

## Taxonomic notes of three tea-plants (*Camellia* sect. *Thea*) recently described in Vietnam

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### Abstract

*Camellia sinensis* var. *dulcamara* is a heterotypic synonym of *C. sinensis* var. *pubilimba*. *Camellia flosculora* and *C. vidalii* were excluded from sect. *Thea*.

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### INTRODUCTION

Tea-plants, one of the most popular beverage plants in the world, belong to *Camellia* L. sect. *Thea* (L.) Griff. in taxonomy. There are 12 or 32 species in this section in different classification systems, distributed in East and Southeast Asia. In China almost all species can be found<sup>[1–3]</sup>. Four new members of this section have been described in Vietnam, including *Camellia vidalii* Rosmann in 1999<sup>[4]</sup>, *C. tenuistipa* Orel, Curry et Luu in 2015<sup>[5]</sup>, *C. sinensis* var. *dulcamara* Q.U. Le et Nguyen in 2020<sup>[6]</sup> and *C. flosculora* Curry, V.S. Le, C.Q. Truong et V.D. Luong in 2021<sup>[7]</sup>. *Camellia tenuistipa* was treated as a heterotypic synonym of *C. sinensis* (L.) Kuntze var. *assamica* (Hook.) Steens by Zhao et al. in 2017<sup>[8]</sup>. After scrutinizing the literature and specimens of these taxa, some taxonomic problems of the remaining three taxa were found and are discussed below.

The relevant literature including the protologues of these names were studied. The specimens (or their images) conserved at herbaria (acronyms based on Thiers<sup>[9]</sup>) BM, DLU, E, GXFI, IBK, IBSC, K, NSW, P, PE, SYS, TEA and VNM were checked. The priority of a name was evaluated under Art. 11.4 of the Shenzhen Code (hereafter ICN)<sup>[10]</sup>.

### Taxonomic treatment of *Camellia sinensis* var. *dulcamara* Q.U. Le et Nguyen

*Camellia sinensis* var. *pubilimba* Hung T. Chang, Acta Sci. Nat. Univ. Sunyats. 20 (1): 98. 1981<sup>[11]</sup>

**Type:** China, Guangxi, Lingyun, *Herb. Guangxi For. Inst.* 4209 (holotype: SYS; isotype: PE!)

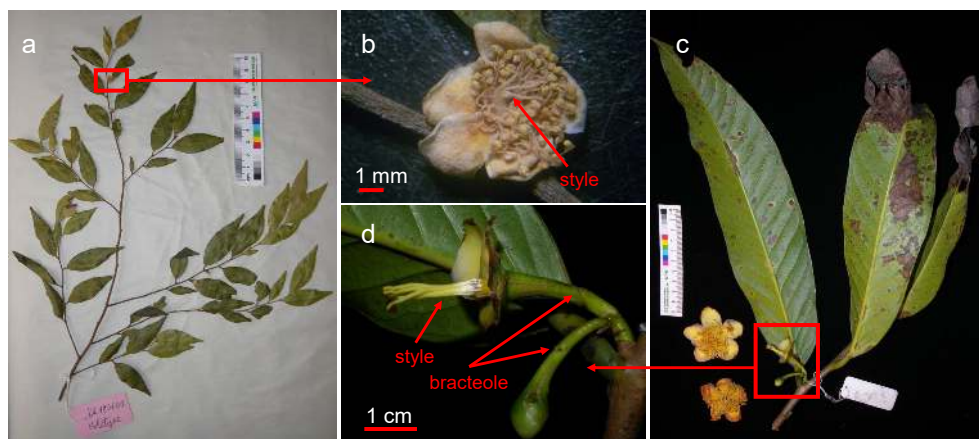
----*Camellia sinensis* var. *dulcamara* Q.U. Le & Nguyen, Journ. New Biol. Rep. 9 (1): 46. 2020<sup>[6]</sup>, **syn. nov.** Type: Vietnam, Bac Kan province, *Le Ung TN20012018* (holotype: VNM; isotype: Thai Nguyen University of Agriculture and Forestry).

*Camellia sinensis* var. *pubilimba* was published twice as new variety by the same authors in the same year: in *Acta Scientiarum Naturalium Universitatis Sunyatseni* in February 1981<sup>[11]</sup> and in *A Taxonomy of the Genus Camellia* in April 1981<sup>[12]</sup>. The later isonym<sup>[12]</sup> has no nomenclatural status (Art. 6. 2 of the ICN).

Le et al.<sup>[6]</sup> stated that *C. sinensis* var. *dulcamara* was different from *C. sinensis* var. *assamica* by its white petals (vs. with a tinge of green at apex for the latter) with pubescent on both sides (vs. glabrous for the latter). The description of the petals with a green apex of var. *assamica* is incomplete. In fact, only the outermost petals have green apex, which is very common in sect. *Thea* even in genus *Camellia*<sup>[1–3,13]</sup>, and is not unique to var. *assamica*. There are three or four varieties under *C. sinensis*, in which, var. *pubilimba* is characterized by hairy sepals and petals<sup>[1–3,10,11,14,15]</sup>. Petals white with pubescent on both sides, the diagnostic character of var. *dulcamara*<sup>[6]</sup>, is shared by var. *pubilimba*. All features, especially the pubescence on the back of sepals, clearly support that var. *dulcamara* should be reduced into var. *pubilimba*.

### Taxonomic position of *Camellia flosculora* Curry et al. (Fig. 1a, b)

In the protologue<sup>[7]</sup>, *C. flosculora* was placed in *C. sect. Thea* ser. *Sinenses* Hung T. Chang based on its '3-loculed, pubescent ovaries and 3-parted, free styles', and distinguished from other species of ser. *Sinenses* by its 'small leaf blades (3–7 × 1.5–2.5 cm), short pedicels (0.3–0.4 mm), very small flowers (0.5–0.7 cm diameter), short stamens (2–3 mm) and short styles (1.5–1.7 mm)'. However, very small flowers (< 1 cm diameter), short pedicels (< 0.5 cm), short stamens (< 1 cm) and short styles (< 0.5 cm) are completely absent in whole sect. *Thea* (not only in ser. *Sinenses*), instead, together with its persistent bracteoles, 3-loculed ovaries and free styles, are diagnostic to sect. *Corallina* Sealy<sup>[2,3,13,14]</sup> or sect. *Brachyandra* Hung T. Chang<sup>[1,12,16]</sup>, which



**Fig. 1** Morphological characteristics of (a), (b) *Camellia flosculora* (Luong Van Dung DL 190701, DLU) and (c), (d) *C. vidalii* (S.X. Yang 6237, KUN). (a), (c) Flowering shoots; (b) flower, showing corolla, stamens and pistil; (d) a flower-bud and a flower without corolla and stamens. Photos by S.X. Yang.

strongly suggests that it is problematic to put *C. flosculora* in sect. *Thea*.

Although a few taxa with persistent bracteoles or/and free styles were temporarily or inappropriately placed in sect. *Thea*<sup>[2,11–13,17]</sup>, it should be emphasized that bracteoles early deciduous and styles connate, which are absent in *C. flosculora*, are the most important diagnostic features of sect. *Thea*.

Sealy<sup>[13]</sup> included two species, *C. gracilipes* (bracteoles persistent and styles connate) and *C. pubicosta* (bracteoles persistent and styles free), in sect. *Thea*, but he explicitly pointed out that the both 'are regarded as anomalous and are placed in section *Thea* as a matter of convenience'. Subsequently, *C. gracilipes* was removed into sect. *Longissima* Hung T. Chang by Chang in 1981<sup>[12]</sup> and sect. *Longipedicellata* Hung T. Chang (including sect. *Longissima*) by Ming in 1999<sup>[17]</sup>, respectively, and *C. pubicosta* was removed into sect. *Corallina* by Ming in 1999<sup>[17]</sup>.

'Bracts (actually bracteoles) 2, early deciduous' and 'styles free or lower half connate' were listed in the diagnosis of Chang's sect. *Thea*<sup>[1,11,12,16]</sup>, in which, however, there were only two species with free styles, i.e., *C. pentastyla* and *C. pubicosta*. Ming<sup>[14]</sup> and our examination of type specimens have confirmed that the styles of *C. pentastyla* are united at the base. As for *C. pubicosta*, its persistent bracteoles clearly indicate that its placement in sect. *Thea* is inconsistent with the diagnosis described above<sup>[1,11,12,16]</sup>. The diagnostic value of bracteoles early deciduous to sect. *Thea* has been widely recognized<sup>[1–3,10–11,13,14,16]</sup> and free styles are virtually absent in sect. *Thea*. Recently, *C. sealyana*, the unique species with free style in Ming's sect. *Thea*, was excluded from this section by Zhao<sup>[18]</sup>.

From what has been discussed above, the main characteristics of *C. flosculora*, especially the very small flowers, short stamens and free styles (Fig. 1a,b), undoubtedly show that it does not belong to sect. *Thea*, but a member of sect. *Corallina* (sensu Ming<sup>[2,17]</sup>, including sect. *Brachyandra*).

### Taxonomic position of *Camellia vidalii* Rosmann (Fig. 1c, d)

*Camellia vidalii* was described in *Adansonia* (in French with a Latin diagnosis) in 1999<sup>[4]</sup>, a valid publication. An English description of this species was presented in the *International Camellia Journal* in 2000<sup>[19]</sup>. This species was characterized by very large leaves (35–40 cm long and 6–8 cm wide), long

pedicels (3.5–4.5 cm long), persistent bracteoles, yellow flowers, (4-)5-loculated ovaries and free styles. *C. vidalii* was first provisionally included in sect. *Archechamellia* Sealy by Rosmann in 1999, who suggested that it was close to *C. krempfii* (Gagnep.) Sealy and *C. longissima* Hung T. Chang<sup>[4]</sup>. In the following year, Rosmann definitely moved *C. vidalii* into sect. *Thea* ser. *Quinquelocularis* Hung T. Chang. However, inexplicably, in the last paragraph of the same article, the author returned his previous opinion, placing it in sect. *Archechamellia*<sup>[19]</sup>.

Section *Thea* is characterised by the caducous bracteoles (2 or 3), white petals and the single style<sup>[1–3,13]</sup>, which are absent in *C. vidalii*. Apparently, it is inappropriate to place *C. vidalii* in sect. *Thea*. With the large leaves, long pedicels, persistent bracteoles, yellow petals, (4-)5-loculed ovaries and free styles (Fig. 1c, d), as well as the molecular phylogenetic analysis<sup>[20]</sup>, it is suggested to put *C. vidalii* in sect. *Piquetia*.

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### Conflict of interest

The authors declare that they have no conflict of interest.

### Dates

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## Taxonomic notes of three tea-plants in Vietnam

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