

Revision of *Cyclocodon* Griff. ex Hook.f. & Thomson (Campanulaceae)

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ABSTRACT. This work concerns the recognition, enumeration, and discussion of 4 species of *Cyclocodon* Griff. ex Hook.f. & Thomson, a genus occurring in Southeast Asia and Malesia. A key to the species of *Cyclocodon* is given. *Cyclocodon axillaris* (Oliv.) W.J.de Wilde & Duyfjes, based on *Campanumoea axillaris* Oliv. is reinstated, as this taxon was previously included in synonymy of *Cyclocodon lancifolius* (Roxb.) Kurz.

KEY WORDS: Campanulaceae, *Cyclocodon* taxonomy, Asia, Malesia.

INTRODUCTION

Cyclocodon is a genus of Campanulaceae close to *Campanumoea* Blume and *Codonopsis* Wall., and into both of which it has previously been synonymised. The genus was recently reinstated as distinct mainly based on characters of the seed coat or pollen (Morris & Lammers, 1997; Hong & Pan, 1998; Lammers, 1998, 2007a, 2007b). It is distributed in SE Asia from Bhutan and NE India through S China to Japan and southeast through Indochina and Malesia to New Guinea. The three

genera also differ in macro morphology, in growth habit, disposition of flowers, and in fruit (capsular versus baccate), and for a large part also in the position of the sepals (calyx lobes) relative to the ovary (Table 1). Concerning this latter item, following the schematic figures of lengthwise flower sections as presented by Chipp (1908) and Moeliono (1960), the differences between the three genera as accepted by the present authors are depicted in figure 1.

Table 1. Differences between *Codonopsis*, *Cyclocodon*, and *Campanumoea*.

	<i>Codonopsis</i>	<i>Cyclocodon</i>	<i>Campanumoea</i>
root	tuberous	short rootstock	tuberous
growth habit	twining	erect	twining
phyllotaxis	alternate (mostly)	opposite	opposite (mostly)
position of flowers	terminal	terminal	axillary
disposition of sepals relative to the ovary	apical or lateral on the ovary Fig. 1A ₁ –A ₂	either lateral on the ovary, or at base of, or below the ovary Fig. 1B ₁ –B ₃	at base of the ovary Fig. 1C
filaments	dilated at base (mostly)	terete or dilated at base	terete
stigma-lobes and locules of ovary and fruit	3	4 or 5 (or 6)	3
fruits	capsule	berry	berry

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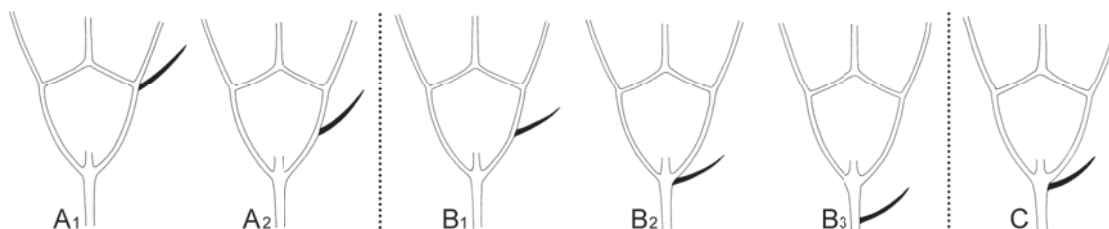


Figure 1. Insertion of the sepals relative to the ovary in *Codonopsis*, *Cyclocodon*, and *Campanumoea*. Note that the corolla is always at the apex of the ovary. Stamens are not indicated. A₁–A₂, *Codonopsis*; B₁–B₃, *Cyclocodon*; C, *Campanumoea*.

For the treatment of Campanulaceae for the Flora of Thailand the genus has been studied again. After the reinstatement of *Cyclocodon axillaris* (Oliv.) W.J.de Wilde & Duyfjes, based on *Campanumoea axillaris* Oliv., we recognize four species in *Cyclocodon*. Two species occur in Thailand: *Cyclocodon celebicus* (Blume) D.Y.Hong and *C. parviflorus* (Wall. ex A.DC.) Hook.f. & Thomson. Because *Campanumoea axillaris* was formerly mostly placed in synonymy of *Cyclocodon lancifolius* (Roxb.) Kurz, *Codonopsis lancifolia* (Roxb.) Moeliono or *Campanumoea lancifolia* (Roxb.) Merr., in previous taxonomic treatments the latter species had a much wider circumscription when compared to that in the present treatment.

TAXONOMY

CYCLOCODON

Griff., Not. Pl. Asiat. 4: 277 (1854), nom. invalid. sub Art. 42.1; Griff. ex Hook.f. & Thomson, J. Proc. Linn. Soc., Bot. 2: 17. 1858; Miq., Fl. Ned. Ind. 2: 1082. 1859.— *Campanumoea* sect.

Cyclocodon (Griff. ex Hook.f. & Thomson) C.B. Clarke in Hook.f., Fl. Brit. Ind. 3: 436 (1881).— Lectotype (designated by Pfeiffer, 1874): *Codonopsis parviflora* Wall. ex A.DC. = *Cyclocodon parviflorus* (Wall. ex A.DC.) Hook.f. & Thomson.

Perennial herbs, stems mostly branched, erect; roots fibrous from short root-stock. *Leaves* opposite. *Inflorescences* in loose terminal panicles (or solitary, terminal or axillary, not in Thailand). *Flowers* pedicellate; bracteoles present or absent; perianth regular, 4- or 5-merous (in Thailand), ovary subglobose, inferior to corolla, superior or partly superior to sepals, 4- or 5-locular; sepals persistent; corolla partially divided; filaments not or only somewhat dilated at base; stigma 4- or 5-lobed. *Fruit*: a berry, 4- or 5-locular. *Seeds* numerous, somewhat flattened, subglobose, very small.

Note.— The lectotypification of the genus *Cyclocodon* by Hong & Pan (1998) with *Cyclocodon adnatus* Griff. is rejected because this name is invalid and also not mentioned in Hooker & Thomson (1858).

KEY TO THE SPECIES

1. Flowers 4-merous. Sepals inserted at base of the ovary or below the ovary on the pedicel, also in these positions in the fruit **4. *C. parviflorus***
1. Flowers 5- (or 6)-merous. Sepals inserted at base of the ovary or on the ovary, in fruit always inserted on the fruit
2. Sepals pectinately long-lobed. Flowers solitary, long-pedicelled, (terminal and) axillary to normal foliage leaves. Filaments much widened at base **1. *C. axillaris***
2. Sepals dentate-serrate, or sub-laciniate or entire. Flowers terminal, solitary or in panicles, pedicels short or long, Filaments not widened at base
3. Flowers solitary on short pedicels, 2 cm long or less, terminal or axillary to normal foliage leaves, bracts small, not appearing as reduced leaves **3. *C. lancifolius***
3. Flowers in loose terminal panicles with mostly longer pedicels, 1–6 cm long, bracts minute or larger, often appearing as much reduced (petiolate) leaves **2. *C. celebicus***

1. *Cyclocodon axillaris* (Oliv.) W.J.de Wilde & Duyfjes, **comb. nov.**— *Campanumoea axillaris* Oliv., Hooker's Icon. Pl., ser. 3, 8: pl. 1775. 1888.— Type: China, Sichuan, Mt Omei, *Faber* 253 (holotype **K**).— *Campanumoea truncata* auct. non (A.DC.) Endl.: Merr., Philipp. J. Sci., C 7(2): 104. 1912.— *Campanumoea celebica* auct. non Blume: Danguy, Fl. Indo-Chine [P.H.Lecomte et al.] 3: 693. 1930.— *Codonopsis lancifolia* (Roxb.) Moeliono subsp. *lancifolia* auct. non Roxb.: Moeliono, Fl. Mal. Ser. 1, Spermat., 6: 121. 1960.— *Codonopsis celebica* auct. non (Blume) Miq.: Thuan, Fl. Laos, Cambodge & Vietnam 9: 10. 1969.— *Cyclocodon lancifolius* auct. non (Roxb.) Kurz: D.Y.Hong & Lammers, Fl. China 19: 527. 2011 (electronic version).

Flowers solitary, 5- or 6-merous, on axillary peduncles ca. 5 cm long; bracteoles minute, linear, ca. 5 mm long; sepals linear, with (1–)3–6 pinnately arranged side-lobes; filaments much widened and adaxially hairy at base. Fruits green, globose, ca. 1 cm in diam.

Distribution.— China (Sichuan), Taiwan, Japan, Laos, Vietnam, N Sumatra, Philippines (no material seen), Moluccas (Buru).

Notes.— 1. In the Flora of China (Hong & Lammers, 2011) this species, under the name *Cyclocodon lancifolius*, is described as having purple-black fruits; in other *Cyclocodon* species the fruits are white (or pinkish).

2. The name *Campanumoea truncata* used by Merrill (1912), as ascribed to Endlicher, Gen. Pl. 1: 515. ("1836") 1838, does not exist. We have not seen *Vanoverbergh* 965 (N Luzon) on which Merrill's record of *C. truncata* was based.

2. *Cyclocodon celebicus* (Blume) D.Y.Hong, Acta Phytotax. Sin. 36, 2: 109. 1998; D.Y.Hong & Lammers, Fl. China 19: 527. 2011 (electronic version).— *Campanumoea celebica* Blume, Bijdr. Fl. Ned. Ind. 13: 727. 1826.— *Campanula celebica* (Blume) D.Dietr., Syn. Pl. 1: 758. 1839.— *Codonopsis celebica* (Blume) Miq., Fl. Ned. Ind. 2: 566. 1857.— *Codonopsis lancifolia* (Roxb.) Moeliono subsp. *celebica* (Blume) Moeliono, Fl. Mal. Ser. 1, Spermat., 6: 121. 1960.— *Cyclocodon lancifolius* (Roxb.) Kurz subsp. *celebicus* (Blume) K.E.Morris & Lammers, Novon 9, 3: 387. 1999.

Type: Sulawesi (Celebes), *Reinwardt* s.n. L0585035 (**L**), lectotype, here designated), see note.— *Canarina moluccana* Roxb., Fl. Ind. (ed. 1832) 2: 173. 1832. Type: *Roxburgh*, not found, specimen possibly seen by Roxburgh at Calcutta, originating from the Moluccas.— *Cyclocodon adnata* Griff., Not. Pl. Asiat. 4: 278. 1854, *nom. inval.*— *Codonopsis albiflora* Griff., Not. Pl. Asiat. 4: 279. 1854. Type: S Myanmar (Mergui 'Mergue'), *Griffith* 1013 (not seen).— *Codonopsis leucocarpa* Miq., Fl. Ned. Ind. 2: 565. 1857.— *Cyclocodon leucocarpus* ('*leucocarpum*') (Miq.) Miq., Fl. Ned. Ind. 2: 1082. 1859. Type: Sumatra (Singgalang Gorge) *Teysmann* HB 1108 (holotype **L**). Fig. 2B–E.

Flowers commonly in few-flowered sub-panicle terminal inflorescences, 5–10 cm across, with pedicels 1–6 cm long; bracts often with the appearance of reduced leaves; bracteoles small, linear; sepals linear, entire or few-serrate or few-dentate; filaments (sub)terete, glabrous. Fruits white, depressed globose, (0.5–)1 cm in diam.

Distribution.— South China (no material seen), southern Myanmar, Thailand, throughout Malesia to New Guinea.

Notes.— 1. In the collection *Vidal et al.* 6179 (Thailand) exceptionally the fruit opens by 3 apical valves.

2. In the original description Blume (1826) only mentions "Celebes", and Miquel (1857), who obviously examined the material, mentions "Celebes (Reinwardt)". This material is composed of two sheets in **L**, presumably duplicates. One sheet (L0585034) bears in Reinwardt's handwriting "1520 *Campanula caesia* R. Habitat in sylvis ad flumen Batudoelang Celebes. Sept. 1821". The other sheet (L0585035) bears in Blume's handwriting: "*Campanula caesia*, Celebes, *Campanumoea celebica*". We have chosen the latter (L0585035) as the lectotype.

3. The collection *Teysmann* 5768 (**L**) from Menado (Celebes) deviates in alternating leaves which are glabrous on the lower surface.

4. Some collections from Sumatra (*Korthals* s.n., *De Voogd* 322 and 1491) approach *Cyclocodon parviflorus* in that the sepals are inserted at or close to the base of the ovary, also in fruit. The flowers, however, are 5-merous. In some flowers the opposite bracteoles (reduced leaves) are inserted on the

peduncle (pedicel) close to the flower, resembling the sepals as in *C. parviflorus*; however, these flowers (and fruits) additionally also have true sepals inserted on the ovary (fruit) close to the base.

3. *Cyclocodon lancifolius* (Roxb.) Kurz., Flora 55: 303. 1872; *J. Asiat. Soc. Bengal* 46, 2: 210. 1877.— *Campanula lancifolia* Roxb., *Fl. Ind.* (Carey & Wallich ed.) 2: 96. 1824; *Fl. Ind.* (ed. 1832) 1: 505. 1832.— *Campanumoea lancifolia* (Roxb.) Merr., *Enum. Phillip. Fl. Pl.* 3: 587. 1923.— *Codonopsis lancifolia* (Roxb.) Moeliono, *Fl. Mal. Ser. 1, Spermat.*, 6: 120. 1960.— *Cyclocodon lancifolius* (Roxb.) Kurz subsp. *lancifolius*: K.E.Morris & Lammers, *Novon* 9, 3: 387. 1999. Type: Chittagong, *Roxburgh* (holotype **BM**, BM000070748, photo seen, see note).— *Codonopsis truncata* A.DC., *Monogr. Campan.*: 122. 1830; *Prodr.* 7: 423. 1839.— *Campanula truncata* (A.DC.) D.Dietr., *Syn. Pl.* 1: 757. 1839.— *Cyclocodon truncatus* (A.DC.) Hook.f. & Thomson, *J. Proc. Linn. Soc., Bot.* 2: 18. 1858.— *Campanumoea truncata* (A.DC.) Diels, *Bot. Jahrb. Syst.* 29: 606. 1901. Type: Irrawady basin, *Wallich 1301* (holotype **G** (photo seen); isotype **K-W**).

Flowers solitary, terminal to the leafy branches; pedicel short, 0.5–1(–2) cm long, bracteoles narrowly lanceolate, ca. 5 mm long; sepals (sparsely) serrate-dentate; filaments (sub)terete. *Fruits* whitish, subglobose, 5–10 mm in diam.

Distribution.— Bangladesh (Chittagong, type) and NE India (Shillong).

Notes.— There has been confusion about the typification of *Campanula lancifolia* Roxb., as no specimen was indicated in the protologue. There would appear to be neither Roxburgh type material nor drawings at CAL, K, or BR (Sanjappa et al., 1994 (“1991”); Sealy, 1956; Forman, 1997). However, BM holds a specimen annotated in Roxburgh’s handwriting “*Campanula lancifolia*” and “*moist soil*” together with “*N 217 Massat Roxburgh Flow Oct 1810*” in unidentified handwriting but possibly also from Roxburgh. We are convinced that this specimen should be regarded as the holotype.

A representative specimen of the species possessing good fruits is: India, Eastern Circle, Shillong, Subansiri, Palin, 15 Nov. 1964, *Sastri BSI (EC) 40628 (L)*.

4. *Cyclocodon parviflorus* (Wall. ex A.DC.) Hook.f. & Thomson, *J. Proc. Linn. Soc., Bot.* 2: 18. 1858.— *Codonopsis parviflora* Wall. ex A.DC., *Monogr. Campan.*: 123. 1830; *Prodr.* 7: 423. 1839.— *Campanula punduana* D.Dietr., *Syn. Pl.* 1: 757. 1839 (non *Campanula parviflora* Lam.).— *Campanumoea parviflora* (Wall. ex A.DC.) C.B.Clarke in Hook.f., *Fl. Brit. India* 3: 436. 1881. Type: NE India, Pundua, *Wallich 1300* (holotype **G-DC**, photo seen; isotype **K-W**, photo seen).— *Cyclocodon distans* Griff., *Not. Pl. Asiat.* 4: 277. 1854, *nom. inval.* Fig. 2A.

Flowers 4-merous, in poor-flowered terminal panicles; bracts (bracteoles) minute; sepals 4, linear, few dentate-lacerate, inserted on the pedicel at base of ovary or up to 4 mm below ovary; filaments terete, slightly widened at base, glabrous. *Fruits* whitish, globose-obovoid, 4-locular, ca. 6 mm in diam.

Distribution.— NE India (Assam, Sikkim), Bangladesh, Bhutan, S China, Myanmar, Thailand, Laos.

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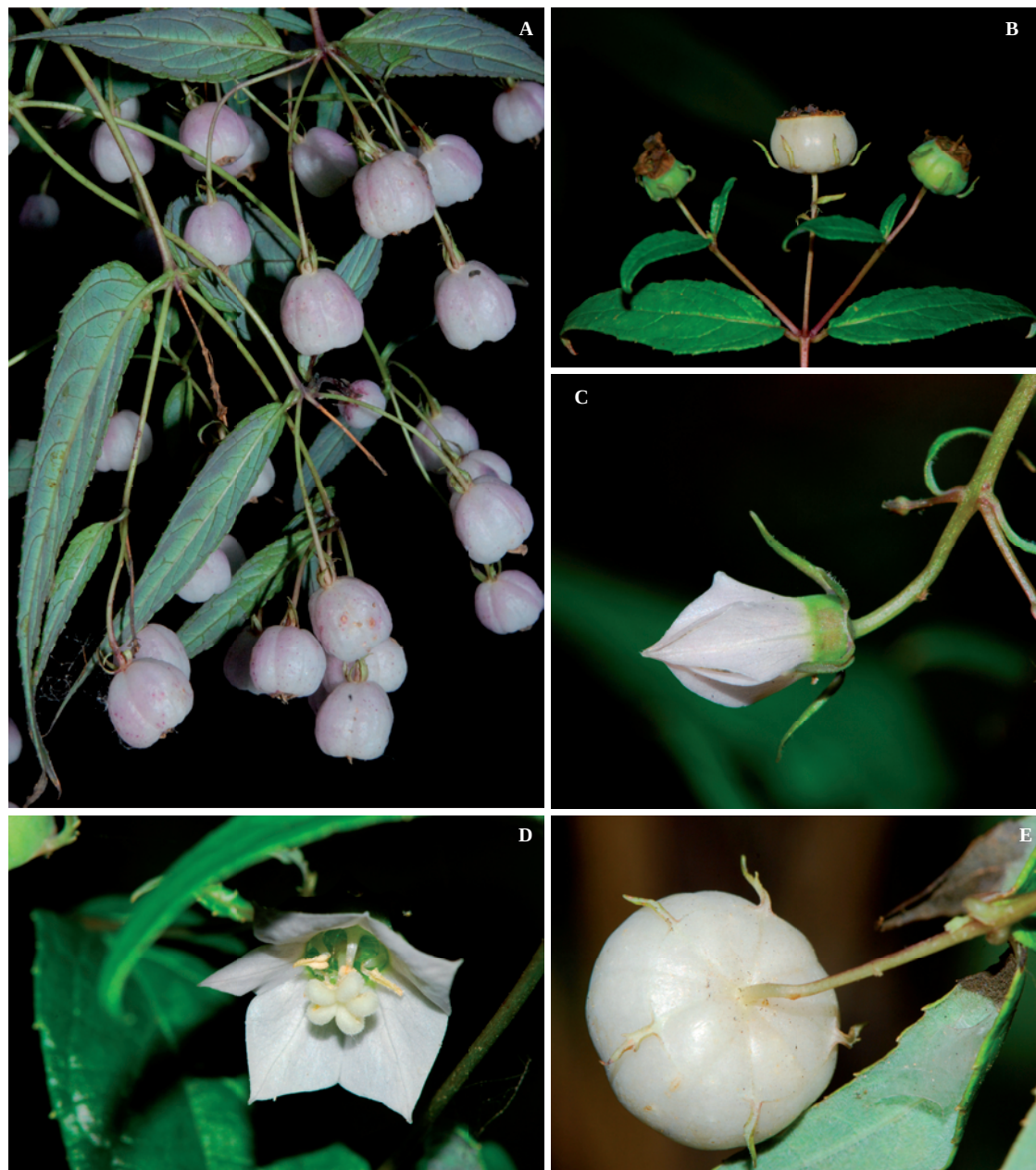


Figure. 2. A. *Cyclocodon parviflorus* (A.DC.) Hook.f. & Thomson. B–E. *Cyclocodon celebicus* (Blume) D.Y.Hong. Photographed by Pramote Triboun (A), Brigitta Duyfjes (B–E).

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