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Revision of the genus *Gomphogyne* (Cucurbitaceae)

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ABSTRACT. The genus *Gomphogyne* Griff. has six species in Asia and Malesia. The type species, *G. cissiformis* Griff., occurs in India, Bhutan, and Yunnan at high elevations. *Gomphogyne bonii* Gagnep. is endemic to Vietnam. Three new species are described: *G. nepalensis* W.J. de Wilde & Duyfjes, endemic to Nepal, *G. cirromitrata* W.J. de Wilde & Duyfjes, with f. *minor* W.J. de Wilde & Duyfjes, endemic to Thailand, and *G. peekelii* W.J. de Wilde & Duyfjes, endemic to lowland East Moluccas and New Guinea. In *G. heterosperma* (Wall.) Kurz one new form is recognized, f. *vittata* W.J. de Wilde & Duyfjes, endemic to Thailand. A key to the six species and descriptions of the Thai and Malesian species and *G. nepalensis* are presented. The pollen morphology of *Gomphogyne*, *Gynostemma*, and *Hemsleya* is presented and found to be fairly uniform.

KEYWORDS: *Gomphogyne*, Cucurbitaceae, Thailand, SE Asia.

INTRODUCTION

Gomphogyne is a somewhat heterogeneous genus in the subfamily Nhandiroboideae (formerly Zanonioideae) with six species and a strange distribution, extending from the mountainous Himalayas to lowland New Guinea with gaps in between the species areas (Map 1). The original publication by William Griffith has been cited by later authors, from Endlicher (1850) and J.D. Hooker (1867), onwards as "Pl. Cantor. 26, in annot., tab. 4 1841?". The original publication is rare and appears to be called more precisely: "Some account of the botanical collection, brought from the eastward, in 1841, by Dr. Cantor", published in 1845 (see below). The sole species of *Gomphogyne* recognized at that time was *G. cissiformis* Griff. from upper montane areas in the Himalayas of NE India. Since then, two species more have been added to *Gomphogyne*: the first by Kurz (1877), *G. heterosperma* (Wall.) Kurz, from Burma, and a second by Cogniaux (1916), *G. macrocarpa* Cogn., from NE India. These latter two species share non-pitted fruits and dioecious flowers with *Hemsleya*, a larger Chinese genus comprising ca 20 species (Jeffrey, 1980; Wu & Chen, 1985; Wu & Chung L. Chen, 1986; Chen, 1995), and so were later accommodated by Jeffrey (1982) in that genus. Jeffrey (1982) thereby transformed *Gomphogyne* back into a monotypic genus. Certainly, the dry capsular fruits of *G. cissiformis*, the type species of *Gomphogyne*, and those of *G. nepalensis* W.J. de Wilde & Duyfjes (herein described), are finely pitted, which may be an unique character in the subfamily.

Numerous recent collections from Thailand appear intermediate between *Gomphogyne* and *Hemsleya* and a decision was required as to which genus they belonged.

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We have refrained from proposing a new genus, and have chosen instead to place them in the genus *Gomphogyne*, rather than *Hemsleya*. However, within *Gomphogyne*, they are clearly not conspecific with *G. heterosperma*. Therefore, *Gomphogyne* as accepted here, comprises six species. The type species, *G. cissiformis*, though distinguished by centrally inserted stamens and finely pitted, broader, bell-shaped fruits does not possess additional differentiating characters to separate it at generic level. In addition to the new species *G. cirromitrata* W.J. de Wilde & Duyfjes from Thailand, two more new species, *G. peekelii* W.J. de Wilde & Duyfjes from remote eastern Malesia: Ceram, New Guinea (Vogelkop and Bismarck Archipelago) and *G. nepalensis* from Nepal, are described as belonging to *Gomphogyne*.

There has long been confusion about the year of publication of the genus *Gomphogyne*. At first it was supposed to have been published in 1837, and later on in 1841. However, the publication most probably appeared in 1845: it comprised a quarto publication without date, of 33 pages including 4 plates; later on it was reprinted, in octavo, in the *Journal of the Asiatic Society of Bengal*, 23: 623–650, with 4 plates, in 1854. See also ING-information on Internet as of 2007.

GOMPHOGYNE VERSUS *HEMSLEYA*

The main differences between the genera are briefly summarized in Table 1. The genus *Hemsleya* is mostly confined to China, with one species, *H. macrocarpa*, also in Assam. The record of *H. chinensis* Cogn. in North Vietnam cited by Keraudren-Aymonin (1975) has not been confirmed by us as we have not seen the voucher specimen.

In both *Gomphogyne* and *Hemsleya* the filaments are free, and are not connate at the base as was stated for *Gomphogyne* (e.g. by Cogniaux, 1881; Hooker, 1867; Clarke, 1879). In *G. cissiformis* and *Hemsleya* the filaments are inserted close to the centre of the receptacle. In the other species of *Gomphogyne* they are inserted further from the centre, which is open, but because of the small, white, almost hyaline dry flowers this cannot always be easily ascertained.

Provisionally, the differences between *Gomphogyne* and *Hemsleya* seem to be in (1) the growth habit, plants annual with fibrous roots versus plants perennial mostly with tuberous roots (2) petal length, (3) petal shape, (4) length of filaments compared to anther size, (5) filaments straight versus strongly out-curved, (6) the number of seeds and ovules, i.e. few versus usually numerous, (7) size of the horn-like processes on the fruit, viz. large and strong versus small or hardly visible, and (8) the distribution, i.e. with *Hemsleya* largely confined to China (not occurring in Thailand), and *Gomphogyne* largely occurring outside China (with *G. cissiformis*, extending into Yunnan and *G. heterosperma*, possibly extending into Yunnan).

The three genera, *Hemsleya*, *Gomphogyne*, and the taxonomically remote *Gynostemma*, all have foliolate leaves with dentate margins, so sterile specimens of these genera are difficult to tell apart. In collections of these genera it is sometimes difficult to associate male specimens with corresponding female and fruiting specimens. This is the reason that the original material used for the description of *Hemsleya chinensis* by Cogniaux

Table 1. Main differences between *Gomphogyne* and *Hemsleya*.

	Gomphogyne G. cissiformis & G. nepalensis (female flowers and fruit only)	**Gomphogyne other species**	**Hemsleya**
distribution	Himalayas	Burma Thailand Indochina E Malesia	China (*H. macrocarpa* also NE India)
growth habit and roots	annual with fibrous roots	annual with fibrous roots	perennial with tuberous roots (except *H. graciliflora*)
male petals	long-acuminate, margin ± erose	ovate-oblong, acute, margin (sub)entire	mostly (ob) ovate-oblong or oblong, obtuse, often recurved, sometimes hairy
diam. male perianth	4–5 mm	3–7 mm	more than 7(–10) mm
filaments	longer than anthers, straight	longer than anthers, straight	(mostly) shorter than anthers, out-curved
insertion of filaments	central	ex-central	central (always?)
secretory glands inside receptacle	absent	absent	present (always?)
locules of ovary	uni-locular (always?)	(incompletely) 3-locular (3-placentiferous)	(incompletely?) 3-locular
tendrils on female (or fruit) pedicel	1 or 2, present or absent	(1 or) 2, mostly present	absent (always?)
shape of capsule	short or long obconical	narrowly-obconical (not or but little constricted at apex)	variously obconical or subglobose, usually constricted at apex
apical horns on fruit (with style-remnant)	large	large	small
pericarp	finely pitted	not pitted	not pitted
number of seeds per fruit	1–9	3–12	usually numerous
size of seeds	Large, little compressed, 6–7 mm long, unwinged	small or large, flat, mostly winged (3–4 mm long, unwinged in *G. heterosperma*)	small or large, little compressed or flat, winged or unwinged

in 1889, and *Gomphogyne bonii* by Gagnepain in 1918, but also, for example, the material used for describing *Hemsleya heterosperma* (Wall.) C. Jeffrey as accepted in the present Internet draft version of Flora of China (2007) consist of mixtures of several species. Within *Hemsleya* some species with smaller male flowers, e.g. *H. graciliflora* (Harms) Cogn. (apparently the only species in *Hemsleya* with a non-tuberous root), *H. delavayi* (Gagnep.) C.Y. Wu & Z.L. Chen ex C. Jeffrey, and *H. dipterygia* Kuang & A.M. Lu, most resemble *Gomphogyne*.

Recent molecular research (Schaefer, Munich (Pers. comm.) shows that *Gomphogyne* and *Hemsleya* are distinct.

POLLEN MORPHOLOGY OF *GOMPHOGYNE* AND RELATED GENERA

Gomphogyne, *Gynostemma* and *Hemsleya* together make up the subtribe Gomphogyninae of the tribe Zanonieae of subfamily Nhandiroboideae (Jeffrey, 2005). In contrast to the pollen of subfamily Cucurbitoideae, the pollen of the Nhandiroboideae is more uniform: 3-colpor(oid)ate, usually medium-sized (up to 40 µm) and striate, sometimes larger (up to 52 µm) and/or perforate or reticulate (Alyoshina, 1971; Marticorena, 1963; Jeffrey, 1964, 1990; Khunwasi, 1998; Van der Ham, 1999; Van der Ham & Pruesapan, 2006). The pollen of *Gomphogyne* (Fig. 1A–C), *Gynostemma* (Fig. 1D–F) and *Hemsleya* (Fig. 1G–L) fits well in the Nhandiroboideae, being 3-colporate, mostly distinctly striate and smaller than 30 µm, or sometimes indistinctly striate and between 30 and 40 mm. The pollen of these genera cannot be distinguished from each other. Remarkably, under high magnification using scanning electron microscopy, the striate ornamentation usually shows a distinct, obliquely to transversely microstriate pattern (Fig. 1C, F, I). The pollen of *Hemsleya amabilis* and that of an as yet unidentified *Hemsleya* collection (Fig. 1L) deviate by not showing this micropattern. The latter differs also by its indistinctly striate ornamentation (Fig. 1J–L). As the microstriate pattern is common in subfamily Nhandiroboideae and is found in four of the five subtribes but not in Actinostemmatidae as distinguished by Jeffrey (2005), it may be a plesiomorphic feature within the subfamily, and so cannot be used to support a close relationship between *Gomphogyne*, *Gynostemma* and *Hemsleya*.

Material studied.— *Gomphogyne bonii* Gagnep.: *d'Alleizette* s.n., Vietnam (L); *G. cirromitrata* W.J. de Wilde & Duyfjes f. *cirromitrata*: *Koonkunthod et al.* 321, Thailand (L); *G. cirromitrata* f. *minor* W.J. de Wilde & Duyfjes: *Phonsena et al*. 4013, Thailand (L); *G. cissiformis* Griff.: *Togashi & Tuyama* 6304022, Nepal (K); *Crawford et al*. KEKE 1226, Nepal (K); *G. peekelii* W.J. de Wilde & Duyfjes: *Panoff et al*. 361, New Britain (L).— *Gynostemma microspermum* C.Y.Wu & S.K.Chen: *Murata et al*. T.15118, Thailand (L); *G. pentaphyllum* (Thunb.) Makino: *De Wilde & Duyfjes* 21890, Java (L).— *Hemsleya amabilis* Diels: *McLaren* 15, China (K); *H. chinensis* Cogn.: *Boufford & Bartholomew* 24556, China (K); *H. delavayi* (Gagnep.) C.Y. Wu & C.L. Chen: *Delavay* 3293, China (P); *H.* cf. *graciliflora* (Harms) Cogn.: *Henry* 4303, China (P); *H. macrocarpa* (Cogn.) C. Jeffrey: *Forrest* 16055, China (K); *Hemsleya* sp.: *Schaefer* 05/601, China (L).

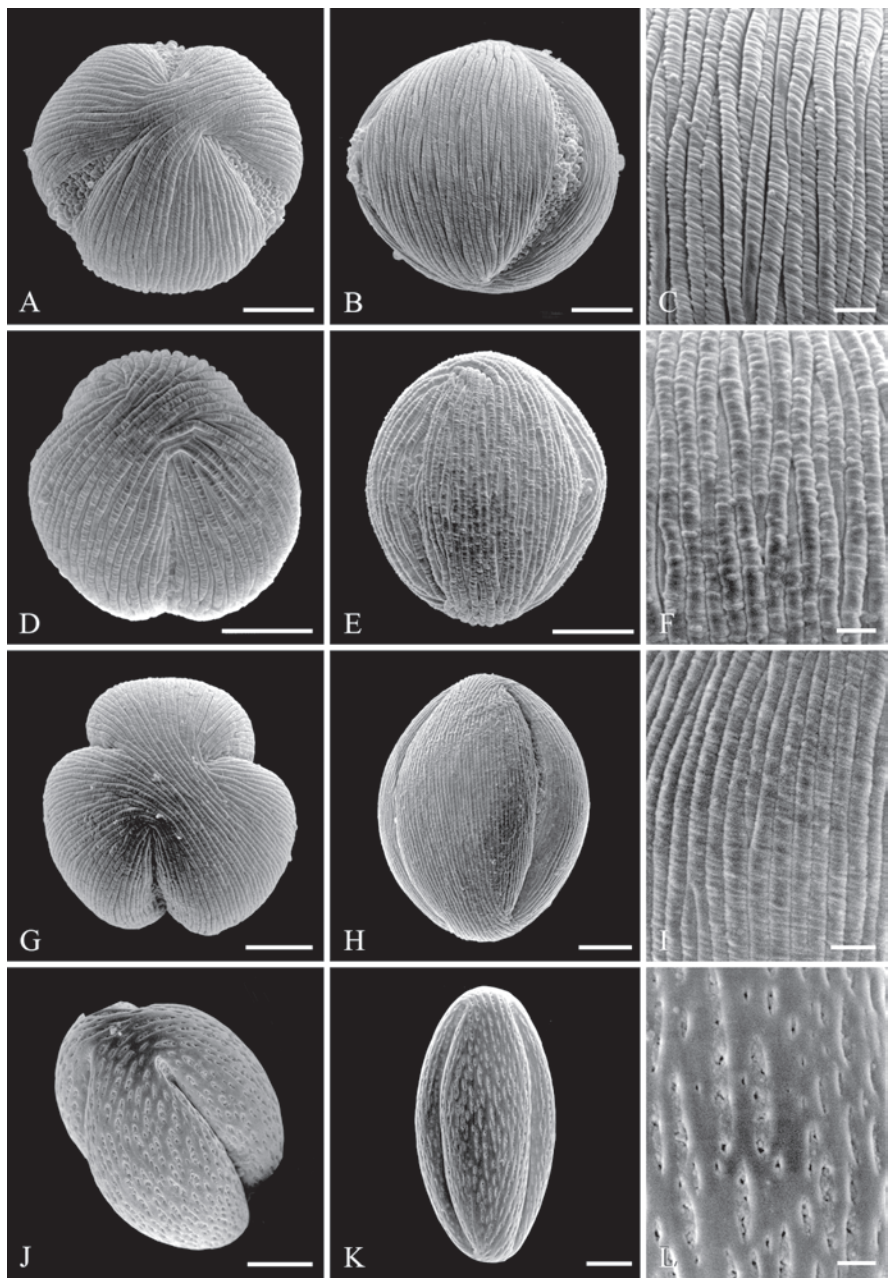


Figure 1. Scanning electron micrographs of pollen grains of *Gomphogyne cirromitrata* f. *minor* W.J. de Wilde & Duyfjes (A–C; *Phonsena et al*. 4013), *Gynostemma pentaphyllum* (Thunb.) Makino (D–F; *De Wilde & Duyfjes* 21890), *Hemsleya* cf. *graciliflora* (Harms) Cogn. (G–I; *Henry* 4303) and *Hemsleya* sp. (J –L; *Schaefer* 05/601). A, D, G, J: ± polar views; B, E, H, K: equatorial views; C, F, I, L: details of ornamentation. Scale bar 1 µm (C, F, I, L) or 5 µm (others).

GOMPHOGYNE

Griff., Account Bot. Coll. Cantor: 26. 1845; Hook. f. in Benth. & Hook. f., Gen. Pl. 1: 838 1867; C.B. Clarke in Hook. f., Fl. Brit. Ind. 2: 632. 1879; Cogn. in A. & C. DC., Monogr. Phan. 3: 923. 1881; in Engl., Pflanzenr. 66, 4.275.1: 38. 1916; Gagnep., Fl. Indo-Chine 2: 1084. 1921; Chakrav., Rec. Bot. Surv. India 17: 184. 1959; Keraudren in Aubrév. & J.-F. Leroy, Fl. Cambodge, Laos & Vietnam 15: 22. 1975; S.K. Chen in A.M. Lu & S.K. Chen, Fl. Reip. Pop. Sin. 73(1): 96. 1986; in C.Y. Wu, C. Chen & S.K. Chen, Fl. Yunnan. 6: 277. 1995. Type species: *Gomphogyne cissiformis* Griff.

Delicate or slender herbaceous climbers, 0.5 to 5 m long, annual or biennial, dioecious; roots fibrous, without tuberous rootstock. *Probract* absent. *Tendrils* 2-branched at apex. *Leaves* simple or pedately foliolate, ovate or subcircular in outline, membranous, leaflets up to 9, petiolulate, lateral ones usually smaller, elliptic or narrowly elliptic, apex acute or acute-acuminate, base acute, margin finely or coarsely serrate-dentate, teeth mucronulate; cystoliths absent or inconspicuous. *Flowers* small, white. *Male inflorescences* lateral, occasionally terminal, few- or many-flowered, paniculate with ultimate branches fine, raceme-like; minute bracts and lower portion of pedicels persistent; bracts linear. *Female inflorescences* few-branched or unbranched, with up to 3 flowers on a slender peduncle and usually with 1 or 2 small, simple and subopposite tendrils on the slender pedicel close to the flower. *Male flowers* with slender pedicel, articulate about halfway or towards the base; buds with subacute apex; corolla rotate; receptacle narrow, flat or shallow; sepals 5, free, ovate, acute, shorter than or subequal to petals; petals 5, free, imbricate in bud, ovate-oblong, acute or short- or long-acuminate, minutely gland-hairy adaxially; stamens 5, inserted in the centre (*G. cissiformis*) or somewhat outside the centre of the receptacle, subpatent, filaments short or long, free, slightly or much longer than the anther, anthers subglobose, small, short, 1-thecous, opening abaxially; disc inconspicuous or absent. *Female flowers* with short pedicel; ovary cylindrical-clavate, 1- or 3-locular, ovules 1 to numerous per placenta, pendulous; perianth segments somewhat longer than in male; styles 3, free, stigmas 2-lobed; staminodes absent. *Fruits* small or medium-sized, capsular, cylindrical-clavate, not or but little narrowed at apex, longitudinally striate by straight rib-like veins or irregular-veined, apex truncate, 3-valvate, circular or triangular with conspicuous straight or out-curved (narrowly) triangular horn-like processes partly formed by the styles at the angles. *Seeds* few, or rather many, up to 12, and then imbricately arranged in 3 rows, elliptic or oblong in outline, little or strongly flattened, tubercled or scrobiculate, unwinged or the margin with a membranous or corky wing either only at the end(s) or all around.

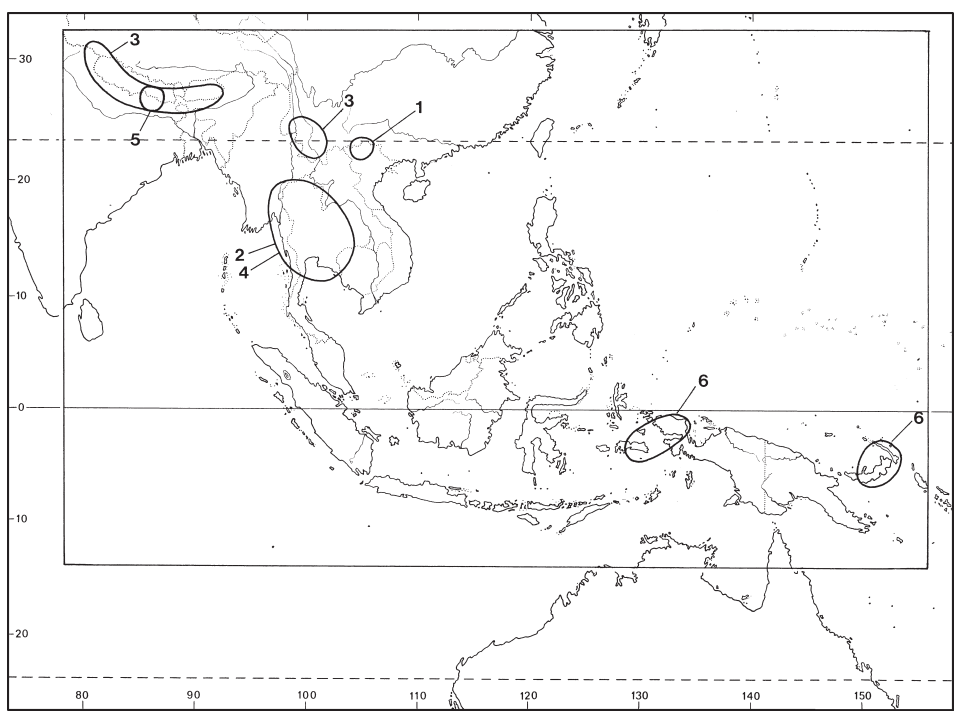
Distribution.— A genus of six species; two in mountainous Himalayas, of which one species in India, Bhutan, Nepal, Yunnan, and one in Nepal, three species in Indochina (not known from Laos, Cambodia, S Vietnam; one species possibly extending into Yunnan), and one species in East Malesia (Ceram, New Guinea, including Bismarck Archipelago). Two species in Thailand. Map 1.

Notes.— Because the species are distinguished mainly on fruit characters, male flowering specimens of species occurring in the same area can often not be named with confidence.

The tendrils on the female pedicel are inserted close to the ovary and obviously function as an additional means of attachment of the pendulous fruit, even when the annual plant itself has died off. Figs. 3C, 7C.

KEY TO THE SPECIES

1. Petals (not known in *G. nepalensis*) ± erose, apex long-acuminate. Pericarp finely pitted. Seeds little compressed, unwinged. Montane area in Himalayas (India, Nepal, Bhutan, China) 2
1. Petals entire, apex acute or rounded. Pericarp not pitted. Seeds strongly flattened, winged or unwinged 3
   2. Capsule broadly obonical (bell-shaped), ca 1 cm long, glabrous or woolly hairy. Seeds 1–3, each 6–8 mm long. India, Nepal, Bhutan, Yunnan **3. G. cissiformis**
   2. Capsule long-obconical, 2.5–3 cm long, glabrous. Seeds 6—9, each 6–6.5 mm long. Nepal **5. G. nepalensis**
      3. Capsule 5–5.5 cm long. Male perianth 3–7 mm in diam. 4
      3. Capsule 1.5–3 cm long. Male perianth 2–5 mm in diam. Yunnan, Burma, Thailand 5
         4. Male perianth ca 7 mm in diam. North Vietnam (Tonkin) **1. G. bonii**
         4. Male perianth 3–4 mm in diam. East Malesia (Ceram, New Guinea) **6. G. peekelii**
            5. Rachis of male panicles ± straight (see the notes under *G. heterosperma*). Capsule striate by 6–9 raised veins, not reticulately veined between. Seeds unwinged or narrowly winged **4. G. heterosperma** (with two forms)
            5. Rachis of male panicles ± zigzag. Capsule with 5 or 6 not or slightly raised veins, coarsely reticulately veined between. Seeds winged **2. G. cirromitrata** (with two forms)



Map 1. Distribution of *Gomphogyne* in SE Asia. 1 = *G. bonii* Gagnep.; 2 = *G. cirromitrata* W.J. de Wilde & Duyfjes; 3 = *G. cissiformis* Griff.; 4 = *G. heterosperma* (Wall.) Kurz; 5 = *G. nepalensis* W.J. de Wilde & Duyfjes; 6. = *G. peekelii* W.J. de Wilde & Duyfjes.

1. Gomphogyne bonii Gagnep., Bull. Mus. Hist. Nat. (Paris) 24: 372, p.p., for the lectotype only. 1918; Fl. Indo-Chine 2: 1084, f. 125, 127: 6–7. 1921.— *Hemsleya chinensis* auct. non Cogn.: Gagnep., Fl. Indo-Chine 2: 1092. 1921, p.p.; Keraudren in Aubrév. & J.-F. Leroy, Fl. Cambodge, Laos & Vietnam 15: 14, pl. 3: 5, 9. 1975.— *Gomphogyne cissiformis* auct. non Griff.: Keraudren in Aubrév. & J.-F. Leroy, Fl. Cambodge, Laos & Vietnam 15: 22, pl. 3: 10–12. 1975. Type: Vietnam, Tonkin, Prov. Hanoi, bois de Vo-xa, *Bon* 4310 (lectotype **P**!, barcode P00526231, chosen here; isolectotypes **P**!, 2 sheets). Fig. 6F–G.

Slender climber, 2–3 m long, subglabrous; stem 1–1.5 mm thick. *Leaves* (3- or) 5-foliolate; blade 8–17 cm in diam.; petiole 2–7 cm long; leaflets elliptic, or narrowly elliptic, the middle one largest, 4–9 by 1.5–4 cm, 5–10-pinnately veined, glabrous, margin shallowly remotely dentate; petiolules 5–10 mm long. *Male inflorescences* 5–15 cm long, paniculate, loose, simple or compound, with up to 5 lateral branches, sparsely minutely hairy, glabrescent; peduncle 3–4 cm long; rachis somewhat zigzag between the lateral branches; ultimate spike-like racemes few-flowered, ca 5 mm long; bracts and basal portion of pedicels persistent, both ca 0.5 mm long or less. *Male flowers* with 2–3 mm long pedicel, articulate towards the base; perianth ca 7 mm in diam.; receptacle 1–1.5 mm in diam.; sepals 1.5–2 mm long; petals 3–3.5 mm long; filaments ca 2 mm long, anthers ca 0.5 mm long. *Female inflorescences* with up to 4 solitary flowers in a short-shoot, forming a raceme 3–5 cm long, including peduncle 1–2 cm long. *Female flowers* not seen; pedicel ca 4 mm long. *Fruits* 1 or 2 per infructescence; fruiting pedicel 0.5–0.7 cm long, without or with a small tendril at base; capsules 3.5–5.5 cm long, (1–)1.5 cm wide at apex, with ca 9 flat veins, apical horns stout, 5–6 mm long. *Seeds* ca 15, flat, ca 8 by 6 mm, when including the wing ca 15 by 7 mm, smooth or finely tubercled on the faces, with a coarsely tubercled margin, wing all around, longest at the ends, deeply notched at apex.

Notes.— *Gomphogyne bonii* was based on two collections, the lectotype *Bon* 4310 (P) and *Henry* 4303 (E, P) from China. The cited illustrations, by both Gagnepain (1921) and Keraudren-Aymonin (1975), are obviously of *Bon* 4310. In L a fine male specimen of *G. bonii*, labeled as "Herbier de Ch. d' Alleizette, Tonkin – Van – Au, sur la Riviere hocio", seems to be, according to its general appearance, a duplicate of *Bon* 4310, although the collection locality is different.

Gagnepain's description and figure (1921, f. 125) seem to be of *Bon* 4310, with male inflorescences in early anthesis. The collection *Henry* 4303, seen by us from E and P, has male flowers and can be referred to *Hemsleya*, possibly *H. gracilis*.

The male flowers of *G. bonii* are the largest in the genus *Gomphogyne*. Its leaves are comparatively large as well. More collections are needed for a complete picture of the species.

Balansa 4023 (P), used in the doubtful treatment of *Hemsleya chinensis* for Indochina (and identified in the herbarium as *H. dipterigia* in 1992 and 1993 by De Zhu Li), belongs, in our opinion, to *Gomphogyne bonii* as well. The fruit depicted by Gagnepain (1921) and Keraudren-Aymonin (1975) is not yet fully mature, as can be seen in mature long-horned fruits on the same specimen. See also the notes under *G. peekelii*.

2. Gomphogyne cirromitrata W.J. de Wilde & Duyfjes, **sp. nov.** A *Gomphogyne heterosperma* in capsulae venis longitudinalibus costis similibus non vel vix elevatis, seminibus alatis distincta. Typus: Thailand, Phetchaburi, Kaeng Kra Chan National Park, 5 Dec. 2002, *Koonkhunthod, De Wilde & Duyfjes* 322 (holotypus BKF!; isotypus L!).

Small or medium climber, 1–5 m long, stem slender, subglabrous or minutely sparsely hairy or glandular hairy. *Leaves* entire or 3–7-foliolate; blade 3–12 cm in diam.; petiole 1.5–8 cm long; leaflets elliptic, narrowly elliptic or rhomboid, 1.5–10 cm long, 4–7-pinnately veined, glabrous except hairy on main veins; petiolules 3–12 mm long. *Male inflorescences* 5–10–15 cm long, 1-, 2- or 3-branched, many-flowered; peduncle 2–5 cm long, rachis usually zigzag between the lateral branches, ultimate spike-like racemes to 1.2 cm long, set with bracts and ca 1 mm long basal portions of pedicels, and with developing flowers and buds at apex; bracts ca 0.5 mm long. *Male flowers* with 3–4 mm long pedicel; perianth 2–5 mm in diam.; receptacle 0.5–1.5 mm in diam.; sepals 1–1.5 mm long; petals 1–2 mm long; filaments 0.5–1.5 mm long, anthers 0.5–0.7 mm long. *Female inflorescences* solitary, rarely a few aggregated on a short shoot, each 1- or 2-flowered; peduncle slender, 3–5(–10) cm long. *Female flowers* with 10–20 mm long pedicel, usually with 1 or 2 small tendrils; ovary narrow, 2–5 mm long, subglabrous; sepals and petals somewhat longer and narrower than in male flowers; styles including stigma ca 1 mm long. *Fruits* 1(–2) per infructescence; fruiting pedicel (0.5–)1–2 cm long, usually with 1 or 2 small tendrils; capsules 1.5–3.5 cm long, 5- or 6-veined, veins flat or but little raised, with coarse reticulation between, apical horns 1–3 mm long. *Seeds* 2–9(–12), elliptic-oblong, flat, 4–6 mm long, finely tubercled, with a wing all around but broadest at the ends.

Distribution.— Thailand; possibly also Cambodia.

Ecology.— Open forest and scrub, and over rocks; common on limestone, also on granite; lowlands to 1800 m altitude; flowering and fruiting mainly in the rainy season.

KEY TO THE FORMS

1. Plant stouter, 2–5 m long. Sepals patent at anthesis. Expanded male perianth 3–5 mm in diam. Filaments at least two times longer than anthers. Capule 2–3.5 cm long, not conspicuously narrowed in basal half. Seeds 6–9(–12) **a. f. cirromitrata**

1. Plant more delicate, 1–2(–4) m long. Sepals recurved at anthesis. Expanded male perianth 2(–3) mmin diam. Filaments only slightly longer than anthers. Capsule 1.5(–2) cm long, much narrowed (and seedless) in the basal half. Seeds 2 or 3 (–6) **b. f. minor**

a. f. **cirromitrata**. Figs. 2A–C, 3, 4E, 7D–E, G.

Plants stouter, 2–5 m long. *Leaves* to 12 cm in diam., (simple or) usually 3–5(–7)-foliolate. *Male panicles* 10–15 cm long. *Flowers* with patent sepals at anthesis. *Male flowers* with 3–5 mm diam. perianth; sepals shorter and narrower than petals; filaments 1–1.5 mm long, at least two times longer than the anthers, anthers ellipsoid-globose, ca 0.5 mm in diam. *Female flowers* with 3–5 mm long ovary; petals ca 4 mm long. *Capsules* 1 (or 2) per infructescence, 2–3.5 cm long, not or but faintly narrowed at base, ca (5–)7–10 mm wide at apex, horns 2–4 mm long. *Seeds* several, 6–9(–12) per capsule, elliptic or narrowly elliptic, 4–6 by 3 mm, when including the wing 6–9 mm long.

Thailand.— NORTHERN: Chiang Mai [Doi Chiang Dao, *Smitinand et al*. 7726 (**BKF**, **K**); *Geesink et al*. 8158 (**L**), Doi Sutep-Pui NP, *Maxwell* 92-479 (**L**), Doi Mawn Angget, *Maxwell* 98-1077 (**L**, **BKF**)]; SOUTHWESTERN: Kanchanaburi [Huay Bankau, *Van Beusekom et al*. 3522 (**K**, **L**, **MO**), Sai Yok, *Van Beusekom et al*. 3982 (**L**, **BKF**, **K**, **MO**), Kroeng Kra wia Village, *Pruesapan et al*. KP 52 (**BK**, **BKF**, **L**); KP 53 (**BK**, **BKF**, **L**)]; Phetchaburi [Kaeng Kra Chan National Park, *Koonkhunthod et al*. 321 (**BKF**, **L**); 322 (**BKF**, **L**), type; *Phonsena et al*. 4670 (**BKF**, **L**); 4671 (**BKF**, **L**)]; Prachuap Khiri Khan (Thung Yao Village, *Pruesapan et al*. KP 9 (**BK**, **BKF, L**)]; SOUTHEASTERN: Sa Kaeo [Khlong Hat, *Phonsena et al*. 5152 (**BKF**, **L**)].

Distribution.— Endemic.

Ecology.— Forest margins, in scrub over rocks, along rivulets; mostly found on limestone, rarely on granite; 150–1800 m altitude; flowering and fruiting mainly from September to January.

Notes.— The collection *Geesink et al*. 8158 (L) from Doi Chiang Dao, in bamboo-rich forest on limestone, at 1800 m altitude, differs in its small (ca 0.5 mm long) horn-like processes on the capsules.

b. f. **minor** W.J. de Wilde & Duyfjes, **f. nov.** A forma typica floribus minoribus, perianthio masculo ca 2 mm diam., fructibus minoribus 1.5–2 cm longis, seminibus paucioribus 2–3(–6) differt. Typus: Thailand, Lop Buri, Bancha Khiri Temple, *Pooma, De Wilde, Duyfjes, Chamchumroon & Phattarahirankanok* 3041 (holotypus BKF!; isotypus L!). Figs. 2D, 4D, 7A–B, H.

Plants delicate, 1–2(–4) m long. *Leaves* to 6 cm in diam., simple or usually 3- or 5-foliolate. *Male panicles* 5(–10) cm long. *Flowers* with recurved sepals at anthesis. *Male flowers* with perianth 2(–3) mm in diam.; sepals somewhat shorter than petals but not much narrower, ± spreading; petals somewhat up-curved, not spreading at anthesis; filaments less than 1 mm long, only slightly longer than anthers, anthers subglobose, 0.5–0.7 mm long. *Female flowers* with 2–3 mm long ovary; petals 2–2.5 mm long. *Capsule* solitary, 1.5(–2) cm long, 0.4–0.5 mm wide at apex, strongly narrowed in the basal half, horns 1–1.5 mm long. *Seeds* 2 or 3 (–6), narrowly elliptic, 4–6 by 2.5–3 mm, when including wing 6–7 mm long, wing narrow, 0.2–0.5 mm wide.

Thailand.— NORTHERN: Chiang Mai [Muang Awn Cave, *Maxwell* 89-1220 (**L**), Doi Chiang Dao Wildlife Sanctuary, *Maxwell* 95-863 (**BKF**, **L**)]; Lampang (Huay Tak, *Shimizu et al*. T-10721 (**BKF**, **L**); T-10731 (**BKF**, **L**); *Tagawa et al.* T-10620 (**L**)]; Tak [Po Tip Tawng Cave Meditation Centre, *Maxwell* 94-922 (**BKF**, **L**)]; Nakhon Sawan (Nakhon Sawan, *Phonsena et al*. 4013 (**BKF**, **L**)]; SOUTHWESTERN: Kanchanaburi [Toong Yai Naresuan WR, *Maxwell* 93-1159 (**L**)], Prachuap Khiri Khan [Thung Yao Village, *Pruesapan et al*. 10 (**BK**, **BKF**, **L**)]; CENTRAL: Lop Buri [Bencha Khiri Temple, *Pooma et al*. 2991 (**BKF**, **L**); 3041, type (**BKF**, **L**); 3042; *De Wilde et al*. 22301 (**L**); 22302 (**L**)]; SOUTHEASTERN: Sa Kaeo [Centennial Botanical Garden, *Phonsena et al.* 3516 (**BKF**, **L**); 3517 (**BKF**, **L**), Khlong Hat, *Phonsena et al.* 5151 (**BKF**, **L**)]; Chon Buri [Bo Thong, *Phonsena et al.* 5193 (**BKF**, **L**)]; Rayong [Khao Wong, *Phonsena et al.* 5168]; PENINSULAR: Chumphon [Than Lod Cave, Thung Tako district, *Koonkhunthod et al.* 316 (**BKF**, **L**)]; Ranong [Kao Talu, *Kerr* 11794 (**BK**, **K**)].

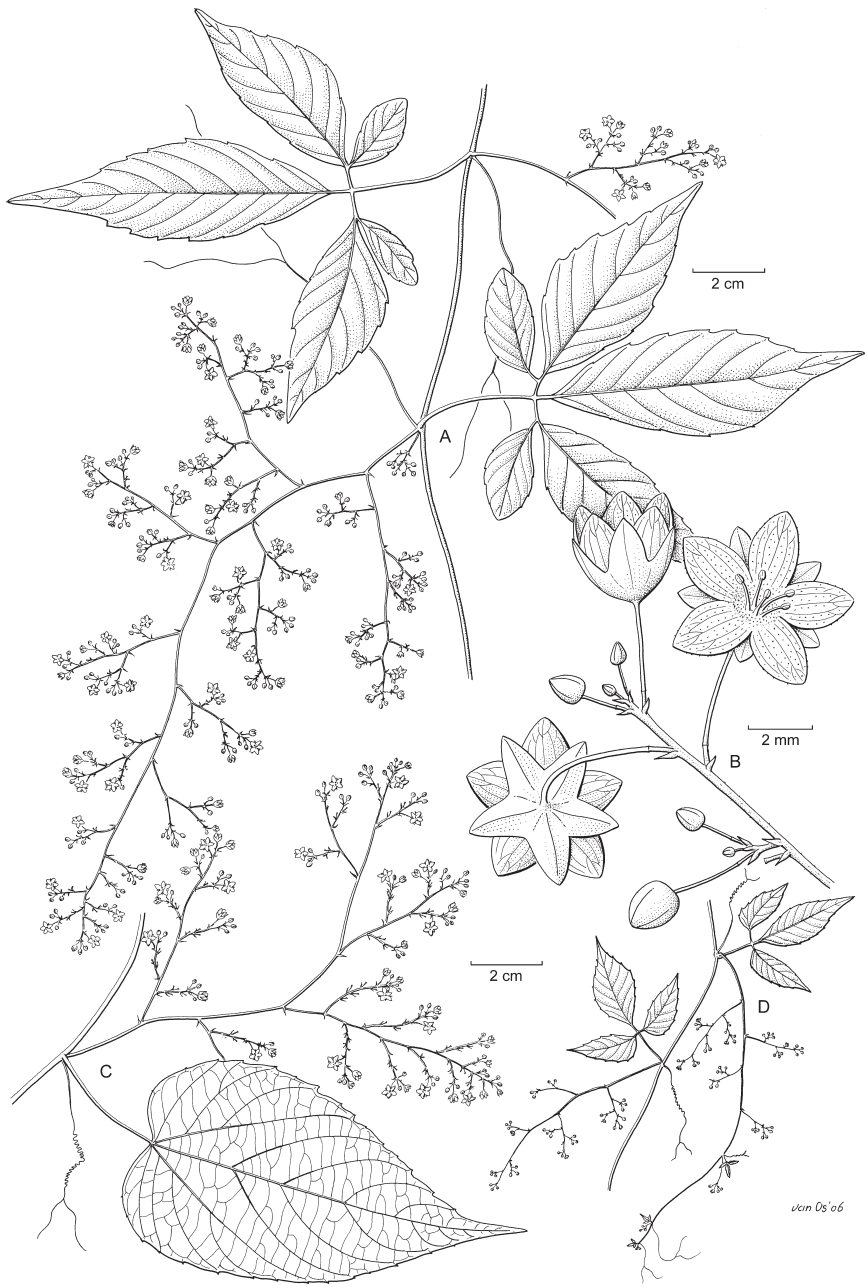


Figure 2. *Gomphogyne cirromitrata* W.J. de Wilde & Duyfjes f. *cirromitrata*: A. Male flowering branch; B. detail of male inflorescence, flowers seen from above and below; C. male flowering branch of a simple-leaved specimen.— *Gomphogyne cirromitrata* W.J. de Wilde & Duyfjes f. *minor* W.J. de Wilde & Duyfjes: D. Male flowering branch. A–B: *Koonkhunthod et al*. 321; C: *Maxwell* 89-1540; D: *Koonkhunthod et al*. 316. Drawn by Jan van Os.

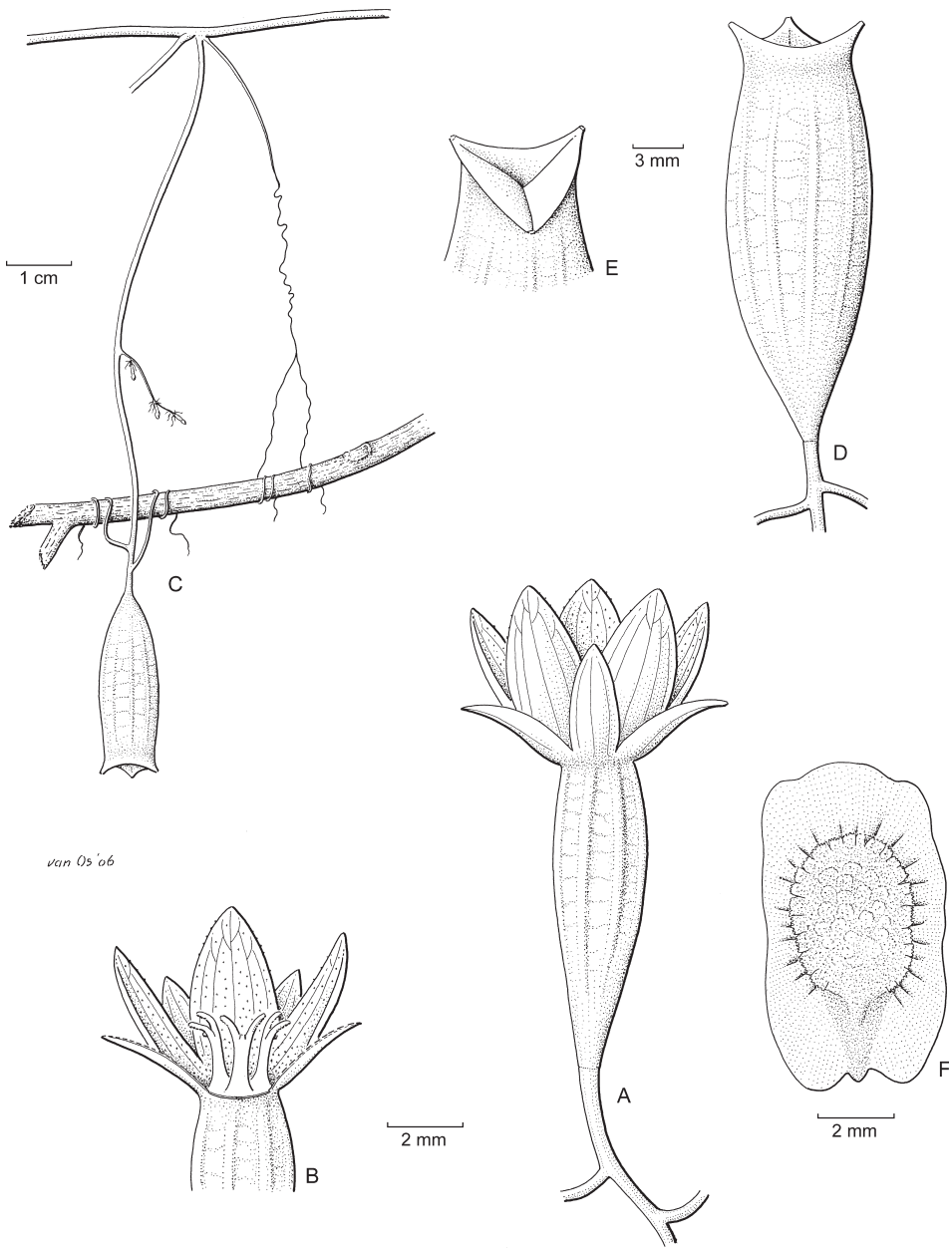


Figure 3. *Gomphogyne cirromitrata* W.J. de Wilde & Duyfjes f. *cirromitrata*: A. Female flower; B. detail of female flower, perianth partly removed; C. fruit clinging on supporting branch with tendrils at fruit base; D, E. fruit and apex of fruit showing valve-sutures; F. seed. A–F: *Koonkhuntod et al*. 322. Drawn by Jan van Os.

Distribution.— Endemic.

Ecology.— In open scrub; on limestone, in rock crevices, or among stones; to 550 m altitude; flowering and fruiting mainly between September and January.

Notes.— The forma *minor* is probably an ecotype from poorer limestone-derived soils and does not occur together with the typical form in the same locality. In herbarium material the forms seem to intergrade, but generally the forms are quite distinct in nature.

The collection *Hosseus* 83 (L), from Thailand and cited by Cogniaux (1916: 39) under *G. cissiformis* belongs here.

3. Gomphogyne cissiformis Griff., Account Bot. Coll. Cantor: 26. 1845, pl. 4: 1–7; J. Asiat. Soc. Bengal: 645, pl. 4: 1–7. 1854; C.B. Clarke in Hook. f., Fl. Brit. Ind. 2: 632. 1879; Cogn. in A. & C. DC., Monogr. Phan. 3: 924. 1881; in Engl., Pflanzenr. 66, 4.275.1: 38, f. 12. 1916; Gagnep., Fl. Indo-Chine 2: 1086, excl. *Hosseus* 83. 1921; Chakrav., Rec. Bot. Surv. India 17: 184. 1959; M. Mizush. in H. Hara, Fl. E. Himalaya: 322. 1966; H. Hara, Photo-album of plants of eastern Himalaya: photo 59. 1968; C. Jeffrey, Cucurb. Eastern Asia: 9. 1980; S.K. Chen in A.M. Lu & S.K. Chen, Fl. Reip. Pop. Sin. 73(1): 96. 1986; in C.Y. Wu, C. Chen & S.K. Chen, Fl. Yunnan. 6: 277. 1995; Grierson & D.G. Long, Fl. Bhutan 2: 270. 1991. Type: Himalayan Range, *Edgeworth* 88 (neotype K!, selected by Keraudren-Aymonin, 1975),.— *G. cissiformis* Griff. var. *villosa* Cogn. in A. & C. DC., Monogr. Phan. 3: 925. 1881.— *G. cissiformis* Griff. f. *villosa* (Cogn.) Mizush., J. Jap. Bot. 41: 259. 1966. Type: India, Sikkim, *Hooker* s.n., 2 Oct. 1843 (holotype K!). Fig. 4A–A'.

Slender annual herbs, 0.5–1.5 m, glabrous or fruit glabrous or woolly hairy. *Leaves* (5-)7–9-foliolate; blade 4–9 cm in diam., petiole 2–6 cm long; leaflets elliptic or narrowly elliptic, the middle one the largest, 3–5 cm long, 8–11 pinnately veined, subglabrous; petiolules 2–7 mm long. *Male inflorescences* a slender few- or usually 2- (or 3-) branched many-flowered raceme-like narrow panicle, 3–20 cm long, including peduncle 1–4 cm long, rachis not zigzag, ultimate spike-like racemes to 1 cm long, few-flowered; bracts linear, minute. *Male flowers* with 1.5–2.5 mm long pedicel, articulated about the middle, perianth 5–6 mm in diam.; receptacle 1–1.5 mm in diam.; sepals ca 1 mm long, acuminate; petals 2.5–3 mm long, margin finely or coarsely erose, in apical half narrow, long-acuminate; filaments ca 1 mm long; anthers ca 0.5 mm in diam. *Female inflorescences* as in male but smaller and fewer-flowered, the flowers single or few-fascicled, peduncle 1.5–2.5(–7) cm long. *Female flowers* with 1–2 mm long pedicel, usually with one small tendril at base; ovary short-obconical, 3–5 mm long, 2–3 mm wide at apex, glabrous or woolly hairy; sepals and petals as in male flowers, but shorter; styles narrow, including 2-hooked stigma 1–1.5 mm long. *Fruits* solitary or 2–10 per infructescence; fruiting pedicel 0.2–1 cm long, with or without one small tendril near its articulation; capsules obconical or campanulate, (0.8–)1–1.2 cm long and (0.8–)1–1.2 cm wide at apex, with 6–9 flat or slightly raised veins, reticulate between, apical horns 1.5–2 mm long, ± spreading. *Seeds* 1–3, elliptic in outline, moderately compressed, 6–8 by 4–5 mm, sparsely verrucose, ± attenuate or pointed at one side, unwinged.

Distribution.— India (Garheval, Darjeeling, Sikkim, type), Nepal, Bhutan, China (Yunnan).

Ecology.— Damp woods; 1500–3000 m altitude.

Notes.— Cogniaux (1881) distinguished two varieties in *Gomphogyne cissiformis*, viz. the type variety, and var. *villosa* with woolly-hairy fruits and a more compact infructescence. Mizushima (1966) found that both varieties occur in the same locality, and reduced var. *villosa* to a forma.

4. Gomphogyne heterosperma (Wall.) Kurz, J. Asiat. Soc. Bengal 46: 105. 1877; C.B. Clarke in Hook. f., Fl. Brit. Ind. 2: 623. 1879; Cogn. in A. & C. DC., Monogr. Phan. 3: 925. 1881; in Engl., Pflanzenr. 66, 4.275.1: 39. 1916; Craib, Fl. Siam. 1: 765. 1931.— *Alsomitra heterosperma* (Wall.) M. Roem., Syn. Monogr. 2: 118. 1846.— *Zanonia? heterosperma* Wall., Cat. 3728, nom. nud. 1828; Pl. Asiat. Rar. 2: 29. 1831; Miq., Fl. Ind. Bat. 1: 683. 1856.— *Hemsleya heterosperma* (Wall.) C. Jeffrey, Kew Bull. 36: 739. 1982. Type: Burma, *Wallich Cat.* 3728 (K-W!). Fig. 7F.

Small climbers, 0.5–2 m long, stems slender, sparsely soft-hairy or glabrous. *Leaves* entire? or 3–7-foliolate; blade 3–5(–7) cm in diam.; petiole 1–4 cm long; leaflets narrowly elliptic or rhomboid, 1.5–7 cm long, the middle one largest, 7–10 pinnately veined, glabrous except a few hairs on veins; petiolules 1–3(–6) mm long. *Male inflorescences* 2–6 cm long, 1 or 2 times branched, ± many-flowered; peduncle 1–2 cm long, rachis not or faintly zigzag; ultimate spike-like racemes up to 1 cm long; bracts ca 0.5 mm long, persistent pedicel bases slightly longer. *Male flowers* with 3–4 mm long pedicel; perianth 2–2.5 mm in diam.; receptacle 0.5–1 mm in diam.; sepals ca 0.5 mm long; petals 1–1.5 mm long; filaments ca 0.5 mm long, anthers ca 0.3 mm long. *Female flowers* 1 or 2 on slender 3–6 cm long peduncle; pedicel ca 10 mm long, with 1 or 2 small tendrils close to the ovary; ovary narrowly turbinate, 3–4 mm long, minutely hairy or glabrous; sepals ca 2 mm long,; petals ca 3 mm long; styles 1–1.5 mm long including the ca 0.5 mm long stigma-lobes. *Fruit* solitary, on slender 3–6 cm long peduncle; fruiting pedicel slender, 1–2 cm long, usually with 1 tendril; capsule (1–)1.5–3 cm long, longitudinally 6–9-veined, veins distinctly raised, smooth between, without coarse reticulate venation, finely hairy or sub-glabrous, apical horns 1.5–3 mm long. *Seeds* elliptic, flat, 3–4 mm long, finely tubercled, unwinged or narrowly winged, wing up to 0.5 mm wide.

Distribution.— Thailand, East Burma; recorded for Yunnan, but no material seen.

Ecology.— Thickets, grassy slopes; on limestone as well as on granite bedrock; flowering and fruiting during September to December; from sea-level to 1600 m altitude.

Notes.— The general habit of *G. heterosperma* is a tiny climber, similar to *G. cirromitrata* f. *minor*. The few collections with male and fruiting material on the same sheet suggest that male inflorescences have the rachis not or but little zigzag between its main lateral branches. The male flowers appear similar to those of *G. cirromitrata*, of a size intermediate to forma *cirromitrata* and forma *minor.* Material with only male flowers therefore cannot be named to the species.

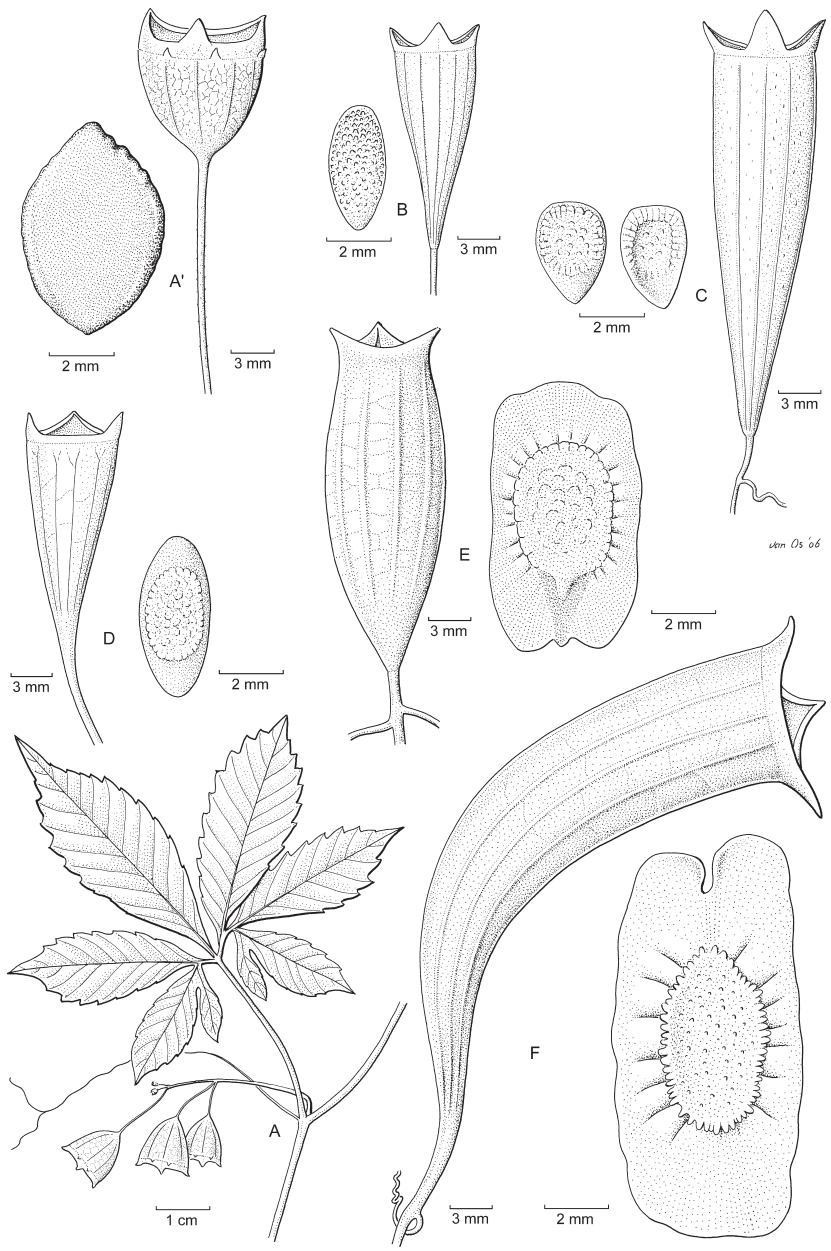


Figure 4. *Gomphogyne*, fruits and seeds.— A–A': *Gomphogyne cissiformis* Griff.; B: *Gomphogyne heterosperma* (Wall.) Kurz f. *heterosperma*; C: *Gomphogyne heterosperma* (Wall.) Kurz f. *vittata* W.J. de Wilde & Duyfjes; D: *Gomphogyne cirromitrata* W.J. de Wilde & Duyfjes f. *minor* W.J. de Wilde & Duyfjes; E: *Gomphogyne cirromitrata* W.J. de Wilde & Duyfjes f. *cirromitrata*; F: *Gomphogyne peekelii* W.J. de Wilde & Duyfjes A–A': *Nair* 35911; B: *Van Beusekom & Smitinand* 2038; C: *Tagawa et al.* T 9502; D: *Koonkhunthod et al.* 317; E: *Koonkhunthod et al.* 322; F: *Peekel* 118. Drawn by Jan van Os.

KEY TO THE FORMS

1. Capsule 1–1.5 cm long, much narrowed and without seeds in the basal pedicel-like portion. Seeds 3–5, each 3(–4) mm long, unwinged **a. f. heterosperma**

Capsule 2–3 cm long, not narrowed in the basal portion, the fruiting pedicel sharply demarcated. Seeds 6–12, each 3.5–4 mm long, narrowly winged or unwinged **b. f. vittata**

a. f. **heterosperma**. Fig. 4B.

Small climber, 0.5–1 m long,. *Capsules* narrowly campanuliform or subclavate, much narrowed and without seeds in the basal pedicel-like portion, 1–1.5 cm long, at apex 0.4–0.5 cm wide. *Seeds* 3–5, ovoid in outline, ca 3(–4) by 2 by 0.7 mm, unwinged.

Thailand.— NORTHERN: Chiang Mai [Doi Muang Awn, *Palee* 322 (**L**); 466 (**L**); 470 (**L**); *Maxwell* 92-658 (**L**)]; Tak [Mae Sot, *Shimizu et al*. T-18501 (**BKF**), Khao Pha Wo, *Murata et al.* 16878 (**BKF**, **L**)]; Nakhon Sawan [Nakhon Sawan, *Phonsena et al.* 4014 (**BKF**, **L**)].

Distribution.— East Burma (type).

Ecology.— Evergreen, deciduous, and bamboo forest on limestone; at 100–700 m altitude; flowering and fruiting mainly during September to November.

b. f. **vittata** W.J. de Wilde & Duyfjes, **f. nov**. A forma typica capsulis maioribus 2–3 cm longis differt. Typus: Thailand, Phrae, Mae Yom National Park, *Maxwell* 91-984 (holotypus **BKF**!; isotypus **L**!),.

Climber, 1(–2) m long. *Capsules* clavate, not narrowed in the basal portion, the fruiting pedicel sharply demarcated, 2–3 cm long, at apex 0.6–0.7 cm wide. *Seeds* 6–12, subcircular to elliptic in outline, ca 3.5–4 by 2.5 by 1 mm, unwinged or narrowly winged. Fig. 4C.

Thailand.— NORTHERN: Chiang Mai [Doi Sutep-Pui National Park, *Maxwell* 89-1234 (**L**); *Palee* 68 (**L**); Doi Suthep, *Tagawa et al*. 9501 (**BKF**, **L**); 9502 (**BKF**, **L**); Doi Chiang Dao National Park, *Put* 312 (**BK**, **K**); *Smitinand et al.* 7731 (**BKF**); 7733 (**BKF**); *Tagawa et al.* 9935 (**BKF**, **L**); Doi Chang, *Chermsirivathana* 3354-1 (**BKF**)); Lamphun [Doi Mai Takian, *Sadekorn* 595 (**BK**)], Phrae [Mae Yom NP, *Maxwell* 91-984 **BKF**, **L**)].

Distribution.— Endemic.

Ecology.— On open ground and grassy slopes, in bamboo bush, common on rocky slopes; on granite bedrock and limestone; 1,000–1,800 m altitude; flowering and fruiting between September and December.

5. Gomphogyne nepalensis W.J. de Wilde & Duyfjes, **sp. nov**. A Gomphogyne cissiformi in fructibus maioribus 2.5–3 cm longis seminibus 6–9 distincta. Typus: Nepal, south of Kalopani, Sept. 1973, *Grey-Wilson & Philips* 847 (holotypus K!). Fig. 5.

Small herbaceous climber; stem 1–2 mm diam, plant glabrous, except for sparse inconspicuous hairs. *Leaves* (5–)7–9-foliolate; blade 6–9 cm in diam.; petiole 2–3 cm long;

leaflets narrowly elliptic, the middle one by far the largest, 4–5.5 by 1.5–2 cm, the outer leaflets 1–1.5 by 0.5–0.8 cm, 6–15 pinnately veined; petiolules 1–4 mm long. *Male inflorescences & male flowers* not known. *Female inflorescences* a solitary flower, either subsessile on a short lateral shoot or on a long slender peduncle 3–5 cm long. *Female flowers* with 1–3 mm long pedicel, with or without 1 or 2 minute tendrils just below the ovary; ovary long-obconical, ca 5 by 1.2 mm, weakly 6-ribbed; sepals long-triangular, 1–1.2 by 0.3–0.5 mm, apex acuminate; petals narrowly elliptic, 2.5–3 by 1.2 mm, apex long-acuminate; receptacle slightly convex, with 3 styles near the margin; styles long-triangular, ca 1 by 0.8 mm, stigma papillose, ca 0.5 mm wide. *Fruit* solitary, on a slender, short or ca 5 cm long peduncle including fruiting pedicel, without or with 1 or 2 ca 1 cm long tendrils just below the fruit; capsule long-obconical, more narrowed to the base, 2.5–3 by ca 1 cm, weakly 6-ribbed, not reticulate between, but finely irregularly pitted, apex flat, with 3 stout, sub-erect, subtriangular horns 4–5 mm long. *Seeds* 6–9, subovoid, moderately compressed, ca 6–6.5 by 4 by 2 mm, apex ± acute, irregularly warty, unmargined, without wing.

Distribution.— Only known from the type.

Ecology.— Habitat not recorded; altitude ca 2300 m; Flowering and fruiting in September.

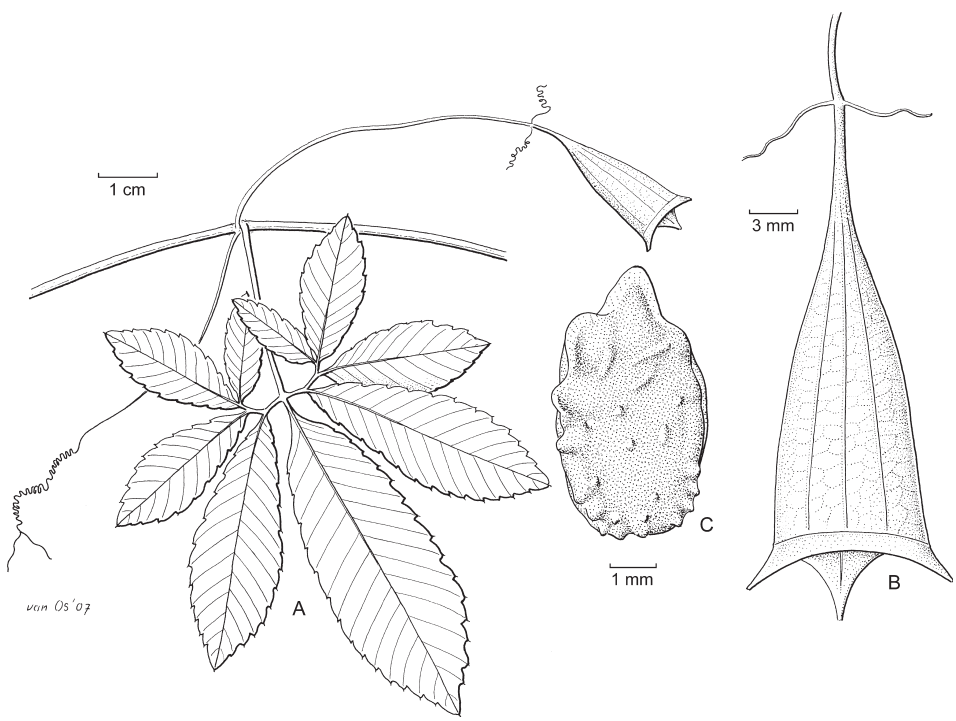


Figure 5. *Gomphogyne nepalensis* W.J. de Wilde & Duyfjes: A. Node with infructescence; B. fruit; C. seed. A–C: *Grey-Wilson & Phillips* 847, type. Drawn by Jan van Os.

Notes.— The type and only known collection of *Gomphogyne nepalensis* was erroneously named and filed under *Hemsleya (Gomphogyne) heterosperma* in K. This latter species, which we reckon to belong in *Gomphogyne*, is distributed in East Burma and Thailand and has smaller non-pitted fruits, and smaller, more flattened seeds. *Gomphogyne nepalensis* resembles, and obviously is closely related to, *G. cissiformis*, both species have pitted fruits, but *G. nepalensis* is distinguished by having larger, 6–9-seeded, fruits. *Gomphogyne nepalensis* can be confused with *Hemsleya macrocarpa* (Cogn.) C. Jeffrey, from NE India and Yunnan, but the latter is distinguished by having larger, non-pitted fruits with much smaller apical horns, and winged seeds. The seeds of *G. cissiformis* and *G. nepalensis* are very similar, ca 6 and 7–8 mm long, respectively.

6. Gomphogyne peekelii W.J. de Wilde & Duyfjes, **sp. nov**. Gomphogyne bonii plurimum similis, sed floribus minoribus, perianthio masculo 2.5–4 mm diam., fructus venis longitudinalibus costis similibus acutis elevatis, seminibus minoribus 6–7 mm longis ubi alae suberosae inclusae 12–14 mm longis differt. Typus: Papua New Guinea, New Ireland, Neu-Mecklenburg, Ugana Distr., 12 May 1938, *Peekel* 118 (holotypus BO!).— *Gynostemma pedatum* auct. non Blume: Peekel, Ill. Fl. Bismarck-Archipels: 551, f. 878. 1984. Figs. 4F, 6A–E.

Climber 1–4 m long, presumably annual; stem 1–2 mm thick, subglabrous. *Leaves* 3–5-foliolate, i.e. the lateral leaflets of 3-foliolate blade either very deeply lobed or 2-foliolate; blade 5–14 cm in diam.; petiole 2.5–7 cm long; leaflets narrowly or broadly elliptic, 3–9 cm long, pinnately veined, glabrous except hairy main veins on upper surface of specimens in Bismarck Archipelago; petiolules (2–)3–6 mm long. *Male inflorescences* 3–9 cm long, rather loose, once or twice branched with 2–5 lateral branches from the rachis, glabrous or finely hairy, few-flowered; peduncle 1.5–3 cm long; rachis straight or somewhat zigzag, 3–5 cm long, lateral branches 1(–2) cm long, ultimate spike-like racemes 3–5 mm long, set with bracts and ca 0.5 mm long basal portions of pedicels; bracts 0.5–3 mm long. *Male flowers* with 2.5–3.5 mm long pedicel, sparsely minutely hairy; perianth 3–4 mm in diam.; receptacle shallow, 0.1–0.2 by 0.5–1 mm, sparsely hairy outside; sepals 1–1.5 mm long; petals ovate, elliptic or oblong, 1.5–2 mm long, subacute, white; filaments 0.5–0.6 mm long, glabrous; anthers ovoid or ellipsoid, ca 0.3 mm in diam. *Female inflorescences* few-flowered; peduncle ca 3 cm long. *Female flowers* not seen. *Fruits* 1 or 2 per infructescence; peduncle ca 3 cm long; fruiting pedicel ca 1 cm long, with 1 or 2 tendrils ca 2 cm long; capsule: 5–5.5 cm long, with (6–)9 rib-like veins, sharply raised, between with coarse reticulate venation, base tapered, at apex ca 1.5 cm wide, apical horns 2–3 mm long, somewhat outcurved. *Seeds* ca 12(?), elliptic, flat, ca 6–7 by 3.5 mm, very finely tubercled, when including corky wing 12–14 mm long.

Distribution.— Indonesia (Ceram [Moluccas], Papua), Papua New Guinea (type).

Ecology.— Primary and secondary forests, along streams and disturbed places, in abandoned gardens; on sandy and damp loamy soil; from sea level to ca 700 m altitude; fruiting in May.

Specimens examined.— INDONESIA: Ceram [*Rutten* in *Kornassi* expedition 656 (**L**)]; Papua [Vogelkop, *Van Royen et al*. 6818 (K, L); *Vink* BW 11401 (**K**, **L**); BW 11487 (**K**,

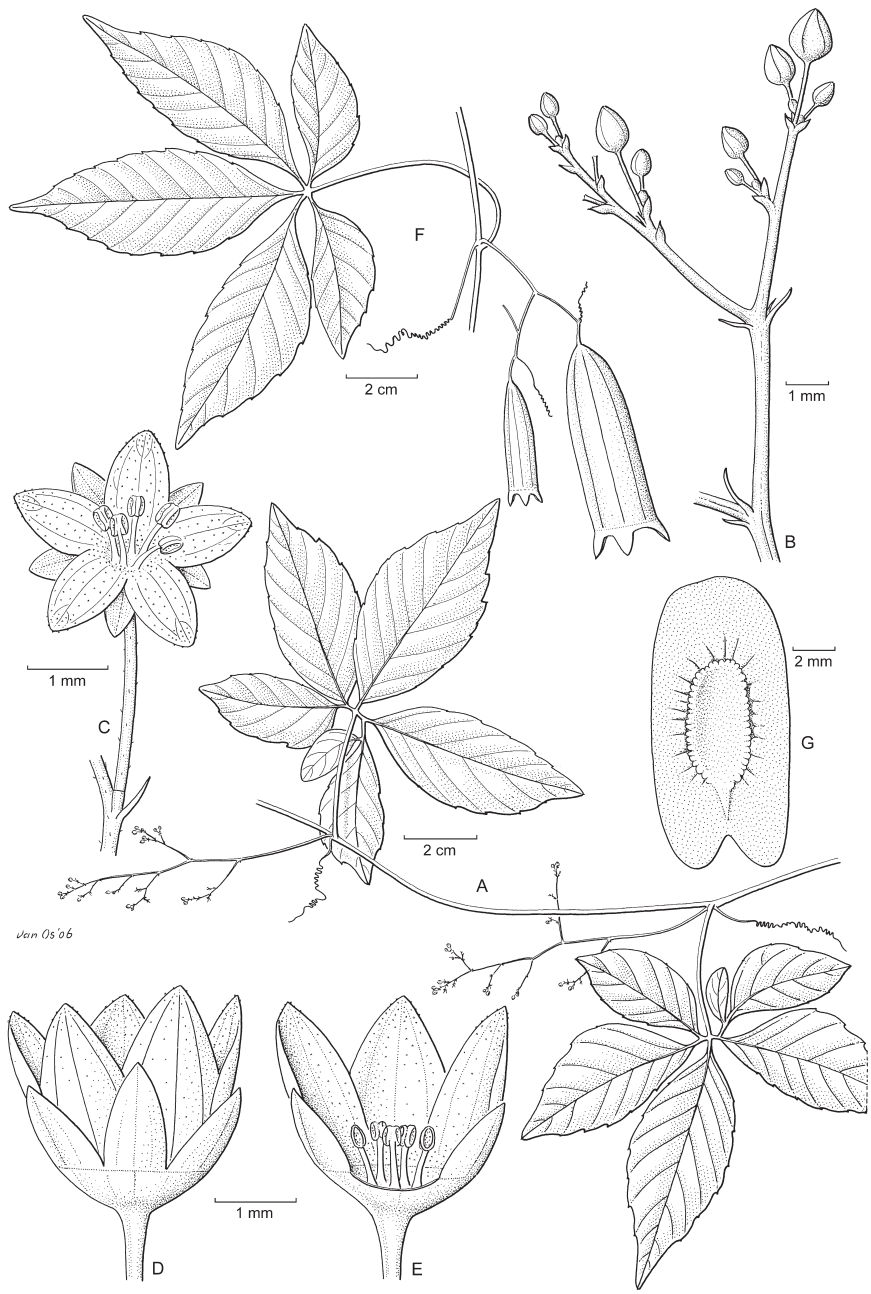


Figure 6. *Gomphogyne peekelii* W.J. de Wilde & Duyfjes: A. Portion of branch with male inflorescences; B. detail of male inflorescence; C. male flower; D, E. ditto, from outside and opened respectively.—*Gomphogyne bonii* Gagnep.: F. Node with infructescence; G. seed. A–B: *Vink BW* 11487; C: *F. & M. Panoff* 361; D–E: *Van Royen & Sleumer* 6818; F–G: *Balansa* 4023. Drawn by Jan van Os.

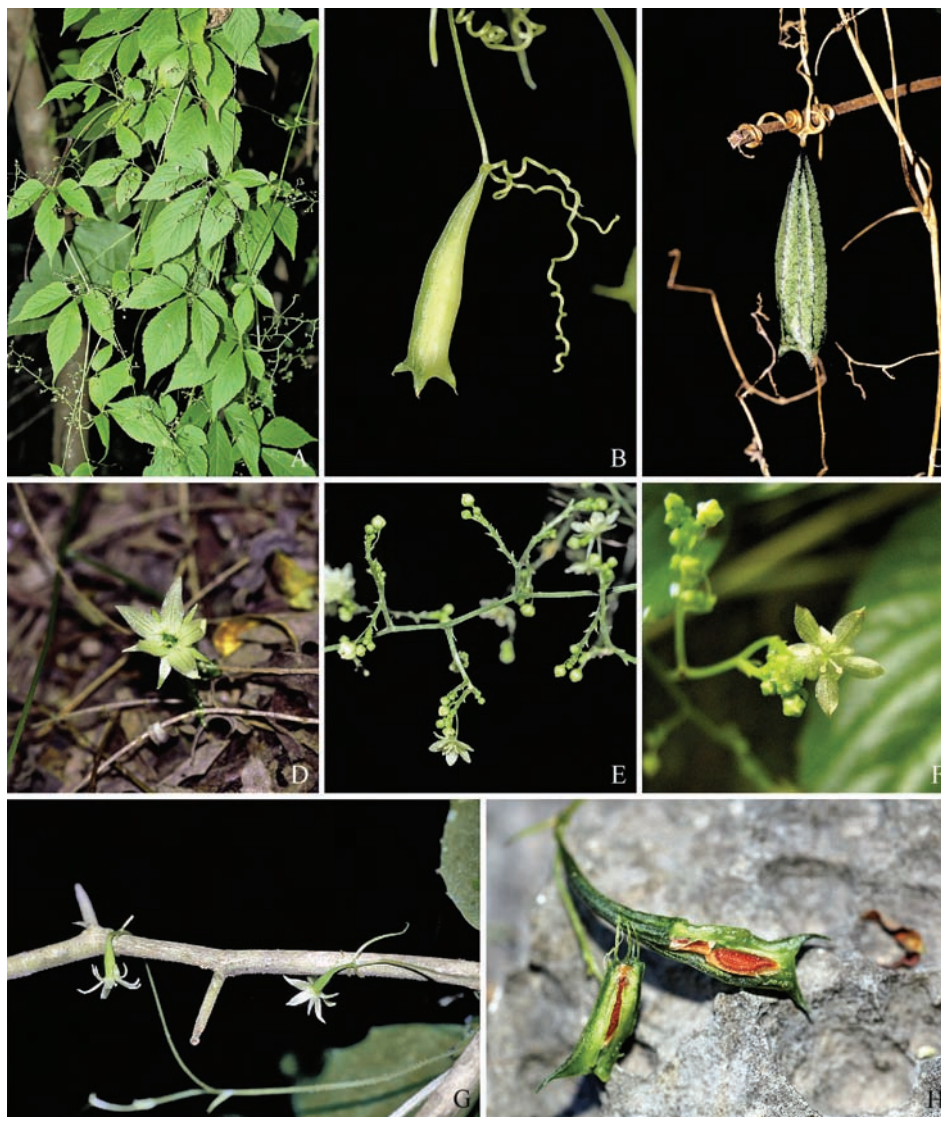


Figure 7. *Gomphogyne cirromitrata* W.J. de Wilde & Duyfjes f. *minor* W.J. de Wilde & Duyfjes: A. habit; B. fruit; H. fruit, opened, showing winged seed.— *Gomphogyne cirromitrata* W.J. de Wilde & Duyfjes f. *cirromitrata*: D, G. female flowers; E. detail of male inflorescence.— *Gomphogyne heterosperma* (Wall.) Kurz: F. detail of male inflorescence. C: *Pruesapan* KP 9; D, G: *Phonsena et al*. 4670; E: *Koonkhunthod* 321. Photos: A, B, H. by T. Putthai; C, D, E, F, G. by De Wilde.

L)]; PAPUA NEW GUINEA: East New Britain [*Panoff et al.* 361 (**K**, **L**); Gazelle Peninsula, *Bateson* 69 (K); *Rechinger et al*. 4167 (W)), New Ireland (*Peekel* 118, type (BO)].

Notes.— In its large fruits *Gomphogybe peekelii* resembles *G. bonii* from North Vietnam. However, the latter has larger male flowers (perianth ca 7 mm in diam.), fruits which are less tapered at the base, with the longitudinal rib-like veins not prominent and seeds with a membranous wing.

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IDENTIFICATION LIST

Gomphogyne bonii = 1

Gomphogyne cirromitrata f. cirromitrata = 2a

Gomphogyne cirromitrata f. minor = 2b

Gomphogyne cissiformis = 3

Gomphogyne heterosperma = 4

Gomphogyne heterosperma f. heterosperma = 4a

Gomphogyne heterosperma f. vittata = 4b

Gomphogyne nepalensis = 5

Gomphogyne peekelii = 6

Balansa 4023: 1; 4025 ter: 1; - Bateson 69: 6; - Bon 4310: 1; - Bunchuai 1306: 2a.

Chermsirivathana 3354-1: 4b; - Clarke 25189 C: 3; 25189 A: 3; - Coode NGF 46091: 6; - Crawford KEKE 1226: 3.

De Wilde 22301: 2b; 22302: 2b; - Duthie 929: 3.

Edgeworth 88: 3.

Gamble 125 B: 3; 7585: 3; 8522: 3; - Geesink 8158: 2a; - Grey Wilson 847: 5.

Herb. Hooker s.n., 02-10-1843 : 3; - Hosseus 83: 2b.

Kerr 3057: 4a; 3057 A: 4a; 4658: 4a; 11079: 4; 11794: 2b; - Koonkhunthod 316: 2b; 317: 2b; 321: 2a; 322: 2a.

Larsen 8231: 2b.

Maxwell 02-366: 4; 92-479: 2a; 92-658: 4a; 93-828: 2b; 95-863: 2b; 94-922: 2b; 91-984: 4b; 98-1077: 2a; 96-1145: 4; 93-1159: 2b; 89-1220: 2b; 89-1234: 4b; 89-1540: 4; - Mitsuta T-38221: 2b; - Murata T-16878: 4a.

Nair 35911: 3.

Palee 68: 4b; 322: 4a; 466: 4a; 470: 4a; - Panoff 361: 6; - Peekel 118: 6; - Phonsena 3516: 2b; 3517: 2b; 3897: 2b; 3906: 2b; 4013: 2b; 4014: 4a; 4670: 2a; 4671: 2a; 5151: 2b; 5152: 2a; 5168: 2b; 5193: 2b; 5236: 4a; 5253: 4a; 7733: 4b; - Pooma 2991: 2b; 3041: 2b; 3042: 2b; - Pruesapan 9: 2a; 10: 2b; 52: 2a; 53: 2a; - Put 312: 4b; 1028: 4.

Rechinger 4167: 6; - Royen 6818: 6.

Sadekorn 595: 4b; - Shimizu T-10721: 2b; T-10731: 2b; T-18501: 4a; T-19467: 2b; - Smitinand 7226: 2a; 7731: 4b; - Strachey 3: 3.

Tagawa T-1071: 4; T-9092: 4; T-9501: 4b; T-9502: 4b; T-9935: 4b; T-10620: 2b; - Togashi 6304022: 3.

Unknown 972: 3.

Van Beusekom 2038: 4a; 3522: 2a; 3982: 2a; - Vink 656: 6; BW 11401: 6; BW 11487: 6.

Wallich Cat. 3728: 4.