

REVISION OF NEOALSOMITRA (CUCURBITACEAE)

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SUMMARY

Neosalsmitra contains 11 species, one of which, *N. clavigera*, is widespread, covering the whole range of the genus from NE India and S China into Australia and the Pacific. The genus is heterogeneous in having species with free stamens and species with the filaments connate; however, this cannot be used for subdivision. *Neosalsmitra hederifolia* and *N. schefferiana* are podagric succulents, i.e. with thickened stem-bases. *Neosalsmitra pilosa* W.J. de Wilde & Duyfjes (New Guinea) is newly described; new combinations are *N. hederifolia* (Decne.) W.J. de Wilde & Duyfjes and *N. schefferiana* subsp. *podagrica* (Steenis) W.J. de Wilde & Duyfjes.

Key words: Cucurbitaceae, *Neosalsmitra*, SE Asia.

INTRODUCTION

After its segregation from *Alsomitra* (Hutchinson, 1942) the SE Asian genus *Neosalsmitra* (subfam. Zanonioideae, subtribe Zanoniiinae) has remained very heterogeneous; it contains annual as well as long-lived perennial species.

The definition and distinction of genera within Cucurbitaceae is not particularly problematic, but has led to a comparatively large proportion of monotypic genera. A criterion of good standing is whether the filaments are free or united into a column. However, in *Neosalsmitra*, a genus with 11 species, about half of the species have the filaments partially or completely fused in contrast to species with free stamens. Rather than splitting up the genus again, we prefer to maintain its present circumscription and accept this variable character state as a peculiarity of *Neosalsmitra* (though a similar variation is sporadically known in other genera, e.g. in *Coccinia* of subfam. Cucurbitaceae). This means that within subfamily Zanonioideae male flowering specimens of those species of *Neosalsmitra* in which the stamens are fused can no longer be keyed out in a simple way from *Gynostemma* (a genus with fused stamens, but different in many respects).

The Australian *N. capricornica* forms with *N. pilosa* and *N. schultzei* (New Guinea) the most aberrant group of species, tempting its splitting off into a separate genus, when compared for instance with *N. clavigera*. The latter also occurs in Australia and New Guinea and is readily distinct by its stout, perennial habit, and compound leaves. The characters uniting the former 3 species are: 1) more tiny, annual growth habit; 2) leaves simple, entire or coarsely dentate, or palmately lobed or palmatisect; 3) flowers monoecious, with the solitary fruit (female flower) borne on the otherwise male-flowered panicle; 4) perianth of male flowers at anthesis rather bowl-shaped, not flattish-rotate;

5) filaments united into a column; 6) capsules thin-textured, small. However, most of these characters appear not to be unique when compared to the characters of the other species of *Neoalsomitra*: an annual growth habit is found in *N. plena* (Thailand); simple, entire or lobed leaves are shared with *N. simplex* and *N. plena* (both Thailand); a bowl-shaped perianth at anthesis is shared with *N. simplex* and *N. hederifolia* (Lesser Sunda Islands); filaments wholly or largely united into a column are also found in *N. angustipetala* (Thailand), *N. hederifolia* and *N. schefferiana* (E Malesia); small, thin-textured capsules are shared with *N. plena* and *N. schefferiana*. Only the monoecism and the solitary female flowers seem to hold as separating characters. Although sex expression surely is a distinctive quality in genus delimitation, monoecious species are found for instance among the species of the mainly dioecious *Trichosanthes*.

We have refrained from subdividing the genus, also because of the winged seeds in all eleven species of *Neoalsomitra* are remarkably uniform (Fig. 1).

NEOALSOMITRA

Neoalsomitra Hutch. (1942) 97. — Lectotype: *Neoalsomitra sarcophylla* (Wall.) Hutch.

Alsomitra M. Roem. (1846) 117, p.p. (non *Zanonia* sect. *Alsomitra* Blume); Hook.f. (1867) 840; Cogn. (1881) 928; (1916) 11.

Climbers, annual or perennial, with or without tuberous rootstock. Leaves simple or compound, subcircular in outline, lateral leaflets sometimes smaller and unequal sided, margin mostly entire. *Tendrils* 2-branched at apex. *Flowers* dioecious or monoecious, small, pale creamy yellowish or greenish. Inflorescences lateral (and terminal), in male mostly many-flowered, paniculate with ultimate branches fine, raceme-like, pedicels persistent; in female paniculate or raceme-like, fewer-flowered. *Male flowers*: rotate or broadly bowl-shaped; receptacle flat or shallow; disc absent or in *N. schultzei* inconspicuous; sepals 5, free; petals 5, imbricate in bud, very short-connate at base; stamens 5, inserted centrally, \pm out-curved, filaments free or partially or wholly fused, anthers small, 1-theous, extrorse, often with a minute dark dot adaxially. *Female flowers*: ovary cylindrical-clavate, imperfectly 3-locular, ovules 5(–10) per placenta, pendulous, styles 3, short, stigma deeply lunate; staminodes present only in *N. plena*. *Fruits* medium-sized cylindrical-clavate *capsules*, apex truncate, 3-valvate, perianth-scar 0.5–2(–2.5) mm from orifice. *Seeds* alternate in each row (wings imbricate), flat, faces (finely) tubercled or smooth, margin narrow or broad, double (not or hardly so in *N. balansae*, *N. sarcophylla*), subentire or finely or coarsely dentate, with apically an \pm oblique membranous translucent wing.

A genus of 11 species, distributed from NE India and S China to Australia and into the Pacific, 1 species, *N. clavigera*, covering the whole area of the genus.

KEY TO THE SPECIES

- 1a. Leaves (of adult or fertile shoots) simple, entire or lobed 2
 b. Leaves (of adult or fertile shoots) compound 7
 2a. Leaf blade not lobed, ovate-cordate. — Thailand **11. N. simplex**
 b. Leaf blade \pm 5-angular, or shallowly to deeply (palmately) lobed, ovate or subcircular in outline 3

- 3a. Dioecious; plant not tuberous. Petals \pm elliptic-oblong, long-acute. Filaments wholly free. Fruit glaucous, glabrous. — Thailand **7. N. plena**
- b. Monoecious or dioecious; plant tuberous (always?). Petals (ob)ovate, \pm obtuse, mucronate or not. Filaments partly or wholly united. Fruit green, glabrous or hairy. — E Malesia, Australia 4
- 4a. Dioecious(?). Plant tuberous. Inflorescences (infructescences) twice branched. Petals adaxially papillose. Filaments largely or completely fused. Fruit glabrous. — Kangean, Timor. **5. N. hederifolia**
- b. Monoecious. Plant not tuberous(?). Inflorescences not or once-branched. Petals adaxially not papillose. Filaments connate in the lower half. Fruit glabrous or hairy 5
- 5a. Plant, including fruit, densely soft-hairy, drying (dark) brown. — E Papua New Guinea **6. N. pilosa**
- b. Plant subglabrous or sparsely hairy, drying green. Fruit glabrous or sparsely glandular-hairy 6
- 6a. Fruit glabrous. [Fruit (female flower) solitary on the node or in otherwise male panicle.] — Papua New Guinea. **10. N. schultzei**
- b. Fruit sparsely hispid-glandular hairy. [Fruit (female flower) borne on otherwise male panicle (always?).] — NE Queensland **3. N. capricornica**
- 7a. Leaves 3-foliolate, petiole less than 0.5 cm long; leaflets carnose, wrinkled on drying, apex usually obtuse. Fruit 3–4 cm long. Seeds shortly 2-horned. — SE Continental Asia, E Malesia. **8. N. sarcophylla**
- b. Leaves 3- or 5-foliolate, petiole 0.5–3(–5) cm long; leaflets membranous (slightly carnose in *N. balansae*), not wrinkled on drying, apex (obtuse or) acute. Fruit 2–8 cm long. Seeds entire, or horned, or star-shaped by coarsely 5–7 (double) dentate margin 8
- 8a. Apex of leaflets obtuse or acute. Stamens wholly united into a column. Male petals narrow, linear, resembling and about as long as sepals. [Fruit 4–6 cm long. Seed margin sub-entire.] — Thailand. **1. N. angustipetala**
- b. Apex of leaflets acute. Stamens free or partly united. Male petals wider, ovate to (narrowly) elliptic, much longer than sepals 9
- 9a. Small climber to 5 m long, not tuberous. Male panicles narrow; perianth c. 8 mm diameter. [Fruit c. 2.5 cm long, glaucous.] — Thailand **7. N. plena**
- b. Robust climber, 5 m long or more, tuberous or not. Male panicles broad or narrow; perianth 3–8 mm diameter 10
- 10a. Filaments partly united. Fruit c. 2 cm long. Stem towards base thorny. — East Malesia **9. N. schefferiana**
- b. Filaments free. Fruit 4–8 cm long. Stem not thorny. — SE Asia, Malesia, Australia, Pacific. 11
- 11a. Leaves 3-foliolate, petiole rather short, 0.5–1 cm long; leaflets slightly carnose, without glands. Fruit 5–6 cm long, narrowed at base. Seeds longly 2-horned. — North Vietnam. **2. N. balansae**
- b. Leaves 3–5-foliolate, petiole comparatively longer, 0.5–3(–5) cm long; leaflets not carnose, often with glands on margin at base of lateral leaflets. Fruit 4–8 cm long, base narrow or broad. Seeds coarsely 5–7-toothed, star-shaped — SE Continental Asia including S China through East Malesia to Australia and the Pacific **4. N. clavigera**

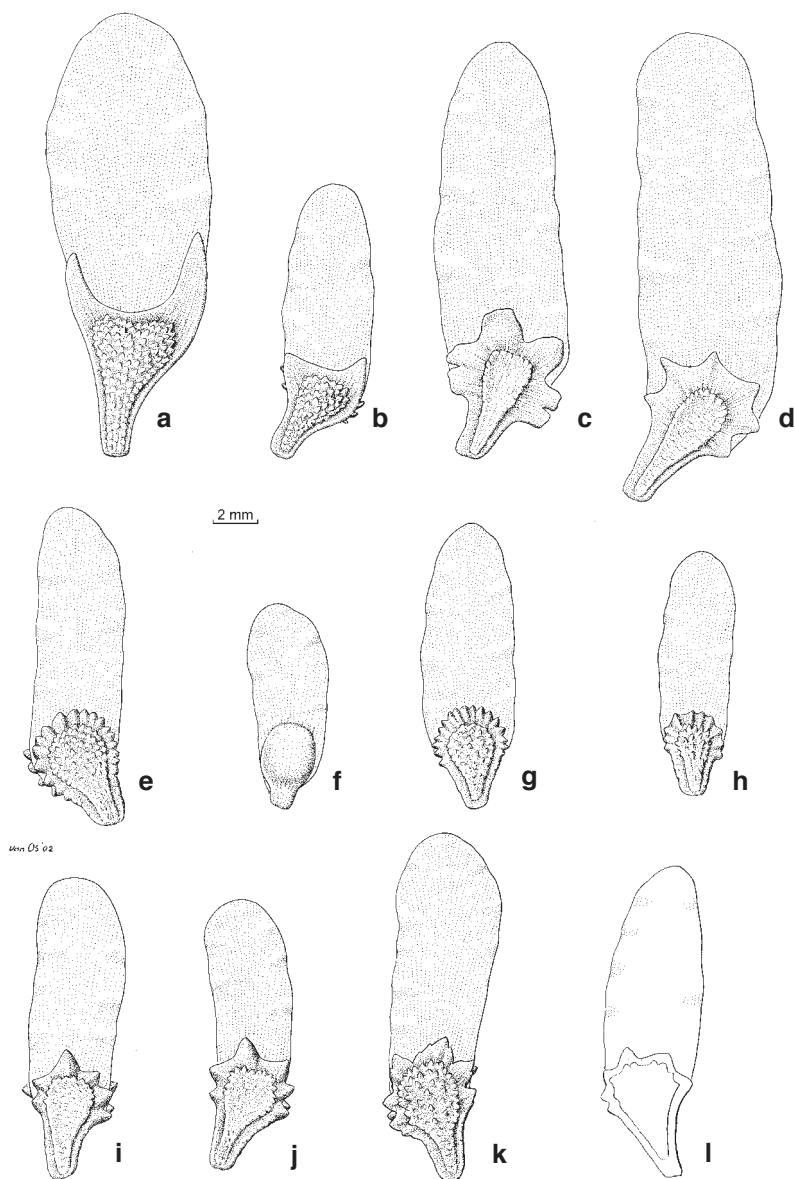


Fig. 1. Seeds of *Neolalsomitra*. a. *N. balansae* (Gagnep.) Hutch.; b. *N. sarcophylla* (Wall.) Hutch.; c. *N. clavigera* (Wall.) Hutch.; d. *N. simplex* (Craib) Hutch.; e. *N. angustipetala* (Craib) Hutch.; f. *N. plena* (Craib) Hutch.; g. *N. schefferiana* (Cogn.) Hutch. subsp. *schefferiana*; h. *N. schefferiana* (Cogn.) Hutch. subsp. *podagrica* (Steenis) W.J. de Wilde & Duyfjes; i. *N. hederifolia* (Decne.) W.J. de Wilde & Duyfjes; j. *N. pilosa* W.J. de Wilde & Duyfjes; k. *N. schultzei* (Cogn.) Hutch.; l. *N. capricornica* (F. Muell.) Hutch. (a: *Balansa* 4022, Vietnam; b: *Maxwell* 00-163, Thailand; c: *Chuang* 3172, Taiwan; d: *Maxwell* 89-80, Thailand; e: *Pooma et al.* 3037, Thailand; f: *Pooma et al.* 2102, Thailand; g: *Teijsmann* 11854, Celebes; h: *Pleyte s.n.*, Bogor, garden number XVIII-A-45a, orig. Timor; i: *Anonymous*, barcode P218587, Timor; j: *Carr* 12477, Papua New Guinea; k: *Brass* 8149, Papua New Guinea; l: adapted from Fig. 36H in Telford, 1982).

1. *Nealsomitra angustipetala* (Craib) Hutch. — Fig. 1e, 2

Nealsomitra angustipetala (Craib) Hutch. (1942) 99. — *Gynostemma angustipetala* Craib (1913) 69. — *Alsomitra angustipetala* (Craib) Craib (1931) 767. — Type: *Kerr 1332* (lecto K, here chosen), N Thailand (Doi Sootep).

Perennial climber, 2–4 m tall, with tuberous root (Fig. 2a), puberulous, stem glabrescent; dioecious. *Leaves* (3–)5-foliolate (see notes), membranous or thinly chartaceous, 4–10 cm diam., glands absent; petiole 1–2.5 cm long; leaflets all separately stalked, petiolules to 1 cm long, elliptic or oblong(-oblanceolate), 2–10 by 2–2.5 cm, base ± attenuate, apex (sub)acute or obtuse, sometimes ± retuse, 1–2 mm mucronate, lateral veins 3–5 per side, the lower strongest, veins densely short pubescent. *Male inflorescences* paniculate, 5–15 by 3–10 cm, rachis and branches puberulous; bracts linear, 2–3 mm long. *Male flowers*: 1(–3) per bract, pedicel 3–6 mm long, bud ovoid; *perianth* rotate, 6–8 mm diam., *receptacle* flat, c. 1 mm diam., sepals and petals very similar, 10(–14) in number, whole flower sparsely glandular hairy. *Sepals* lanceolate-linear, c. 3 mm long, acute. *Petals* 3–4 by 0.4–0.7 mm. *Filaments* connate into c. 0.5 mm long column (occasionally one stamen free); anthers (3 or) 5, less than 0.5 mm long, free or rarely two connate. *Female inflorescences* raceme-like, to 5 cm long. *Female flowers* ovary conical, 4–6 mm long, subglabrous, styles less than 0.5 mm long, stigma lobulate, perianth ± as in male. *Capsule* solitary or up to 10 per infructescence; capsule 4–6.5 cm long, base short or long attenuate, apex truncate, 1–1.5 cm wide, glabrous; fruiting pedicel 4–10 mm long. *Seeds* many, obpyriform, 6–7.5 by 4–6 mm, margin narrow, finely tuberculate, faces finely tuberculate, wing 8–13 by 4–7 mm.

Distribution — Endemic to Thailand.

Habitat & Ecology — In mixed (deciduous, dry) dipterocarp and bamboo forest, also on limestone; altitude 100–400 m.

Notes — 1. The completely united stamens in this species are reminiscent of the genus *Gynostemma*.

2. The first leaves of shoots of the sprouting tuber are simple and slightly fleshy in the fresh state. Leaves in adult plants are normally 5-foliolate, but 3-foliolate in association with inflorescences.

2. *Nealsomitra balansae* (Gagnep.) Hutch. — Fig. 1a

Nealsomitra balansae (Gagnep.) Hutch. (1942) 101. — *Alsomitra balansae* Gagnep. (1918) 371; (1921) 1090, f. 127, 2–3. — Type: *Balansa 4022* (lecto P, here chosen), Tonkin.

Small subherbaceous climber, glabrous; dioecious. *Leaves* 3-foliolate, slightly carnose but not wrinkled on drying, 8–16 cm diam., glands absent; petiole c. 1 cm long; leaflets ovate-oblong, 6–10 by 4–5 cm, base attenuate into petiolule, apex acute(-acuminate), minutely acuminate, midvein stout, pale, nerves 3 or 4 pairs; petiolules 5(–10) mm long. *Male inflorescences* lax, delicate, widely branched panicles, 13–20 by 10–15 cm, puberulous, terminal racemes condensed with (1–)2–7 flowers; bracts linear, c. 1 mm long, subcaducous. *Male flowers*: pedicel 1.5–2 mm long; *perianth* almost glabrous, very minutely papillose, 2–2.5 mm diam., *receptacle* less than 1 mm wide; *sepals* resembling petals, ± obovate, minutely mucronate, c. 1.2 by 1 mm; *petals* slightly longer, the midvein at base adaxially passing into raised membranes alternating with stamens. *Filaments* c. 0.6 mm long; anthers subglobose, c. 0.2 mm diameter. *Female*

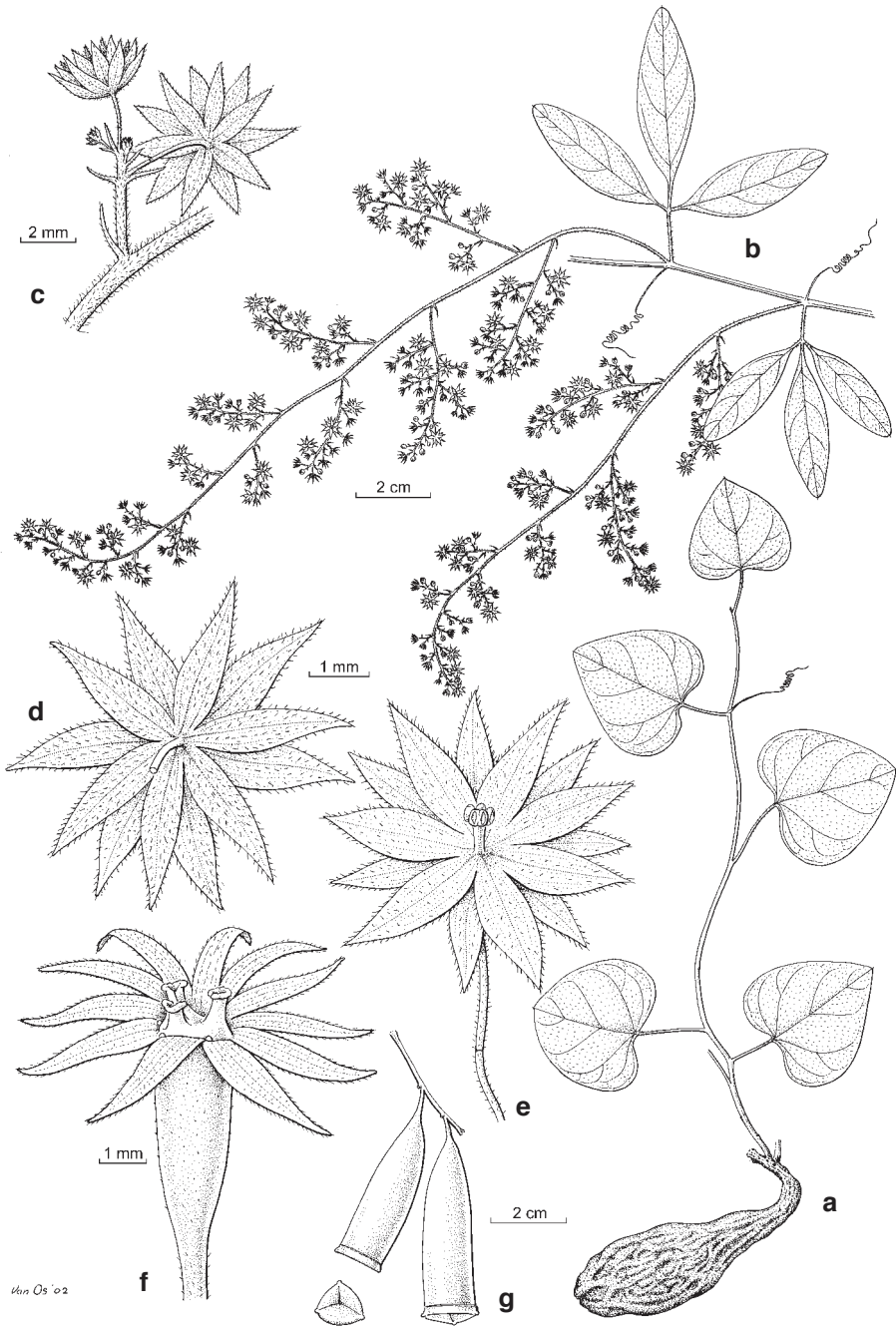


Fig. 2. *Neoalsomitra angustipetala* (Craib) Hutch. a. Sprouted tuber, note simple first leaves; b. male inflorescence on twig, note 3-foliolate leaves (leaves on non-flowering shoots usually 5-foliolate); c. detail of male inflorescence; d, e. male flowers; f. female flower; g. fruit (a: De Wilde & Duyffjes 22268; b–e: Maxwell 93-1047; f, g: Pooma et al. 3037).

inflorescences (fruiting): paniculate, 10–18 cm long. *Female flowers* not known. *Capsules* 2–10 per infructescence; capsule subcylindrical, 5.5–6 cm long, base acute, apex truncate, c. 1.5 cm wide, glabrous; fruiting pedicel c. 10 mm long, glabrescent. *Seeds* c. 15, subtriangular, c. 10 by 7 mm, for c. 4 mm narrowed at base, apex long two-horned, faces densely verrucose, wing 10–13 by 7 mm.

Distribution — Vietnam: Tonkin; known only from 2 collections.

Habitat & Ecology — In the mountains. Flowering: October; fruiting: November.

3. *Nealsomitra capricornica* (F. Muell.) Hutch. — Fig. 11

Nealsomitra capricornica (F. Muell.) Hutch. (1942) 99; I. Telford (1982) 163, f. 36 E–H, map 183. — *Alsomitra capricornica* F. Muell. (1870) 61; Cogn. (1881) 929; (1916) 12. — Type: *P. O'Shanesy 1063* (MEL, not seen), E Queensland.

Small little-branched herbaceous climber, sparsely glandular-pilose, glabrescent; monoecious; annual(?). *Leaves* simple; petiole 2(–3) cm long; blade membranous, broadly ovate, 4–8 cm diam., shallowly or deeply 3–5-lobed, minutely mucronate, margin coarsely irregularly widely dentate; glands not known; green on drying. *Inflorescences* fragile, largely with male flowers, rather few-flowered, 3–15 cm long (including 2–5 cm long peduncle), male flowers in terminal and few lateral racemes, and at node of basal branch with a solitary female flower (always?); bracts lanceolate, less than 1 mm long. *Male flowers*: pedicel 2–6 mm long, (sub)glabrous or glandular hairy; *perianth* ± bowl-shaped; *receptacle* minute; *sepals* oblong or lanceolate, 0.8–1 by c. 0.4 mm, acute; *petals* (ob)ovate, 1.5–2 by c. 1.2 mm, apex (abruptly) acute-acuminate, abaxially glabrous, adaxially finely glandular hairy. *Filaments* c. 0.7 mm long, connate for c. 0.6 mm into a slender column, glabrous; anthers broad-ellipsoid, c. 0.3 mm diam., without dark point adaxially. *Female flowers*: pedicel c. 4 mm long, subglabrous; ovary obconical, c. 3 mm long, sparsely pilose; *sepals* minute; *petals* elliptic, c. 1.5 mm long; styles including stigma c. 1 mm long, stigma ± frondose. *Capsule* solitary on c. 3 cm long peduncle of otherwise male-flowered panicle; capsule 2–2.5(–3.5) cm long, 0.9–1.2 cm wide, base rounded, sparsely roughly glandular pilose or setulose, valves glabrous; fruiting pedicel c. 10 mm long, pilose. *Seeds* rather many, obovate, (4–)6 by 4–5 mm, narrowed at base, margin few lobed-tuberculate towards apex, faces ± finely warty, wing 8–10 by 4 mm.

Distribution — Australia (NE & E Queensland).

Habitat & Ecology — Climber in coastal forest. Flowering and fruiting: March and April.

Note — A richly flowering collection, apparently not seen for Flora of Australia (Telford, 1982), is *Dietrich 1463*, collected at Rockhampton around 1864–1866 (HBG, L).

4. *Nealsomitra clavigera* (Wall.) Hutch. — Fig. 1c

Nealsomitra clavigera (Wall.) Hutch. (1942) 101; C. Jeffrey (1980) 3; S.K. Chen (1986) 101, f. 32, 5–6. — *Zanonia clavigera* Wall. (1831a) 3725, nom. nud.; (1831b) 28, pl. 133. — *Alsomitra clavigera* (Wall.) M. Roem. (1846) 118; C.B. Clarke (1879) 634; Cogn. (1881) 931; (1916) 16. — Type: *Wallich 3725A* (lecto, excluding male inflorescence and seeds, K-Wall., here chosen), Sylhet (Bangladesh).

- Zanonia integerrima* Wall. (1831a), nom. nud. (*Wallich 3725B*, K-Wall.).
- Melothria trifoliolata* F. Muell. (1866) 181. — *Alsomitra trifoliolata* (F. Muell.) K. Schum. (1898) 155; Cogn. (1916) 15. — *Neoalsomitra trifoliolata* (F. Muell.) Hutch. (1942) 100; I. Telford (1982) 165. — *Alsomitra hookeri* F. Muell. (1868) 188, nom. illeg.; (1877) 107 (not seen); Cogn. (1881) 933. — *Zanonia hookeri* F. Muell. (1882) 76, nom. illeg. — Type: *J. Dallachy? in herb. F. Mueller s.n.* (iso L, barcode L1623), Australia (Rockingham Bay).
- Zanonia stephensiana* F. Muell. (1874) 181. — *Alsomitra stephensiana* (F. Muell.) Cogn. (1881) 934; (1916) 17. — *Neoalsomitra stephensiana* (F. Muell.) Hutch. (1942) 102. — Type: *W. Hill s.n.* (ex F. v. Mueller, herbarium unknown, not seen), eastern Australia (Barnard Is.).
- Alsomitra clavigera* (Wall.) M. Roem. var. *hookeri* C.B. Clarke (1879) 635. — Type: *Hook.f. s.n.* (K), India (Khasia); a monstrem with non-alate seeds.
- Alsomitra beccariana* Cogn. (1881) 932. — *Neoalsomitra beccariana* (Cogn.) Hutch. (1942) 101. — Type: *Beccari s.n.* (holo FI; iso BR), Key Is.
- Gynostemma integrifoliola* Cogn. (1881) 916. — *Alsomitra integrifoliola* (Cogn.) Hayata (1911) 121. — *Neoalsomitra integrifoliola* (Cogn.) Hutch. (1942) 99; Merr. & L.M. Perry (1949) 56; M. Jacobs (1954) 622; S.K. Chen (1986) 99, f. 32, 1–5; (1995) 279, f. 71, 3–5; Keraudren (1975) 12. — Lectotype (Keraudren, 1975): *Cuming 517* (holo K; iso L, P), Philippines.
- Alsomitra pubigera* Prain (1898) 292; Cogn. (1916) 17. — *Neoalsomitra pubigera* (Prain) Hutch. (1942) 99; Chakrav. (1959) 197. — Type: *Mokim (King's Coll.) s.n.* (lecto, fruit, CAL, not seen; iso K; here chosen), Burma (Kachin hills), Jan. 1898.
- Gynostemma elongatum* Merr. (1908) 267. — *Hemsleya elongata* (Merr.) Cogn. (1916) 26. — Type: *FB (Curran) 54741* (B⁺; duplicates not seen), Philippines (Luzon).
- Hemsleya henryi* Cogn. (1916) 26. — Type: *Henry 13420* (B⁺; duplicates not seen), Yunnan.
- Alsomitra muelleri* Cogn. (1887) 363; (1916) 15. — *Neoalsomitra muelleri* (Cogn.) Hutch. (1942) 100. — Type: *Armit s.n.* (herbarium unknown, not seen), Papua New Guinea.
- Alsomitra rotundifolia* Cogn. (1916) 13. — *Neoalsomitra rotundifolia* (Cogn.) Hutch. (1942) 100; Peekel (1984) 541, f. 863 (2). — Type: *Peekel 471* (B⁺), Papua New Guinea; neotype here chosen: drawing f. 863 (2) in Peekel (1984).
- Alsomitra pubescens* Merr. (1918) 64. — *Neoalsomitra pubescens* (Merr.) Hutch. (1942) 101. — Type: *FB (Mabesa) 26346* (†), Philippines.
- Alsomitra tonkinensis* Gagnep. (1918) 372; (1921) 1088. — *Neoalsomitra tonkinensis* (Gagnep.) Hutch. (1942) 100. — Type: *Balansa 4024* (lecto P, here chosen), Tonkin.
- Alsomitra pubigera* Prain var. *glauca* Craib (1931) 768. — Type: *Curtis 2504* (not seen), Langkawi Island.
- Alsomitra schefferiana* auct. non Cogn.: Peekel (1984) 541, f. 863 (1), based on *Peekel 328* (382) (B⁺); Cogn. (1916) 15, p.p., f. 3A–H; Harms (1925) 152.

Herbaceous or subwoody climber to 12 m tall, pubescent or (nearly) glabrous all over; dioecious. *Leaves* 3–5-foliolate (i.e. the blade is primarily 3-foliolate and the lateral ones not divided or divided into 2 leaflets, the petiolule of the outer ones inserted on the petiolule of the inner), membranous, (5–)10–20 cm across, glands 1 or 2, usually towards the base of the outer margin of the outer leaflets, flat, 1–3 mm diam., blackish on drying; petiole 0.5–3(–5) cm long; leaflets ovate or elliptic(–oblong), to 12(–15) by 5(–8) cm, base (obtuse or) attenuate, apex obtuse or acute, 1–2 mm mucronate, petiolules 0.4–2 cm long, midvein distinct, lateral veins 4–7 per side. *Male inflorescences* broadly paniculate, axillary, 10–30 cm long, peduncle 1.5–4 cm long, branches (glandular-)pubescent or subglabrous, bracts linear, minute 0.5–2 mm long, the basal ones larger and 3(–5)-foliolate, to 1 cm long, flowers up to 5 (sub) fascicled, in condensed terminal racemes. *Male flowers*: pedicel slender, 5–10 mm long, (glandular-)pubescent or subglabrous; bud ovoid; *perianth* 5–8 mm diam., *receptacle* shallow, 1.5–2 mm diam., sometimes 5-saccate below sepals; *sepals* ovate-oblong, acuminate, c. 2 mm long; *petals* ovate, subobtusate or acute, 2.5–3 by (1.5–)2 mm, glabrous or puberulous.

Filaments free, c. 0.5 mm long; anthers less than 0.5 mm diam. *Female inflorescences* paniculate, 2–10 cm long, up to 10-flowered. *Female flowers*: pedicel c. 10 mm, ovary subcylindrical, 7–8(–10) mm long, finely pubescent, styles short, stigma not lobulate. *Infructescence* one- or several-fruited. *Capsule* 4–8 cm long, glabrous or pubescent, base narrowed or rounded, at apex 1.2–2.5(–3) cm wide; fruiting pedicel 10–20 mm long. *Seeds* many, ± unequal-sided star-shaped, 6–11 by 5–8 mm, margin of 5–7 coarse acute or blunt teeth, faces low tuberculate, wing 14–27 mm long to 8 mm wide.

Distribution — NE India, Bhutan, Myanmar, S China (Yunnan, Hainan), Taiwan, Laos, Cambodia, Vietnam, Thailand, through Langkawi Is., N Sumatra, Philippines, E to NE Australia (Queensland) and the Pacific (Solomon Is., E to Fiji). (Not in Peninsular Malaysia, C & S Sumatra, Java, Borneo.)

Habitat & Ecology — Shaded and open places in primary evergreen montane forest and evergreen seasonal forest along streams, clayey soils on limestone and granite bedrock, altitude 200–1300 m.

Notes — 1. A polymorphic species, varying in hairiness, number and shape of leaflets, and size and shape of fruit. The fruit varies in length from 4 to 8 cm and may be (sub)glabrous or hairy including densely pubescent (*N. pubigera*, from Myanmar). Fruit size varies especially in NE India and New Guinea, where large-fruited as well as smaller-fruited specimens have been collected; for example fruits from New Guinea vary from 4 to 8 cm long, including fruits of c. 4 cm long with a comparatively broad apex, to nearly 3 cm diameter, and with a broad rounded base. The largest fruits contain the largest seeds. *Alsomitra pubigera* Prain var. *glauca* Craib is a limestone form with somewhat succulent leaves with rather short petioles.

2. The typification of the here accepted oldest name is complicated and needs explanation. Wallich's description (1831b) refers to number 3725 of his List (1831a). In the Wallich Herbarium (K-Wall.) are two sheets of 3725: 3725A & 3725B; the leafy shoots on both sheets belong to one taxon. However, 3725A, in fruit, bears the name *Zanonia clavigera* Wall., while 3725B, male flowering, bears the name *Zanonia integerrima* Wall.; the latter name remains a nomen nudum. Sheet 3725A comprises, on close examination, a mixture of 3 elements: 1) a long, curved shoot, bearing immature and mature fruits 4–5 cm long; 2) a short leafy fragment with a male inflorescence (apparently identical with the material on 3725B); and 3) three seeds of *Zanonia indica* (already remarked so by Clarke, 1879). Wallich's protologue (1831b) consists of a description of the leafy shoot and of the fruit and seeds, but the description of the fruit obviously concerns the fruit from which the seeds were taken, hence *Zanonia indica*, though this fruit is not present on sheet 3725A. The fruit was described as being broad and c. 3 inches (7–8 cm) long, whereas the fruits on 3725A are much smaller, and rather narrow. By the exclusion of Wallich's material of the seeds (and hence also the corresponding fruit, described by him in the protologue) we herewith reconfirm and choose again the element of the leafy shoot with attached fruits on sheet 3725A (K-Wall.) as lectotype of *Zanonia clavigera* Wall., as was already indirectly chosen by Clarke (1879).

3. Cogniaux's figure 3A–H (1916), apparently from *Peckel 328* (B†), was erroneously taken for the male flowers of *Alsomitra schefferiana*, but represents *N. clavigera*; *Peckel 328* was also depicted in *Peckel* (1984). The small apical appendage of the anther obviously is exaggerated in the drawing, as normally this is much smaller or absent.

5. *Neoalsomitra hederifolia* (Decne.) W.J. de Wilde & Duyfjes, *comb. nov.*

— Fig. 1i, 3

Sicyos hederifolius Decne. (1834) 450; Walp. (1843) 204; M. Roem. (1846) 104; Span. (1841) 206; Miq. (1856) 682, '*hederaefolius*'. — *Gynostemma ? hederifolia* (Decne.) Cogn. (1881) 916, '*hederaefolia*'; M. Jacobs (1954) 617 (excluding material *Hort. Bot. Bog. sub XVIII A 45*); Steenis (1956) 192, f. 1a. — Type: *Anonymous* (3 sheets, see note) (531, barcode P218602, lecto P, here chosen), Timor.

Zanonia timorana Span. (1841) 205, Icon. 55 (plate not found); Walp. (1843) 194, '*timorensis*'; Miq. (1856) 683. — *Alsomitra timorana* (Span.) M. Roem. (1846) 117; Cogn. (1881) 935; (1916) 13. — *Neoalsomitra timorana* (Span.) Hutch. (1942) 98. — Neotype (here designated, see note): *De Voogd 2323*, male fl. (holo L; iso BO, K, SING), Timor.

Gynostemma spec. C. de Voogd (1936) 71, f. 8, photo of habit; Woerden (1940) 6, f. 7, photo of thickened stem base.

Low or medium climber, densely or sparsely glandular-pubescent all over (except flowers), hairs 0.5–2 mm long; stem at base to 1 cm thick; dioecious; perennial, growing from a supra-terrestrial tuber to 30 by 15 cm and c. 2.5 kg in weight. *Leaves* simple, brown on drying; petiole 1.5–3 cm long; blade entire or shallowly 3(–5)-lobed, membranous, broadly ovate or circular in outline, 5–6 by 4–7.5 cm, base deeply cordate, apices acute-acuminate, 1(–2) mm mucronate, margin entire or coarsely remotely dentate, sparsely or densely (setose) hairy, especially so on margin and abaxially on nerves; nerves 5-palmate, pale; glands absent. *Male inflorescences* paniculate, pu-

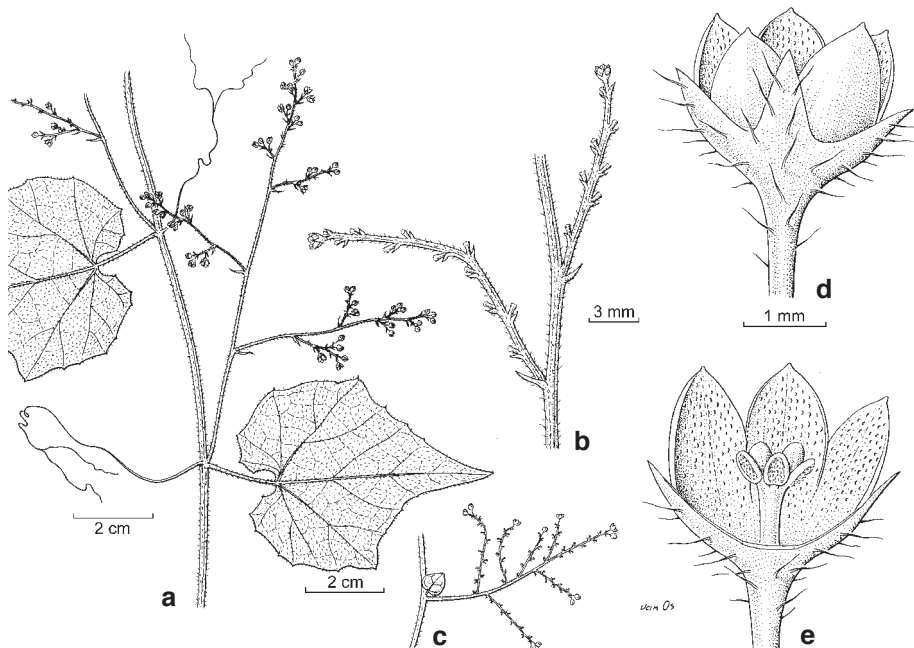


Fig. 3. *Neoalsomitra hederifolia* (Decne.) W.J. de Wilde & Duyfjes. a. Habit with male inflorescence; b. detail of male inflorescence; c. portion of male inflorescence; d, e. male flowers (a, b, d, e: *Backer 26948*; c: '*Decaisne*' P00218601, syntype).

bescent, situated occasionally close to the base of the plant, once or twice branched, 5–17(–32) cm long including 1–2.5 cm long peduncle, ultimate branches raceme-like, 1–4 cm long, 5–10(–15)-flowered, with bracts and basal portion of pedicel (c. 1 mm long) persistent; bracts minute, oblong, 0.5–1 mm long, lower bracts in the larger twice branched, inflorescences leafy, 1–1.5 cm diam. *Male flowers* solitary, (sub)glabrous; pedicel 3–4 mm long, articulate at c. 1 mm from the base; bud subglobose; *perianth* at anthesis bowl-shaped; *receptacle* shallowly bowl-shaped, 0.4–0.5 by c. 1.5 mm; *sepals* long-triangular, c. 1 mm long, with out-curved apiculum; *petals* broadly obovate or subcircular, c. 1.5 mm long, papillose adaxially, very minutely mucronate. *Filaments* (0.7–)1 mm long, either completely or for 2/3 fused (column hollow); anthers elliptic or subcircular, c. 0.5 mm long, adaxially with or without a faint brown spot. *Female inflorescences* and *flowers* not known. *Infructescences* (sub)racemose, 3–5-fruited or a fruit solitary on the leafy node of lateral shoots. *Capsule* brittle, glabrescent, 2.5–3 cm long, at apex (0.8–)1 cm wide, base narrowly rounded, perianth scar (rim) at c. 2.5 mm distant from the flat apex; fruiting pedicel 7–10 mm long, glabrous with some vestigial minute hairs. *Seeds* 15–20, obovate with narrowed base, c. 6 by 4.5 mm, dark brown, margin coarsely 5-toothed, faces coarsely few-tubercled, wing 7 by 2.5 mm.

Distribution — Indonesia, known from 5 collections: Kangean, E of Madura, *Backer* 26948, male (BO), filaments completely fused; Pulau Semau, near Timor, *De Voogd* 2323, male (BO, K, L, SING), filaments fused for 2/3; Timor, *Anonymous s.n.*, male, 3 sheets (in Herb. Decaisne, P), filaments completely fused.; *Anonymous s.n.* fruits (P); *Spanoghe s.n.*, specimens not found.

Habitat & Ecology — Lowland savannah and dry forest in monsoon climate on limestone; 0–200 m altitude. Flowering: March (Kangean) and November (Timor).

Notes — 1. The three anonymous sheets with male flowers in P, syntypes of *Sicyos hederifolia*, were collected around 1801–1821, either by Sautier, Riedlé, Quichenot, or by Gaudichaud; see Van Steenis-Kruseman (1950), and the introduction to Decaisne's enumeration (1834).

2. The infructescences and fruits of *Sicyos hederifolia* are known only from an anonymous single collection in P, a leafless specimen annotated *Zanonia indica* L., Timor, apparently collected in the same period as the type of *S. hederifolius*. Its assignment to *N. hederifolia* is not fully certain, but the old, dead twigs with leaf scars and tendrils agree, and the fruits and seed (one single seed only is preserved, Fig. 1i) differ from the fruits and seeds of the other *Neoalsomitras* from Timor: *N. sarcophylla* differs in seed and *N. schefferiana* subsp. *podagrica* differs in fruiting pedicel c. 5 mm long against c. 10 mm long in *N. hederifolia*.

3. Jacobs (1954) cites a note by Van Steenis on living flowering material cultivated in Bogor, about 1939, not preserved or apparently lost, obviously belonging to *N. hederifolia*.

4. It is not fully certain whether the photo of the tuber in Van Woerden (1940) represents *N. hederifolia*, as no voucher specimen was collected.

5. For *Zanonia timorana* Span. a neotype is designated as the type *Spanoghe s.n.*, from Timor, could not be found. According to Van Steenis-Kruseman (1950), *Spanoghe* specimens and icones are in L, but are not extant there. *Spanoghe* (1841) described male and female flowers and fruits.

6. *Neosalsmitra pilosa* W.J. de Wilde & Duyfjes, *spec. nov.* — Fig. 1j

Neosalsmitra capricornica F. Muell. similis, fructuum pilis densioribus longioribus (3–4 mm) obsito differt. — Typus: *Carr 12477* (holo CANB; iso BM, K, L, SING), fruits, E Papua New Guinea.

Herbaceous climber, a few metres long, sparsely soft-woolly grey glandular-hairy; annual?; monoecious. *Leaves* simple, membranous, blackish on drying, sparsely villous; petiole 1–1.5 cm long; blade entire or shallowly (faintly) 3–5-lobed, ± ovate, 4–7.5 by 3.5–7 cm, base broadly cordate, apex rather long acute-acuminate, minutely mucronate, margin entire, ad- and abaxially villose; glands absent. *Inflorescences* glandular hairy, to 10 cm long (including 2–6 cm long peduncle), with few (uni)lateral 10–20-flowered male racemes, and with 1 (or 2 or 3) solitary female flowers (fruit) at the nodes of the lower branch(es), occasionally co-axillary with the panicle an additional male raceme; bracts lanceolate, c. 1 mm long, ± caducous. *Male flowers*: pedicel 1.5–2 mm long, sparsely hairy; *perianth* ± bowl-shaped; *receptacle* shallowly bowl-shaped, 0.7(–1) mm wide; *sepals* ± long-triangular, c. 1 mm long, sparsely hairy; *petals* (ovate-)elliptic, c. 1.5 mm long, glabrous, at apex with minute papillose mucro. *Filaments* united into c. 0.5 mm long column; anthers 1-theous, broadly ellipsoid, c. 0.3 mm long, abaxially with minute dark blotch. *Female flowers* not known (ovary hairy). *Capsules* 1(–3) per infructescence (in old otherwise male-flowered inflorescence); capsule (2.5–)3–3.5 by 1–1.3 cm, sparsely whitish villous, hairs glandular, 3–4 mm long, base (narrowly) rounded, apex truncate, with 2–3 mm long stylar processes; fruiting pedicel 4–8 mm long. *Seeds* 15–20, obovate, narrowed at base, 6–7 by (4–)5 mm including double 6–8-toothed margin, faces ribbed towards margin, nearly smooth in the centre, wing c. 8 by 4 mm.

Distribution — SE Papua New Guinea, in the mountains near Port Moresby; known only from 2 collections: *Carr 12477* (male fl., fr.) and *Carr 15873* (male fl., immat. fr.).

Habitat & Ecology — Open places in woods on steep hillsides; 400–1500 m altitude. Flowering and fruiting: March to June.

Note — This species is close to *N. capricornica*, which differs in drying colour green, leaf shape and more coarsely hairy capsules.

7. *Neosalsmitra plena* (Craib) Hutch. — Fig. 1f

Neosalsmitra plena (Craib) Hutch. (1942) 768. — *Alsomitra plena* Craib (1930) 408; (1931) 768. — Type: *Kerr16191* (lecto K, here chosen, male), Thailand (Prachuap, South-western Prov.).

Climbing herb 1–5 m tall, finely glandular-hairy; dioecious; annual or biennial. *Leaves* simple (but shallowly or deeply 3–5-lobed, or subfoliolate), or 3–5-foliolate; petiole 0.5–3 cm long; blade membranous, 2–13 cm diam., glands absent; leaflets ovate or elliptic-oblong, base attenuate or rounded, apex acute, 1–3 mm mucronate, lateral nerves 3–5 per side, petiolules 3–10 mm long. *Male inflorescences* paniculate, usually narrow, little-branched or raceme-like, 5–10(–15) cm long, branches raceme-like, puberulous, peduncle short; bracts linear, 1–2(–3) mm long, ± caducous. *Male flowers* solitary or 2 per bract; pedicel (4–)5–12 mm long, glandular-pubescent; buds at apex 5-toothed by ± spreading apices of sepals; corolla subrotate, 6–8 mm diam.; *receptacle* shallow,

c. 1.5 mm diam.; *sepals* narrowly triangular, acuminate, 1.5–2 mm long, puberulous; *petals* ovate(-oblong), acute-acuminate, 2.5–3(–4) by c. 2.5 mm, with midvein at base raised adaxially, subglabrous. *Filaments* free, out- and recurved, 0.5–0.7 mm long; anthers less than 0.5 mm long, inserted on broadened apex of filaments. *Female inflorescences* 1- or few-flowered. *Female flowers*: pedicel 3–7 mm long, faintly articulate, puberulous; ovary 4–5 by c. 1 mm, glabrous; *tepals* as in male; staminodes ± fleshy, c. 0.2 mm long (see note); styles c. 0.6 mm long, stigma 0.5 mm long. *Capsules* solitary (or 2 or 3 on short shoot), capsule 2.5–3 by 0.6–0.9 cm, glabrous, base ± rounded, apex truncate; fruiting pedicel 5(–10) mm long. *Seeds* 15–20, light brown to nearly black, ellipsoid with abruptly narrowed base, 4–5 by 2.5–3.5 mm, margin finely or coarsely undulate, faces smooth or faintly irregular-warty, wing nearly all around seed but much extending to one side, c. 8 by 4–5 mm.

Distribution — Endemic to Thailand: Northern, Eastern (Nakhon Ratchasima), South-Western, Central, Peninsular (Surat Thani).

Habitat & Ecology — Scrub and rocky places on limestone; altitudes 10–580 m. Flowering and fruiting: May to December.

Note — The staminodes, alternating with the petals in the female flowers, are unique for the genus in this species. They were described by Craib (1930), as half as long as the sepals, but in our material seen (*Pooma et al.* 2102) they are only 0.2 mm long. Craib (1930) described the fruit as 4 cm long; in several collections we measured 2.5–3 cm long.

8. *Nealsomitra sarcophylla* (Wall.) Hutch. — Fig. 1b

Nealsomitra sarcophylla (Wall.) Hutch. (1942) 100; Chakrav. (1959) 194; Keraudren (1975) 9, pl. 1. (p.p., excl. *Nealsomitra balansae*). — *Zanonia sarcophylla* Wall. (1831a) 3724, nom. nud.; (1831b) 28, t. 133. — *Alsomitra sarcophylla* M. Roem. (1846) 118; Cogn. (1881) 929; (1916) 13; Craib (1931) 769; P.H. Hô (1991) 713, f. 1977. — Type: *Wallich 3724B* (lecto K-Wall., here chosen, fr.), Burma.

Alsomitra philippinensis Cogn. (1916) 15. — *Nealsomitra philippinensis* (Cogn.) Hutch. (1942) 100. — Type: *Copeland 255* (B⁺), Philippines, Luzon.

Liana 3–7 m, glabrous; perennial from woody rootstock; dioecious. *Leaves* 3-foliolate, fleshy-leathery, wrinkled on drying, 5–20 cm diam., glands absent; petiole 0.5–1 cm long; leaflets (broadly) ovate-elliptic to oblong-lanceolate, to 12 by 6 cm, base rounded or ± narrowed, apex (narrowly) rounded, minutely mucronate, basal nerves 3–5, curving towards apex, mostly indistinct; petiolules 0.2–0.5(–1) cm long, after abscission leaving raised flat scars. *Tendrils* often with terminal adhesive pads. *Male inflorescences* paniculate, little or much branched, sometimes branched from the base, 10–20(–30) cm long, pendent, glabrous; bracts linear, 1 mm long or less. *Female inflorescences* paniculate or ± raceme-like, 5–10 cm long. *Male flowers* often to 3 sub-fascicled, pedicel 2–5 mm long; *perianth* subrotate, c. 5 mm diam., glabrous or minutely papillose; *receptacle* flattish, faintly 5-saccate, c. 1 mm diam.; *sepals* lanceolate, c. 2.5 mm long, acuminate; *petals* (ob)ovate, c. 3 by 1.5 mm, apex acuminate, midvein distinctly raised in lower portion, forming dissepiments between the stamens. *Filaments* free, spreading, c. 1 mm long; anthers less than 0.5 mm long. *Female flowers*: ovary narrow, c. 8 by 1 mm, glabrous; staminodes 0.2–0.5 mm long; styles short, broad at base, stigma ± lobulate-dentate; style and stigma together c. 1 mm long. *Infructescences* pendent,

5–10 cm long, with 5–10(–20) capsules. *Capsule* much narrowed to the base, glabrous, 3(–4) cm long, apex truncate, 8(–10) mm wide; fruiting pedicel slender, 10(–15) mm long. *Seeds* 12–15, sub-triangular, 6–7 by 3–4 mm, 2-horned at apex, margined, edge smooth or verrucose, faces finely verrucose, wing suberect, 8–10 by 4 mm.

Distribution — Myanmar, Thailand, Laos, Cambodia, Vietnam, Langkawi Is., rare and scattered in E Malesia: Philippines (Luzon, Palawan), Celebes (Central, SW, Kabaena Is.), Timor. Sometimes cultivated in botanical gardens.

Habitat & Ecology — Mixed, (partly) deciduous evergreen lowland and montane forest, on basalt and granite bedrock and limestone; altitude 10–850 m. In SE Asia: flowering: November to January; fruiting: December to March; in E Malesia: flowering: March to September.

Note — In *Teijsmann 19765* (BR), Timor, the seeds lack the two horns; it is the only known collection with seeds from E Malesia.

9. *Nealsomitra schefferiana* (Cogn.) Hutch. — Fig. 1g, h

Nealsomitra schefferiana (Cogn.) Hutch. (1942) 101, (excl. *Peekel 328* (B†) = *Nealsomitra clavigera*) — *Alsomitra schefferiana* Cogn. (1881) 932; (1916) 16, excl. descr. fl. masc. sec *Peekel 328* et excl. f. 3A–H. — Type: *Teijsmann 11854*, sheet 1 of 4 (holo BO; iso BO (3 sheets), L), Celebes, Pangkadjena.

Alsomitra schefferiana Cogn. var. *minor* Cogn. (1881) 933; (1916) 16. — Type: *Teijsmann s.n.* (holo BO, not seen), SW Celebes, Pangkadjena.

For further references see under the subspecies.

Perennial climber to 8(–30) m long, with one or few green stems somewhat fleshy-woody at base, either slightly thickened, or base swollen, flask- or spindle-shaped, stem with ± hard green thorns 1–2(–4) cm long up to 3(–5) m from the ground, apical shoots puberulous, glabrescent, finely grooved, with raised leaf scars; dioecious. *Leaves* (simple or) 3- or 5-foliolate; petiole 2–5 cm long; blade membranous (slightly fleshy when fresh), green on drying, 5–15(–20) cm diam.; glands absent; petiolules 0.3–2 cm long, those of outermost leaflets in 5-foliolate leaves inserted on those of the next leaflets; leaflets elliptic or (ob)ovate, apex roundish or acute, minutely acuminate, the middle leaflet largest, to 11(–15) by 7(–10) cm. *Tendrils* on innovations, mostly caducous, and on apical shoots. *Male inflorescences* paniculate, with numerous flowers, 8–20(–40) cm long, once or twice branched, ultimate branches raceme-like, pubescent, hairs c. 1 mm long; bracts minute, c. 1 mm long, pubescent (lower bracts 3-foliolate, larger). *Male flowers*: pedicel c. 1.5 mm long, glabrous; *perianth* rotate, 2.5–3.5 mm diam., sparsely pubescent; *receptacle* shallow, c. 1 mm wide; *sepals* ovate-acute, c. 0.5 mm long; *petals* broadly ovate-acute, c. 1 mm long. *Filaments* glabrous, fused into a partly hollow column c. 0.75 mm long, free parts c. 0.25 mm long, anthers broadly ellipsoid, c. 0.25 mm long, dark spot not obvious. *Female inflorescences*: as in male, (widely) paniculate, 10–30 cm long, flowers ultimately in racemes. *Female flowers*: see under subsp. *podagrica*. *Capsule* many per infructescence; capsule 1.5–2.5 cm long, 0.7–0.9 cm wide, pubescent, glabrescent, base ± attenuate or rounded, apex truncate with minute style-remnants; fruiting pedicel 2–7 mm long, glabrous or pubescent. *Seeds* c. 15, obovate, 4–5 by 3–3.5 mm, base attenuate, finely or coarsely rugulose-warted, margin double 5–7-toothed or -tuberculate, wing 6–8 mm long.

Distribution — E Malesia: SW Celebes, Moluccas, eastern Lesser Sunda Islands, and Irian Jaya: Vogelkop Peninsula; 2 subspecies.

Habitat & Ecology — Limestone rocks and soil over limestone, dry seasonal areas; lowland. Flowering: February (Timor), May (Alor), June (Seram).

Uses — Used medicinally for its extremely bitter resin with strong haemolytic action in Timor; see Van Steenis (1956). In Vogelkop the people are afraid to be hurt by the thorns (Avé, oral comm.).

Notes — 1. *Neolsonsmitra schefferiana* is characterized by its thorny stem base, 3- or 5-foliolate leaves, and stamens of which the filaments are c. 3/4 connate.

2. The limited fertile material available suggests the existence of only one species, with 2 subspecies. The wild growing specimens as well as those cultivated in the greenhouse of both subspecies (which persistently refuse to flower in European greenhouses) are possibly distinct in the mode of swelling of the stem base; we did not see conspicuous stem thickening in our own Celebes specimens of subsp. *schefferiana*, and stem thickening was not mentioned for the remainder of the collections.

The two subspecies chiefly differ in shape of the thorny stem base and fruit size; the male perianths of a specimen from Seram (*Kornassi 1433*) are slightly longer than those from Timor. Because most collections are sterile and mostly the thorny base is not recorded, such specimens are tentatively assigned to subsp. *schefferiana*. Subsp. *podagrica* is regarded as confined to Timor and the nearby islands of Semau and Alor.

The thorns are obviously homologous with leaves, as was already noted by Van Steenis (1956). Occasionally the bases of withered tendrils may resemble thorns. In the collections from Vogelkop of subsp. *schefferiana* (*Avé 4835*) some thorns are minutely furcate at apex.

KEY TO THE SUBSPECIES

- 1a. Main stem at base not or hardly thickened, 2–3 cm thick. Leaves of (fertile) upper branches 3-foliolate. Capsules c. 2.5 cm long (material of var. *minor* not seen).
— SW Celebes, Seram, Vogelkop Peninsula. **a.** subsp. **schefferiana**
- b. Main stem at base swollen, 5–10 cm thick. Leaves of (fertile) upper branches 3- or 5-foliolate. Capsules 1.5–2 cm long. — Timor, Alor Is. **b.** subsp. **podagrica**

a. subsp. **schefferiana** — Fig. 1g

Main stem base slender, 2–3 cm diam., thorns 1–2 cm long. *Leaves* 3-foliolate. *Female flowers* not known. *Infructescences* rather open, much branched, many-fruited, short-tomentose, 20–30 cm long. *Capsules* c. 2.5 by 0.7–0.9 cm, base shortly attenuate, when old glabrescent except at the very base; fruiting pedicel 3–7 mm long, tomentose. *Seeds* ovate, 4.5–5 by 3–3.5 mm, faces densely sharply, rather finely tuberculate, margin finely crenulate, wing 6–7 by c. 4 mm.

Distribution — Known from one fruiting collection from SW Celebes (type); one male flowering specimen from Seram, and from sterile specimens from SW Celebes, and Vogelkop Peninsula.

b. subsp. podagrica (Steenis) W.J. de Wilde & Duyfjes, *stat. nov.* — Fig. 1h

Nealsomitra podagrica Steenis (1956) 192, f. 1b, 2, nom. prov.; (1955) 171, f. 1; H. Jacobsen (1970) 267, t. 112, 1; E. Newton & Njoroge (2002) 90, f. 13e. — Type: *Pleyte s.n.* (lecto L, here chosen), male, culta, Hort. Bot. Bogor II-0-X-6, Timor (see note 1), 6 May 1954.

Alsomitra spec. Woerden (1940) 6, f. 7, right hand photo.

Base of main stem(s) fleshy, thickened, flask- or spindle-shaped up to 100 by 10 cm, sometimes with additional superposed thickened bases of lateral stems; thorns 1.5–5 cm long. *Leaves*: lower 3-foliolate, upper 3- or 5-foliolate. *Female inflorescences* paniculate, rather condensed, pubescent, the ultimate branches one-sided racemes with up-curved flowers; bracts minute. *Female flowers*: pedicel c. 1 mm long, glabrous; ovary tubular, terete, c. 3 by (1–)1.5 mm, pubescent; *sepals* hardly 1 mm long; *petals* c. 2 by 1.5 mm, ± pubescent (some adaxially with minute appendages at base); styles including stigma c. 1 mm long. *Fruits* many per infructescence. *Capsule* almost glabrous, 1.5–2 by 0.7–0.8 cm, base narrowed or rounded; fruiting pedicel 2–5 mm long, almost glabrous. *Seeds* pear-shaped, 4–5 by 3–3.5 mm, faces coarsely tuberculate and with irregular radial crests, wings 6.5–8.5 by 3.5–4.5 mm.

Distribution — Eastern Lesser Sunda Islands: Alor Is., Semaui Is., and Timor (according to Van Steenis (1956) throughout Timor).

Habitat & Ecology — Lowland and hilly country on limestone.

Notes — 1. Subspecies *podagrica* was introduced by tubers from Timor (through the mediation of Mr de Voogd and Mr Koster, see also under *N. hederifolia*) about 1938–1940 into the Botanic Garden at Bogor and the private garden of Van Steenis, also Bogor. Around 1940 it was male flowering in the garden of Van Steenis and between 1954 and 1960, individual male and female plants were richly flowering and fruiting in the Botanic Garden, but since 1995 the subspecies is no longer extant there. In some European greenhouses the subspecies grows easily and is propagated by cuttings; however, it never flowers.

2. Although the subspecies seems widespread in Timor it is noteworthy that this conspicuous plant was not seen by the old French and Dutch collectors, who collected the pachypodous *N. hederifolia* (syn. *N. timorana*) several times. Anyway, in the wild, subsp. *podagrica* seems to flower or fruit at an unknown period, under a strong seasonal climate, but apparently not frequently.

3. This subspecies was already, though unnamed, pictured and described in a manuscript by Father Alberti de San Tomé about 1750, in Lisbon (as was discovered there by Mr Koster, postmaster at Kupang; see Van Steenis (1956), Van Steenis-Kruseman (1950) 298).

10. Nealsomitra schultzei (Cogn.) Hutch. — Fig. 1k

Nealsomitra schultzei (Cogn.) Hutch. (1942) 98; Merr. & L.M. Perry (1949) 56. — *Alsomitra schultzei* Cogn. (1916) 12. — Type: *Schultze 170* (B⁺), Papua New Guinea (Augusta River).

Slender small climber; subglabrous; monoecious; annual? *Leaves* simple, glabrous except for a few hairs near insertion of petiole; petiole 1–1.5 cm long, sparsely minutely pubescent; blade membranous, green on drying, ovate in outline, 3.5–7 cm diam., faintly to distinctly (3–)5-lobed (up to c. 2/3 deep), base subtruncate or cordate, apex acute-acuminate, 1–2 mm mucronate as are lobe-apices, margin smooth or coarsely

sinuate. *Inflorescences* glabrous, all or predominantly male-lowered, sometimes with a few female flowers co-axillary with lowermost branch(es), branches few, consisting of 5–10 male-flowered racemes; position of female flowers (from fruits) either mixed in otherwise male flowered panicle (see above) or solitary at leafy node; bracts oblong, 0.5–1 mm long, subsistent. *Male flowers*: pedicel c. 1.5 mm long, the lower half persistent; *perianth* bowl-shaped; *receptacle*-tube c. 1 by 1.5–2 mm, the inside wholly thickened into an inconspicuous disc; *sepals* (long-)triangular, c. 0.8(–1) by 0.7 mm, acute; *petals* ovate-broadly ellipsoid, minutely mucronate, dotted with glands. *Filaments* united for 2/3 or completely united, c. 1 mm long; anthers ellipsoid, c. 0.6 mm long, adaxially without dark blotch. *Female flowers* not seen (ovary subclavate, 4–5 mm long, glabrous, corolla segments c. 2 mm long, see Cogniaux, 1916). *Capsules* 1(–6) per infructescence, solitary at leafy node, or peduncled; capsule 2.5–3 cm long, glabrous, base rounded, 10–12 mm wide at truncate apex; fruiting pedicel c. 10 mm long. *Seeds* 15–20, obovate with narrowed base, 6–7 by 4–5 mm, margin 5–7 coarsely dentate or tuberculate, faces finely warty, wing c. 9 by 4–5 mm.

Distribution — Papua New Guinea, known from a few collections only (Sepik, lower Fly River, Central Prov.).

Habitat & Ecology — Lowland; margins of monsoon forest, in reed swamps. Flowering and fruiting: April and October.

Notes — 1. The present description of *N. schultzei*, drawn from the collections *Brass* 8149 and *Pullen* 6847, is somewhat doubtful because the type, *Schultze* 170, is lost, but Cogniaux's protologue agrees very well. A designation of a neotype should wait for a good collection from the type locality, Sepik (Augusta River).

2. *Neoalsomitra schultzei* is distinct within the genus by a disc-like thickened receptacle. It forms together with *N. capricornica*, *N. pilosa* and *N. hederifolia* a group within *Neoalsomitra*. However, we have refrained from naming this group, as explained in the introduction.

11. *Neoalsomitra simplex* (Craib) Hutch. — Fig. 1d, 4, 5

Neoalsomitra simplex (Craib) Hutch. (1942) 98. — *Alsomitra simplex* Craib (1930) 409; (1931) 769.
— Type: *Kerr* 7524 (holo K; iso BK), Thailand.

Low- to medium-sized climber, subherbaceous, (glandular-)puberulous; dioecious. *Leaves* simple; petiole 3–8 cm long; blade membranous, greenish brown on drying, broadly ovate, 10–20 by 9–18 cm, base deeply cordate, apex acute-acuminate, margin entire, marginal teeth minute; nerves 5(–7)-palmate, puberulous-pilose; glands absent. *Male inflorescences* lax, 10–20 cm long, densely glandular-puberulous; bracts linear, c. 1 mm long. *Female inflorescences* paniculate or raceme-like, 5–10 cm long. *Male flowers* 1 (or 2) per bract in slender terminal racemes; pedicel 3–4 mm long, glabrous above the ± median articulation; bud subglobose; *perianth* bowl-shaped, c. 3 mm wide, *receptacle* minute, shallow, c. 1 mm wide; *sepals* ovate-triangular, c. 1.5 mm long, (sparsely) hairy; *petals* broadly ovate-elliptic, c. 2 mm long, apex broadly rounded, hardly mucronate, glabrous, midvein towards base conspicuously crested adaxially. *Filaments* free, outcurved, c. 1 mm long; anthers c. 0.5 mm long, the theca attached to a saucer-shaped pad, with a faint brown point adaxially. *Female flowers* not known. *Fruits* 2–8 per infructescence. *Capsule* 5–5.5 by 1.5(–2) cm, densely roughly pubescent, base short-acute to rounded, slightly narrowed towards apex; fruiting pedicel

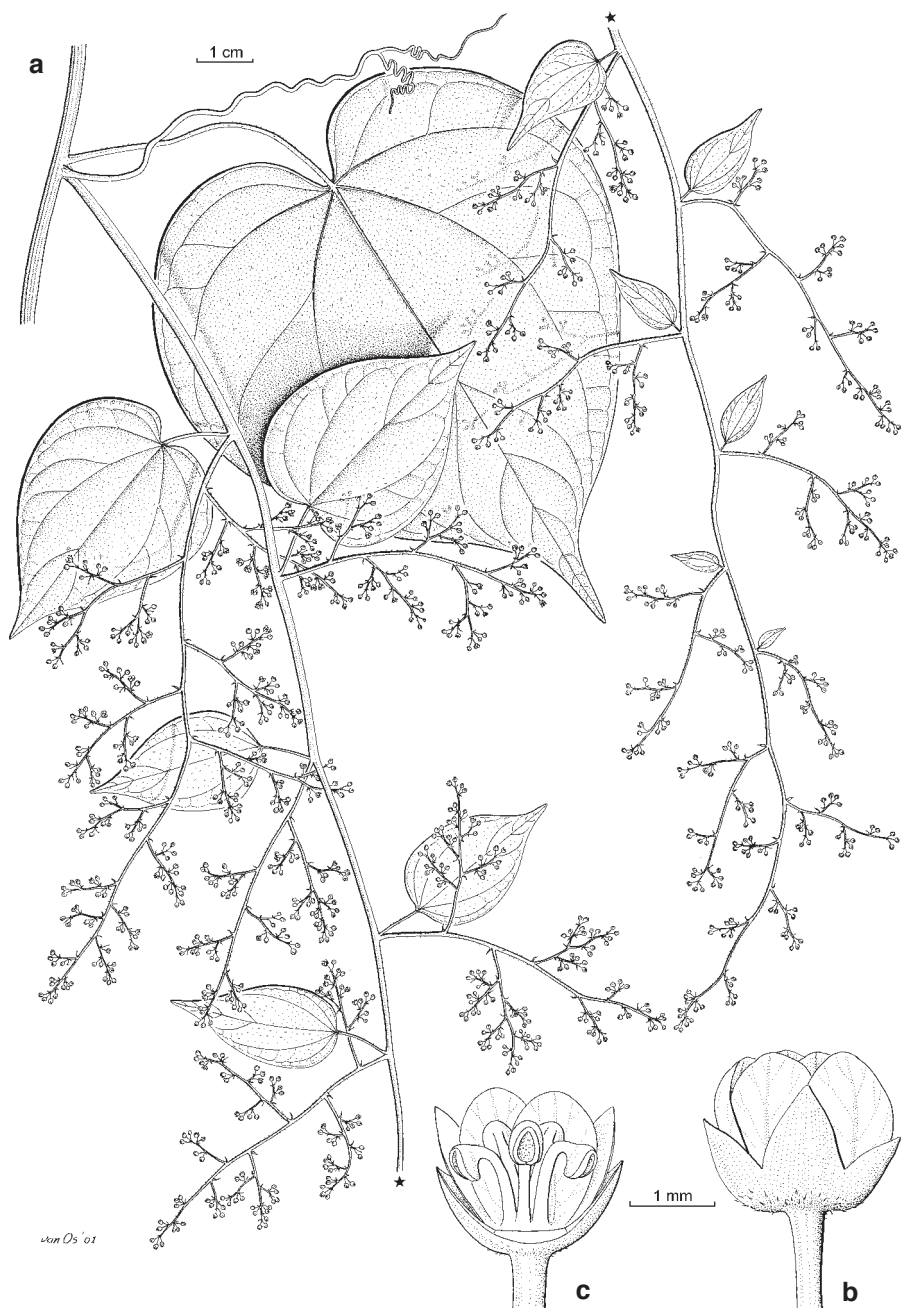


Fig. 4. *Nealsomitra simplex* (Craib) Hutch. a. Habit of male inflorescence; b. male flower; c. male flower opened, showing free stamens (all: Maxwell 95-845).

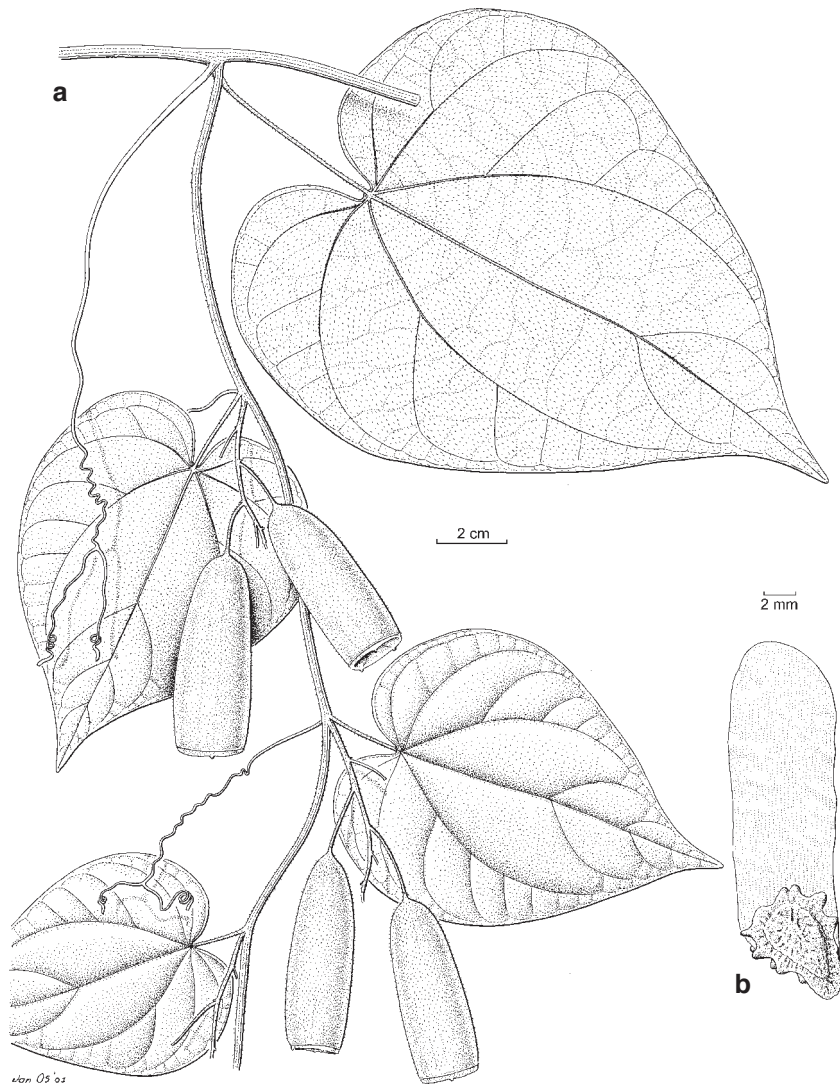


Fig. 5. — *Nealsomitra simplex* (Craib) Hutch. a. Habit of fruiting branch; b. seed (all: *Maxwell* 89-80).

15–20 mm long, glandular pubescent. *Seeds* 15–20, light brown, obovate, 9–10 by 6–7 mm, margin with 5–8 obtuse irregular teeth, faces warty-tuberculate, wing c. 18 by 6–7 mm.

Distribution — Endemic to Thailand: Northern: Chiang Mai (Doi Chiang Dao); Peninsular: Pattani.

Habitat & Ecology — Climbing on trees by stream in evergreen forest, and in open and disturbed evergreen thicket bordering agricultural fields; altitude 200–600 m. Male flowering: October; fruiting: January.

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IDENTIFICATION LIST

Nealsomitra

1 = <i>N. angustipetala</i>	7 = <i>N. plena</i>
2 = <i>N. balansae</i>	8 = <i>N. sarcophylla</i>
3 = <i>N. capricornica</i>	9a = <i>N. schefferiana</i> subsp. <i>schefferiana</i>
4 = <i>N. clavigera</i>	9b = <i>N. schefferiana</i> subsp. <i>podagrica</i>
5 = <i>N. hederifolia</i>	10 = <i>N. schultzei</i>
6 = <i>N. pilosa</i>	11 = <i>N. simplex</i>

- Alston 17128: 8 — Anonymous in herb. d'Alleizette: 4; 521, in herb. Decaisne (barcode P218602): 5; (barcode P218603): 5; (barcode P218601): 5; cultivated bot. garden Bogor XII-B-153 & XII-B-153a: 8; cultivated bot. garden Bogor XVIII-A-45, 30 Apr. 1955: 9b; cultivated bot. garden Bogor XVIII-A-45a, 30 Apr. 1955: 9b; cultivated bot. garden Bogor XVIII-A-45a, probably 17 Mar. 1955: 9b; cultivated bot. garden Bogor XVIII-A-45, 17 Mar. 1955: 9b; cultivated bot. garden Bogor XVIII-A-45, 19 Mar. 1960: 9b; HLB 901287475: 4; HLB 901289102: 4 — Avé 4835: 9a.
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- Gamble Sept. 1873: 4; 3939A: 4; 3939B: 4 — Geesink & Hiepko 7893: 8.
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Accepted taxa are in roman type, new taxa in **bold** and synonyms in *italics*. Numbers refer to the species number as used in this revision.

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| <i>balansae</i> Gagnep. 2 | var. <i>minor</i> Cogn. 9 |
| <i>beccariana</i> Cogn. 4 | <i>schefferiana</i> auct. 4 |
| <i>capricornica</i> F. Muell. 3 | <i>schultzei</i> Cogn. 10 |
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stephensiana F. Muell. 4
timorana Span. 5