards. *Disk* grey-pubescent. *Style* stoutish, glabrous, at full anthesis \pm exerted from the corolla.

Distr. *Malesia*: West New Guinea (Weyland Mts, Swart R. and Balim R. valleys).

Ecol. In (secondary) forest, 1600-2100 m. *Fl.* June.

Vern. *Soodnieken*, Dani.

Note. Apparently much related to *D. amblyornidis* var. *amblyornidis*.

15. *Dimorphanthera pulchra* J. J. S. Ic. Bog. 4 (1913) 175, t. t. 353; in Fedde, Rep. 30 (1932) 174; SLEUM. Bot. Jahrb. 70 (1939) 115; Nova Guinea, Bot. n. 7 (1961) 84. — *D. moluccana* J. J. S. in Fedde, Rep. 30 (1932) 174; SLEUM. Bot. Jahrb. 70 (1939) 115.

Shrub or small tree (reported up to 15 m), apparently scandent occasionally. Branchlets angular or subterete, glabrous or pubescent at the tips, glabrescent. *Leaves* lax, ovate-oblong or -elliptic, apex shortly obtusely acuminate, base \pm rounded or broadly attenuate, coriaceous, initially sparsely puberulous at the base above and all over beneath, glabrescent, or glabrous from the beginning, laxly glandular-punctulate beneath, entire, 7-15 by 3.5-5.5(-6.5) cm, 5-7-plinerved, midrib

and nerves \pm impressed above, prominent beneath, reticulation obscure; petiole rugulose, 0.8-1.4 cm by 1.5-2 mm. *Inflorescences* (3-)6-10-flowered, fascicles or very short racemes from foliate or defoliate axils; rachis puberulous initially, up to 0.5 cm. Pedicels stoutish, laxly pubescent or glabrous, 2-2.5(-2.7) cm. Bracteoles at the base. *Calyx* tube obconical, base subtruncate to almost rounded, mostly glabrous, sometimes laxly pubescent, *c.* 3 mm high, 5-7 mm σ below the limb, the latter spreading, 2-3 mm, shortly obtusely or subacutely 5-lobed. *Corolla* campanulate, (dark) red, subdensely grey-pubescent at full anthesis (sometimes glabrescent in later stages?), rather fleshy, 2-2.5(-2.7) cm long, 5-6 mm σ at base, 2-2.5 cm across limb, lobes broad, *c.* 5 mm. *Stamens* 10-12 and 9-10 mm; *major stamens*: filaments \pm patently subhirsute upwards, *c.* 4.5 mm; cells oblong, base contracted into a kind of beak, *c.* 8 mm including the moderately divergent, *c.* 3 mm long tubules; processes ribbon-like on back of each tubule and equalling it, adnate except the tip, hirsutulous below, sparingly hairy upwards. *Disk* subglabrous to subdensely short-hairy. *Style* slender, glabrous, 3-3.5 cm.

Distr. *Malesia*: Moluccas (Buru, Ceram, Ambon).

Ecol. In primary forest, also on limestone, 600-1200 m. *Fl.* July, Oct.

Note. Much allied to *D. amblyornidis* var. *amblyornidis*, but with probably constantly larger flowers.

3. Section *Trochilanthe*

SCHLTR, Bot. Jahrb. 55 (1918) 185; SLEUM. Nova Guinea, Bot. n. 7 (1961) 84. — *Dimorphanthera* subsect. *Trochilanthe* (SCHLTR) SLEUM. Bot. Jahrb. 70 (1939) 110.

Calyx tube \pm terete or smooth, not winged or ribbed. *Corolla* tubular, but slightly or not dilated distally, shortly lobed, lobes up to $\frac{1}{5}$ as long as the total corolla.

16. *Dimorphanthera velutina* SCHLTR, Bot. Jahrb. 55 (1918) 193, f. 14, A-D; SLEUM. *ibid.* 70 (1939) 118; Nova Guinea, Bot. n. 7 (1961) 84.

High climbing or sometimes epiphytic shrub, *c.* 3 m. Branchlets velutinous. *Leaves* lax, lanceolate-elliptic, apex shortly acutely acuminate, base cuneate, basal glands covered by hairs or indistinct, coriaceous, initially laxly hairy on both faces, glabrescent above, 5(-7)-plinerved from and a little from above the base, entire, 10-18 by 2-3.5 cm, midrib and nerves slightly prominent above, strongly so beneath, reticulation lax, somewhat raised especially beneath; petiole 5-7 by *c.* 2 mm. *Racemes* axillary, densely yellowish or brownish velutinous, 6-12-flowered; rachis robust, 5-6 cm. Pedicels *c.* 1.5 by 0.2 cm. Bracteoles halfway. *Calyx* tube \pm semi-globose, *c.* 3 mm, limb much spreading, 2-3 mm, shallowly 5-denticulate. *Corolla* cylindrical, *c.* 3 by 0.6-0.9 cm, white, lobes erect, deltoid, *c.* 4 mm. *Stamens* 14-16 and 11-13 mm; *major stamens*: filaments *c.* 5 mm, upwards densely appressed-hirsutulous; cells elongate-oblong, with a short anchor-like \pm bearded dorsal

appendage at base, very base pointed and slightly curved inward, *c.* 9 mm long including the narrow, \pm divergent, *c.* 3 mm long tubules; processes hirsutulous, inserted \pm behind the tubules, free and \pm divergent in the upper part, exceeding the tubules by 3-4 mm. *Disk* densely hairy. *Style* slenderly columnar, with sparse, long, appressed hairs, \pm exceeding the corolla.

Distr. *Malesia*: N. Central New Guinea (Sepik Distr.: April R.). Two collections.

Ecol. In dense mountain forest, 850-1000 m. *Fl.* Sept.-Dec.

17. *Dimorphanthera amoena* SLEUM. Nova Guinea, Bot. n. 7 (1961) 84; Blumea 12 (1963) 139; *ibid.* 12 (1964) 344.

High climbing liana or epiphytic bush up to 4 m, with long, pendent branches. Branchlets slender, pale rusty tomentose. *Leaves* \pm lax, narrow-oblong to ovate, apex shortly obtusely acuminate, base broadly attenuate, truncate or cordate, with a pair of thick glands, subcoriaceous, hairy at midrib and nerves, above densely soft-hairy to

tomentulose along midrib and nerves, laxly so on the intervenium beneath, with sparse, very short, appressed glandular hairs all over beneath, (3.5-) 7-16 by (1-)2-5 cm, entire, 5-plinerved, midrib much impressed above, prominent beneath, nerves \pm impressed above, raised beneath, reticulation lax, \pm prominent beneath only; petiole tomentose, 3-5 by 1.5 mm. *Racemes* from the upper, partly defoliate axils, laxly 6-8(-10)-flowered, tomentulose; rachis angular, (2-)3.5-6 cm by 2-3 mm. Pedicels (1-)1.2-2 cm by c. 1.5 mm. Bracteoles (c. 5 by 2-3 mm) in the lower third to almost at base. *Calyx* tube cylindrical, c. 3 mm, base truncate or a little apophysate, limb \pm spreading, 3-4 mm, lobes broadly ovate, apiculate, 2-2.5 mm. *Corolla* tubular, glabrescent towards base, fleshy, base pale yellowish or greenish, turning pink towards the (sometimes lighter) lobes, (3-)3.5-4 by 0.8-1 cm (c. 4.5 by 1.3 cm fresh), lobes erect, deltoid, c. 5 mm. *Stamens* 13-14(-16) and 10-11(-12) mm; *major stamens*: filaments hirsute in upper half, c. 4 mm; cells narrow-oblong, base shortly acuminate and inflexed, (0.9-)1-1.3 cm including the narrow, divergent, c. 3 mm long tubules; connective a narrow hirsute ribbon in front connecting the cells, much broader on the back of the cells, processes slightly divergent, c. 2 mm longer than the tubules. *Disk* hirsutulous. *Style* slender, glabrous, as long as the corolla. *Fruit* dark purple, lower half semiglobose, upper one more cylindrical, with a shallow contraction between, 1-1.3 cm ϕ .

Distr. *Malesia*: East New Guinea (Eastern Highlands: Goroka Subdistr.; Morobe Distr.: Edie Creek area).

Ecol. In forest, 1980-2500 m, common locally. Fruits eaten by birds. *Fl. fr.* May-Sept.

18. *Dimorphanthera latifolia* SCHLTR. Bot. Jahrb. 55 (1918) 192; SLEUM. *ibid.* 70 (1939) 118; Nova Guinea, Bot. n. 7 (1961) 85.

Epiphytic, much ramified shrub. Branchlets glabrous. *Leaves* ovate, apex obtusely acuminate, base rounded, coriaceous, glabrous, entire, large up to 25 by 14 cm, 7-plinerved, nerves prominent beneath; petiole robust, 7-10 mm. *Racemes* subdensely 5-8-flowered; rachis c. 2 cm. Pedicels glabrous, 7-9 mm. *Calyx* cup-shaped, glabrous, 4 mm in all, limb very low, obtusely 5-lobed. *Corolla* cylindrical, minutely papillose-puberulous outside, dark rose red, c. 2.3 by 0.5 cm, lobes erect, subovate, acute, c. 3 mm. *Stamens* 15 and 9 mm; *major stamens*: filaments broadly linear, shortly substrigose hairy dorsally; cells narrow-oblong; tubules somewhat divergent; connective processes conical-subulate, substrigose-villous, distinctly exceeding the tubules. *Disk* glabrous. *Style* filiform, glabrous, as long as the corolla. *Ex descr. typ.*

Distr. *Malesia*: New Guinea (West Ra., Sepik Distr.). One collection; type \uparrow .

Ecol. In mountain forest, 1400-1500 m. *Fl.* Aug.

19. *Dimorphanthera hirsutiflora* SLEUM. Nova Guinea, Bot. n. 7 (1961) 85.

Scandent shrub. Branchlets subterete, obtus-angular at the tips, glabrous, red brown when dry. *Leaves* lax, subovate-lanceolate or lanceolate-oblong, shortly (1.5-2 cm) subcaudate-acuminate, acutish, base subtruncate-rounded and with 2 distinct glands, stiff-coriaceous, glabrous above at full age, subappressedly yellowish tomentulose in the lower part of midrib and nerves beneath, intervenium laxly glandular-muriculate or punctate beneath, entire, (8-)9-20 by (2-)2.5-6 cm, 5-plinerved from and from above the base, with several other, less distinct nerves higher up, midrib above thick-prominent to the base, gradually decreasing upwards, raised for its entire length beneath, nerves \pm immersed above, \pm prominent beneath, reticulation lax, raised beneath only; petiole glabrous above, tomentulose beneath, (3-)5-7 by 2-3 mm. *Racemes* axillary, 5-7-flowered, laxly pubescent or glabrous; rachis 2-4 cm by 3-4 mm. Pedicels 0.8-1.2 cm by 2-3 mm. Bracteoles in lower third. *Calyx* green, tube broad-cylindrical, c. 4 by 5 mm, base truncate, limb erect, 3 mm, lobes deltoid, subacute, c. 1.5 mm. *Corolla* cylindrical, 3.5-4(-4.5) by 0.5-0.6 cm, red, tipped white, fleshy, hirsute-tomentulose, lobes erect, c. 4 mm. *Stamens* 16-17 and 11-12 mm; *major stamens*: filaments broadly linear, c. 5 mm, appressed-hirsutulous upwards; cells narrow-oblong, base obtuse, 1.5-1.6 cm including the narrow, \pm divergent, c. 3 mm long tubules; processes \pm connate, appressed-hirsutulous, exceeding the tubules by c. 1 mm. *Disk* glabrous. *Style* slender, glabrous, exerted for c. 3 mm.

Distr. *Malesia*: New Guinea (Wahgi Divide area, Western Highlands). One collection.

Ecol. Scandent over shrubs and rocks, 2900 m. *Fl.* Sept.

20. *Dimorphanthera brassii* SLEUM. Bot. Jahrb. 70 (1939) 122; Nova Guinea, Bot. n. 7 (1961) 86; Blueina 12 (1963) 139. — **Fig. 123.**

Large, stiff-branched climber, up to 6 m. Branchlets subterete, glabrous. *Leaves* lax, oblong to elliptic-oblong, rarely subovate, apex shortly obtusely acuminate, base broadly attenuate to almost rounded, the 2 basal glands \pm indistinct, coriaceous, glabrous, laxly blackish punctate beneath, entire, 14-23 by (4-)5-6(-9) cm, 7-plinerved from and from above the base, midrib and nerves \pm immersed above, much prominent beneath, reticulation rather dense, finely raised on both faces; petiole 1-1.5 cm by c. 2 mm. *Racemes* from defoliate axils or from old wood, 5-10-flowered; rachis (1-)2-2.5 cm, robust, laxly hairy or subglabrous. Pedicels laxly hairy or subglabrous, (10-)12-15 by 1.5 mm. Bracteoles 2, large (3 by 2 mm), basal \pm pubescent. *Calyx* cup-shaped, green, laxly short-pubescent, tube 4-5 mm, base rounded in outline, but shortly truncate at the very base, limb expanded, 2-2.5 mm, shortly obtusely 5-lobed nearly to the base. *Corolla* tubular, obscurely angled, fleshy, bright or coral red, rather densely shortly fulvous- or greyish hairy outside, 3-3.5(-5) by 0.6-1 cm in dry, 4-4.5 by 1.3 cm in fresh specimens, lobes c.

4 mm. *Stamens* 10, (16-)17(-20) and (8-)9-10 (-14) mm; *major stamens*: filaments 5-6 mm, short-pubescent distally; cells narrow, base apiculate, without appendage, (1.1-)1.2-1.3 cm including the \pm divergent, 2.5 mm long tubules; processes distinct, subdensely to laxly and longish fulvous-hairy, connate, \pm as long as the tubules. *Disk* \pm densely hairy or tomentulose. *Style* slender, glabrous, \pm as long as the corolla.

Distr. Malesia: New Guinea (Central and Morobe Distr., not rare in the Edie Creek area). *Ecol.* In mountain forest, locally plentiful, (610-)1600-2050 m. *Fl.* Febr.-Oct.

Vern. *Loloulolou*, Kuepa: Movoi, Upper Akaifu valley.



Fig. 123. *Dimorphanthera brassii* SLEUM. Edie Creek near Wau, 1700 m, E. New Guinea (NGF 13487 WOMERSLEY & SLEUMER) (SLEUMER, 1961).

21. *Dimorphanthera wollastonii* WERNH. *Trans. Linn. Soc. II, Bot.* 9 (1916) 90; *SLEUM. Bot. Jahrb.* 70 (1939) 122; *Nova Guinea, Bot. n. 7* (1961) 86.

Shrub. *Leaves* oblong-elliptic, apex very shortly (1-1.5 cm) subacutely and \pm abruptly acuminate, base broadly attenuate, coriaceous, glabrous but laxly minutely glandular-pointed beneath, 16-21 by 6-8.3 cm, entire, 9(-11)-plinerved from and from up to 4 cm above the base, midrib and nerves strongly impressed above, prominent beneath, reticulation rather dense, minutely raised on both faces; petiole glabrous, 1.2-1.5 by 0.3 cm, \pm flattened. Abbreviate *racemes* or fascicles 6-8-flowered, from defoliate axils or old wood; rachis stoutish, c. 2 cm; \pm glabrous. Pedicels c. 10 by 1.8 mm, laxly puberulous. Bracteoles oblong-ovate, 4-5(-7) by 2-3 mm, glabrous. *Calyx* laxly and very shortly pubescent, tube cup-shaped, base rounded, c. 4(-5) by 4 mm, limb slightly spreading, 2 mm, deeply 5-lobed, lobes depressed-ovate, apiculate. *Corolla* tubular, fleshy, laxly very shortly pubescent outside, (3-)3.5 by c. 0.5 cm, lobes deltoid, obtuse, c. 4 mm. *Stamens* 13 and 11 mm; *major stamens*: filaments c. 5 mm, hairy distally; cells elongate, 8 mm including the tubules, hooked inward below; tubules \pm divergent, 2.5 mm; processes hirsute, connate, as long as the tubules. *Disk* glabrous. *Style* rather slender, glabrous, c. 3 cm.

Distr. Malesia: SW. New Guinea (ascent from Utaqua R. to Mt Carstenz), at c. 945 m. One collection, incompletely known.

22. *Dimorphanthera racemosa* SCHLTR. *Bot. Jahrb.* 55 (1918) 191; *SLEUM. ibid.* 70 (1939) 119; *Nova Guinea, Bot. n. 7* (1961) 86.

Epiphytic shrub. Branchlets subterete, glabrous. *Leaves* elliptic, apex obtusely acuminate, base almost rounded, glands inconspicuous, coriaceous, glabrous, very laxly glandular-punctate beneath, entire, 5-7-plinerved from and from above the base, nerves prominent beneath, reticulation very lax and but slightly raised on both faces, 12-18 by 5-7 cm; petiole 7-10 by 2.5 mm. *Racemes* axillary, laxly many-flowered, glabrous; rachis 3.5-4 cm. Pedicels slender, 10-13 mm. *Calyx* cup-shaped, 4 mm long in all, limb low, indistinctly 5-lobed. *Corolla* cylindrical, rose red, c. 2.4 cm. *Stamens* 11 and 8 mm; *major stamens*: filaments papillose-puberulous dorsally; tubules acute, divergent; processes much divergent, minutely papillose-puberulous, markedly longer than the tubules. *Disk* glabrous. *Style* filiform, glabrous, \pm as long as the corolla. Floral characters copied from type description.

Distr. Malesia: New Guinea (April R. in Sepik Distr.), in dense primary forest, at 200-400 m. Only one collection. *Fl.* Nov.

23. *Dimorphanthera eymae* SLEUM. *Nova Guinea, Bot. n. 7* (1961) 86.

Shrub. Branchlets subterete, glabrous. *Leaves* lax, subovate- or lanceolate-oblong, apex shortly gradually acuminate, bluntish, base broadly at-

tenuate, or more rarely obtuse to almost rounded, basal glands not much conspicuous, subcoriaceous, glabrous, laxly blackish punctate beneath, entire, 7(-9)-plinerved from and from high above the base, 15-20 by 4.5-7(-8) cm, midrib and nerves slightly impressed above, prominent beneath, reticulation rather dense, distinct beneath only; petiole 8-20 by 2-3 mm. *Racemes* axillary, 5-7-flowered, glabrous; rachis 2-2.5 cm. Pedicels 10-13 cm by $\frac{3}{4}$ -1 mm. Bracteoles basal. *Calyx* tube subsemiglobose, base \pm rounded, 3 by 3 mm, limb \pm spreading, 2 mm, 5-lobed nearly to the base, lobes broadly ovate-acuminate, apiculate. *Corolla* tubular, fleshy, 2-2.3 cm by c. 5 mm, lobes obtuse, c. 4 mm. *Stamens* 12 and 10 mm; *major stamens*: filaments ciliate in the upper $\frac{1}{4}$, c. 4 mm; cells elongate-oblong, base obtuse, 1 cm including the 2 mm long tubules; connective subdensely or more laxly hirsutulous, processes connate and \pm as long as the tubules. *Disk* glabrous. *Style* glabrous, c. 2.4 cm, hardly exerted.

Distr. *Malesia*: SW. New Guinea (Wissel Lakes region). Twice found. *Fl.* Oct.-Nov.

24. *Dimorphanthera cornuta* J. J. S. Bull. Jard. Bot. Btzg II, 8 (1912) 54; Nova Guinea 12 (1914) 148, 150, t. 39 B; SLEUM. Bot. Jahrb. 70 (1939) 122; Nova Guinea, Bot. n. 7 (1961) 87; Blumea 12 (1963) 139.

var. cornuta.

Small or large scrambling shrub, or small tree. Branchlets slender, terete, subdensely hairy. *Leaves* lax, ovate or oblong-ovate (to \pm oblong), apex shortly and rather abruptly acuminate, the very tip subacute or bluntish, base mostly \pm subtruncate-rounded, rarely broadly attenuate, glands minute, thin-coriaceous, when juvenile with some spreading hairs at the lower part of the midrib and nerves beneath, later glabrous, very laxly punctate beneath, minutely subserrate-crenulate, (3.2-)-4-7 by (1-)-2-3 cm, 5 (or indistinctly 7)-plinerved from and from above the base, midrib and nerves \pm sunken above, prominent beneath, reticulation \pm obscure; petiole short-pubescent, (3-)-4-7 by 1-1.5 mm. Perulate ovate-orbicular to oblong, obtuse, glabrous, ciliate, up to 1.6 by 1 cm. *Inflorescences* in axillary 3-5-flowered clusters. Pedicels rather stoutish, glabrous or with some sparse hairs distally, 5-6 mm. *Calyx* tube cylindrical-obconical, base \pm truncate, c. 3 mm, limb 1-1.5 mm, erect, minutely 5-dented. *Corolla* almost tubular, base \pm contracted, thin, red or crimson, subdensely short-pubescent outside, (1.8-)-2(-2.3) cm long, c. 4 mm ϕ below, 5-6 mm across the mouth, lobes 2.5 mm. *Stamens* 7 and 6 mm; *major stamens*: filaments glabrous, 1.5-2.5 mm; cells elongate-oblong, base subacute, slightly curved inward and whether or not provided with some short hairs there, 5-6 mm including the \pm divergent, 1.5-1.8 mm long tubules; connective very laxly long-hairy below, processes slender, dark, much divergent and fixed \pm behind the tubules, free only in the upper part, \pm as

long as the tubules, glabrous or muriculate. *Disk* glabrous. *Style* rather slender, glabrous, 2-2.2 cm, \pm exerted in full anthesis.

Distr. *Malesia*: New Guinea (Mt Goliath, Lake Habbema and Bele R. areas, Hindenburg Ra., Western and Southern Highlands).

Ecol. In grassy, secondary growth forest along river, on moss covered rocks or margin of secondary scrub, usually solitary, common locally, 2200-3250 m. *Fl.* March-Nov.

Vern. *Poro*, Enga.

var. tenuiflora SLEUM. Nova Guinea, Bot. n. 7 (1961) 87; Blumea 12 (1963) 139; *ibid.* 12 (1964) 344.

Branchlets glabrous. *Leaves* lanceolate or ovate-lanceolate. *Corolla* glabrous, deep red or crimson.

Distr. *Malesia*: East New Guinea (Western and Southern Highlands), (1585-)-2300-3350 m.

Ecol. In undergrowth of open *Nothofagus* forest or forest edge. *Fl.* July-Oct.

Vern. *Kurink*, Enga, *weta*, Mendi.

25. *Dimorphanthera torricellensis* SCHLTR., Bot. Jahrb. 55 (1918) 190; SLEUM. *ibid.* 70 (1939) 119; Nova Guinea, Bot. n. 7 (1961) 87.

Epiphytic shrub. Branchlets subterete, glabrous. *Leaves* scattered, ovate-lanceolate, apex obtusely acuminate, base rounded, glands minute, thin-coriaceous, glabrous, very laxly glandular-punctate beneath, edge minutely dented or subentire, (10-)-12-15 by (4-)-5-6.5 cm, 5-plinerved from and from above the base, midrib and nerves slightly immersed above, prominent beneath, reticulation rather lax, faintly raised beneath; petiole 5-8 by 1.5 mm. *Inflorescences* short, 5-8-flowered racemes; rachis c. 1.5 cm. Pedicels 7-10 by c. 1 mm, glabrous or slightly pubescent. *Calyx* glabrous or laxly short-pubescent, tube narrowly cup-shaped, 3 mm, base subtruncate, limb erect-patent, 2 mm, shallowly and obtusely 5-lobed halfway. *Corolla* cylindrical, fleshy, greenish whitish, glabrous, 2.5 cm by 8 mm in dry, c. 3.7 cm by 8-9 mm in fresh specimens, lobes triangular, c. 5 mm. *Stamens* 9 and 7 mm (14 and 9 mm in fresh state); *major stamens*: filaments shortly hairy and ciliate in the upper part, c. 4 mm; cells oblong, base obtuse, 7(-8) mm including the \pm divergent, 2.5 mm long tubules; processes fixed behind the tubules as a dark glabrous ribbon, free in their uppermost part and slightly surpassing the tubules. *Disk* glabrous. *Style* slender, glabrous, distinctly exerted at anthesis.

Distr. *Malesia*: East New Guinea (Torricelli Mts). One collection.

Ecol. In forest at c. 1000 m. *Fl.* Sept.

26. *Dimorphanthera brachyantha* SLEUM. Nova Guinea, Bot. n. 7 (1961) 87; Blumea 12 (1963) 139.

Climbing shrub. Branchlets robust or more slender, obtusangular at the tips, quite glabrous. *Leaves* lax, lanceolate or lanceolate-oblong, apex shortly subacutely acuminate, base broadly cuneate (very base subtruncate, glands \pm obscure), coriaceous or subcoriaceous, glabrous, laxly

glandular-muriculate or -punctate beneath, subentire, *i.e.* edge with \pm regular, very short, caducous, setular glands, 5–12.5 by 2–3.5 cm, sometimes even smaller, 5–7-plinerved from and a little from above the base, midrib and nerves slightly impressed above, prominent beneath, veins \pm transverse, forming a lax network with the veinlets, faintly raised beneath or rather obscure; petiole 8–13 by 1.5–2 mm, as the base of the midrib blackish when dry. *Fascicles* axillary, 10–15-flowered, sometimes few–1-flowered, glabrous, initially enclosed by chartaceous, ovate-to subspathulate-oblong perulae (1–1.5 by 0.5–1 cm). Pedicels \pm robust, c. 1 cm. Bracteoles basal. *Calyx* tube cylindrical, c. 2.5 mm, base truncate, limb erecto-patent, 2 mm, shortly 5-dented or -apiculate. *Corolla* subcylindric, \pm dilated distally, rather fleshy, white or green, 1–1.3(–1.8) cm by 4–5 mm ϕ at base, 6–7 mm across the mouth, glabrous, lobes 2.5 mm. *Stamens* 9 and 7.5 mm; *major stamens*: filaments laxly long-ciliate distally, c. 3 mm; cells narrow-oblong, base shortly acute, 7–7.5 mm long including the much divergent c. 3 mm long tubules; connective glabrous below, processes divergent, fixed on the back of the tubules, glabrous or papillose-muriculate, free in their upper part only and \pm as long. *Disk* glabrous. *Style* slender, glabrous, hardly exerted. Immature *fruit* subglobose, truncate at the apex, c. 8 mm ϕ .

Distr. *Malesia*: East New Guinea (Eastern and Western Highlands: Wabag Subdistr. and Okapa area).

Ecol. In rain-forest, high climbing liana or climbing over tree stumps, 1950–2285 m. *Fl.* July, Sept.

27. *Dimorphanthera gracilis* SLEUM. Nova Guinea, Bot. n. 7 (1961) 89.

Epiphytic shrub, hanging from tree trunk. Branchlets slender, subterete, glabrous. *Leaves* lax, oblong-ovate, 1.5–2 cm subcaudate-acuminate at the apex, tip bluntish, rounded or more rarely broadly attenuate at the base, glands subinconspicuous, thin-coriaceous, glabrous, minutely denticulate or subentire, 7–11 by (2.5–)3–4.5 cm, 7-plinerved from and from somewhat above the base, midrib and nerves faintly immersed above, prominent beneath, reticulation lax and visibly raised beneath only; petiole terete, rugulose, c. 5 by 1.5 mm. *Fascicles* axillary, (1–)2–3-flowered; rachis \pm absent. Pedicels glabrous, 8–12 by c. 1 mm. Bracteoles basal. *Calyx* glabrous, green (fresh), tube subcylindric-obconical in outline, broadly attenuate towards the very shortly truncate base, c. 5 mm, limb suberect, 2 mm, 5-lobed halfway, lobes ovate-acuminate, acute. *Corolla* cylindrical, white, c. 1.3 cm by 3–4 mm, rather fleshy, very shortly subdensely hairy outside, lobes 2–3 mm. *Stamens* 9 and 7 mm; *major stamens*: filaments c. 4 mm, appressed-hirsutulous distally; cells oblong, base obtuse, c. 7 mm including the hardly divergent, 2 mm long tubules; processes hirsutulous, \pm connate, surpassing the tubules by c. 1 mm. *Disk* glabrous. *Style* slender, glabrous, c. 5 mm exerted at full anthesis. *Fruit*

subglobose, apex truncate and crowned by the constricted calyx limb, red when fully ripe, c. 8 mm ϕ (dry).

Distr. *Malesia*: East New Guinea (Central Highlands, near Goroka), at 2370 m. *Fl. fr.* Nov.

28. *Dimorphanthera vestita* SLEUM. Nova Guinea, Bot. n. 7 (1961) 88.

Slender shrub, 1.5–2 m, or high climbing liana, also epiphytic. Branchlets densely patently yellowish hairy in the youngest parts, glabrescent. *Leaves* scattered, elliptic or oblong-elliptic, apex shortly (0.5–1 cm) acuminate, tip \pm bluntish, base very broadly attenuate or rounded, basal glands indistinct, coriaceous, initially shortly subdensely or more laxly hairy on both faces, first glabrescent on the intervenium, remaining hairy on midrib and nerves for a long time beneath, laxly glandular-punctate beneath, 5-plinerved from and a little from above the base, (4–)5–8 (–10) by 2–4 cm, edge \pm revolute and subdenticulate, midrib and nerves much impressed above, prominent beneath, reticulation obscure; petiole rather densely hairy, 4–7(–8) by 1.5–2 mm. *Fascicles* axillary, 4–6(–10)-flowered, \pm densely and shortly yellowish tomentulose; rachis up to 5 mm. Pedicels rather robust, 10–17 mm, bracteolate in lower third. *Calyx* cup-shaped, tube semiglobose, c. 1.5 mm, limb spreading, 1 mm, 5-denticulate. *Corolla* subcylindric, red or pink, 1.5–1.7(–1.8) cm long, c. 4 mm ϕ at base and 5 mm across distally, lobes subdeltoïd, obtuse, 2 mm. *Stamens* 7(–8) and 5–5.5 mm; *major stamens*: filaments c. 3 mm, densely appressedly yellowish hirsutulous distally; cells oblong, base acute, c. 5 mm including the \pm divergent, c. 2 mm long tubules; processes hirsutulous, narrow, connate, but free at tip, \pm as long as tubules. *Disk* yellowish tomentulose. *Style* slender, glabrous, 1.7–1.9 cm. Submature *fruit* subglobose, truncate at apex, disk thick and slightly surpassing the calyx limb.

Distr. *Malesia*: West New Guinea (Bernhard Camp, Idenburg R.).

Ecol. In rain-forest at 850 m, epiphytic on trees overhanging the river, or high climbing liana in oak forests at 1200 m, and as a slender shrub in the mossy forest in dense scrub on exposed summit at 2150 m. *Fl.* Febr.–March.

29. *Dimorphanthera brevipes* SCHLTR. Bot. Jahrb. 55 (1918) 187; SLEUM. *ibid.* 70 (1939) 119; Nova Guinea, Bot. n. 7 (1961) 88.

Epiphytic, much branched shrub. Branchlets glabrous. *Leaves* lax, elliptic-oblong, apex obtusely acuminate, base broadly attenuate, basal glands \pm inconspicuous, subcoriaceous, glabrous, very laxly glandular-punctate beneath, edge shallowly remotely crenulate, sub-5–7-plinerved from and from up to 2 cm above the base, 10–19 by 4–7 cm, nerves and midrib \pm impressed above, prominent beneath, reticulation lax, a little raised beneath only; petiole 7–10 by c. 1.5 mm. *Inflorescences* \pm many-flowered abbreviate

racemes or clusters from defoliate axils. Pedicels rather stoutish, short-pubescent distally, 5–7 mm. *Calyx* tube cylindrical, c. 2 mm, minutely pubescent, base subtruncate, limb erecto-patent, entire or hardly 5-denticulate or -apiculate, 1.5 mm. *Corolla* subtubular, c. 1.3 cm, subcampanulate-dilated and c. 8 mm across the lobes, rose red, or white with rose red stripes outside and light red inside, short-pubescent outside, lobes triangular, bluntish. *Stamens* 7.5–8 and 6.5 mm; *major stamens*: filaments 3 mm, densely subsericeous-hirsutulous distally as is the connective; cells narrow-oblong, 6 mm including the c. 2 mm long, \pm divergent tubules, base acute and a little curved inward; processes \pm connate, subdensely hirsutulous, slightly longer. *Disk* glabrous. *Style* slender, c. 2 cm, distinctly exerted.

Distr. *Malesia*: East New Guinea (Sepik Distr., April R. vicinity; base of the Central Ra.; Telefomin).

Ecol. In dense, also secondary mountain forest at c. 850–1520 m. *Fl.* Oct.

Note. In the remaining type material no open flowers were left.

30. *Dimorphanthera crassifolia* SLEUM. Nova Guinea, Bot. n. 7 (1961) 89.

Shrub, scandent up to 5 m. Branchlets subtrigonous-compressed at the tips, glabrous. *Leaves* lax, oblong- or more rarely subovate-elliptic, apex shortly (0.5–1 cm) subabruptly acuminate, tip bluntish, base broadly attenuate into the petiole, sometimes almost rounded, basal glands \pm indistinct, coriaceous, stiff, glabrous, entire or mostly minutely subserrate-crenulate, very laxly or not glandular-punctate beneath, 8–13 (–15) by 3–5 (–8) cm, 7 (–9)-plinerved from and from above the base, midrib and nerves \pm impressed above, much prominent beneath, veins transverse, \pm raised beneath only, veinlets laxly reticulate, rather obscure; petiole rugose, 8–13 by 2.5–4 mm. *Fascicles* from foliate and defoliate axils, 5–7-flowered, subdensely short-pubescent; rachis \pm absent. Pedicels 10–13 by 1 mm. Bracteoles basal. *Calyx* green (fresh), broadly cylindrical, tube c. 3 mm, base rounded-obtuse, limb \pm spreading, 2 mm, broadly 5-lobed up to halfway, or merely -apiculate. *Corolla* cylindrical, (1.2–) 1.3–1.4 cm by 5 mm, more densely hairy than calyx and pedicels or almost tomentulose, deep carmine, lobes erect, c. 3 mm. *Stamens* 7 and 5 mm; *major stamens*: filaments glabrous, 3 mm; cells oblong, base apiculate, 5–6 mm including the hardly divergent, 1.5 mm long tubules; connective laxly appressedly substrigose below, muriculate; processes \pm connate, free but for their upper part, shorter than the tubules. *Disk* glabrous. *Style* thick-filiform, glabrous, c. 1.7 cm, \pm exerted at full anthesis.

Distr. *Malesia*: New Guinea (Western Highlands: Nondugl at Al R.). One collection.

Ecol. Scandent in trees on river bank, at c. 2100 m. *Fl.* Sept.

31. *Dimorphanthera nigropunctata* SLEUM. Blumea 12 (1963) 139.

Pendent epiphytic shrub, 2–4 m. Branchlets obtusangular, glabrous. *Leaves* lax, elliptic-oblong, apex for c. 1 cm subabruptly acuminate, subacute, more rarely broadly acuminate-attenuate, coriaceous, glabrous, sparsely blackish punctate beneath, entire, 10–15 (–20) by (3–)3.5–6 (–7) cm, 7–9-plinerved from and from up to 3.5 cm above the base, midrib prominent in the lower, slightly impressed (as are the nerves) in the upper part above, much prominent beneath, nerves decurrent considerably along the midrib, veins and veinlets reticulate, rather obscure above, \pm prominent beneath; petiole blackish, transversely rugose, (8–)10–12 by 2–3 mm. *Racemes* axillary, abbreviate, 5–8 (–10)-flowered; rachis 5–10 (–15) mm, glabrous. Bracteoles oblong-ovate, basal. Pedicels 7–10 by c. 1 mm, \pm accrescent, laxly puberulous especially distally. *Calyx* green, cupular, more densely pubescent than the pedicels, tube c. 2.5 by 3–4 mm, limb expanded, 5-denticulate, c. 1 mm. *Corolla* tubular, fleshy, red, rather densely short-hairy, c. 1.5 by c. 0.5 cm, lobes 2 mm. *Stamens* 9–10 and 7–8 mm; *major stamens*: filaments 3 mm, hirsutulous distally as is the connective; cells rostrate at base, c. 8 mm including tubules; processes \pm connate, \pm shorter than the tubules. *Disk* glabrous. *Style* slender, c. 2 cm. Mature *fruit* subglobose, blackish purple, c. 9 mm ϕ .

Distr. *Malesia*: NW. New Guinea (Vogelkop Peninsula: Nettoti Ra.).

Ecol. In riverine and in mossy crest forest, 1550–1750 m. *Fl.* fr. Nov.–Dec.

Galls. The species sometimes bears big leafy galls replacing the inflorescences.

32. *Dimorphanthera thibaudifolia* SLEUM. Blumea 12 (1963) 140.

Terrestrial shrub, 2–3 m, much branched. Branchlets obtusangular, short-pubescent. *Leaves* dense, narrow-oblong, apex shortly acutely or mostly rather obtusely acuminate or attenuate, base cuneate, coriaceous, stiff, entire or obscurely crenulate, marginate, 4–7 by 1.2–1.5 (–3) cm, glabrous, laxly glandular-blackish punctulate beneath, midrib and nerves not much distinct above, though prominent beneath, nerves 2 or 3 pairs from and from above the base, high curved-ascending, several others more irregular, more patent and less conspicuous, reticulation \pm obscure; petiole (5–)6–9 by 1 mm, pubescent. *Fascicles* (2–)3–4 (–5)-flowered, from foliate and defoliate axils; rachis 0–5 mm. Pedicels and calyx subdensely short-pubescent, (1.5–)1.8–2 (–2.5) cm by 1 mm. Bracteoles ovate-acuminate, 2 mm, inserted at 6–10 mm above base. *Calyx* subsemiglobose after anthesis, c. 4 by 4 mm, limb erecto-patent, 5-dentate almost to base, 2 mm. *Corolla* tubular, probably red, 1.8 cm (found dry on the fruit), c. 5 mm ϕ , densely short-hairy outside, with lax, rather long hairs inside, lobes 2 mm. *Stamens* 9 and 7 mm; *major stamens*: filaments except the very base subdensely hairy as is the connective, c. 3 mm; cells hairy along the midline in front, 7 mm; processes at the back of tubules, subdensely

clad with rather long hairs, \pm shorter than the tubules. *Disk* subdensely and \pm appressedly hairy. *Style* slender, glabrous, c. 2.3 cm. Immature *fruit* subglobose, contracted at the limb.

Distr. *Malesia*: New Guinea (Arfak Mts: Mt Gwamongga).

Ecol. In \pm open, low *Nothofagus* forest edge at 2200 m. *Fl. fr.* Jan.

33. *Dimorphanthera robbinsii* SLEUM. *Nova Guinea*, Bot. n. 7 (1961) 90; *Blumea* 12 (1963) 140; *ibid.* 12 (1964) 344.

Scandent or scrambling shrub, ascending to 20 m, with long trailing branches, or epiphytic. Branchlets angular, slender, glabrous. *Leaves* lax, elliptic-oblong, apex for c. 1 cm subacutely acuminate, base broadly attenuate, basal glands \pm distinct, subcoriaceous, glabrous, laxly appressedly glandular-muriculate or -punctate beneath, regularly subserrate-crenulate, the crenation 2–3 mm spaced, c. 0.3 mm long, 6.5–9.5 by 2.5–3.5 cm, 5–7-plinerved from and from a little above the base, midrib and nerves slightly impressed above, prominent beneath, reticulation lax, \pm faintly raised especially beneath; petiole (6–)7–9 by 1–1.5 mm. *Fascicles* from foliate and defoliate axils, (3–)4–7(–9)-flowered, subdensely and shortly pubescent at pedicels and calyces, slightly longer and more densely so at the corolla; rachis \pm absent. *Perulae* pubescent dorsally, up to 5 by 3 mm, early caducous. Pedicels stout, gradually thickened distally, 10–13 mm, in *fr.* 15 mm. *Calyx* tube cylindrical, c. 3 by 3 mm, green, base obtuse or subtruncate, limb erecto-patent, 2.5–3 mm, 5-lobed almost halfway, lobes depressed-ovate and apiculate. *Corolla* subcylindrical, 1.8–2 cm long, 4–5 mm ϕ at base, 6–8 mm across the mouth, very dark, blackish red, whitish at the lobes, rarely paler, densely red-hairy on the tube, white-hairy at the lobes outside, lobes obtuse, c. 4 mm. *Stamens* 8 and 6.5 mm; *major stamens*: filaments densely shortly substrigose distally as is the connective, c. 3 mm; cells narrow-oblong, c. 7 mm including the tubules, hairy in front between cells and at acute base; tubules c. 2 mm, \pm divergent; processes free, \pm equalling the tubules. *Disk* laxly very shortly hairy at the inner margin. *Style* slender, glabrous, 2–2.5 cm, much exerted at anthesis. *Fruit* subglobose, truncate, with a calycine rim of 5 short teeth, laxly pubescent, 7–8 mm ϕ (dry).

Distr. *Malesia*: East New Guinea (Eastern Highlands).

Ecol. In mossy forest, 2315–3300 m, maybe on limestone ridges. *Fl.* Jan.–Nov.

Vern. *Darkai*, *dekoba*, Chimbu.

34. *Dimorphanthera clemensiae* SLEUM. Bot. Jahrb. 70 (1939) 123; *Nova Guinea*, Bot. n. 7 (1961) 91; *Blumea* 12 (1964) 345. — Fig. 124.

Large, subscandent shrub, up to 6 m, or climbing vine with woody stem c. 2.5 cm ϕ . Branchlets angular at the tips, glabrous. *Leaves* scattered, oblong, sometimes subovate-oblong, apex rather shortly acuminate, subacute, base broadly at-

tenuate to \pm rounded, basal glands minute, but mostly well discernible, \pm coriaceous, glabrous at maturity, laxly to subdensely glandular-punctate beneath, entire, 14–21 by (4–)5–7.5(–9) cm, 5–7-plinerved from and from somewhat above the base, nerves and midrib mostly \pm deeply immersed above, much prominent beneath, reticulation subdense, generally raised beneath only; petiole rugose, 10–15 by 2–3 mm. *Racemes* abbreviate, 5–8(–12)-flowered, from lower, mostly defoliate axils or old wood, densely shortly whitish greyish pubescent; rachis 5–15 mm. Pedicels (8–)10–15 by 1.5(–2) mm. Bracteoles basal. *Calyx* tube semiglobose, 3–4 mm, limb spreading, 2 mm, shortly obtusely 5-denticulate. *Corolla* tubular or \pm dilated distally, fleshy, dark rose pink to deep red or bright crimson, (3–)3.5(–4.5) cm by 7–8(–10) mm, lobes 3–4 mm. *Stamens* (20–)23(–25) and 17–19 mm; *major stamens*: filaments c. 7 mm, densely \pm appressedly fulvous-hairy in the upper part; cells elongate, base subacute, 16–18(–20) mm including the \pm divergent, 2.5–3(–4) mm long tubules; processes densely substrigose, \pm connate, \pm as long as the tubules. *Disk* tomentellous. *Style* robust, glabrous, \pm exerted. *Fruit* globose, apex truncate and hairy, c. 1 cm ϕ , finally purplish.

Distr. *Malesia*: E. New Guinea (W. and E. Highlands Hindenburg Ra. and Mt Saruwaged area).

Ecol. In tall fern grassland along creek, in shrubby (re)growth of a landslip in *Nothofagus* forest, 1675–2700(–3000?) m. *Fl.* May–Sept.

Vern. *Biguni*, Asaro: Kefamo, Miruma, *dehgumba*, Chimbu: Masul, *keildagan*, Waghi: Minj, *borregugu*, Hagen: Togoba, *ansami*, Wain.

35. *Dimorphanthera anchorifera* J. J. S. *Nova Guinea* 12 (1914) 151, t. 40; SLEUM. Bot. Jahrb. 70 (1939) 118; *Nova Guinea*, Bot. n. 7 (1961) 91; *Blumea* 12 (1963) 140.

Scandent epiphytic shrub, up to 4 m. Branchlets robust, glabrous, tips obtusangular, lower parts terete. *Leaves* scattered, oblong or subovate-oblong, apex shortly and abruptly or more gradually acuminate, base attenuate to rounded, basal glands \pm conspicuous, coriaceous, glabrous, laxly glandular-punctate beneath, entire, 7(–9)-plinerved from and from above the base, midrib and nerves shallowly impressed above, prominent beneath, reticulation conspicuous, rather densely raised on both faces, 12–22 by (4–)4.5–7.5(–10) cm; petiole (7–)10–14 by 2–3 mm. Abbreviate *racemes* or clusters from the foliate or defoliate axils or from old wood; rachis robust, 10–15(–25) mm, glabrous or sometimes short-pubescent. Pedicels robust, glabrous or short-pubescent, 12–15 mm. Bracteoles basal. *Calyx* green, cup-shaped, laxly hairy, tube semiorbicular, 5 mm (7–8 mm fresh), limb low, spreading, hardly 2 mm, obtusely 5-lobed halfway. *Corolla* cylindrical, pink to deep scarlet, \pm densely yellowish or whitish pubescent, 2.5–3 by 0.5–0.6 cm (3.4–4 cm by 9 mm fresh), lobes paler, erect, obtusely deltoid, 1–2 mm. *Stamens* (15–)16–18 and 12–13 mm; *major stamens*: filaments white, linear, appressed-hairy

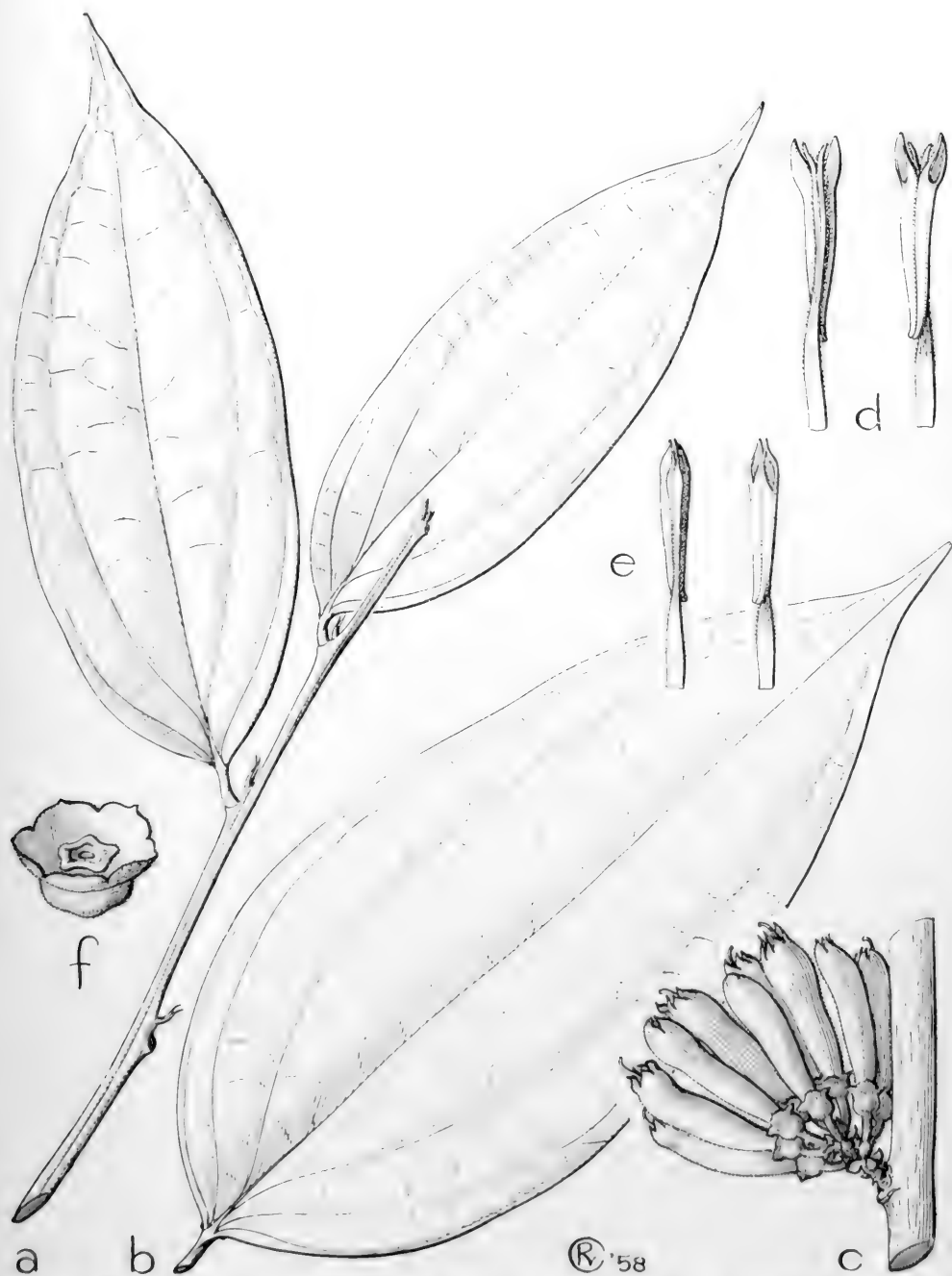


Fig. 124. *Dimorphanthera clemensiae* SLEUM. a. Habit, $\times \frac{2}{3}$, b. leaf, $\times \frac{2}{3}$, c. inflorescence, $\times \frac{2}{3}$, d. major stamens, back and front view, $\times 2$, e. minor stamens, back and front view, $\times 2$, f. calyx and disk, $\times 2$ (a-f HOOGLAND & PULLEN 5380).

distally, 4(–5) mm; cells narrow-oblong, base much recurved into a beak, each cell bearing a basal curved appendage which together form an anchor-like organ, 12–14 mm including the narrow, 2.5–3 mm long, not or \pm divergent tubules; processes \pm connate, hirsutulous, \pm as long as the tubules. *Disk* whitish, \pm densely pubescent. *Style* green, glabrous, c. 2.8 cm. *Fruit* red.

Distr. *Malesia*: West New Guinea (Fak-fak; Vogelkop Peninsula; Gaultier Mts; Mt Cycloop; Aitape area; Idenburg R.; Hindenburg Ra.).

Ecol. In mixed lower and upper montane forest, sometimes descending along creeks, (75–)240–1220 (–2450) m, locally common. *Fl.* Jan.–Dec.

Vern. *Gabebron*, Maibrat: Ajamaru, *forforia*, Mendi, *pubrume*, Orne: Kaiye.

36. *Dimorphanthera beccariana* (KOORD.) J. J. S. Nova Guinea 12 (1914) 148; *ibid.* 12 (1917) 516; SLEUM. Bot. Jahrb. 70 (1939) 122; Nova Guinea, Bot. n. 7 (1961) 91. — *Agapetes beccariana* KOORD. Nova Guinea 8 (1912) 885, t. 156.

Scandent shrub, up to 4 m. Branchlets glabrous. *Leaves* scattered, oblong-lanceolate, apex shortly (c. 2 cm) acutely subcaudate-acuminate, base acute, basal glands not too distinct, coriaceous, glabrous, \pm densely glandular-punctate beneath, entire, edge slightly revolute, 11–22 by (2.7–)3.5–6 cm, 7–9-plinerved, nerves and midrib slightly impressed above, prominent beneath, reticulation dense, finely raised beneath; petiole 7–10 by c. 2 mm. *Racemes* or clusters abbreviate, few-flowered; rachis up to 7 mm. Pedicels stoutish, (sub)glabrous, 7–9 mm. Bracteoles basal. *Calyx* tube semiglobose, laxly hairy, 3 mm, limb \pm spreading, 2 mm, 5-dented almost to the base. *Corolla* tubular, red (type) or white, densely subappressedly yellowish puberulous (or very short-pubescent) outside, \pm fleshy, 2–2.3 cm by c. 4 mm, lobes 2.5 mm. *Stamens* 10–11 and 8–8.5 mm; *major stamens*: filaments 3–4 mm, short-pubescent distally as is the connective; cells narrow-oblong, base obtuse, 9–10 mm including the \pm divergent tubules (2 mm); processes densely hairy, \pm divergent, as long as or \pm exceeding the tubules. *Disk* laxly to subdensely pubescent. *Style* rather slender, glabrous, c. 2 cm.

Distr. *Malesia*: West New Guinea (Hellwig Mts and Bernhard Camp on Idenburg R.).

Ecol. Canopy liana in forest, 1200–1750 m. *Fl.* Nov.–Febr.

37. *Dimorphanthera forbesii* (F. v. M.) F. v. M. Descr. Not. 9 (1890) 63; J. J. S. Nova Guinea 12 (1914) 148; SCHLTR, Bot. Jahrb. 55 (1918) 189; SP. MOORE, J. Bot. 61 (1923) Suppl. 28; SLEUM. Bot. Jahrb. 70 (1939) 118; Nova Guinea, Bot. n. 7 (1961) 91; Blumea 12 (1963) 140. — *Agapetes forbesii* F. v. M. J. Bot. 24 (1886) 290. — *D. alba* J. J. S. Nova Guinea 18 (1936) 105, t. 24, f. 1; SLEUM. Bot. Jahrb. 70 (1939) 118.

Large epiphyte, sending roots down to the ground. Branchlets robust, somewhat angular, glabrous. *Leaves* scattered, ovate- to oblong-lanceolate, apex short-acuminate, subacute, base

broadly attenuate to rounded, the 2 basal glands rather indistinct, \pm coriaceous, glabrous, slightly and rather regularly denticulate, 9–22 by 4–8 cm, the very edge a little revolute in dry specimens, 5-plinerved from and from above the base, midrib and nerves impressed above, prominent beneath, reticulation lax, finely raised beneath; petiole 1–1.3 by c. 0.2 cm. *Inflorescences* in (1–2–)few-flowered clusters from defoliate axils or old wood; rachis up to 0.5 cm. Pedicels 10–17 by c. 1.5 mm, laxly short-pubescent or glabrous. Bracteoles basal. *Calyx* laxly hairy, tube broad-cylindric, base truncate, constricted below the limb, 2 mm, limb spreading, c. 3 mm, obtusely dented (1 mm). *Corolla* cylindrical, white, fragrant, fleshy, subdensely and very shortly hairy, (2.2–)2.5 by 0.5 cm (4 by 1 cm when fresh), lobes c. 4 mm. *Stamens* (11–)12–13 and (7–)8–9 mm; *major stamens*: filaments densely hirsutulous distally as is the connective; cells oblong, base acutely attenuate into an incurved beak, laxly hairy there, 9–10 mm including the narrow, 3 mm long, divergent tubules; processes connate below, free and divergent distally, hirsutulous, c. 2 mm longer than the tubules. *Disk* glabrous or practically so. *Style* slender, glabrous, \pm as long as the corolla.

Distr. *Malesia*: Central and SE. New Guinea (Nassau Mts (*D. alba*); Central Distr.: Mafulu, Woitape, Sogere).

Ecol. In forest, 1200–1525 m. *Fl.* Aug.–Oct.

38. *Dimorphanthera splendens* SLEUM. Nova Guinea, Bot. n. 7 (1961) 91; Blumea 12 (1963) 140; *ibid.* 12 (1964) 345.

Low scandent to high climbing shrub, stiffly branched. Branchlets obtusangular, glabrous. *Leaves* subdense to lax, lanceolate to lanceolate-oblong, apex shortly (1–1.5) cm subacutely acuminate, base attenuate or cuneate, basal glands obvious, \pm stiffly coriaceous, glabrous above, laxly very shortly glandular-setulose or -punctate, glabrescent beneath, minutely subserulate-crenulate, 7-plinerved from and from high above the base, nerves and midrib slightly impressed above, prominent beneath, reticulation lax, finely raised beneath only, or sometimes subinconspicuous, 7–14 by 2–4.5 cm; petiole 5–8(–10) by c. 2 mm. *Fascicles* both from foliate and defoliate axils, 3–5(–7)-flowered, subdensely short-pubescent; rachis up to 0.5 cm. Pedicels thickened upwards, 10–15 by 2–3 mm. *Calyx* green, tube broadly cylindrical, base truncate or even somewhat dilated, the tube than becoming apophysate, c. 4 by 4 mm, limb \pm spreading, 1.5–2(–2.5) mm, broadly obtusely 5-lobed halfway. *Corolla* tubular, hardly widened, fleshy or waxy, bright red or crimson, sometimes whitish at the very base and the tips, (3–)3.5(–4) cm by 5–6 mm. *Stamens* 13–14 and 10–11 mm; *major stamens*: filaments narrow and sericeous-pubescent upwards, c. 4.5 mm; cells narrow-oblong, connective hairy in front, base thickened and very shortly curved inward, 1.1–1.2 cm including the slightly divergent, 4 mm long tubules; processes \pm connate, densely appressedly hirsutulous, \pm equally long. *Disk*

glabrous. *Style* glabrous, thick-filiform, c. 5 mm exerted. Submature *fruit* depressed-globose, truncate, purplish green, c. 1.3 cm ϕ .

Distr. *Malesia*: East New Guinea (Eastern, Western and Southern Highlands).

Ecol. In mid-mountain rain-forest, or in edge of open (*Nothofagus*) forest, margin of *Metroxylon* swamp and forest, locally not rare, (760-)1740-2150 m. *Fl.* Jan.-Oct.

Vern. *Yalupubi*, Kutubu.

39. *Dimorphanthera alpina* J. J. S. Med. Rijks-herb. n. 25 (1915) 7; Nova Guinea 12 (1917) 516; *ibid.* (1918) t. 209; SLEUM. Bot. Jahrb. 70 (1939) 121; Nova Guinea, Bot. n. 7 (1961) 92; Blumea 12 (1963) 140.

var. alpina.

Large scandent shrub, ascending to 7 m. Branchlets obtusangular, subterete, glabrous. *Leaves* lax, ovate or mostly ovate-elliptic, apex very shortly (1 cm) subacutely acuminate, base rounded, or rarely broadly attenuate or acute, basal glands conspicuous, firmly coriaceous, glabrous above, yellowish pubescent beneath on lower part of midrib and nerves, laxly blackish punctate beneath, \pm regularly denticulate by minute blackish callous teeth, 5-15 by 2-8 cm, 5(-7)-plinerved from and from above the base, midrib and nerves \pm immersed above, prominent beneath, reticulation rather dense and prominent beneath, much less so or obscure above; petiole densely pubescent, 5-10 by 2-3 mm. *Inflorescences* in axillary 4-7-flowered abbreviate racemes or clusters, glabrous; rachis up to 1.5 cm. Pedicels 9-14 by 2 mm. Bracteoles basal. *Calyx* tube \pm cylindrical, base markedly truncate, c. 5 by 6 mm, limb erect, 3(-4) mm, lobes ovate-acuminate, apiculate, 2(-3) mm. *Corolla* cylindrical, \pm contracted at the very base and dilated towards the mouth, fleshy, densely yellowish hirsutulous or -subvelutinous outside, deep pink with whitish lobes, or white to cream, suffused with red distally, 4(-4.5) cm by 8-10 mm, lobes triangular, obtuse, 4(-5) mm. *Stamens* 16-17 and 13-14 mm; *major stamens*: filaments 3 mm, densely appressedly pubescent and ciliate distally as is the connective; cells narrow-oblong, base acute and protracted, 13-14 mm including the slightly divergent, 2.5 mm long tubules; processes hirsutulous, \pm connate below, divergent distally and \pm as long as the tubules. *Disk* glabrous. *Style* glabrous, \pm stoutish, 3-5 mm exerted.

Distr. *Malesia*: New Guinea (Oranje Mts: top of Mt Kajan; Western Highlands: from the N. slopes of Mt Sugarloaf; Southern Highlands, Mt Giluwe).

Ecol. In edge of *Nothofagus* forest, alpine shrubberies and in grassland, 2600-3200 m. *Fl.* Febr.-Aug.

Vern. *Kangip*, Enga, *walita*, Mendi.

var. pubigera SLEUM. Nova Guinea, Bot. n. 7 (1961) 92.

Branchlets and undersurface of the leaves

densely softly hairy initially, pedicels, calyces and bracteoles more laxly so. *Corolla* c. 3 by 0.6 cm. *Stamens* alternately 14 and 12 mm. *Fruit* globose, c. 1 cm ϕ , red, sweet and palatable.

Distr. *Malesia*: New Guinea (Oranje Mts: Habbema Lake; Western Highlands: near Sirunke).

Ecol. Climbing on trees edging forest openings, common, 2800-3225 m. *Fl.* Oct., *fr.* Aug.

40. *Dimorphanthera denticulifera* SLEUM. Bot. Jahrb. 70 (1939) 120; Nova Guinea, Bot. n. 7 (1961) 92; Blumea 12 (1963) 141.

var. denticulifera.

Shrub of weak, spreading habit, not rarely (sub)scandent, up to 5 m, glabrous. Branchlets red brown, subterete. *Leaves* scattered, oblong, sometimes subovate-oblong, apex shortly (1-1.5 cm) subacutely acuminate, base broadly attenuate, rarely rounded, basal glands distinct, subcoriaceous or coriaceous, sparsely blackish punctate beneath, 7-20 by 2.5-5.5 cm, regularly subseriate-denticulate or -crenulate by minute, \pm callose, caducous, \pm blackish, 2-4 mm spaced glandular teeth, 5(-7)-plinerved from and from above the base, midrib and nerves \pm plain above, prominent beneath, reticulation lax, distinct beneath only; petiole 6-8(-12) by 2-1.5 mm, blackish. *Fascicles* axillary, 3-10-flowered; rachis rarely up to 1 cm. Pedicels rather stout, c. 10 mm. Bracteoles basal. *Calyx* green, tube subcylindric, base \pm truncate, 3-4 mm, limb erect, 2-1.5 mm, broadly subacutely 5-lobed. *Corolla* tubular, 1.8-2(-2.2) cm by 4 mm, thin-fleshy, from crimson in various shades to pure white, lobes c. 2.5 mm. *Stamens* (8-)-10(-11) and c. 7 mm; *major stamens*: filaments 4 mm, hirsutulous distally as is the connective; cells oblong, base obtuse, (6-)-7-8(-9) mm including the 2 mm long slightly divergent tubules; processes behind or between the tubules, surpassing or equalling them. *Disk* glabrous. *Style* slender, glabrous, 2.3-2.7 cm, much exerted. *Fruit* subglobose, soft, blackish blue, c. 1.2 by 1 cm.

Distr. *Malesia*: East New Guinea (Western Highlands to Morobe Distr.).

Ecol. Undergrowth of mossy *Castanopsis* or *Nothofagus* ridge forest, occasionally in low second grow or on sides of cuttings along high-road, in shrubberies on debris of an old landslip, locally plentiful, 1700-2600 m. *Fl.* April-Sept.; *fr.* July-Sept.

Vern. *Poror*, Enga, *walain*, Mendi.

var. pubens SLEUM. Nova Guinea, Bot. n. 7 (1961) 92; Blumea 12 (1963) 141.

Corolla subdensely pubescent especially towards the apex.

Distr. *Malesia*: New Guinea (Eastern Highlands: Mt Wilhelm, Mt Michael and Mt Otto; Morobe Distr.: Wau-Edie creek area), locally common in young forest secondary growth, 1830-3290 m. *Fl.* July-Sept.

41. *Dimorphanthera leucostoma* SLEUM. Nova Guinea, Bot. n. 7 (1961) 92; Blumea 12 (1963) 141.

Subscandent shrub, 2–5 m. Branchlets slender, glabrous or sometimes pubescent on one side. *Leaves* ± dense, oblong or oblong-elliptic, apex shortly subacutely acuminate, base broadly attenuate, glands ± conspicuous, ciliate in the young shoots, glabrous and ± coriaceous at maturity, regularly, minutely subserrulate-crenulate, 2.5–3.5 by 1–1.5(–1.7) cm, 5-plinerved from and a little from above the base, some other less distinct nerves higher up, nerves and midrib ± faintly impressed above, subinconspicuous beneath, reticulation none; petiole initially pubescent, early glabrescent, 3–5 by c. 1 mm. *Flowers* 1–3 per fascicle in the upper axils. Pedicels robust, laxly hairy at least below the calyx, 1–1.3 (–1.5) cm at anthesis. Bracteoles basal. *Calyx* green, tube subcylindric, base subtruncate, laxly very shortly pubescent below and glabrescent distally, or glabrous, c. 3 by 4 mm, limb widened, suberect, 4–5 mm, 5-lobed halfway, lobes ovate, subacute. *Corolla* tubular, ± dilated distally, glabrous, rather fleshy, red or orange at the tube, white or cream at the lobes, 2.8–3 cm by c. 5 mm, lobes deltoid, obtuse, 3 mm. *Stamens* 13–14 and 11–12.5 mm; *major stamens*: filaments towards apex subdensely long-hairy, 3.5 mm; cells narrow-oblong, apiculate and curved inward at the very base, 11 mm including the hardly divergent, 2 mm long tubules; processes appressedly long-hirsutulous, ± divergent, usually ± half as long, rarely as long as the tubules, sometimes very short and represented by long ± appressed hairs at the lower part of the back of and between the tubules. *Disk* glabrous. *Style* slender, glabrous, c. 5 mm exerted. *Fruit* subglobose, black, 8–10 mm ø.

Distr. *Malesia*: New Guinea (Eastern Highlands: Mt Wilhelm, near the lakes), 3350–3650 m, in alpine shrubbery or remains of *Podocarpus* forest. *Fl. fr.* July–Sept.

42. *Dimorphanthera meliphagidum* (BECC.) F. v. M. in Wing's South. Sc. Rec. n.s. 2 (1886), repr. Bot. Centrbl. 26 (1886) 164; *WARB.* Bot. Jahrb. 18 (1893) 204 (*'meliphagidum'*); *K. SCH. & LAUT.* Nachtr. (1905) 338; *J. J. S. Nova Guinea* 12 (1914) 148; *SLEUM.* Bot. Jahrb. 70 (1939) 121; *Nova Guinea, Bot. n. 7* (1961) 93. — *Agapetes meliphagidum* BECC. *Malesia* 1 (1878) 208.

Epiphytic glabrous shrub. Branchlets rather slender. *Leaves* lax, ovate- to lanceolate-elliptic, apex shorter or longer subcaudate-acuminate, tip bluntish, base broadly attenuate, basal glands inconspicuous, subcoriaceous to coriaceous, laxly set with blackish glandular muriculate hairs or points beneath, remotely minutely subserrate-crenulate or ± entire, 8–14 by 3–5.5 cm, 5(–sub-7) plinerved from and from c. 1.5 cm above the base, midrib and nerves faintly impressed above, prominent beneath, reticulation subdense, not much raised beneath, even less so above; petiole 8–10 by c. 1.5 mm. *Flowers* in 5–7-flowered abbreviate racemes or fascicles from foliate and defoliate axils; rachis up to 1 cm. Pedicels 10–15 by 1 mm. Bracteoles basal. *Calyx* tube subcampanulate-obconical, truncate, 4 mm, limb ± spreading, 2

mm, 5-lobed almost halfway, lobes depressed-ovate, apiculate. *Corolla* tubular, fleshy, 2.5–2.8 cm by 5 mm (4 by 1 cm fresh), wine-red, lobes erect, obtusely triangular, c. 3 mm. *Stamens* 13–14 and 11–12 mm; *major stamens*: filaments short-hairy distally as is the connective in its lower part, 5 mm; cells narrow-oblong, base acute with a dorsal anchor-like appendage, 10–11 cm including the ± divergent tubules; processes close long-hairy or subhirsute, ± as long as the tubules. *Disk* glabrous. *Style* slender, glabrous, c. 3.2 cm.

Distr. *Malesia*: NW. New Guinea (Vogelkop Peninsula: Mt Morait near Sorong), One collection. *Fl.* Febr.

43. *Dimorphanthera doctersii* J. J. S. Nova Guinea 18 (1936) 104, t. 23, f. 2; *SLEUM.* Bot. Jahrb. 70 (1939) 119; *Nova Guinea, Bot. n. 7* (1961) 93; *Blumea* 12 (1963) 141.

Epiphytic shrub, c. 2 m. Branchlets robust to slender, angular, glabrous. *Leaves* lax, oblong or subovate-oblong, apex subabruptly and shortly (c. 2 cm) acuminate (very tip bluntish), base broadly attenuate to rounded, basal glands ± indistinct, ± stiff by coriaceous, glabrous, sparingly glandular-punctate beneath, 14–20 by 5–8 cm, entire, 7(–9)-plinerved from and from (high) above the base, midrib and nerves slightly sunken above, prominent beneath, reticulation rather dense, finely raised beneath, less so above; petiole rugose, 10–12 by c. 2.5 mm. *Racemes* abbreviate, few-flowered, from foliate and defoliate axils, glabrous; rachis robust, 1–1.5(–2) cm. Pedicels stout, 8–10 by c. 2 mm. Bracteoles basal. *Calyx* green, tube cup-shaped, base ± rounded to subtruncate, 4–5 by 4(–5) mm, limb low, c. 2 mm, broadly 5-lobed halfway. *Corolla* cylindric, ± contracted at base, 2.5(–3) cm by c. 5 mm, bright to dark red, fleshy, lobes obtusely triangular, c. 2.5 mm. *Stamens* 13–14(–16) and 11–12(–14) mm; *major stamens*: filaments densely shortly appressedly hairy and ciliate distally as is the connective in its lowest part; cells narrow-oblong, base subacute and curved inward, 11–12 mm including the ± divergent, c. 2.5 mm long tubules; connective sparsely short-hairy or almost glabrous, laxly to subdensely long-hairy at the processes, these near together, between or partly behind the ± equally long tubules. *Disk* very shortly hairy or puberulous, or glabrous. *Style* rather robust, glabrous, ± exerted. *Fruit* subglobose, purplish blackish, c. 1 cm ø.

Distr. *Malesia*: West New Guinea (Rouffaer R. at 175 m; a slightly different form in the Kebar valley, Vogelkop Peninsula, at 1060–1800 m).

Ecol. In edge of forest or ravine. *Fl. fr.* March, Sept., Nov.

44. *Dimorphanthera womersleyi* SLEUM. *Nova Guinea, Bot. n. 7* (1961) 93; *Blumea* 12 (1964) 345.

Shrub with long trailing branches or small tree, rarely scandent vine. Branchlets obtusangular, glabrous. *Leaves* scattered or narrow-oblong, apex shortly gradually acuminate, subacute, base cuneate, basal glands small but well discernible,

coriaceous, glabrous, very laxly or not glandular-punctate beneath, 10–20 by (2–)2.5–5 cm, minutely and remotely denticulate or subrenulate, 5(–7)-plinerved from and from 2–3 cm above the base, midrib and nerves faintly impressed above, prominent beneath, reticulation lax, raised beneath only; petiole 6–8 by c. 2 mm. *Racemes* abbreviate, axillary or often from the stem, 5–6(–15)-flowered, glabrous; rachis thick, c. 1 cm. Pedicels 15–20 by 1–1.5 mm. Bracteoles \pm connate at the base, ciliate, subbasal. *Calyx* cupshaped, tube semiglobose, base rounded, c. 3 mm, articulation with the pedicel indistinct, limb \pm spreading, 2 mm, wavy, very shortly 5-lobed or -denticulate. *Corolla* subcylindric, \pm dilated distally, fleshy, white or creamy white, 1.8–2 cm by 4–5 mm ϕ at base, 6–7 mm across the mouth (1.8–2.2 cm, 7 mm and 10–13 mm fresh), lobes deltoid, c. 3 mm. *Stamens* 8–9(–10) and 6.5–7(–8) mm; *major stamens*: filaments densely fulvous-substrigose distally as are the connective and its processes, c. 4 mm; cells narrow-oblong, base apiculate, 7(–8) mm including the \pm divergent, 2 mm long tubules; processes very close or \pm connate, at least 0.5 mm longer. *Disk* glabrous. *Style* rather slender, glabrous, (2–)2.2(–2.7) cm.

Distr. Malesia: East New Guinea, typically only known from the Western Highlands; a form with slightly larger flowers is known from Gurak, Lae-Wau road, at 450 m.

Ecol. In depleted primary forest or on eroded clay ridges with *Gleichenia*, 1585–2100 m. *Fl. fr.* Jan.–Aug.

Vern. Garēm, koikgagem, Hagen: Chimbu.

45. *Dimorphanthera longifolia* KANEH. & HATUS. Bot. Mag. Tokyo 56 (1942) 476, f. 4; SLEUM. Nova Guinea, Bot. n. 7 (1961) 94.

Scandent shrub, laxly branched, up to 5 m. Branchlets subterete, glabrous. *Leaves* (narrow-) oblong to oblong-lanceolate, apex subcaudate-acuminate (3–4 cm), acute, base broadly acutely attenuate, basal glands \pm indistinct, coriaceous, glabrous, very laxly glandular-punctate beneath, 20–30 by 4–6(–8) cm, entire or very remotely subcallose-denticulate or -crenulate, 5(–7)-plinerved from and from above the base, midrib and nerves faintly impressed above, prominent beneath, reticulation lax, slightly raised beneath only; petiole 5–10 by 2 mm. *Fascicles* c. 2-flowered, from defoliate axils. Pedicels robust, glabrous, c. 10 mm. Bracteoles basal, laxly pubescent. *Calyx* green, widely cup-shaped, laxly short-hairy, tube obconical, very base \pm truncate, 3–4 mm, limb spreading, 2 mm, but very shallowly 5-lobed. *Corolla* cylindrical, fleshy or waxy white, 2.8–3.2 cm by c. 5 mm, papillose-puberulous, sometimes with some hairs at the deltoid, subacute lobes, c. 4 mm. *Stamens* 13–14 and 10–12 mm; *major stamens*: filaments 4–5 mm, appressedly fulvous-hirsutulous in the upper third as is the whole connective; cells elongate-oblong, base apiculate, c. 9 mm including the \pm divergent, 2.5 mm long tubules; processes \pm connate, up to 2 mm longer. *Disk* glabrous. *Style*

white, slender, glabrous, c. 4 mm exerted.

Distr. Malesia: West New Guinea (Geelvink Bay: Nabire). One collection.

Ecol. In edge of rain-forest, c. 400 m. *Fl.* March.

46. *Dimorphanthera ovatifolia* SLEUM. Nova Guinea, Bot. n. 7 (1961) 94.

Slender shrub, up to 3 m, with pendent branches. Branchlets subterete, glabrous. *Leaves* lax, ovate, shortly (0.5–1 cm) acuminate towards the obtuse apex, base rounded to subcordate, basal glands indistinct, coriaceous, glabrous, laxly glandular-punctate beneath, entire, 7-plinerved from and from somewhat above the base, 5–9 by 3–5.5 cm, midrib and nerves flat above, slightly prominent beneath, reticulation \pm dense and minutely raised beneath only; petiole glabrous, 5–8 by 1.5–2.5 mm. *Fascicles* 3–5-flowered, axillary, glabrous; rachis almost 0. Pedicels c. 15 by 1.5 mm. Bracteoles subbasal. *Calyx* tube obconical, 4–5 mm, base subtruncate and 2.5 mm, apex c. 5 mm ϕ , limb spreading, wavy and obscurely obtusely 5-lobed. *Corolla* tubular, rather fleshy, light red, c. 3 cm by 7 mm, lobes reflexed, c. 5 mm. *Stamens* 12 and 10 mm; *major stamens*: filaments subdensely hirsutulous distally, c. 6 mm; cells narrow-oblong, base acute and curved inward, 8 mm including the divergent, c. 2.5 mm long tubules; processes much divergent, slightly shorter than the tubules, free only in their upper part and more laxly hirsutulous there. *Disk* glabrous or sparsely hairy. *Style* slender, glabrous, as long as the corolla.

Distr. Malesia: NW. New Guinea (Waigeu I., slope of Mt Nok, E. side of Majalibit Bay), in shrubby vegetation at c. 820 m. One collection. *Fl.* Jan.

47. *Dimorphanthera peekelii* SLEUM. Nova Guinea, Bot. n. 7 (1961) 95.

Epiphytic shrub, c. 1 m. Branchlets obtusangular at the tips, glabrous. *Leaves* scattered, elliptic- or lanceolate-oblong, apex shortly (1–1.5 cm) acuminate, blunt, base broadly attenuate, basal glands indistinct, coriaceous, glabrous, laxly glandular-punctate beneath, entire, edge \pm revolute, 9–16(–19) by 3.5–8(–10) cm, 5–7-plinerved from and from above the base, nerves and midrib almost flat above, prominent beneath, reticulation rather dense, \pm raised above, more distinctly so beneath; petiole rugose, 8–10 by c. 2 mm. *Fascicles* from foliate and defoliate axils, glabrous, (3–)4–5-flowered; rachis up to 1 cm. Pedicels 12–15 by c. 1 mm. Bracteoles basal. *Calyx* tube cup-shaped or semiglobose, base rounded, c. 3 mm, limb \pm spreading, 2–3 mm, 5-lobed obtusely to $\frac{2}{3}$, lobes minutely apiculate. *Corolla* tubular, fleshy, deep red, c. 3 cm by 6–7 mm (3.5–4 cm by 10–12 mm fresh), lobes erect, obtuse, c. 3.5 mm. *Stamens* 15 and 13 mm; *major stamens*: filaments \pm dilated towards base, subdensely hairy in the upper half, 7–8 mm; cells oblong, base obtuse, (8–)9 mm including the much divergent, 3 mm long tubules; connective

subdensely hirsute below, less so and more patently hairy at the processes, the latter as long as the tubules, free and much divergent in their upper part. *Disk* glabrous. *Style* rather slender, glabrous, \pm exerted.

Distr. *Malesia*: New Ireland (Schleinitz Mts, W. side of the Lelet plateau). Two collections.

Ecol. In primary forest, 300–600 m. *Fl.* April.

48. *Dimorphanthera kalkmanii* SLEUM. Nova Guinea, Bot. n. 7 (1961) 95.

Treelet up to 8 m, trunk c. 2 m. Branchlets \pm slender, obtusangular at the tips, glabrous. *Leaves* lax, ovate-elliptic or elliptic, more rarely ovate-oblong, apex rather abruptly (1–1.5 cm) acuminate, bluntish, base broadly attenuate or rounded, glands \pm marked, coriaceous, glabrous, laxly to subdensely set on both faces with blackish glandular points, regularly minutely subserrate-denticulate or subentire, 5–9(–14) by 2.5–4.5(–5.5) cm, 5–7-plinerved from and from up to 2 cm above the base, midrib and nerves slightly impressed above, prominent beneath, reticulation lax to rather dense, only raised beneath; petiole blackish, rugulose, 6–10 by 1.5–2(–2.5) mm. Abbreviate *racemes* or clusters from foliate and/or defoliate axils, 4–5(–7)-flowered, glabrous; rachis \pm robust, 0.5–1(–1.5) cm. Pedicels stout, 8–12 mm. Bracteoles basal. *Calyx* tube subcylindric, green, 3–4 by 4 mm, base truncate, limb \pm spreading, 2 mm, 5-lobed halfway, lobes depressed-ovate, apiculate. *Corolla* subcylindric, 1.5–1.8 cm by 3–4 mm at base, 5–6 mm ϕ at apex, red, \pm fleshy, lobes deltoid, obtuse, 2.5 mm. *Stamens* 8–9 and 6.5–7 mm; *major stamens*: filaments linear, densely yellowish hirsutulous and ciliate above base, c. 3.5 mm; cells narrow-oblong, base acute and laxly short-hairy, c. 6 mm including the \pm divergent, c. 2 mm long tubules; processes \pm connate, densely hirsutulous, c. 1 mm longer than the tubules. *Disk* glabrous. *Style* rather thick, glabrous, c. 3 mm exerted. *Fruit* subglobose, apex truncate, shining, purplish when fresh, 8–9 mm ϕ .

Distr. *Malesia*: Central New Guinea (Star Mts: Mt Antares). Two collections.

Ecol. In mossy forest at 2360 m. *Fl.* July.

49. *Dimorphanthera collinsii* SLEUM. Nova Guinea, Bot. n. 7 (1961) 96; *Blumea* 12 (1963) 141. — **Fig. 125.**

var. collinsii.

Terrestrial shrub, sometimes scandent, 2–3 m. Branchlets angular, red brown, glabrous. *Leaves* lax to subdense, elliptic-oblong, more rarely elliptic, apex shortly subacutely acuminate, broadly attenuate towards the base, glands marked, subcoriaceous, subdensely pubescent on both faces, later still pubescent or hirsutulous partly beneath, tardily glabrescent except the midrib, furthermore laxly set with appressed glandular-muriculate, subsetulose hairs or points beneath, entire, 4–6(–7.5) by 1.5–2.5(–3) cm, 5-plinerved from and from a little above the base, midrib and nerves

\pm raised above, more prominent beneath, reticulation rather dense and somewhat prominent beneath; petiole transversely rugose, initially pubescent, glabrescent, 4–6(–8) by 1–2 mm. *Fascicles* axillary, 3–4-flowered, glabrous and \pm lustrous; rachis 0. Pedicels curved, 6–8 by 1.5–2 mm. Bracteoles basal, ovate, ciliate, up to 5 mm. *Calyx* tube broadly obconical, base abruptly truncate, 4–5 by 4 mm ϕ at base, 6–7 mm across limb, the latter 3–4 mm, 5-lobed almost to the base, lobes ovate-acuminate, apiculate. *Corolla* cylindric, deep red, sometimes pinkish at base, not rarely paler to whitish at the tips, fleshy, glabrous or with some hairs at the lobes, (2.8–)3–3.5 cm by 6–8 mm, lobes deltoid, rather bluntish, 3–4 mm. *Stamens* 18–20 and 15–17 mm; *major stamens*: filaments sparsely hairy at apex, 4–5(–6) mm; cells elongate, with a short basal, sometimes barbate appendage, 13–15 mm including the \pm divergent, c. 3 mm long tubules; processes laxly longish fulvous-hirsutulous, \pm connate, 1–2 mm longer than the tubules. *Disk* glabrous. *Style* thickish, glabrous, 3.2–4 cm.

Distr. *Malesia*: East New Guinea (Eastern and Southern Highlands).

Ecol. Fairly common in forest-grassland edge or in patches of subalpine forest, 3300–3560 m. *Fl.* July–Aug.

var. montis-wilhelmi SLEUM. Nova Guinea, Bot. n. 7 (1961) 97; *Blumea* 12 (1963) 141; *ibid.* 12 (1964) 345. — **Fig. 125.**

Leaves similar to those in *var. collinsii*, 5–8(–15) by 2–3(–4, –6) cm; flush pink, glossy. *Inflorescences* densely tomentose, partly glabrescent, calyx and pedicels becoming lustrous then. *Calyx* green. *Corolla* paler or darker pink, lobes (and maybe base) white, up to 5 by 1 cm when fresh. *Stamens* 14–15(–17) and 11–12(–13) mm; *major stamens*: filaments c. 4 mm, densely appressedly hirsutulous distally as is the connective; cells elongate, base subacute, \pm curved inward, 11–14 mm including the \pm divergent, c. 3 mm long tubules; processes \pm connate, much longer than the tubules. *Disk* glabrous or slightly hairy. *Style* glabrous. *Fruits* subglobose, purple black when ripe, c. 1.5 cm ϕ , with persistent bracteoles.

Distr. *Malesia*: East New Guinea (Eastern Highlands: E. slope of Mt Wilhelm and down to Pengal creek; Western Highlands: on the Nonaminj Divide-Kubor Ra.).

Ecol. A stiff, scandent shrub, frequent in edges of subalpine forest, ascending to 7 m, at 2600–3560 m. *Fl. fr.* June–Sept.

50. *Dimorphanthera elegantissima* K. SCH. in K. SCH. & LAUT. Nachtr. (1905) 338; SCHLTR, Bot. Jahrb. 55 (1918) 190; SLEUM. *ibid.* 70 (1939) 121; Nova Guinea, Bot. n. 7 (1961) 97; *Blumea* 12 (1964) 345. — *D. forbesii* [non (F. v. M.) F. v. M.] WARB. Bot. Jahrb. 18 (1893) 203; K. SCH. & LAUT. Fl. Schutzgeb. (1901) 488. — *D. kaniensis* SCHLTR, Bot. Jahrb. 55 (1918) 190, f. 15.

Shrub, scandent and ascendent to the top of high trees, sometimes epiphytic. Branchlets stoutish,



Fig. 125. *Dimorphanthera collinsii* SLEUM. var. *montis-wilhelmi* SLEUM. Mt Wilhelm, 3500 m, E. New Guinea (SLEUMER 4149) (SLEUMER, 1961).

sometimes compressed at apex, glabrous. *Leaves* lax, oblong or narrowly elliptic-lanceolate, apex shortly (c. 2 cm) acutely acuminate, base broadly attenuate, basal glands small and \pm inconspicuous, coriaceous, glabrous, very laxly or practically not glandular-punctulate beneath, shallowly and rather remotely subdentate-crenulate (callous points early caducous), 5(-7)-plinerved from and from above the base, 11-20(-23) by 3-6(-8) cm, midrib and nerves a little impressed above, slightly raised beneath, reticulation rather obscure; petiole 8-10(-13) by 2 mm. *Fascicles* (3-)5-10-flowered from defoliate parts, glabrous. Pedicels 10-13 by 2-3(-4) mm. Bracteoles basal. *Calyx* tube cylindrical-obconical, base truncate, 4-5 by 5 mm, limb suberect, (2-)3-4 by 6-7 mm, obtusely lobed or dented up to halfway. *Corolla*

cylindrical, fleshy or waxy, deep (crimson) red or rose red, with white or pale tips, (2.8-)3-3.5 by 0.6-0.8 cm (3.5 by 1.3-1.6 cm fresh), lobes erect, deltoid, obtuse, 4-5 mm. *Stamens* (12-)13-14 and (9-)10-11 mm; *major stamens*: filaments c. 5 mm, upper $\frac{1}{3}$ subdensely hairy distally as is the connective in its lower part; cells elongate-oblong, base contracted, apiculate and much curved inward, (8-)9-10 mm including the divergent, 2.5-3 mm long tubules; processes subdensely to more laxly and longish substrigose, \pm connate with or close, 1-3 mm longer than the tubules. *Disk* glabrous. *Style* \pm slender, 3.5-4 cm, \pm exserted.

Distr. Malesia: East New Guinea (Eastern Highlands, Madang, Morobe, and Milne Bay Distr.).

Ecol. Locally frequent in *Castanopsis* forest or other dense mossy forest or forest clearing, 800–1830 m. *Fl.* Jan.–Dec.

Vern. *I-úó*, Jabim, *unangai*, Daga.

51. *Dimorphanthera megacalyx* SLEUM. Bot. Jahrb. 70 (1939) 119; Nova Guinea, Bot. n. 7 (1961) 97.

Small scandent and recumbent shrub. Branchlets \pm slender and subterete, red brown, glabrous. *Leaves* scattered, narrow-oblong, apex shortly gradually acuminate, subacute, base broadly truncate or \pm rounded, basal glands distinct, subcoriaceous, laxly punctate beneath, entire or minutely callose-denticulate, 10–12(–14, –19) by 3–4.5(–7.5) cm, 7-plinerved from and from a little above the base, midrib and nerves plain or \pm raised above, more distinctly prominent beneath, reticulation minutely raised on both faces or beneath only; petiole stoutish, 6–8 mm. *Fascicles* axillary, 5–7-flowered, glabrous. Pedicels thick, 1 cm. Bracteoles 2.5 mm, basal. *Calyx* tube broadly cylindrical, base truncate, c. 5 mm, limb suberect, 3 mm, deeply 5-lobed, lobes broad-triangular, bluntish, 1.5–2 mm. *Corolla* cylindrical, c. 2 cm by 5 mm, \pm fleshy, red or pink, tips whitish, lobes 2.5 mm. *Stamens* 9–10 and 8 mm; *major stamens*: filaments glabrous, fulvous-hirsutulous for upper $\frac{1}{3}$ as is the whole connective, c. 3 mm; cells elongate-oblong, 8–9 mm including the \pm divergent, 2 mm long tubules, base obtuse; processes thick, obtuse, close together, fixed between and partly behind the tubules, slightly longer. *Disk* glabrous. *Style* slender, glabrous, c. 2.3 cm, \pm exserted. *Fruit* subglobose, purple, c. 8 mm \varnothing , crowned by the erect calyx lobes, c. 4 mm.

Distr. *Malesia*: New Guinea (Morobe Distr.: Sattelberg and Mt Saruwaged vicinity).

Ecol. In forest, 800–2745(–3050?) m.

52. *Dimorphanthera militaris* J. J. S. Nova Guinea 18 (1936) 102, t. 23, f. 1; SLEUM. Bot. Jahrb. 70 (1939) 121; Nova Guinea, Bot. n. 7 (1961) 98.

Shrub. Branchlets angular, glabrous. *Leaves* lax, elliptic to ovate-elliptic, apex shortly obtusely acuminate, base broadly attenuate and contracted or obtuse, rarely \pm rounded, basal glands \pm inconspicuous, coriaceous, \pm rigid, glabrous, sparsely glandular-punctate beneath, 5–7-plinerved from and from above the base, subentire, 7.5–13 by 3.5–6(–8.5) cm, midrib and nerves only prominent beneath, reticulation faintly raised beneath; petiole transversely rugose, 7–10 by 2–3 mm. *Inflorescences* few-flowered fascicles from defoliate axils or old wood, glabrous; rachis up to 5 mm. Pedicels 10–12 by 1.5 mm. Bracteoles basal. *Calyx* cup-shaped, tube obconical, c. 4 mm, base decidedly truncate, limb suberect, 2 mm, 5-dented in the upper third or merely apiculate. *Corolla* (submature) cylindrical, fleshy, dark red, 2–2.5 by c. 0.5 cm, shortly 5-lobed. *Stamens* 11–12 and 7–8 mm; *major stamens*: filaments linear, c. 3 mm, \pm densely hairy and ciliate from above base as is the connective; cells elongate-oblong, 9–10 mm including the slightly divergent, c. 3 mm long tubules, base apiculate, curved inward and

set with some hairs; processes \pm connate, appressedly hirsutulous, c. 1.5 mm longer. *Disk* glabrous. *Style* slender, glabrous, c. 2.5 cm.

Distr. *Malesia*: NW. New Guinea (Rouffaer R.), in forest, at c. 250 m. *Fl.* Sept.

53. *Dimorphanthera lancifolia* SLEUM. Blumea 12 (1963) 141.

Epiphytic shrub, glabrous. Branchlets slender, obtusangular. *Leaves* scattered, lanceolate, apex subcaudate-acuminate for c. 2 cm, \pm falcate and acute, base narrowed, subcoriaceous, rather regularly and finely crenulate by \pm impressed, setular, \pm caducous, 3–5 mm spaced glands, 7–9.5 by 1.5–2 cm, 5-plinerved from and from c. 1 cm above the base (outer pair often \pm indistinct), midrib and nerves \pm impressed or flat above, prominent beneath, veins slightly raised beneath only, reticulation \pm obscure; petiole 4–6(–7) by 1–1.5 mm. *Fascicles* 3–6(–8)-flowered, from foliate and defoliate axils; rachis almost 0. Pedicels 8–12 by 1 mm. Bracteoles subbasal, subulate, glandular-fimbriate. *Calyx* tube subcylindrical, base truncate, 1.5–2 mm, limb erecto-patent, 2–2.5 mm, lobes much depressedly ovate, apiculate or obtuse, c. 0.6 mm. *Corolla* tubular, fleshy, white, glabrous, c. 1.4 cm, c. 4 mm \varnothing at base, c. 6 mm across limb, lobes acute, c. 2 mm. *Stamens* 9 and 7 mm; *major stamens*: filaments appressed-hairy upwards, c. 4 mm; cells narrow-oblong, base rostrate, 7 mm including the 2.5 mm long tubules; processes \pm connate, hirsutulous, c. 1 mm longer. *Disk* glabrous. *Style* slender, glabrous, c. 2 cm.

Distr. *Malesia*: New Guinea (Torricelli Mts). One collection.

Ecol. Epiphyte on tall tree in high forest, c. 1525 m. *Fl.* Sept.

Vern. *Emingo*, Wapi: Wigote.

54. *Dimorphanthera calodon* SLEUM. Bot. Jahrb. 70 (1939) 121; Nova Guinea, Bot. n. 7 (1961) 98.

Large scandent shrub, c. 8 m. Branchlets subangular, densely short-pubescent, glabrescent. *Leaves* lax, ovate-oblong or ovate-elliptic, apex acuminate (1 cm), bluntish, base broadly truncate-rounded or mostly subcordate, coriaceous, stiff, initially laxly pubescent, finally glabrous the midrib excepted, laxly and shortly yellowish pubescent beneath, tardily glabrescent on midrib and nerves, moreover laxly glandular-subsetulose or finally -punctate beneath, 6–9 by 3–4 cm, margin regularly subserrate-denticulate by distinct, blackish, callose-thickened, subpersistent, bristle-like, c. 3 mm spaced glands, c. 0.2 mm long, 5–7-plinerved from and from above the base, with another higher pair of curved-ascending nerves, all \pm impressed above, \pm prominent beneath, reticulation obscure above, faintly raised beneath; petiole densely hairy, 5–7 by 1.5–2 mm. *Racemes* axillary, 8–12-flowered, densely yellowish hairy to -subtomentose, glabrescent; rachis stout, 2–2.5 cm. Pedicels 8–10 by 1 mm. Bracteoles basal. *Calyx* tube \pm semiglobose, c. 3 mm, limb suberect or \pm spreading, 2.5 mm, 5-lobed half-way, lobes broadly ovate-acuminate, apiculate.

Corolla cylindrical, \pm dilated distally, \pm fleshy, red, white tipped, 2.8–3 cm by c. 5 mm, lobes 4 mm. *Stamens* 9–10 and 7.5 mm; *major stamens*: filaments c. 3 mm, above the base densely set with appressed fulvous substrigose hairs as is the connective; cells narrow-oblong, base subacute, c. 7 mm including the divergent, 2 mm long tubules; proper processes replaced by ferruginous hairs at the back of the tubules to almost their top. *Disk* glabrous. *Style* thick-filiform, glabrous, c. 3.6 cm, much exserted. *Fruit* subglobose, \pm glabrous, c. 8 mm σ .

Distr. Malesia: SE. New Guinea (Central Distr., Wharton Ra.: Murray Pass). One collection.

Ecol. In forests, at 2840 m, locally fairly common. *Fl.* July.

55. *Dimorphanthera prainiana* (KOORD.) J. J. S. Nova Guinea 12 (1914) 148; SLEUM. Bot. Jahrb. 70 (1939) 124; Nova Guinea, Bot. n. 7 (1961) 98; Blumea 12 (1963) 142. — *Agapetes prainiana* KOORD. Nova Guinea 8 (1912) 886. — **Fig. 126.**

Shrub. Branchlets stout, terete, glabrous, tips slender, finely pubescent. *Leaves* ovate-lanceolate, apex caudate-acuminate (c. 1.5 cm), base broadly attenuate, basal glands inconspicuous, coriaceous, glabrous, laxly blackish punctate beneath, entire or practically so, (4–)6–14 by (1.5–)2–5.5 cm, 5–7-plinerved from and from a little above the base, nerves slightly impressed above, prominent beneath, veins laxly reticulate and raised beneath, finer reticulation rather faint; petiole \pm flattened, 4–5 by 2 mm. Stipule-like perulae in the upper axils, or slightly supra-axillary, finally caducous. *Fascicles* axillary, (5–)6–10-flowered. Pedicels very slender, glabrous or with some sparse bristle-like glandular hairs, 10–15 mm. Bracteoles subbasal. *Calyx* tube cup-shaped or semiglobose, 2 by 2 mm, base rounded, with short, lax, \pm crisped or subappressed subglandular setular hairs, limb spreading or reflexed, 1 mm, subacutely 5-dented almost to the base. *Corolla* tubular, membranous, scarlet to almost carmine, 1.3–1.5 cm by c. 4 mm, outside with lax glandular bluntish yellowish hairs as found on pedicel and calyx, lobes c. 2 mm. *Stamens* 4.5–5 and 3.5 mm; *major stamens*: filaments 1.5 mm, laxly hairy upwards; cells narrow-oblong, 3.5–4 mm including the widely divergent, c. 1.8 mm long tubules, membranous, base apiculate; connective laxly hairy at the back of the cells, \pm indistinct, evanescent upwards and not continued on the back of the very thin tubules. *Disk* glabrous. *Style* filiform, glabrous, c. 2 cm.

Distr. Malesia: W. New Guinea (Vogelkop Peninsula: Nettoti Mts; Oranje Mts: Mt Hellwig). *Fl.* Nov.–Dec.

56. *Dimorphanthera vonroemeri* (KOORD.) J. J. S. Nova Guinea 12 (1914) 148; SLEUM. Bot. Jahrb. 70 (1939) 124; Nova Guinea, Bot. n. 7 (1961) 98. — *Agapetes vonroemeri* KOORD. Nova Guinea 8 (1912) 886. — *D. obovata* J. J. S. Med. Rijks-herb. n. 25 (1915) 8 (as to flowers); Nova Guinea

12 (1917) 514; *ibid.* (1918) t. 208, as to flowers, *nom. illeg.*

Shrub scandent, up to 10 m. Branchlets pubescent, slender. *Leaves* scattered, on top of 1–4 cm long lateral branchlets, ovate to oblong-ovate, apex subcaudate-acuminate (c. 2 cm), tip bluntish, base rounded, basal glands \pm imperceptible, coriaceous, glabrous, smooth and rather lustrous above, laxly glandular-punctate beneath, entire, 6–10 by 3–5.5 cm, 5-plinerved from and from a little above the base, nerves faintly raised above, more distinct beneath, reticulation obscure; petiole c. 2 mm. *Fascicles* c. 3-flowered from old wood, \pm densely short-pubescent. Pedicel slender, 8–13 mm. Bracteoles minute, subbasal. *Calyx* tube



Fig. 126. *Dimorphanthera prainiana* (KOORD.) J. J. S. Mt Nettoti, Kebar valley, NW. New Guinea (VAN ROYEN & SLEUMER 7401) (SLEUMER, 1961).

obconical, base \pm attenuate, articulation \pm indistinct, 2.5 by 2.5 mm, limb spreading, \pm reflexed, 1.5 mm, obtusely 5-lobed \pm halfway. *Corolla* tubular, thin, red with white stripes, c. 1.5 cm by 4 mm, lobes c. 2 mm. *Stamens* 9 and 7.5 mm; *major stamens*: filaments glabrous or distally with some very short hairs, c. 4.5 mm; cells narrow-oblong, granular at the obtuse base, c. 6 mm including the thin, \pm divergent, c. 3 mm long tubules; connective represented by some very short hairs at the back of the cells, evanescent distally. *Disk* glabrous. *Style* rather slender, 1.8 cm.

Distr. *Malesia*: Central New Guinea (Oranje Mts: Wichmann and Perameles Mts).

Ecol. In forest, 900–3000 m. *Fl.* Nov.

Note. The leaves of *D. obovata* J. J. S. belong to a *Diplycosia*; the name must hence be rejected.

57. *Dimorphanthera parviflora* J. J. S. Nova Guinea 18 (1936) 106, t. 24, f. 2; SLEUM. Bot. Jahrb. 70 (1939) 124; Nova Guinea, Bot. n. 7 (1961) 98.

Epiphytic shrub or small liana. Branchlets obtusangular, glabrous. *Leaves* lax, lanceolate or ovate-, sometimes oblong-lanceolate, apex \pm gradually acuminate, or subcaudate, subacute, base broadly attenuate to obtuse, sometimes rounded, basal glands minute, coriaceous, glabrous, entire or nearly so, 8.5–16.5 by 2.6–4.8 cm, 7-plinerved from and from somewhat above the base, nerves and midrib \pm prominent above, more distinctly so beneath, reticulation lax, \pm raised beneath only; petiole (2.5–)4–7 by 1.5–2 mm. *Fascicles* c. 3-flowered from defoliate axils or old wood. Pedicels slender, puberulous, 16–19 mm. Bracteoles basal. *Calyx* dark red, tube broadly tubular, slightly 5-angular, base truncate, subdensely to laxly short-pubescent, 2–3 mm, limb \pm spreading, 1.5–2 mm, very shortly 5-dented, or subentire. *Corolla* tubular, membranous, light red, whether or not with dark red longitudinal stripes, c. 1.5 cm by 3 mm, subdensely to laxly short-pubescent at least in upper half, lobes c. 2 mm. *Stamens* 7–9 and 6–6.5 mm; *major stamens*: filaments very laxly hairy upwards, c. 4 mm; cells narrow-oblong, base with an acute, inward-curved beak, echinulate, c. 4 mm including the \pm divergent, c. 2 mm long tubules; connective laxly hairy at the back of the cells, no processes. *Disk* glabrous. *Style* slender, c. 1.6 cm.

Distr. *Malesia*: West New Guinea (Rouffaer R.), in thin-stemmed primary forest, 250–300 m. Two collections. *Fl.* Sept.

58. *Dimorphanthera vaccinioides* SLEUM. Blumea 12 (1963) 142.

Scandent shrub. Branchlets terete, slender, glabrous. *Leaves* lax, subovate- or oblong-elliptic, apex acuminate, tip obtuse, base cuneate, subcoriaceous, glabrous, remotely and \pm indistinctly subserrate-crenulate, 5–7 by 2–4 cm, midrib and nerves slightly prominent above, more distinctly so beneath, nerves 2(–3) pairs, high curved-ascending from and a little from above the base;

petiole 4–6(–7) by c. 1 mm. *Flowers* in 1–3-flowered axillary fascicles. Perulae minute. Pedicels slender, subdensely puberulous in upper half, reddish, 1.5–2 cm. *Calyx* finely pubescent, tube green, cupular, 1.5–2 by c. 3 mm, limb erect, denticulate, 1–1.5 mm. *Corolla* tubular, thin, light red, c. 2.2 cm long, c. 4 mm ϕ , finely pubescent outside, glabrous inside, lobes erect, 1.5 mm. *Stamens* 6.5 and 5 mm; *major stamens*: filaments c. 3 mm, laxly hairy towards the connective; cells including tubules 5 mm, tubules close together, connective hardly distinct at their back, indicated merely by a few hairs. *Disk* glabrous. *Style* very slender, c. 1.5 cm.

Distr. *Malesia*: West New Guinea (Wissel Lakes), in primary *Agathis* forest on sandy clay at 1800 m.

Vern. *Korè*, Kapauku.

59. *Dimorphanthera parvifolia* J. J. S. Nova Guinea 18 (1936) 106, t. 25, f. 1; SLEUM. Bot. Jahrb. 70 (1939) 124; Nova Guinea, Bot. n. 7 (1961) 98.

Shrub, c. 2 m. Branchlets obtusangular, tips minutely patent-puberulous. *Leaves* dense, oblong to lanceolate-elliptic, apex gradually acuminate, obtuse, base broadly cuneate, bluntish, basal glands \pm inconspicuous, coriaceous, rigid, glabrous, margin markedly; subserrate-crenulate, thickened, 1.5–2.5 by 0.4–0.9(–1) cm, midrib impressed above, obtusely prominent beneath, nerves 1–2 pairs ascending from the base, faintly raised beneath or obscure, reticulation 0; petiole rather robust, 2–4 mm. *Flowers* 1–2 in upper axils, nodding, glabrous. Pedicel robust, c. 10 mm. Bracteoles basal. *Calyx* cup-shaped, tube subcylindric, base \pm rounded, 3 mm, limb 2 mm, subacutely 5-lobed almost to the base. *Corolla* subtubular, \pm dilated towards the mouth, rather fleshy, dark red, 1.8–2 cm by 3–4 mm ϕ at base, c. 6(–8) mm across the limb, lobes c. 2 mm. *Stamens* 7.5 and 6 mm; *major stamens*: filaments c. 3 mm, glabrous or laxly ciliate in the upper part and at the connective; cells narrow, base acute and echinulate, 5.5 mm including the much divergent, 2 mm long tubules. *Disk* glabrous. *Style* rather slender, \pm as long as the corolla or but shortly exerted.

Distr. *Malesia*: West New Guinea (Doormantop), in sheltered ravine at 3200 m. One collection. *Fl.* Oct.

60. *Dimorphanthera alpivaga* SLEUM. Nova Guinea, Bot. n. 7 (1961) 98.

Low shrub. Branchlets obtusangular, laxly pubescent at the tips. *Leaves* subdense, oblong-elliptic, elliptic, or obovate-elliptic, apex broadly and shortly acuminate, obtuse, rarely \pm rounded, base broadly cuneate or attenuate, basal glands subinconspicuous, coriaceous, glabrous, laxly blackish punctate beneath, regularly subserrate-crenulate (teeth minute, 2–4 mm spaced), 2–3.5 by 1–1.5 cm, midrib faintly impressed above, obtusely prominent beneath, nerves 2 basal and 3–4 upper pairs, mostly obscure above, slightly

raised beneath, reticulation lax, \pm prominent beneath only; petiole rather robust, 2–4 mm. *Fascicles* 2–4-flowered, axillary, glabrous. Pedicels stoutish, c. 1 cm, with several thick papillae or emergences below the calyx. Bracteoles basal. *Calyx* tube cylindrical, base subtruncate, c. 4 by 3 mm, limb \pm spreading, 3 mm, 5-lobed to $\frac{2}{3}$, lobes subacutely ovate-acuminate. *Corolla* tubular, slightly dilated distally, rather fleshy, c. 2 cm by 4 mm σ at base, c. 6 mm across limb, lobes c. 3 mm, reflexed. *Stamens* 8–8.5 and 6.5–7 mm; *major stamens*: filaments very laxly long-hairy or ciliate distally; cells narrow-oblong, very granular, base obtuse, 6 mm including \pm divergent, c. 2 mm long tubules; connective very laxly hairy or glabrous, evanescent towards the tubules. *Disk* glabrous. *Style* filiform, glabrous, 2.2 cm.

Distr. *Malesia*: New Guinea (Mt Carstensz), in alpine meadows, 3700–4300 m. One collection. *Fl. Nov.-Dec.*

61. *Dimorphanthera obtusifolia* SLEUM. *Nova Guinea, Bot. n. 7* (1961) 99.

Scandent shrub. Branchlets rigid, tips angular, glabrous. *Leaves* \pm dense, mostly obovate or elliptic-obovate, more rarely subobovate-oblong, apex shortly and broadly attenuate, obtuse or rounded, base cuneate or attenuate, basal glands \pm distinct, very coriaceous, glabrous, laxly blackish punctate beneath, edge slightly revolute, rather densely 2–5 mm spaced subserrate-crenulate, 2–5.5 by 1–2.5 cm, midrib narrowly immersed above, obtusely prominent beneath, nerves 1–2 basal or slightly suprabasal and curved-ascending, and 3–4 upper, less distinct pairs, all faintly or not impressed above, slightly raised beneath, reticulation none; petiole rugulose, 3–5 by 1–1.5 mm. *Fascicles* axillary, (1–)2–4-flowered, glabrous. Pedicels 5–9 by c. 1 mm. Bracteoles 3 mm, basal. *Calyx* tube subcylindric, 2–2.5 mm σ and long, base subtruncate, limb \pm spreading, 2 mm, 5-dented \pm halfway. *Corolla* cylindrical, 1.5–1.8 cm by c. 4 mm, \pm fleshy, red, lobes c. 2 mm. *Stamens* 6–7 and 5–6 mm; *major stamens*: filaments 2 mm, with some sparse distal papillae; cells narrow, echinulate, base obtuse, 5 mm including the divergent, 1.5 mm long tubules; connective indistinct, indicated merely by a few papillae. *Disk* glabrous. *Style* slender, c. 2 cm, much exerted.

Distr. *Malesia*: West New Guinea (Lake Habbema), in margins of (subalpine) forest, at 3225 m. Two collections. *Fl. Aug.*

62. *Dimorphanthera myzomelae* (BECC.) J. J. S. *Nova Guinea* 12 (1917) 514; *SLEUM. Bot. Jahrb.* 70 (1939) 124; *Nova Guinea, Bot. n. 7* (1961) 99; *Blumea* 12 (1963) 142. — *Agapetes myzomelae* BECC. *Malesia* 1 (1878) 209.

Epiphytic and scandent shrub, glabrous. Branchlets obtusangular, \pm slender, reddish and papillose at the tips. *Leaves* \pm dense to elliptic, in part subobovate, apex shortly and broadly attenuate, obtuse to almost rounded, base broadly attenuate, basal glands indistinct, coriaceous to

subcoriaceous, glabrous, laxly blackish punctate beneath, minutely to more distinctly subserrate-crenulate, 2.5–5.5(–7) by 1.5–2.5 (rarely –4) cm, nerves 2–3 basal, slightly suprabasal, curved-ascending, and a few upper, equally ascending but much shorter nerves, all anastomosing and \pm prominent on both faces, reticulation \pm dense, finely raised on both faces or \pm obscure; petiole 3–5 by 1–1.5 mm, \pm flattened. *Flowers* axillary, 1–3(–6) per fascicle. Pedicel stoutish, 1–1.5 cm. Bracteoles at $\frac{1}{3}$ or halfway. *Calyx* tube narrow-obconical, base \pm rounded, c. 3 by 2.5 mm, limb much spreading, 1.5 mm, deeply 5-lobed, lobes ovate-acuminate, subacute. *Corolla* pink to red, sometimes green, tubular, thin, 1.5–2 cm by c. 4–5 mm, lobes finally reflexed, c. 2.5 mm. *Stamens* 6 and 5 mm; *major stamens*: filaments c. 3 mm, glabrous or papillose; cells oblong, granular, base obtuse, 4 mm including the \pm divergent, 1.5 mm long tubules; connective indicated merely by some very short hairs at the back of the cells. *Disk* glabrous. *Style* very slender, glabrous, \pm as long as the corolla.

Distr. *Malesia*: NW. New Guinea (Arfak and Wondiwoi Mts), at 800–2000 m. *Fl. March-July.*

Vern. *Anggam, mengaamkubei, n̄rettingoi*, Hattam.

63. *Dimorphanthera microphylla* SLEUM. *Nova Guinea, Bot. n. 7* (1961) 100; *Blumea* 12 (1963) 142; *ibid.* 12 (1964) 345.

Erect, subscandent shrub or treelet, up to 4 m. Branchlets subtrigonal and deeply grooved at the youngest, quite glabrous parts. *Leaves* dense, lanceolate, oblong-lanceolate or ovate-oblong, apex shortly acuminate, subacute or bluntish, base broadly attenuate or obtuse, basal glands indistinct, \pm rigidly coriaceous, convex above, edge revolute (dry), laxly long-ciliate when young, later glabrous, 1.5–3 by 0.4–0.8(–1) cm, 2–4 mm spaced subserrate-crenulate, midrib \pm deeply impressed above, obtusely prominent beneath, nerves 1 basal and 2–3 upper pairs, faintly impressed or obscure above, minutely raised beneath, not rarely inconspicuous, reticulation none; petiole 2–4 by 0.5–1 mm. *Flowers* 1–3 per fascicle in the upper axils, nodding, glabrous. Pedicels robust, (0.7–)1–1.5 cm. Bracteoles basal. *Calyx* tube subsemiglobose or almost obconical, 4–5 by 3–4 mm, limb erecto-patent, 3–4 mm, lobes broad-ovate, apiculate, 2–3 mm. *Corolla* tubular, slightly widened towards the mouth, \pm fleshy, glossy, bright red or orange, with white to cream tips, throat pink, 2.8–4 cm by 6 mm σ at base, c. 10 mm across limb (5 by 1.2 cm, fresh), lobes deltoid, 4–5 mm, finally reflexed. *Stamens* 10–12 (–14) and 8.5–10(–12) mm; *major stamens*: filaments ciliate upwards, c. 4 mm; cells narrow-oblong, base obtuse, echinulate, 8–9(–11) mm including the \pm divergent, c. 3 mm long tubules; connective subdensely to laxly long-hairy, or glabrous, a dark ribbon connate with the tubules, or \pm evanescent distally. *Disk* glabrous. *Style* \pm slender, glabrous, 5–8 mm exerted. *Fruit* blackish, subglobular, c. 8 mm σ .

Distr. *Malesia*: East New Guinea (E. slope of Mt Wilhelm and Mt Kinkain in the Kubor Ra.).

Ecol. In edges of patches of subalpine forest, or rarely alpine grassland, 3350–3650 m, locally common. *Fl. fr.* June–Sept.

64. *Dimorphanthera wrightiana* (KOORD.) J. J. S. Nova Guinea 12 (1914) 148; *ibid.* 12 (1917) 516; SLEUM. Bot. Jahrb. 70 (1939) 124; Nova Guinea, Bot. n. 7 (1961) 100; Blumea 12 (1963) 142. — *Agapetes wrightiana* KOORD. Nova Guinea 8 (Sept. 1912) 887, t. 157. — *D. d'armandvillei* J. J. S. Bull. Jard. Bot. Btzg II, 8 (Oct. 1912) 54; Nova Guinea 12 (1914) 146, 148, t. 38 A.

Shrub, c. 2 m. Branchlets subterete, glabrous. *Leaves* lax, ovate to oblong-ovate, apex caudate-acuminate (2–3 cm), subacute, base broadly attenuate, sometimes \pm rounded, basal glands small though distinct, coriaceous, glabrous, very laxly or not glandular-punctate beneath, remotely denticulate to subentire, 6–15 by 2.5–8 cm, 5(–7)-plinerved from and from somewhat above the base, nerves and lax reticulation \pm impressed above, raised beneath, veinlets prominent-reticulate only beneath; petiole 4–6 by 1.5–2 mm. *Flowers* 1–3 per fascicle, glabrous. Pedicels \pm slender, 10–13 mm. Bracteoles minute, basal. *Calyx* tube cup-shaped to subobconical, base rounded or attenuate, 3–4 by c. 3 mm, limb suberect or \pm spreading, 1.5 mm, very shortly obtusely 5-lobed. *Corolla* tubular, bright red, 1.5–1.8 (–2) cm by 4–5 mm, lobes subacute, c. 2.5 mm. *Stamens* 7–7.5 and 5.5–6 mm; *major stamens*: filaments 2.5 mm, sparingly hairy or ciliate upwards; cells narrow-oblong, base subacute, 5–5.5 mm including the \pm divergent, 1.5 mm long tubules; connective sparsely hairy at the back of the cells, evanescent upwards. *Disk* glabrous. *Style* slender, glabrous, \pm exserted.

Distr. *Malesia*: West New Guinea (Wissel Lakes, Hellwig and Johannes Keyts Mts, and Bele R. near Lake Habbema).

Ecol. In forest and forest openings, 2000–2600 m. *Fl.* Nov.–Jan.

65. *Dimorphanthera dryophila* SLEUM. Nova Guinea, Bot. n. 7 (1961) 101.

var. dryophila.

Shrub or large liana, up to 20 m. Branchlets obtusangular, glabrous. *Leaves* lax, ovate, ovate-lanceolate or oblong or elliptic-oblong, apex

shortly (1–1.5 cm) acuminate, tip bluntnish, base broadly attenuate to \pm rounded, basal glands distinct, coriaceous, \pm densely 1–3 mm spaced subserrate-denticulate, glabrous above, laxly set with minute appressed glandular bristles initially beneath, at full age very laxly or not glandular-punctate there, 7–16 by 2.5–7 cm, 5–7-plinerved from and from a little above the base, midrib and nerves impressed above, prominent beneath, reticulations \pm dense, subinconspicuous above, \pm prominent beneath; petiole 7–10 by c. 2 mm. *Fascicles* 3–5-flowered, axillary, glabrous; rachis nearly 0. Pedicels 7–10 by 1.5–2 mm. Bracteoles 2 concave, ovate, 5–7 by 3–5 mm. *Calyx* tube broad-cylindric to obconical, 4–5 by c. 5 mm, base \pm rectangularly truncate, limb erect, 3–4 mm, lobes deltoid, subacute, 2–3 mm. *Corolla* tubular, fleshy, red, c. 2 cm by 5–6 mm, lobes 2 mm. *Stamens* 10 and 8.5 mm; *major stamens*: filaments 3 mm, glabrous or very laxly long-hairy upwards; cells narrow-oblong, base contracted into an inward curved beak, 7 mm including the \pm divergent, 2.5 mm long tubules; connective thickened at the back of the cells, glabrous or very sparsely hairy, evanescent towards the tubules. *Disk* glabrous. *Style* \pm slender, glabrous, c. 2.3 cm. *Fruit* subglobose, apex truncate, c. 8 mm ϕ (dry submature).

Distr. *Malesia*: SE. New Guinea (Milne Bay Distr. mainland and Goodenough and Normanby Is.).

Ecol. Frequent in mossy oak forest, 820–1600 m. *Fl.* Oct.

var. trichoclada SLEUM. Nova Guinea, Bot. n. 7 (1961) 101.

Branchlets and *leaves* (especially underneath) covered by a \pm dense almost velutinous tomentum. Bracteoles ciliate. *Corolla* pink. Mature *fruit* black, soft, palatable, c. 1.5 cm ϕ .

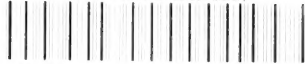
Distr. *Malesia*: New Guinea (Milne Bay Distr.: N. slope of Mt Dayman), frequent in mossy forest at 2230 m. One collection. *Fl. fr.* May.

Excluded

Catãnthera F. v. M. J. Bot. 24 (1886) 289; Descr. Not. 9 (1890) 63; SCHLTR, Bot. Jahrb. 55 (1918) 193 = *Melastomataceae*.

Mischopleura WERNH. Trans. Linn. Soc. II, Bot. 9 (1916) 99 = *Sericolea* SCHLTR, cf. GIBBS, Arfak (1917) 148; SCHLTR, in Fedde, Rep. 16 (1919) 30 (*Elaeocarpaceae*).





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FLORA MALESIANA

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