

# A New Species of *Camellia* Sect. *Stereocarpus* (Theaceae) from Vietnam

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**ABSTRACT.** A new species of *Camellia* L. (Theaceae), *C. maiana* Orel, endemic to the Da Lat Plateau in southern Vietnam, is described and illustrated. The newly described species has variable-sized, ovate to obovate leaves; 2-whorled, terminal, sessile flowers exhibiting emarginate, opaque to translucently white, finely textured petals; a compound style consisting of four parts that are fused at the base; persistent bracteoles; and a superior 4-chambered ovary. The morphological evidence supports taxonomic placement as a transitional member of *Camellia* sect. *Stereocarpus* (Pierre) Sealy.

**Key words:** *Camellia*, IUCN Red List, Theaceae, Vietnam.

*Camellia* L. is a member of the tea family (Theaceae). This genus is well represented in Vietnam, and its species are located throughout most areas of the country. Vietnam is considered a major center of diversity for *Camellia*, having approximately 20% of all the species located within its boundaries (Sealy, 1958; Chang & Bartholomew, 1984). The genus *Camellia* is characterized within the family by having seeds without wings and capsules dehiscing from the apex (Sealy, 1958).

In this paper, a new species within *Camellia* sect. *Stereocarpus* (Pierre) Sealy from Vietnam is described. As the infrageneric classification of the genus varies from author to author, in this study, the taxonomic treatments of Sealy (1958), Chang and Bartholomew (1984), and Ming and Bartholomew (2007) are considered. This section was originally established by Pierre in 1887 and, as constituted by Chang and Bartholomew (1984), it contains five species, namely *C. dormoyana* (Pierre ex Laness.) Sealy, *C. krempfii* (Gagnep.) Sealy, *C. yunnanensis* (Pit. ex Diels) Cohen-Stuart, *C. liberistyla* Hung T. Chang, and *C. liberistylodes* Hung T. Chang (Chang & Bartholomew, 1984). In Ming and Bartholomew's classification system (2007), *Camellia* sect. *Stereocarpus* contains three species, *C. dormoyana* (the type species), *C. pubipetala* Y. Wan & S. Z. Huang, and *C. luteoflora* Y. K. Li ex Hung T. Chang & F. A. Zeng.

Data obtained from the taxonomic evaluation of the new *Camellia* species proposed here indicate a number of morphological characteristics that have

established affinities with sections *Brachyandrae* Hung T. Chang and *Furfuraceae* Hung T. Chang (sensu Chang & Bartholomew, 1984). Placement of the proposed new *Camellia* species into section *Brachyandrae* was judged rather tenuous because the shared morphological characteristics were relatively few. Further detailed analysis has shown that the proposed new *Camellia* species possesses a number of, but not all, morphological characteristics exhibited by species in section *Brachyandrae*. The new species also shares some affinities with the members of section *Furfuraceae*; however, placement of the proposed new *Camellia* species into section *Furfuraceae* was also judged inappropriate, as the morphological traits in common were only superficial. In similar cases, Sealy (1958) and Chang and Bartholomew (1984) deemed such species "transitional"; we have followed Sealy's approach and consider the new species proposed here to be transitional in section *Stereocarpus*. A concise description of *Camellia* sect. *Stereocarpus* follows:

***Camellia* sect. *Stereocarpus*** (Pierre) Sealy, Rev. Gen. *Camellia*. 45. 1958. Basionym: *Thea* sect. *Stereocarpus* Pierre, Fl. Forest. Cochinch., fasc. 2: pl. 119. 1887. TYPE: *Camellia dormoyana* (Pierre ex Laness.) Sealy.

Leaf blades 11–18(–25) × 5.5–8 cm. Flowers solitary at the ends of the branches, erect, almost sessile; bracteoles 2 or 4, opposite, inserted close to and much smaller than the sepals, persistent; sepals 5 or 6, large, persistent; petals ca. 12; stamens united with the petals but free above, glabrous; gynoecium glabrous; style 1, 5(or 6)-lobulate.

***Camellia maiana*** Orel, sp. nov. TYPE: Vietnam. Lam Dong Prov.: unnamed mtn., Da Lat Plateau, 19 Nov. 2002, G. Orel, R. Cherry, S. Jones, B. Mika 21149 (holotype, NSW; isotype, HN). Figure 1.

Haec species a congeneris ad *Camelliam* sect. *Stereocarpum* (Pierre) Sealy pertinentibus floribus albis plerumque non solitariis, petalis 7 vel 8, filamentis abbreviatis 1.3–1.5 cm longis, stylo 4-partito atque ovario 4-loculari distinguitur.

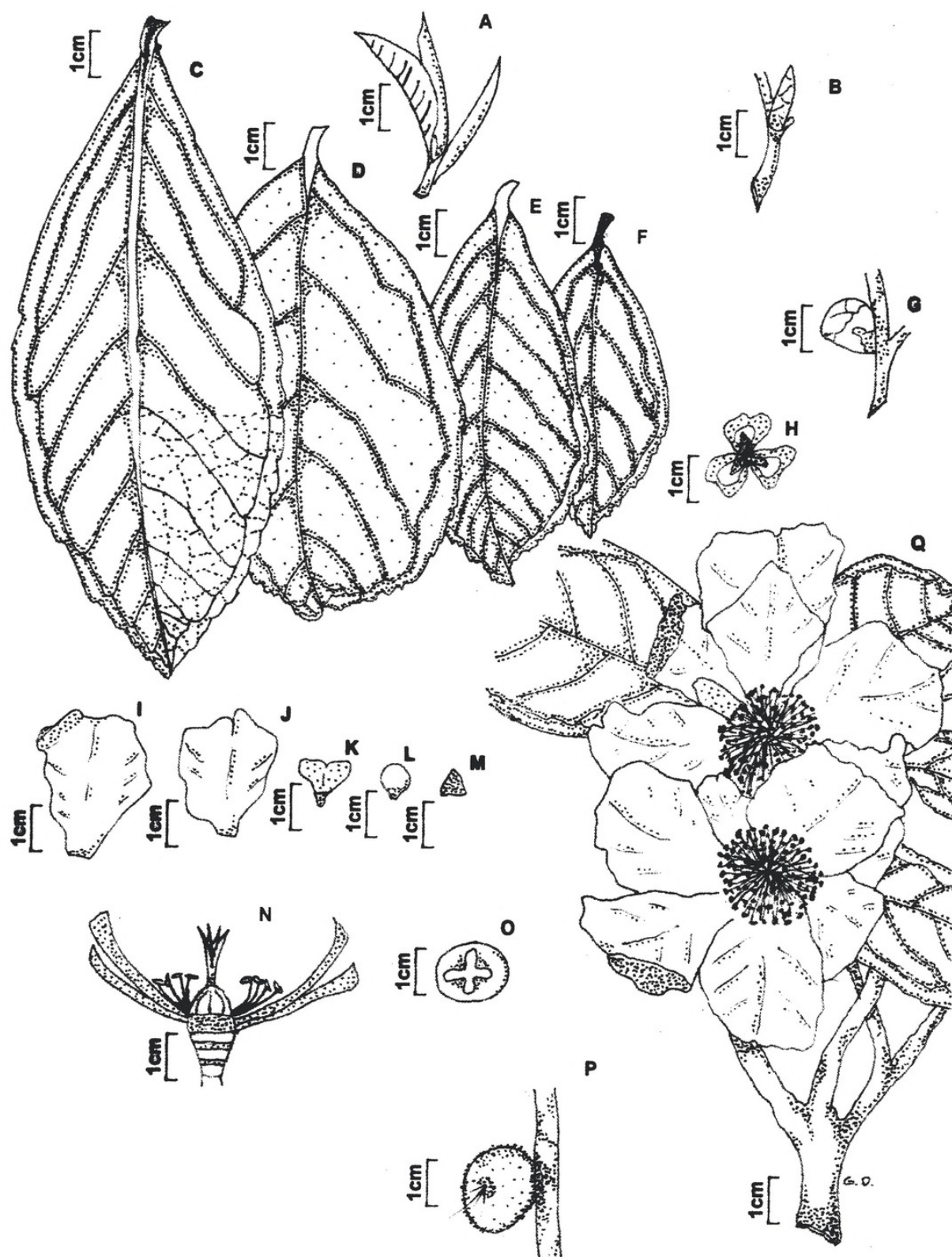


Figure 1. *Camellia maiana* Orel. —A. Juvenile leaf with deciduous leaf sheaths. —B. Terminal leaf bud with leaf petiole. —C. Adult leaf showing primary, secondary, and tertiary venation, adaxial view. —D. Adult leaf and leaf petiole, abaxial view. —E. Adult leaf and leaf petiole, abaxial view. —F. Adult leaf and leaf petiole, adaxial view. —G. Fully developed flower bud. —H. Adult flower, view of sepals, bracts, and bracteoles, proximal end. —I. Petal, first whorl. —J. Petal, second whorl. —K. Sepal. —L. Bract. —M. Bracteole. —N. Lateral view of adult flower, showing all flower parts. —O. Adult gynoecium, transverse section. —P. Adult fruit. —Q. Branch with flowers and leaves. Drawn from the holotype *G. Orel et al.* 21149 (NSW).



*Perennial*, small to medium variable evergreen shrub to 5 m high; well branched, rarely multi-stemmed, upright habit; twigs glabrous, green toward terminals, turning entirely light cinnamon brown on semi-mature branches; older branches light to cinnamon brown, to gray and slightly furrowed; trunk light brown with sparse gray striations and slightly furrowed. Leaf petiole slightly falcate and concave, slightly compressed, slender, green above, dark green and shiny beneath, to  $7 \times 3$  mm; petiole ascending, attached at  $50^\circ$  angle to midrib; leaf lamina continues as a 1-mm-high ridge on each side of the adaxial petiole, axillary leaf buds dull green and glabrous at the proximal end, light brown and tomentose at the distal end, elliptic with blunt apex; terminal buds slightly canescent, flattened, falcate with sharp apex,  $10\text{--}15 \times 3\text{--}6$  mm; developing leaves with 2 to 5 deciduous and overlapping leaf sheaths, yellowish green,  $3\text{--}3.5 \times 0.3\text{--}0.5$  cm, leaf rigid, initially with coppery sheen, slightly waxy and ascending, adaxial lamina dull green, abaxial lamina slightly lustrous; juvenile leaves variable in both size and shape; mature leaves irregularly but distinctly finely serrate at distal end, serrations oriented abaxially, sometimes smooth at the proximal end, variable, to  $10\text{--}14 \times 5\text{--}6$  cm; lamina coriaceous, variable, elliptic, oval to obovate to oblanceolate, apex variable, sometimes emarginate, acuminate to cuspidate, base attenuate to rounded; adaxial surface glabrous, green and shiny, lighter green and dull abaxially; blade midrib to 2 mm proximally,  $< 1$  mm distally, light green and dull, adaxially sunken, abaxially prominent; secondary venation pinnate, brochidodromous, with up to 9 pairs of veins adaxially sunken, abaxially prominent; tertiary venation sparse, craspedodromous (Roth-Nebelsick et al., 2001). Flowers sessile, terminal, slightly scented; flower buds round, ca. 10 mm diam., initially green, then mostly white, brown bud scales covering 1/3 of proximal end, flowers in groups of 2 to 4(5), seldom solitary; flowers 5–8 cm diam., soft, opaque to translucent; petals emarginate, white, glabrous, overlapping at proximal end; petals arranged in 2 whorls; the outer whorl of 4 (rarely 3) petals,  $3\text{--}3.5 \times 1.5\text{--}2.5$  cm, slightly concave, asymmetric, elliptic to oblong, slightly overlapping, petal edges ruffled; the inner whorl of 4 petals,  $2\text{--}3 \times 1.5\text{--}2$  cm, slightly concave, asymmetric, elliptic to oblong, distinctly emarginate, petal edges ruffled, petal striations slightly raised and of the same color as petal; sepals ca.  $0.7 \times 1$  cm, hairy, bilobate, light green or light brown, lighter toward distal end; bracteoles persistent and woody, in 2 whorls; first whorl with 3 bracteoles, ca.  $8 \times 7$  mm, loosely adpressed to sepals, light brown, hairy, not emarginate; second whorl with 3 to 4 bracteoles, ca.  $5 \times$

5 mm, triangular, woody, tightly adpressed to the first whorl; bracteole bases arise from 0.1-mm-deep indentation where attached to petiole; stamens numerous (250 to 350), in a circular formation, 2–3 cm diam.; filaments abbreviated, 1.3–1.5 cm, yellow, fused in bottom 1/3; anthers yellow to dark yellow, acuminate at the distal end, cordate at proximal end; style compound, distally 4-parted, fused in bottom 1/4, 10–12 mm long, green to yellow, hairy at base, glabrous at top, with an indistinct stigma of the same color; ovary superior, 4-carpellate, each carpel not always bilocular, densely tomentose,  $14\text{--}18 \times 10\text{--}12$  mm. Mature fruit reddish brown, globose to unevenly ovoid,  $15\text{--}20 \times 9\text{--}12$  mm, sessile, partially furfuraceous; seed dark brown to black, dull, 8–10 mm, ovoid to hemispherical.

*Distribution.* *Camellia maiana* is known only from the type collection. The species provenance details are withheld for conservation reasons.

*IUCN Red List category.* Despite repeated searches (in 2004 and 2005) of the area around the type locality, no other plants were located. Given this situation, we assess the new species as Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).

*Phenology.* The new species was collected in flower in March; this was followed by fruit maturation in May–July, with fruit capsules dehiscing in late July.

*Etymology.* The specific epithet honors Phoung Viet Mai and his son Phuoc Viet Mai, who made the collection of this new species possible.

#### PHYTOGEOGRAPHIC AND TAXONOMIC REMARKS

This endemic species appears to be confined to a small mountainous area of dense rainforest. Further searching of the relevant area is required. The author was not able to find another specimen of *Camellia maiana* in any Vietnamese herbarium. *Camellia maiana* was found within the range of *Camellia* distribution suggested by Sealy (1958) and Gao et al. (2005). Morphologically, the new species is transitional to section *Stereocarpus* (sensu Chang & Bartholomew, 1984), sharing a number of morphological characteristics with some of its members. These include the sessile and terminal flowers (*C. yunnanensis*); free or partially free stamens (*C. liberistyla*, *C. yunnanensis*); free styles (*C. liberistyla*); and eight to 13 persistent bracts and sepals (*C. dormoyana*, *C. liberistyla*, and *C. liberistylodes*).

*Camellia maiana* differs from the generalized description of section *Stereocarpus* (sensu Chang & Bartholomew, 1984) by possessing flowers that are not



solitary (as does *C. yunnanensis*); seven or eight petals, not 10 to 13 (*C. dormoyana*); a 4-parted style, not 5-parted (*C. liberistyla* and *C. yunnanensis*); and 4-locular, not 5-locular ovaries (*C. dormoyana* and *C. liberistylodes*) (Chang & Bartholomew, 1984).

*Camellia maiana* also differs from the generalized descriptions of the species of section *Stereocarpus*, as constituted by Ming and Bartholomew (2007) (*C. pubipetala* and *C. luteoflora*), by possessing white flowers that are mostly in groups of four to five and seldom solitary, not yellow flowers that are always solitary (*C. pubipetala* and *C. luteoflora*); by possessing seven to eight petals, not nine to 13 petals (*C. pubipetala*), or seven to nine petals (*C. luteoflora*); by having abbreviated filaments, 1.3–1.5 cm, not 2.5–3 cm (*C. pubipetala*), or very short filaments of 1.2 cm (*C. luteoflora*); by possessing a 4-parted style 1–1.2 cm long, not a 3- or 4-grooved style of unspecified length (*C. pubipetala*), or a 3-parted style (*C. luteoflora*); and by having 4-carpellate ovaries, not 3-carpellate ovaries (*C. pubipetala* and *C. luteoflora*) (Ming & Bartholomew, 2007).

Due to its transitional taxonomic status, *Camellia maiana* shares a number of characteristics with *Camellia* species that belong to sections other than *Stereocarpus*, particularly section *Brachyandrae*. For example, *C. nervosa* (Gagnep.) Hung T. Chang also possesses glabrous branchlets, numerous stamens, a 3- or 4-parted style, and furfuraceous capsules (Gagnepain, 1941; Sealy, 1958; Chang & Bartholomew, 1984). The relatively large leaf size (up to 14 cm) is reminiscent of *C. yangkiangensis* Hung T. Chang (Chang & Bartholomew, 1984). Despite this, *C. maiana* possesses a number of morphological characteristics that place this newly proposed species into section *Stereocarpus* and distinguish it from the species members of section *Brachyandrae*.

*Camellia maiana* is well distinguished from *C. nervosa* by a number of morphological characteristics. *Camellia maiana* is a small to medium evergreen shrub to 5 m high, not a large upright tree to 20 m (Gagnepain, 1941); with juvenile leaves orange to coppery red (not bright green) and without a prominent yellow midrib; adult leaves ca. 14 × 6 cm (not ca. 7.5 × 3 cm); obovate to ovate leaves (not lanceolate or oblong); leaf petiole 7 × 3 mm (not 6–8 × 5–6 mm); sessile, 2-whorled, terminal flowers in groups of two to four (to five) (not subsessile, 1-whorled, axillary, and solitary); elliptic to oblong, emarginate, opaque to translucent petals (not obovate, non-emarginate, solid colored); and a 4-parted, 10–12 mm compound style (not 3-parted, ca. 14 mm [sensu Gagnepain, 1941, but noted as 4-parted in Chang & Bartholomew, 1984]).

The newly described species also shares some morphological characteristics with *Camellia gilbertii* (A. Chev.) Sealy (sect. *Brachyandrae*), i.e., flowers borne in multiples and similar leaf size, but it differs from it in a number of key morphological characteristics. *Camellia maiana* is a shrub up to 5 m tall, not a small shrub of up to 2 m (Gao et al., 2005). The obovate to ovate leaf shape (not elliptic or oblong-elliptic), the variable acuminate leaf apex (not bluntly acuminate), and the attenuate leaf base (not cuneate) clearly distinguishes *C. maiana* from *C. gilbertii* (Gao et al., 2005). Furthermore, *C. maiana* lacks pedicels, whereas *C. gilbertii* possesses pedicels that are 4–6 mm long. The distinct lack of flower color of *C. maiana* (translucent white) is perhaps the most notable feature that distinguishes the newly described species from *C. gilbertii*, the latter species' flowers being light yellow (Ming & Bartholomew, 2007) or greenish cream (Gao et al., 2005). The flower size of the newly described species seems to be confined to a narrow range, 5–8 cm diam., which is larger than the flower size of *C. gilbertii* (10–17 mm diam.) (Gao et al., 2005).

Due to its transitional taxonomic status, *Camellia maiana* also shares some characteristics with *Camellia* species that belong to section *Heterogenea* Sealy (sensu Sealy, 1958), section *Furfuraceae* (sensu Chang & Bartholomew, 1984), and section *Heterogenea* (sensu Ming & Bartholomew, 2007). Section *Heterogenea* (sensu Sealy, 1958) was established as “a section of diverse species” or “a section of convenience” made up of species that “do not fit easily into any of the other groups of species” (Sealy, 1958) and contains 10 species. Section *Furfuraceae* (sensu Chang & Bartholomew, 1984) is based on the type species, *C. furfuracea* (Merr.) Cohen-Stuart, and contains some eight *Camellia* species. Section *Heterogenea* (sensu Ming & Bartholomew, 2007) contains 14 diverse species. Of this large number of species, only three *Camellia* species, namely *C. furfuracea*, *C. crapnelliana* Tutchet, and *C. gaudichaudii* (Gagnep.) Sealy, have found their way into each of the three taxonomic systems, hence the following comparisons to the type species *C. furfuracea*, as established by Chang and Bartholomew (1984).

*Camellia maiana* differs from *C. furfuracea* in several phenotypic characteristics. *Camellia maiana* possesses obovate to ovate leaf laminae (not leaves narrow to broad-elliptic [Sealy, 1958], narrowly oblong [Chang & Bartholomew, 1984], or elliptic, oblong-elliptic, or oblong [Ming & Bartholomew, 2007]); a variable, acuminate leaf apex (not bluntly acuminate [Sealy, 1958]); and an attenuate leaf base (not cuneate to obtuse [Sealy, 1958] or cuneate to

broadly cuneate [Ming & Bartholomew, 2007]). Furthermore, *C. maiana* lacks pedicels, whereas *C. furfuracea* possesses pedicels that are 4–9 mm long (Sealy, 1958) or sessile (Ming & Bartholomew, 2007). The distinct lack of flower color of *C. maiana* (translucent white) is a notable feature that distinguishes the newly described species from *C. furfuracea*, the latter species' flowers being greenish cream (Gao et al., 2005) or white (Ming & Bartholomew, 2007). The flower size of the newly described species seems to be confined to a narrow range, 5–8 cm diam., which is larger than the flower size of *C. furfuracea*, 40–45 mm diam. (Gao et al., 2005) or 20–35 mm diam. (Ming & Bartholomew, 2007). *Camellia maiana* possesses a distally 4-parted style that is fused in the bottom quarter, 10–12 mm long, not a 3-parted free style that is 15 mm long (Chang & Bartholomew, 1984), or a 3- to 5-parted free style that is 14–18 mm long (Gao et al., 2005). The ovary of *C. maiana* is 4-carpellate, not 3-carpellate (Sealy, 1958; Ming & Bartholomew, 2007). *Camellia maiana* produces mature fruit capsules that are globose to unevenly ovoid, 15–20 × 9–12 mm, not globose or oblate, 25–35 mm diam. (Chang & Bartholomew, 1984), or 20–40 mm long (Ming & Bartholomew, 2007).

Many of the species mentioned above have had a varied history. Chang and Bartholomew (1984) accepted both *Camellia liberistyla* and *C. liberistylodes* in section *Stereocarpus*, but Ming and Bartholomew (2007) treated both names as synonyms of *C. yunnanensis* var. *camellioides* (Hu) T. L. Ming in section *Heterogenea*. Chang and Bartholomew (1984) placed *C. yangkiangensis* in section *Brachyandrae* with *C. nervosa*, but Ming and Bartholomew (2007)

placed it in synonymy under *C. crassipes* Sealy in section *Theopsis* Cohen-Stuart. Chang and Zeng (1982) had placed *C. luteoflora* in a monotypic section *Luteoflorae* Hung T. Chang; this was maintained by Chang and Bartholomew (1984), but Ming and Bartholomew (2007) included it in section *Stereocarpus*. These examples highlight the unstable nature of the infrageneric classification of *Camellia* and confirm the present authors' view of the unsatisfactory nature of the existing classifications and the need for further supporting evidence.

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