



Agapetes huangiana (Ericaceae), a new species from Southeast Xizang, China

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ABSTRACT: *Agapetes huangiana* Bin Yang, Y.H.Tan & Y.H.Tong (Ericaceae) is described and illustrated as a new species endemic to Xizang, China. It is morphologically similar to *A. guangxiensis* D. Fang and *A. epacridea* Airy Shaw, but clearly differs in having thinly leathery leaf blades with verrucose-scabrid trichomes abaxially, shorter pedicel, and densely white-puberulent calyx and corolla.

KEY WORDS: *Agapetes epacridea*, *A. guangxiensis*, floristic exploration, Mêdog, morphology, Taxonomy.

INTRODUCTION

Agapetes D. Don ex G. Don (1834: 862) comprises approximately 100 currently recognized species (Fang and Stevens, 2005), most of which are distributed in the Asian subtropical monsoon region (Wang *et al.*, 2021). In China, 57 species and two varieties are currently recognized (Fang and Stevens, 2005; Tong, 2014, 2016; Tong *et al.*, 2019, 2021a; Wang *et al.*, 2021; Yang *et al.*, 2021a, b). In preliminary phylogenetic analyses using nuclear and plastid sequence data indicated that *Agapetes* species nested among *Vaccinium* species, although only few *Agapetes* species were sampled (Kron *et al.*, 2002; Tanaka *et al.*, 2016). Currently it is thought that many species of *Agapetes* are part of the same lineage as many SE Asian-Malesian *Vaccinium* (Fang and Stevens, 2005). There is still much work to do to clarify the generic delimitations between *Agapetes* and *Vaccinium* (Tong and Xia *et al.*, 2014; Zhou *et al.*, 2017). Thus, we still adopt the traditional circumscription of *Agapetes* in this study.

Mêdog (Motuo) County is in southeastern Xizang, China, bordered by northeastern India. As one of the biodiversity hotspots in China (Zhou *et al.*, 2021), Mêdog County remains mysterious and is a paradise where botanists yearn to discover its plant diversity (e.g., Sun and Zhou, 1996, 2002). Since the construction of a road from Bome (Bomi) County to Mêdog County was completed in 2013, access to Mêdog has become easier and more convenient. Numerous new and newly recorded plant taxa from Mêdog County were discovered in recent years (e.g., Chen *et al.*, 2020; Li *et al.*, 2018; Liu *et al.*,

2019, 2020; Luo *et al.*, 2020; Tong *et al.*, 2021b; Ya *et al.*, 2021; Zhou *et al.*, 2021).

During our floristic exploration of Mêdog in November 2018 and December 2020, we encountered an interesting plant with fruits from two locations in the understory of a primeval subtropical forest. Some individuals were then introduced to the greenhouse of Kunming Institute of Botany for cultivation and flowered in September 2021. Morphologically, it resembled *Agapetes epacridea* Airy Shaw (1948: 94) in the small ovate leaves. When we checked the relevant *Agapetes* specimens deposited from Mêdog at the herbaria of the Kunming Institute of Botany (KUN) and Institute of Botany (PE), we also found that several specimens of this unknown species were also identified as *Agapetes epacridea*. Under work on a revision of *Agapetes* species from Myanmar, we observed that *A. epacridea* has corolla tubes with five fine red vertical lines and the anthers with 2 spurs, while this unknown species has pure white corolla tubes, the anthers without spurs and the indumentum of their leaf blades are also different as indicated by Tong (2014). Based on a detailed morphological comparison, we concluded that this unknown species represents a new one and is described and illustrated as *Agapetes huangiana* below.

MATERIALS AND METHODS

Morphological descriptions were based on living collections and dried specimens deposited in the Herbaria of Xishuangbanna Tropical Botanical Garden (HITBC), the Institute of Botany, Chinese Academy of Sciences

**Table 1.** Morphological comparison of *Agapetes huangiana*, *A. epacridea* and *A. guangxiensis*.

Characters	<i>A. huangiana</i>	<i>A. epacridea</i>	<i>A. guangxiensis</i>
Leaf blade	thinly leathery, adaxially unobviously wrinkled when dry	coriaceous, adaxially conspicuously wrinkled when dry	coriaceous, adaxially wrinkled when dry
Leaf blade indumentum	verrucose-scabrid abaxially	nearly glabrous abaxially	glabrous
Leaf blade size	5–8 × 3–6 mm	8–15 × 4–7 mm	7–14 × 4–9 mm
Leaf blade apex	acute or apiculate	with a 1–1.5 mm long pungent mucro	acute
Pedicle length	1.0–1.5 mm	4–5 mm	ca. 5 mm
Corolla color in vivo	white, green apically	white with five fine red vertical lines, green apically	white, tinged with pale green
Corolla length	11–12 mm	19–20 mm	9.5–10 mm
Flower indumentum	densely white-puberulent	densely white-puberulent and spreading long-stipitate-glandular-hirsute	pubescent on corolla angles
Filament length	5–6 mm	11.5–13.0 mm	ca. 4 mm
Anthers	5–6 mm long, without spurs	5.5–6.0 mm long, with 2 spurs	ca. 4.5 mm long, without spurs

(PE), and Kunming Institute of Botany, Chinese Academy of Sciences (KUN). The introduced living collections are cultivated in the greenhouse of Kunming Institute of Botany. The description of the new species follows the terminology used by Fang and Stevens (2005), and the general plant terminology follows Beentje (2016). This new species was compared with the morphologically similar species *Agapetes epacridea* Airy Shaw (Airy Shaw, 1948; Tong *et al.*, 2022) and *A. guangxiensis* D. Fang (1998: 276) according to the descriptions from protologues, related literature and also the dried herbarium specimens. Images of the type specimens of *Agapetes epacridea* were gathered from JSTOR Global Plants (<http://plants.jstor.org>).

TAXONOMIC TREATMENT

Agapetes huangiana Bin Yang, Y.H.Tan & Y.H.Tong, *sp. nov.*

Figs. 1-2 & S1-2

Type: CHINA. Xizang, Mêdog County, Beibeng Township, De'ergong Village, 29°11'14.85"N, 95°08'29.49"E, elev.1647m, primeval subtropical evergreen broad-leaved forest, introduced to and cultivated at the greenhouse of Kunming Institute of Botany, Chinese Academy of Sciences, 23 September 2021, *J. D. Ya & C. Liu BC210908* (holotype: HITBC[0069897]!; isotype: HITBC!).

Agapetes epacridea auct. non. Airy Shaw: S. H. Huang in *Fl. Reipubl. Popularis Sin.* 57(3): 203. 1991; R.C. Fang & P.F. Stevens, *Fl. China* 14: 515. 2005.

Diagnosis: *Agapetes huangiana* is morphologically similar to *A. guangxiensis* and *A. epacridea* in having spirally alternate leaves with short pedicels and ovate blades, and branchlets densely covered with spreading setae, but can be clearly distinguished from the former by its smaller leaf blades (5–8 × 3–6 mm vs. 7–14 × 4–9 mm), leaf blades verrucose-scabrid (vs. glabrous) abaxially, midvein and secondary veins inconspicuous (vs. conspicuous, Fig. S1F), leaf blade margin almost entire with inconspicuous glandular teeth (vs. with glandular

spiny serration, Fig. S1F), much shorter pedicel (1.0–1.5 mm vs. ca. 5 mm), and white-puberulent (vs. hirsute) pedicel and calyx; and from the latter by its thinly leathery (vs. thickly leathery) leaf blades with apiculate apices (vs. with 1–1.5 mm long pungent mucros, Fig. S1C & D), shorter (11–12 mm vs. 19–20 mm) and pure white corolla tube without coloured lines (vs. with five fine red vertical lines, Fig. S1C), shorter filaments (5–6 mm vs. 11.5–13.0 mm) and anthers without spurs dorsally (vs. with 2 spurs) (Table 1).

Description: Shrubs, epiphytic, evergreen, much branched, 15–40 cm long, with subglobose root tubers. **Rootlets** fine, adventitious along branches. **Branchlets** terete, slender, 1–2 mm in diam., densely covered with fuscous spreading setae 2–5 mm long; **Leaves** spirally alternate around stem, crowded. **Petiole** 1.0–1.5 mm long, sparsely puberulent. **Blade** ovate to suborbicular, 5–8 × 3–6 mm, thinly leathery, abaxially verrucose-scabrid, adaxially sparsely verrucose-scabrid to sparsely puberulent, sometimes almost glabrous, slightly transversely wrinkled when dry, midvein and secondary veins indiscernible, young leaves occasionally with 1–2 pairs of secondary veins slightly visible adaxially in vivo, base rounded, margin almost entire, with 3–7 pairs of inconspicuous glandular teeth, slightly recurved, apex acute or apiculate. **Inflorescences** axillary or cauline, 1- to 2-flowered, peduncle ca. 0.5 mm long. **Bracts** 3–4, ovate, 0.5–1.0 mm, glabrous. **Flowers** articulated with pedicel, ca. 1.5 cm long. **Bractoles** 2, ovate, ca. 1.0 mm. **Pedicel** 1.0–1.5 mm long, slightly expanded to 1.0–1.2 mm wide towards apex, densely white-puberulent. **Calyx** densely white-puberulent, tube obconical, 1.0 × 1.5–2.0 mm, limb 1.5–2.0 mm, lobes 5, triangular, 1.0–1.5 × ca. 1.0 mm, densely white-puberulent, apex acute. **Corolla** in vivo white, yellowish green apically, cylindrical, slightly narrowing towards apex, 11–12 × ca. 4.5 mm, densely white-puberulent exteriorly, sparsely pubescent interiorly in upper part, lobes 5, slightly reflexed at maturity, ovate-triangular, ca. 1.0 × 1.0 mm, acute apically. **Stamens** 10, 10.0–10.5 mm long. **Filaments** parallel, flattened, 5.0–

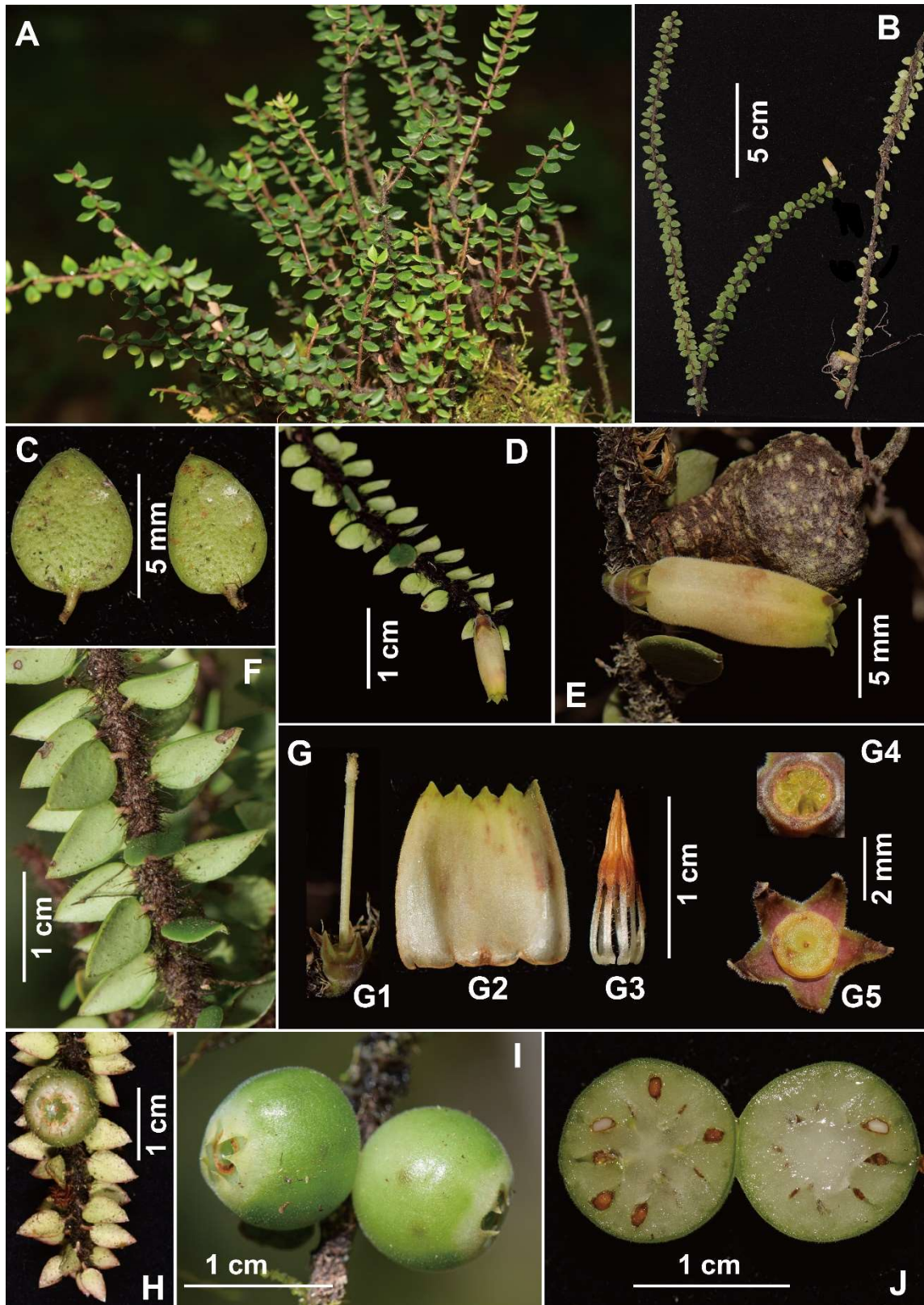


Fig. 1. *Agapetes huangiana* Bin Yang, Y.H.Tan & Y.H.Tong. **A.** habit; **B.** flowering branch; **C.** leaves (abaxial view); **D.** part of flowering branch; **E.** flower and one root tuber; **F.** part of leafy branch; **G.** dissection of flower (G1. flower with corolla removed; G2. corolla, showing inner face; G3. stamens; G4. cross section of ovary; G5. calyx limb and disc); **H.** part of fruiting branch; **I.** mature berries; **J.** cross section of mature berry. (Photos: H by J.D. Ya, A-G, I-J by B. Yang).

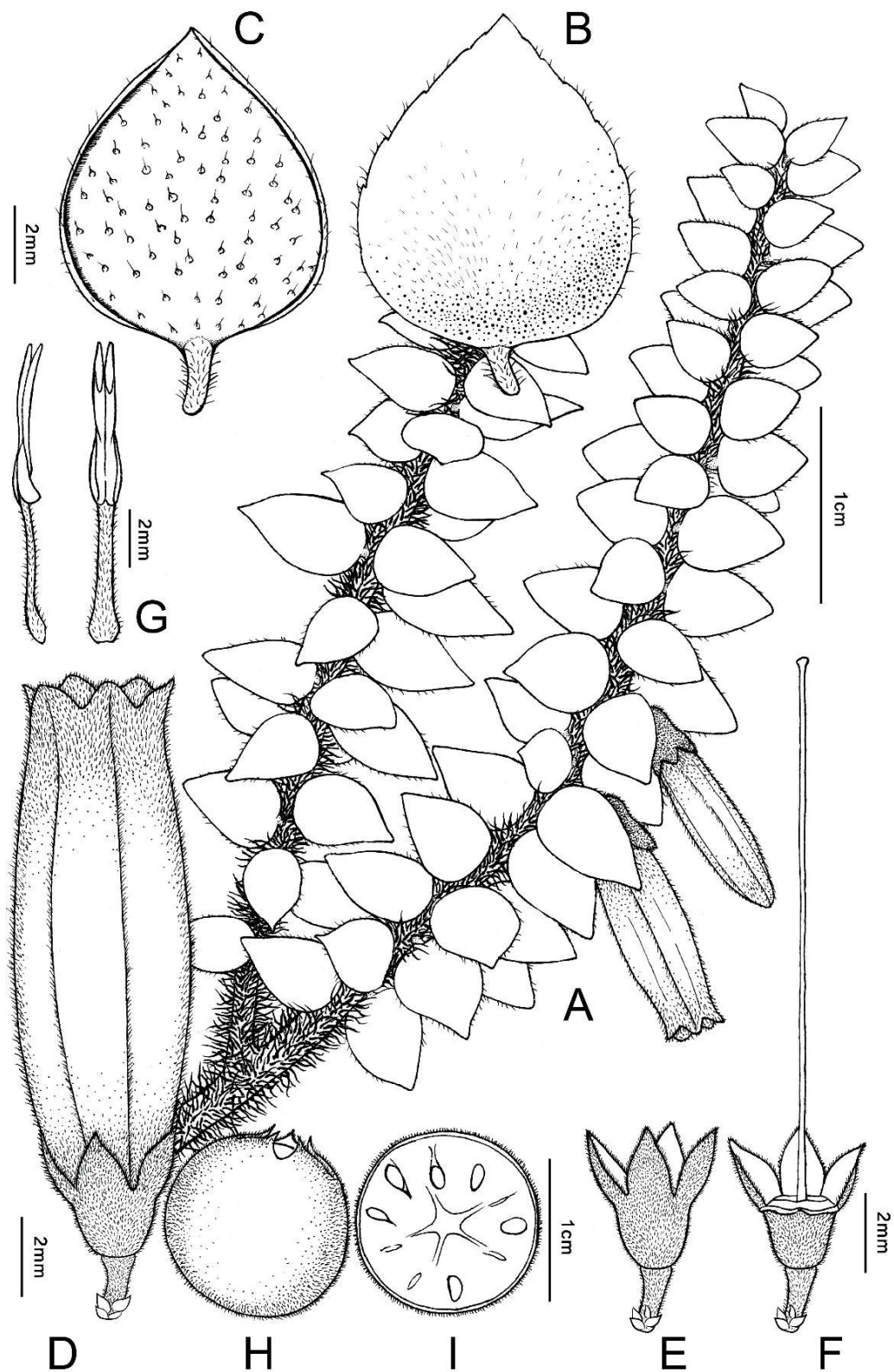


Fig. 2. *Agapetes huangiana* Bin Yang, Y.H.Tan & Y.H.Tong. **A.** flowering branch; **B.** leaf (adaxial view); **C.** leaf (abaxial view); **D.** flower; **E.** flower, with corolla and style removed; **F.** flower, with corolla removed and part of calyx cut away to expose disc and style; **G.** stamens (side view and abaxial view); **H.** mature berry; **I.** cross section of mature berry (Drawn by L.H. Liu).



5.5 mm long, widening at base, white-pubescent all over except base. **Anthers** adpressed to each other forming a ring around the style, 5.0–5.5 mm long, without spurs, thecae ca. 1.5 mm long, verrucous echinulate, tubules parallel, 3.5–4.0 mm long. **Disc** margin scalloped with inconspicuous 10 peaks, glabrous. **Ovary** inferior, psuedo-10-locular, 1–2 mm in diam. Style ca. 1.1 mm long. **Stigma** punctate. **Mature berry** globose, yellowish green, 12–13 mm in diam. in vivo, densely white puberulent with persistent calyx lobes at apex.

Distribution and habitat: *Agapetes huangiana* is known only from Beibeng Township of Mêdog County, in Southeast Xizang, Southwest China. It is usually epiphytic on the trees of subtropical evergreen broad-leaved forest at elevations of 1390–2100 m.

Phenology: Flowering from August to September, fruiting from November to December.

Etymology: The specific epithet is named in honor of Prof. Su-Hua Huang (1938–2020), a female botanist in Yunnan University, who has made great contributions to the taxonomic study of *Agapetes* in China (Huang, 1983, 1987, 1991; Huang *et al.*, 1998).

Vernacular: 素华树萝卜

Preliminary conservation status: According to historical collections, there are several scattered sites of this species in Mêdog County, but the range of distribution of this species is still unclear. During our survey, only two populations of *Agapetes huangiana* were encountered, and these two localities are near the roadside. Due to the continuous improvement of road infrastructure, and the continuous development of tourism, this species is assessed as vulnerable (VU) following IUCN guidelines (IUCN, 2022).

Additional specimens examined (paratypes): CHINA. Xizang, Mêdog County, Beibeng Township, Gelin Village, elev.1800m, 31 August 1974, *Qingzang Team Vegetation Group 2910* (PE[01838885]); *ibid.*, elev.1600m, August 1974, *Qingzang Team Vegetation Group s.n.* (PE[01908522]); Xirang Village, elev.1800m, 15 April 1983, *B.S. Li & S.Z. Chen 04106* (PE[00194005, 00194006]); *ibid.*, elev.2100m, 26 April 1983, *B.S. Li & S.Z. Chen 04696* (PE[00194007, 00194008]); the back hill of Xirang Village, elev.2000m, subtropical montane evergreen broad-leaved forest, 8 December 1992, *H. Sun, Z.K. Zhou & H.Y. Yu ETM2043* (KUN[0428984, 0549512]); Beibeng Township, De'ergong village, 29°11'14.85"N, 95°08'29.49"E, elev.1647m, 23 November 2018, *C. Liu & J. D. Ya 18CS17261* (KUN[1487459]); *ibid.*, 29°12'10"N, 95°09'11.26"E, elev.1394m, 26 December 2020, *B. Yang & P. Y. Wang T777* (HITBC).

Notes: According to Airy Shaw's infrageneric classification (Airy Shaw, 1935, 1958), the presence of spur in the anther was regarded as an important character for separating the *Agapetes* ser. *Graciles* Airy Shaw (1935: 25) (without spur) from the *A. ser. Longifiles* Airy Shaw (1935: 25) (with spur). Both *Agapetes huangiana* and *A. guangxiensis* own spurless anthers, and small, ovate leaves, these characters matching well with the circumscription of *A. ser. Graciles* subser. *Parvifoliae* Airy Shaw (1958: 490), while *A. guangxiensis* was assigned to *A. ser. Longifiles* by Fang (1998) due to its

pubescent filaments nearly equal in length to anthers, except that its anthers are not spurred. In this case, there are five *Agapetes* species which have filaments nearly equal or longer in length to the unspurred anthers in China, i.e. *A. huangiana*, *A. guangxiensis*, *A. graciliflora* R.C. Fang (in Fang and Stevens, 2005: 508), and *A. heana* Y.H. Tong & J.D. Ya (in Tong *et al.*, 2021a: 134) and *A. lacei* Craib (1913: 43). Only *A. huangiana* and *A. guangxiensis* have white corolla, and the leaves of *A. huangiana* are the smallest among the five species. Both spurred and unspurred anthers occur also in other series, such as ser. *Agapetes* and ser. *Pteryganthae* (Airy Shaw, 1935, 1948, 1958; Huang 1991), this character appears to have evolved more than once in this genus (Tong *et al.*, 2021a).

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Supplementary materials are available from Journal Website.