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Research

Novelties in Myanmar *Agapetes* (Ericaceae) with an updated checklist of species from the country

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We provide novel taxonomic information for *Agapetes* (Ericaceae) from Myanmar, describe the new species *A. oligodonta*, provide a supplemental description of the floral morphology of *A. epacridea*, and raise *A. odontocera* var. *stenosepala* to the rank of species. Line illustrations and photographs of living plants of *A. oligodonta* and *A. epacridea* are included, as well as an updated checklist of *Agapetes* from Myanmar (56 species, 9 varieties and 1 form) with discussion on the distribution of some species.

Keywords: Burma, Kachin, Vaccinieae, Vaccinioideae

Introduction

The genus *Agapetes* D. Don ex G. Don belongs to the tribe Vaccinieae Rchb. of the subfamily Vaccinioideae Arn. (Ericaceae) and comprises 109 species (POWO 2021) distributed from the Himalaya to China, and Indochina to Southeast Asia (Fang and Stevens 2005). Kress et al. (2003) recorded 53 species of *Agapetes* in their checklist of seed plants from Myanmar. Based on the results of several recent botanical expeditions to Myanmar, new taxa and new records from the country have since been added (Tong and Xia 2014, Tanaka et al. 2016, Zhou et al. 2017, Yang et al. 2019); thus, the checklist of this genus needs to be updated.

During field expeditions to Kachin State, northern Myanmar from 2009 to 2018 by several of us, nearly 160 gatherings of *Agapetes* were collected. On examining these specimens, we found that one species with pseudoverticillate branches and leaves and 1-flowered inflorescences with pinkish corollas does not match any previously known species in the genus; hence, we here describe this species as new to science. In addition, flowering material of the poorly known species *A. epacridea* Airy Shaw was collected. Hence, we here amplify the description of *A. epacridea* to include new floral morphological data from our collections. We include line illustrations and images of the living plants of the two species. We also raise *A. odontocera* var. *stenosepala* Airy Shaw to

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the rank of species based on a suite of characters. Finally, we update the list of *Agapetes* species recorded in Myanmar from that of Kress et al. (2003).

Material and methods

Fruiting and flowering material was collected from northern Myanmar during several field trips from 2009 to 2018. The introduced living collections are cultivated in South China Botanical Garden and Xishuangbanna Tropical Botanical Garden. Descriptions were made from both living and dried collections, which were deposited at the herbaria of Botanical Research Institute of Texas (BRIT), Royal Botanic Garden Edinburgh (E), Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences (HITBC), South China Botanical Garden, Chinese Academy of Sciences (IBSC), New York Botanical Garden (NY) and Forest Research Institute of Myanmar (RAF). Measurements were performed with a ruler and small plant structures were observed and measured under a stereomicroscope.

Taxonomic treatment

Agapetes oligodonta Y. H. Tong, K. Armstr. & Bin Yang, sp. nov. (Fig. 1, 2)

A species similar to *A. spissa* Airy Shaw in having pseudoverticillate branches and leaves, but differing in its smaller leaf blades (5–15 × 3–7 mm versus 20–25 × 7–10 mm) with apiculate (versus subacute or subobtuse) apices, glabrous or sparsely white-hirtellous (versus glandular-setose) pedicel, sparsely white-hirtellous (versus densely pubescent) calyx tube, calyx lobes glabrous or sparsely white-hirtellous (versus pubescent) outside with abruptly acute-apiculate apices (versus subacuminate to acute), light pinkish white (versus white) and glabrous (versus densely puberulous with glandular hairs along angles) corolla with ridges (versus without ridges) externally, and anther tubules ca 3 times (versus 1.5 times) as long as the thecae (Table 1).

Type: Myanmar, Kachin State, Putao District, Naungmung Township, buffer zone of Hkakaborazi National Park, along trail between Maza and Namti, 27°28′0.1″N, 97°42′53.3″E, 1002 m a.s.l., 18 Jun 2017 (fl.), Kate Armstrong, Thet Yu Nwe, Moe Myint Thu, San Naing Dee, Zaw Naing Tun, Hla Naing Htay & Pa Rang Gang Ken Sar 2951 (holotype NY [02653946], isotypes BRIT [BRIT573614], E, RAF).

Etymology

The specific epithet refers to the sparse serrations at the apex of the leaf margin (*oligo* = few, *donta* = teeth).

Description

An epiphytic, evergreen, 20 cm tall shrub, spreading, with swollen stem bases or roots, much-branched with branches often pseudoverticillate. Rootlets adventitious along branches. Young branchlets 0.5–1.4 mm in diam., strongly ridged, densely covered with reddish brown ascending setae up to 1.4 mm long; perennating buds not visible; mature branchlets grayish, ± terete, with few lenticels; epidermis not peeling. Leaves pseudoverticillate, (1)3–6 per whorl; petiole absent or up to 1.1 mm long, ca 0.5 mm in diam., abaxially glaucous white; leaf blade obovate, 5–15 × 3–7 mm, 1.7–2.6 times as long as wide, coriaceous, abaxially in vivo pale green, in sicco light brown, slightly glossy, glabrous, adaxially in vivo deep green with paler major veins, in sicco brown or reddish brown, dull, glabrous; midvein bluntly raised abaxially, sharply raised adaxially; secondary veins 3–7 on each side of midvein, pinnately arranged except with first pair arising at or near base, ± arc-ascending, often meeting in a closed loop before reaching margin, slightly raised abaxially, planar or slightly impressed or raised adaxially; tertiary veins slightly raised abaxially, obscure adaxially; leaf base attenuate; leaf margin without sessile glands, slightly recurved, entire to 50–95% of total length and 1- to 5-toothed distally, with marginal teeth incurved-glandular-apiculate; leaf apex rounded to broadly acute and apiculate. Inflorescence 1-flowered, borne proximal to leaves along branchlets; peduncle 0.4–0.7 mm long. Basal bracts 3–5 or more, narrowly triangular, planar, 0.30–0.80 × 0.05–0.24 mm, chartaceous, glabrous, with margin entire or irregularly undulate-serrulate, sharply acute at apex. Pedicel light red or green in vivo, brown in sicco, 1.0–3.0 × 0.4–0.5 mm, slightly expanded to 0.6–0.7 mm wide towards apex, glabrous or sparsely white-hirtellous, articulated with calyx. Bracteoles 2, borne at base of pedicel or slightly above, narrowly triangular, planar, 0.26–0.38 × 0.08–0.16 mm, chartaceous, glabrous, with margin entire or irregularly undulate-serrulate, sharply acute at apex. Calyx 1.5–3.1 × 2.5–3.0 mm, sparsely but regularly white-hirtellous throughout with straight or curved trichomes up to 0.4 mm long; tube obconical, olive green flushed light red at least distally in vivo, brown to black in sicco, 0.4–1.4 × 2.2–2.9 mm; limb 2.0–3.4 mm long; lobes 5, broadly ovate-triangular, light pink in vivo, brown in sicco, 0.9–1.5 × 1.2–1.6 mm, with several slightly raised veins, glabrous or sparsely white-hirtellous outside, glabrous inside, its margin sparsely hirtellous, smooth (i.e. without sessile glands) except minutely erose at apex, abruptly acute-apiculate at apex, without terminal gland. Corolla urceolate with five vertical ridges in line with petal midveins, externally glabrous, internally hirtellous especially towards apex; tube light pinkish white in vivo, 8.2–10.0 × 3.0–4.5 mm; lobes 5, spreading to slightly reflexed, triangular, 0.5–1.0 × 1.0–1.2 mm, obtuse at apex. Stamens 10, distinct, not notably dimorphic, 6.9–7.2 mm long; filaments slightly inflexed, 3.5–3.7 mm long, their margins white-hirtellous with straight or curved trichomes to 0.36 mm long; anthers 4.0–4.1 mm long; thecae ca 0.9 mm long, echinulate; tubules parallel, 3.1–3.2 mm long; apical pores strongly oblique, ca half to nearly the length of the tubule; apices obtuse, with 2 spurs; spurs nearly parallel with tubules, straight, 0.7–0.9 mm long, echinulate. Disk slightly 5-angled, yellow in vivo, ca 2 mm in diam., glabrous. Ovary

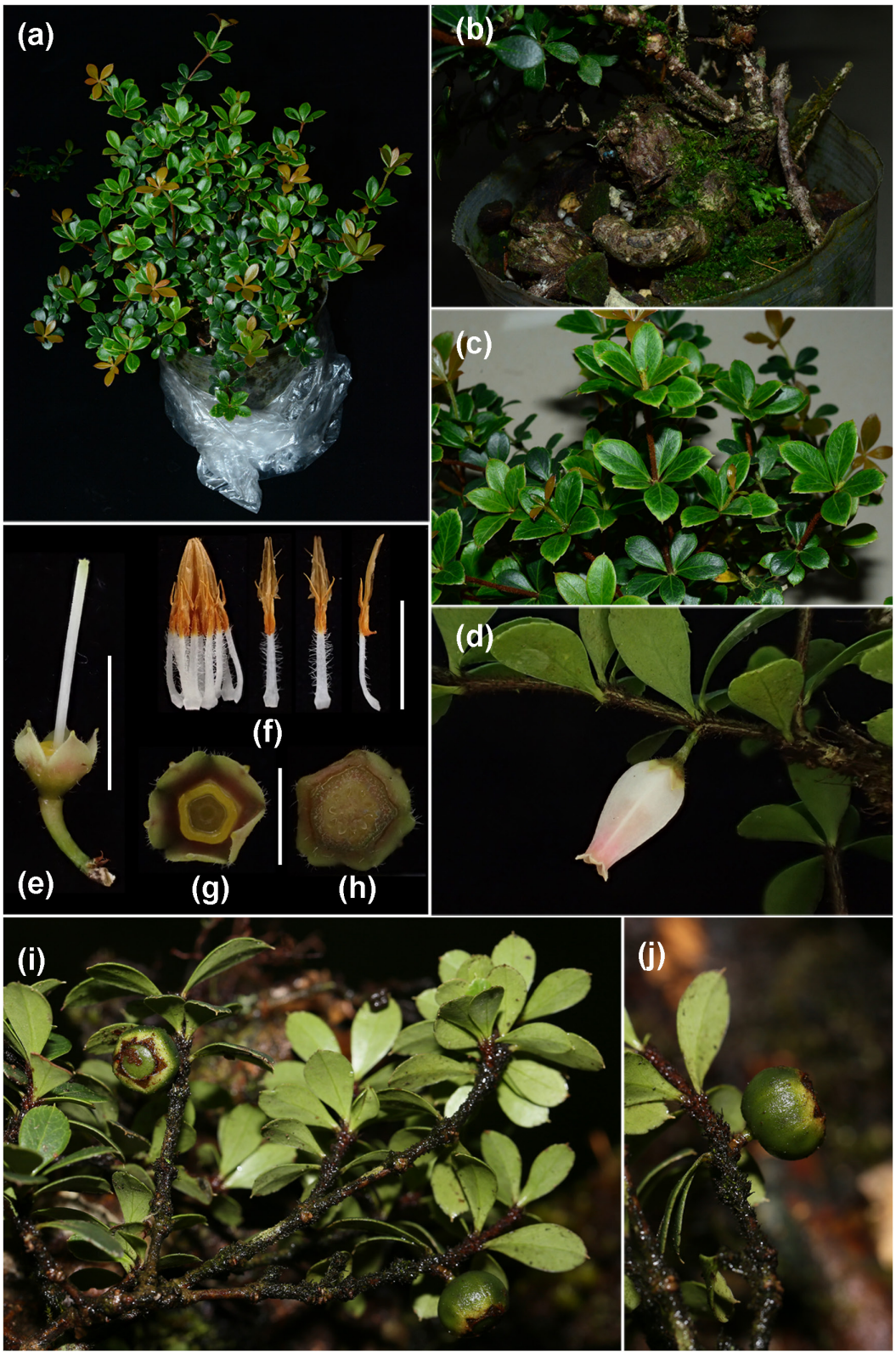

Figure 1. *Agapetes oligodonta* sp. nov. (a) Habit, (b) swollen stem base, (c) leafy branches, (d) flowering branch, (e) flower with corolla and stamens removed, (f) androecium and adaxial (left), abaxial (middle) and lateral (right) view of a stamen, (g) disk and calyx, (h) cross section of ovary, (i) fruiting branches, (j) young fruit, lateral view. Scale bars: (e) 6 mm; (f–h) 3 mm. Photos (a–h) by Y. H. Tong, (i, j) by B. Yang.

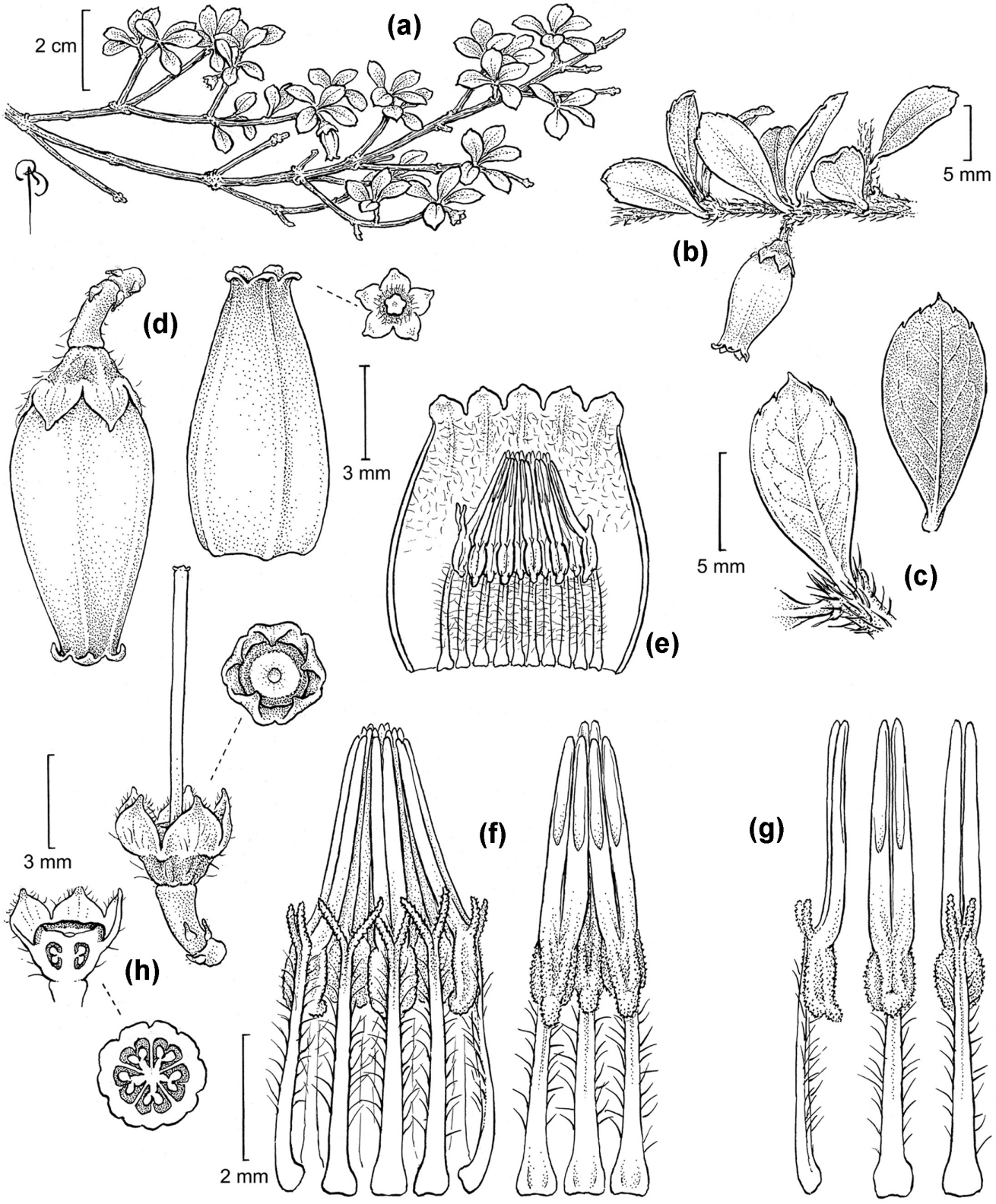

Figure 2. *Agapetes oligodonta* sp. nov. (a) Habit, (b) flowering branch, (c) leaves, abaxial (left) and adaxial (right) view, (d) flower (left), corolla (right) with apical view of flower showing stigma, (e) opened corolla and stamens, (f) androecium (left) and adaxial view of three stamens (right), (g) lateral (left), adaxial (middle) and abaxial (right) view of a stamen, (h) flower with corolla and stamens removed (middle) with apical view of disk and calyx (upper right), longitudinal (left) and cross (below) sections of ovary. Drawn by Bobbi Angell.

Table 1. Morphological comparison between *Agapetes oligodonta* and *A. spissa*.

Character	*A. oligodonta*	*A. spissa*
Leaf blade size (mm)	5–15 × 3–7	20–25 × 7–10
Leaf blade apex	apiculate	subacute or subobtuse
Pedicel indumentum	glabrous or sparsely white-hirtellous	glandular-setose
Calyx tube indumentum	sparsely white-hirtellous	densely pubescent
Calyx lobe indumentum	glabrous or sparsely white-hirtellous outside	pubescent outside
Calyx lobe apex	abruptly acute-apiculate	subacuminate to acute
Corolla color	light pinkish white	white
Corolla indumentum	glabrous externally	densely puberulous externally
Edges on corolla angles	present	absent
Ratio of the length of anther tubule to thecae	3:1	1.5:1

pseudo-10-locular. Style ± even with corolla apex, 8.0–8.5 mm long, glabrous. Stigma ca 0.6 mm wide, truncate. Berry green when nearly mature, depressed globose, slightly yellowish green at apex, 10–11 mm in diam., glabrous.

Phenology

Flowering April–June and fruiting in January of the next year.

Distribution and habitat

Agapetes oligodonta is known only from the Babulongtan mountain range between the Putao and Naungmung valleys (Fig. 3). It grows epiphytically on tree branches at an elevation of ca 1000 m a.s.l. in the Kachin Hills Subtropical Rainforest ecosystem (Armstrong et al. 2020, Murray et al. 2020), a type of closed-canopy lower montane subtropical forest with high rainfall and atmospheric moisture levels.

Conservation status

The only known locality of the new species occurs outside the core of Hkakaborazi National Park, along the route between the populated areas Naungmung and Putao. The site is potentially vulnerable to encroachment in the next decade. Therefore, we propose to categorize the species as Vulnerable under VU D2 (IUCN Standards and Petitions Committee 2019).

Additional specimens examined (paratypes)

Cultivated in Guangzhou: introduced from Namti, in the buffer zone of Hkakaborazi National Park, Naungmung Township, Putao District, Kachin State, Myanmar, 16 Apr 2019 (fl.), B.-M. Wang TYH-2018 (IBSC); cultivated in Xishuangbanna Tropical Botanical Garden: introduced from the same locality as above, 19 Jul 2020, B. Yang XTBG0170 (HITBC).

Discussion

According to Airy Shaw's infrageneric system, *Agapetes oligodonta* should be assigned to *Agapetes* sect. *Agapetes* ser. *Longifiles* Airy Shaw subser. *Subsessiles* Airy Shaw, which is characterized by stems typically slender, leaves typically small (less than 3 cm), inflorescence 1- to 3-flowered, flowers subsessile or shortly pedicellate (pedicel rarely up to 5 mm long), filaments pubescent and elongate, longer than the anther and anthers spurred (Airy Shaw 1935, 1958). In this subseries, only this new species and *A. spissa* have pseudoverticillate branches and leaves, but there are many differences between the two species as indicated in the diagnosis.

***Agapetes epacridea* Airy Shaw, Kew Bull. 3: 94. 1948. (Fig. 4, 5)**

Type: Myanmar, [Kachin State, Putao District], between the Nam Tamai and Nam Tisang [streams] subtropical hill jungle region, 27°35′N, 97°40′E, 1829 m, 5 Dec 1937 (young fr.), F. Kingdon-Ward 13540 (holotype BM [BM000752869], image!).

An epiphytic, evergreen, much branched, pendulous shrub, ca 1 m long. Rootlets fine, adventitious along branches. Young branchlets terete, 2–4 mm in diam., densely covered with ferruginous spreading setae 0.5–2.6 mm long; perennating buds not visible; mature branchlets grayish, more or less terete; lenticels sparse; epidermis not peeling. Leaves spirally alternate around stem, crowded; petiole ca 1.0–1.4 × 0.3–0.5 mm, adaxially grooved, glabrous; leaf blade ovate to suborbicular, 8–15 × 4–7 mm, 1.3–2.2 times as long as wide, coriaceous, glabrous, abaxially dull pale green except lime green marginally in vivo, light brown in sicco, dull, adaxially glossy deep green and smooth in vivo, greenish brown and transversely rugose in sicco; midvein planar abaxially, slightly grooved adaxially; secondary and tertiary veins obscure; leaf base broadly cuneate or rounded, without sessile glands along margin, widely thickened-recurved, entire, sparsely stipitate-glandular-ciliate towards apex, at apex abruptly narrowed into a long pungent mucro 1.0–1.5 mm long. Inflorescences axillary, fasciculate, 1- to 3-flowered; peduncle 0.3–0.5 mm long, densely pubescent. Bracts ovate, planar, ca 0.5 × 0.7 mm, chartaceous, glabrous except margin sparsely pubescent, acute to acuminate at apex, brown in sicco. Flowers articulated with pedicel, 1.5–2.2 cm long. Pedicel 4–5 mm long, slightly expanded to 1.0–1.5 mm wide towards apex, densely white-puberulent and spreading long-stipitate-glandular-hirsute; glands with white stalks and red heads. Bracteoles deltoid, planar, ca 1.0 × 0.5 mm, chartaceous, glabrous, except margin sparsely pubescent, acuminate at apex, brown in sicco. Calyx 4.0–6.5 × 5.0–6.5 mm, densely white-puberulent and spreading long-stipitate-glandular-hirsute; tube green in vivo, terete, obconical, 1.5–2.0 × 1.5–2.0 mm; limb 4–5 × 4–5 mm; lobes 5, green with red margin in vivo, ovate,

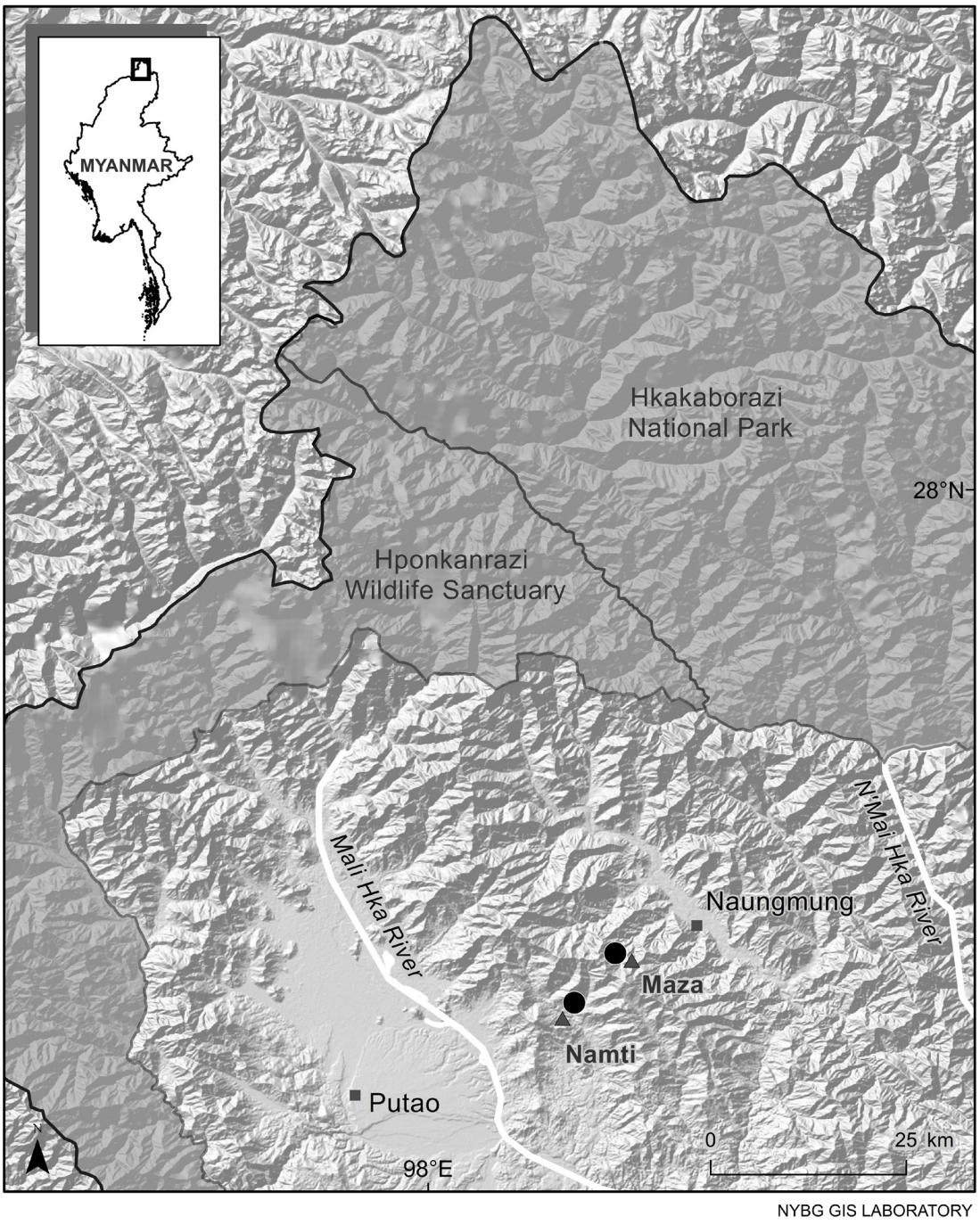

Figure 3. Distribution map of *Agapetes oligodonta* in Myanmar (black dots). The data of the protected areas are from Protected Planet (UNEP-WCMC and IUCN 2021).

1.5–2.5 × 1.5–2.5 mm, densely white-puberulent and spreading long-stipitate-glandular-setose, their margin smooth (i.e. without sessile glands), acute at apex, without terminal gland. Corolla in vivo white (except green apically) with five fine red vertical lines ending in the sinus between lobes, cylindrical, slightly widening towards apex, 19–20 × ca 6 mm, densely spreading long-stipitate-glandular-hirsute abaxially, pubescent adaxially; lobes 5, reflexed at maturity, triangular, ca 2.0 × 2.5 mm, acute apically. Stamens 10, distinct, not notably dimorphic, 16.5–18.0 mm long. Filaments parallel, flattened, ca 11.5–13.0 × ca 0.7 mm, densely white-pubescent all over, trichomes up to 0.3 mm. Anthers adpressed to each other forming a ring around the style, 5.5–6.0 mm long, with 2 spurs; thecae ca 3 mm long, echinulate; tubules parallel, 2.5–3.0 mm long; apical pores strongly oblique, ca 1 mm long, two-fifths the length of the tubule; spurs nearly parallel with tubules, curved, 1–2 mm long, echinulate. Disk margin scalloped with 10 peaks, 2.0–2.5 mm diam., glabrous. Ovary

Figure 4. *Agapetes epacridea*. (a) Branches with young leaves, (b) inflorescences, (c) flowering branch, top view, (d) flowering branch, bottom view. Photos taken by (a) B. Q. Xu, (b) K. Armstrong, (c, d) Y. H. Tan.

psuedo-10-locular. Style even with corolla apex, 18–20 mm long. Stigma ca 0.3 mm in diam., punctate. Young berry ca 7 mm in diam., densely spreading long-stipitate-glandular-hirsute, with persistent calyx lobes at apex.

Phenology

Flowering in November, and fruiting in December.

Distribution and habitat

According to previous reports, this species is distributed in N Myanmar (Kachin) and China (SE Xizang) (Huang 1991, Fang and Stevens 2005). However, Tong (2014) noted that the population from SE Xizang differs from the Myanmar population in having thinly leathery leaf blades that are not wrinkled when dry, verrucose-scabrid (versus glabrous) on both sides, and without a long pungent mucro at the apex. Thus, the population in SE Xizang might not belong to this species, but possibly an undescribed one. We consider that, for now, *A. epacridea* is known to be distributed only in N Myanmar and the population from SE Xizang needs further study to determine its taxonomic placement. *Agapetes epacridea* grows on trees or rocks in the evergreen forests of the Kachin Hills at an elevational range of 1000–1800 m.

Additional specimens examined

Myanmar, Kachin State, Putao District: Naungmung Township, buffer zone of Hkakaborazi National Park, around Shingsankhu rest house, 27°41′13.5″N, 97°53′39.2″E, 1239 m, 7 Nov 2015, K. Armstrong et al. 1298 (NY [02649033], E, RAF); Pannandin, 1022 m, 10 Mar 2009, X.-F. Gao et al. 2150 (IBSC); near Shingsankhu station, 27°42′11.15″N, 97°52′51.86″E, 1400 m, 28 Nov 2014, J.-W. Li et al. M193 (HITBC, KUN).

Agapetes stenosepala (Airy Shaw) Y. H. Tong, Bin Yang & K. Armstr., comb. et stat. nov. (Fig. 6)

Basionym: *Agapetes odontocera* var. *stenosepala* Airy Shaw in Kew Bull. 21: 475. 1968.

Type: Myanmar, Kachin State, Sumprabum Sub-division, eastern approaches from Sumprabum to Kumon Range, between Ning W'Krok and Kanang, on the eastern aspects of Gwe-Kya-Kat-Bum, 1200–1500 m, 20 Jan 1962 (fl.), J. Keenan, U Tun Aung & U Tha Hla 3340 (holotype E [E00232913], image!).

Description

An epiphytic, evergreen, 0.5–1.0 m tall shrub with swollen stem bases or roots. Young branchlets pale green in vivo, grayish white in sicco, slightly angled, 2.0–2.5 mm in diam., glabrous; perennating buds not visible; mature branchlets grayish brown, ± terete, with few lenticels; epidermis not peeling. Leaves pseudoverticillate, (1)3–6 per whorl; petiole absent or up to 3 mm long, ca 2.5 mm in diam., abaxially glaucous white; leaf blade lanceolate to oblanceolate, slightly recurved, 7.5–16.0 × 1.3–3.0 cm, 4.8–6.6 times as long as wide, coriaceous, abaxially in vivo bluish green, in sicco light brown, slightly glossy, glabrous, adaxially in vivo pale green, in sicco brown or reddish brown, dull, glabrous, with veins raised on each sides; secondary veins 8–12(–16) on each side

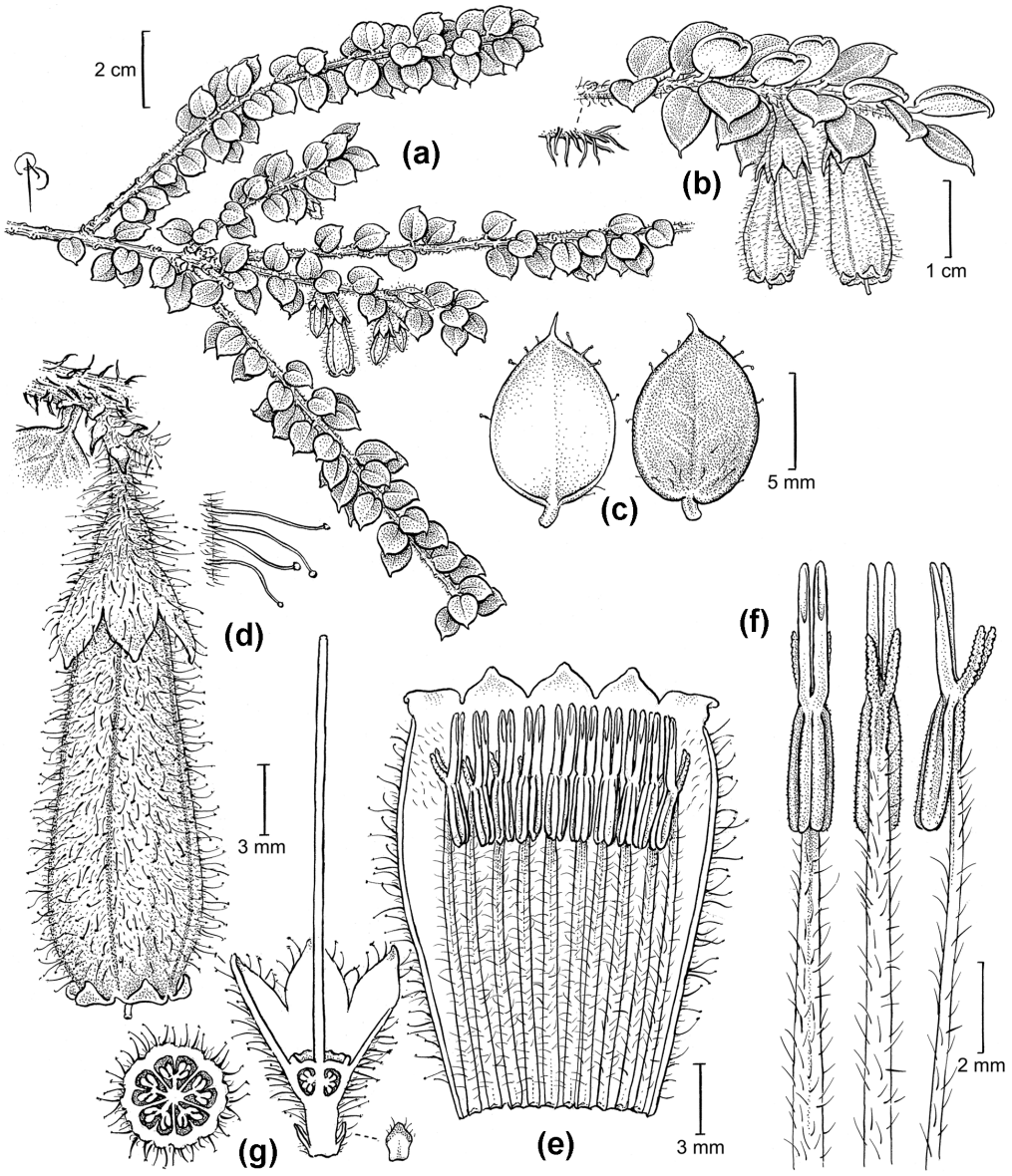

Figure 5. *Agapetes epacridea*. (a) Habit, (b) flowering branch, (c) leaves, abaxial (left) and adaxial (right) view, (d) flower and close up of trichomes on calyx, (e) opened corolla and stamens, (f) adaxial (left), abaxial (middle) and lateral (right) view of a stamen, (g) cross section of ovary (left), longitudinal section of flower with corolla and stamens removed (middle) and bracteole (right). Drawn by Bobbi Angell.

of midvein, pinnately arranged, ± arc-ascending, often meeting in a closed loop before reaching margin; leaf base attenuate; leaf margin with 1 basal gland at each side, entire; leaf apex broadly acute. Inflorescence a corymb-like raceme, (1–)7- to 20-flowered, 1- to 3-clustered on leafless stems or branches; peduncle 7–13 mm long. Basal bracts 2–3, small, triangular, 0.6–0.7 × 0.6–0.7 mm, chartaceous, glabrous, with margin entire or irregularly undulate-serrulate, acute at apex. Pedicel light red or green in vivo, brown in sicco, 1–2 cm long, glabrous, articulated with calyx. Bracteoles 2, borne at base of pedicel or slightly above, narrowly triangular, ca 1.0 × 0.4 mm, chartaceous, glabrous, with margin entire or irregularly undulate-serrulate, acute at apex. Calyx tube light red or green in vivo, brown to black in sicco, obconical, ca 1.5 × 2.0–2.5 mm; limb 5–7 mm long; lobes 5, lanceolate, light red and tinged with green at apex in vivo, brownish in sicco, 4–6 × 1–2 mm, with several slightly raised veins, glabrous, acute at apex, without terminal gland. Corolla tubular, constricted at apex, 5-angular, glabrous externally and internally; tube red and tinged with green at apex in vivo, brown in sicco, 1.9–2.0 × 0.6–0.8 cm, lobes 5, spreading to slightly reflexed, triangular, 3.5–4.0 × 2.7–3.0 mm, obtuse at apex. Stamens 10, distinct, ± monomorphic, 1.7–1.8 cm long; filaments white, inflexed, flat, 2.5–2.8 mm long, glabrous; anthers yellow, 1.65–1.70 cm long, thecae 5.0–5.5 mm long, tuberculate, with 2 small spur-like appendages at base, these 0.2–0.3 mm long; tubules parallel, 1.10–1.15 cm long; apical pores strongly oblique, ca 5 mm; apices obtuse, with 2 spurs 0.2–0.3 mm long; spurs

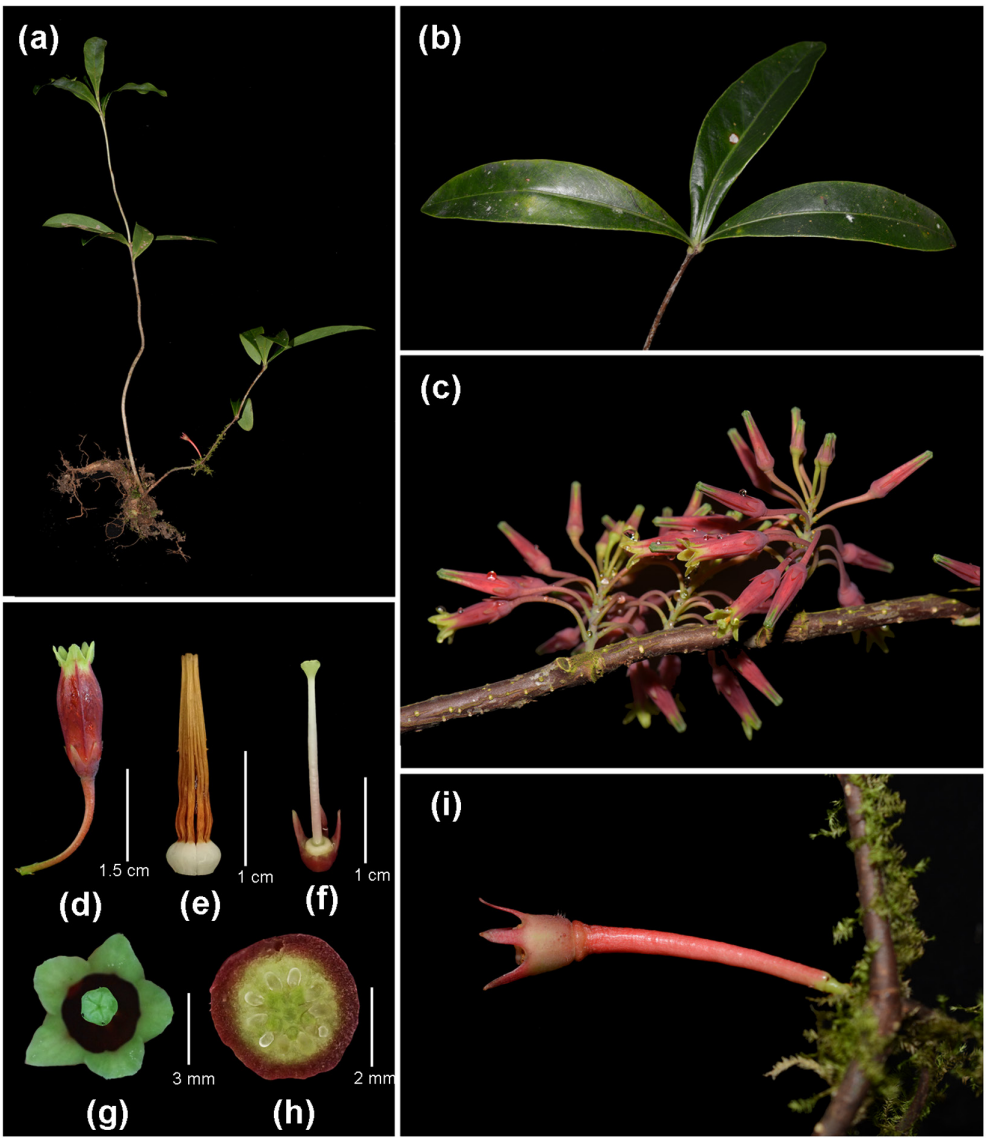

Figure 6. *Agapetes stenosepala*. (a) Habit, (b) leafy branch, (c) inflorescences, (d) flower, (e) androecium, (f) calyx with two lobes removed showing glabrous disk, and style, (g) apical view of flower showing capitate stigma, (h) cross section of ovary, (i) young fruit. Scale bars: (d) 1.5 cm; (e, f) 1 cm; (g) 3 mm; (h) 2 mm. Photos taken by (a), (b) and (i) K. Armstrong, (c) B. Yang, (d–h) X. H. Ye.

Table 2. Morphological comparison between *Agapetes stenosepala* and *A. odontocera*.

Character	*A. stenosepala*	*A. odontocera*
Leaf petiole length (mm)	0–3	2–11
Leaf blade apex	broadly acute	acuminate
Leaf blade margin	entire	serrate
Number of secondary veins on each side of midvein	8–12(–16)	16–20
Inflorescence	corymb-like racemose	fasciculate
Calyx lobe shape	lanceolate	ovate-deltoid
Calyx lobe length (mm)	4–6	2–3
Corolla lobe color	green	dark red or rarely pink
Apex of corolla lobe	obtuse	caudate
Filament indumentum	glabrous	puberulous to pilose
Style length (cm)	1.80–1.85	2.0–2.5(–3.2)
Stigma	capitate	truncate

Table 3. A checklist of *Agapetes* species from Myanmar.

Number	Taxon	Distribution	Literature	Exemplar specimen
1	*Agapetes adenobotrys* Airy Shaw	Kachin	Airy Shaw 1935, Kress et al. 2003	F. Kingdon-Ward 9099 (holotype: BM, image!)
2	*Agapetes affinis* (Griff.) Airy Shaw	Kachin	Kress et al. 2003	without any specimen from Myanmar cited by previous literature
3	*Agapetes angulata* (Griff.) Hook. f.	Kachin	Airy Shaw 1935, Kress et al. 2003	N. H. Xia et al. 1527 (IBSC!)
4	*Agapetes angustifolia* (Knagg) Airy Shaw	Kachin	Airy Shaw 1935, Kress et al. 2003	F. Kingdon-Ward 5566 (holotype: E, image!)
4a	*Agapetes angustifolia* f. *latifolia* Airy Shaw	Kachin	Airy Shaw 1958	F. Kingdon-Ward 13573 (holotype: BM, image!)
5	*Agapetes bhareliana* (Airy Shaw) D. Banik & Sanjappa	Kachin	Yang et al. 2019	Myanmar Exped. 3762 (HITBC!)
6	*Agapetes brachypoda* Airy Shaw	Kachin	Airy Shaw 1935, Kress et al. 2003	F. Kingdon-Ward 7639 (holotype: K, image!)
7	*Agapetes bracteata* Hook. f.	Kayin, Mon	Clarke 1881, Kress et al. 2003	T. Lobb s.n. (holotype: K, image!)
8	*Agapetes brevipedicellata* Y. H. Tan & S. S. Zhou	Kachin	Zhou et al. 2017	Myanmar Exped. 20160001 (holotype: HITBC!)
9	*Agapetes brandisiana* W. E. Evans	Kachin	Evans 1927, Kress et al. 2003	G. E. S. Cubitt 351 (holotype: E, image!)
10	*Agapetes campanulata* C. B. Clarke	Mon	Clarke 1881, Kress et al. 2003	S. Kurz s.n. (holotype: K, image!)
11	*Agapetes dispar* Airy Shaw	Kachin	Airy Shaw 1958, Kress et al. 2003	F. Kingdon-Ward 13234 (holotype: BM, image!)
12	*Agapetes epacridea* Airy Shaw	Kachin	Airy Shaw 1948	F. Kingdon-Ward 13540 (holotype: BM, image!)
13	*Agapetes fasciculiflora* Airy Shaw	Kachin	Airy Shaw 1958, Kress et al. 2003	F. Kingdon-Ward 21701 (holotype: BM, image!)
14	*Agapetes forrestii* W. E. Evans	Kachin	Airy Shaw 1935, Kress et al. 2003	F. Kingdon-Ward 388 (NY!)
15	*Agapetes graciliflora* S. H. Huang	Kachin	Airy Shaw 1958, Kress et al. 2003	F. Kingdon-Ward 5541 (holotype: E, image!)
16	*Agapetes grandiflora* Hook. f.	Kachin	Tanaka et al. 2016, misidentified as *A. burmanica*; Banik and Sanjappa 2014, cited as *A. macrantha* var. *grandiflora*	J. Murata et al. 041355 (MBK, not seen)
17	*Agapetes haemantha* Airy Shaw	Kachin	Airy Shaw 1958, Kress et al. 2003	F. Kingdon-Ward 20927 (holotype: BM, image!)
18	*Agapetes hillii* Brandis	Kachin	Brandis 1906, Kress et al. 2003	M. Hill 112 (holotype: K, image!)
19	*Agapetes hyalocheilos* Airy Shaw	Kachin	Airy Shaw 1968, Kress et al. 2003	J. Keenan et al. 3205 (K, not seen).
20	*Agapetes inopinata* Airy Shaw	Shan	Airy Shaw 1960b) Kress et al. 2003	F. Kingdon-Ward 8788 (isotypes: A, image!, S, image!)
21	*Agapetes interdicta* (Hand.-Mazz.) Sleumer	Kachin, Sagaing	Airy Shaw 1948, Kress et al. 2003	F. Kingdon-Ward 206 (NY!)
22	*Agapetes kingdonis* Airy Shaw	Kachin	Airy Shaw 1958, Kress et al. 2003	F. Kingdon-Ward 13462 (holotype: BM, image!)
23	*Agapetes lacei* Craib	Kachin	Kress et al. 2003	J. H. Lace 5771 (holotype: E, image!)
23a	*Agapetes lacei* var. *setosa* Airy Shaw	Kachin	Craib 1913, Airy Shaw 1958	G. Forrest 25962 (holotype: K, image!; isotype: PE!)
24	*Agapetes linearifolia* C. B. Clarke	Kachin	Yang et al. 2019	Myanmar Exped. 405 (HITBC!)
25	*Agapetes lobbii* C. B. Clarke	Kachin, Kayin, Taninthayi	Clarke 1881, Kress et al. 2003	T. Lobb s.n. (holotype: K, image!; isotype: BM, image!)
26	*Agapetes loranthiflora* D. Don ex G. Don	Bago, Mandalay, Shan, Taninthayi	Wallich 1828–1849 (no. 754) , Kress et al. 2003	W. Gomez 754 (holotype: K, image!)
27	*Agapetes macrantha* Hook. f.	Kachin, Mon, Taninthayi	Hooker 1851, Kress et al. 2003	T. Lobb 535 (holotype: K, image!; isotype BM, image!)
27a	*Agapetes macrantha* var. *oblanceolata* (Airy Shaw) D. Banik & Sanjappa	Kachin	Airy Shaw 1948, Banik and Sanjappa 2014	C. W. D. Kermode 16666 (holotype: K, not seen)
28	*Agapetes macrostemon* (Kurz) C. B. Clarke	Mon	Kurz 1873, Kress et al. 2003	C. S. P. Parish s.n. (holotype: K, image!)
29	*Agapetes mannii* Hemsl.	Chin, Kachin	Airy Shaw 1958, Kress et al. 2003	F. Kingdon-Ward 22355 (BM, not seen); P. Srisanga et al. 097048 (US, image!)
30	*Agapetes megacarpa* W. W. Sm.	Kachin	Evans 1927, Kress et al. 2003	G. Forrest 24981 (E, image!)
31	*Agapetes moorei* Hemsl.	Chin	Evans 1927, Kress et al. 2003	R. Unwin 3047 (K, image!, NY!)
31a	*Agapetes moorei* var. *glabrescens* Airy Shaw	Chin	Airy Shaw 1958	R. E. Cooper 6073 (holotype: E, image!)
32	*Agapetes nana* (Griff.) Hook. f.	Kachin	Yang et al. 2019	Myanmar Exped. 1888 (HITBC!, RAF, not seen)

Table 3. Continued.

Number	Taxon	Distribution	Literature	Exemplar specimen
33	*Agapetes neriifolia* (King & Prain) Airy Shaw	Kachin, Shan	Airy Shaw 1935, Kress et al. 2003	A. Huk s.n. (syntype: K, image!)
33a	*Agapetes neriifolia* var. *minor* (King & Prain) Airy Shaw	Kachin	Airy Shaw 1958	J. Wallace s.n. (holotype: CAL, image!)
34	*Agapetes oblonga* Craib	Kachin	Craib 1913, Kress et al. 2003	J. H. Lace 5772 (holotype: K, image!)
35	*Agapetes oligodonta* Y. H. Tong, K. Armstr. & Bin Yang	Kachin	this study	K. Armstrong et al. 2951 (holotype: NY!)
36	*Agapetes oxycoccoides* J. Murata, Nob. Tanaka & Ohi-Toma	Kachin	Tanaka et al. 2016	J. Murata et al. 1401 (holotype: TI, not seen; isotype: RAF, not seen)
37	*Agapetes pachyacme* Airy Shaw	Kachin	Airy Shaw 1958, Kress et al. 2003	F. Kingdon-Ward 13481A (holotype: BM, image!)
38	*Agapetes parishii* C. B. Clarke	Chin, Mon	Clarke 1881, Kress et al. 2003	C. S. P. Parish s.n. (holotype: K, image!)
38a	*Agapetes parishii* var. *annulata* Airy Shaw	Shan	Airy Shaw 1948	W. A. Robertson 91A (holotype: K, image!)
39	*Agapetes pensilis* Airy Shaw	Kachin	Airy Shaw 1935, Kress et al. 2003	F. Kingdon-Ward 7458 (holotype: K, image!)
40	*Agapetes pentastigma* J. Murata, Nob. Tanaka & H. Murata	Kachin	Tanaka et al. 2016	H. Murata & J. Murata 1402 (holotype: TI, not seen; isotypes: NY!, RAF, not seen, TNS, not seen)
41	*Agapetes pottingeri* Prain	Kachin	King and Prain 1898, Kress et al. 2003	H. Pottinger s.n. (holotype: CAL, not seen); *B. Q. Xu & J. Wang 4815* (IBSC!)
42	*Agapetes pseudogriffithii* Airy Shaw	Kachin	Airy Shaw 1935, Kress et al. 2003	F. Kingdon-Ward 9144 (holotype: BM, image!)
42a	*Agapetes pseudogriffithii* var. *abbayana* Airy Shaw	Kachin	Airy Shaw 1935	B. N. Abbay s.n. (holotype: E, image!)
43	*Agapetes pubiflora* Airy Shaw	Kachin	Airy Shaw 1935, Kress et al. 2003	F. Kingdon-Ward 9118 (holotype: BM, image!)
43a	*Agapetes pubiflora* var. *glabra* Airy Shaw	Kachin	Airy Shaw 1948	S. M. Toppin 6058 (holotype: CAL, image!; isotype: K, image!)
44	*Agapetes putaoensis* Y. H. Tong & N. H. Xia	Kachin	Tong and Xia 2014	Ayeyarwady Exped. 2416 (holotype: IBSC!; isotype: CDBI!)
45	*Agapetes pyrolifolia* Airy Shaw	Kachin	Airy Shaw 1958, Kress et al. 2003	F. Kingdon-Ward 6784 (holotype: K, image!)
46	*Agapetes reflexiloba* Y. H. Tan & Bin Yang	Kachin	Yang et al. 2019	Myanmar Exped. 3648 (holotype: HITBC!; isotype: RAF!)
47	*Agapetes rubropedicellata* P. F. Stevens	Kachin	Stevens 1985, Kress et al. 2003	J. Keenan et al. 3253 (holotype: E, image!; isotypes: A, image!, K, image!)
48	*Agapetes setigera* D. Don ex G. Don	Ayeyarwady, Chin, Kayin, Mon	Kress et al. 2003, Tanaka et al. 2016	J. Murata & T. Ohi-Toma 1602 (TI, not seen, RAF, not seen)
48a	*Agapetes setigera* var. *parviflora* (Kurz) Airy Shaw	Mon	Airy Shaw 1935	S. Kurz s.n. (holotype: K?, not seen)
49	*Agapetes spissiformis* Airy Shaw	Kachin	Airy Shaw 1958, Kress et al. 2003	F. Kingdon-Ward 12872 (holotype: BM, image!)
50	*Agapetes stenosepala* (Airy Shaw) Y. H. Tong, Bin Yang & K. Armstr.	Kachin	Airy Shaw 1968	J. Keenan et al. 3340 (holotype: E, image!)
51	*Agapetes subvinacea* Airy Shaw	Kachin	Airy Shaw 1958, Kress et al. 2003	F. Kingdon-Ward s.n. (holotype: BM, image!)
52	*Agapetes toppinii* Airy Shaw	Kachin	Airy Shaw 1960a, Kress et al. 2003	S. M. Toppin 6018 (holotype: CAL, image!)
53	*Agapetes trianguli* Airy Shaw	Kachin	Airy Shaw 1958, Kress et al. 2003	F. Kingdon-Ward 21430 (holotype: BM, image!)
54	*Agapetes variegata* var. *puberula* Airy Shaw	Ayeyarwady	Airy Shaw 1948	C. W. D. Kermode 7325 (holotype: K, image!)
55	*Agapetes vernayana* Merr.	Kachin	Merrill 1941, Kress et al. 2003	F. Kingdon-Ward 214 (holotype: A, image!)
56	*Agapetes wardii* W. W. Sm.	Kachin	Smith 1915, Kress et al. 2003	F. Kingdon-Ward 200 (holotype: E, image!)
56a	*Agapetes wardii* var. *heterotricha* Y. H. Tong & N. H. Xia	Kachin	Tong and Xia 2014	Ayeyarwady Exped. 1245 (holotype: IBSC!; isotype: CDBI!)

Table 4. Names in Kress et al. (2003) that are synonyms and their presently accepted names. Homotypic synonymes are denoted by ≡, and taxonomic heterotypic synonyms by =.

Synonym	Accepted name
Agapetes bulleyana Diels	≡ *Vaccinium bulleyanum* (Diels) Sleumer
Agapetes obovata (Wight) Benth. & Hook. f.	≡ *Vaccinium obovatum* Wight
Agapetes pilifera Hook. f. ex C. B. Clarke	≡ *Vaccinium piliferum* (Hook. f. ex C. B. Clarke) Sleumer
Agapetes leptantha Airy Shaw	≡ *Agapetes graciliflora* S. H. Huang
Agapetes burmanica W. E. Evans	= *Agapetes megacarpa* W. W. Sm.
Agapetes corallina Cowan	= *Agapetes lobbii* C. B. Clarke
Agapetes glabra (Griff.) C. B. Clarke	= *Agapetes affinis* (Griff.) Airy Shaw
Agapetes stenantha Rehder	= *Agapetes lobbii* C. B. Clarke
Agapetes unwinii Airy Shaw	= *Agapetes moorei* Hemsl.
Agapetes yunnanensis Franch.	= *Agapetes mannii* Hemsl.

sometimes not obvious. Disk margin scalloped with 10 peaks, light green or sometimes tinged with red in vivo, ca 1.8 mm in diam., glabrous. Ovary pseudo-10-locular. Style ± even with corolla apex, 1.80–1.85 cm long, glabrous. Stigma 1.3–1.6 mm wide, capitate. Berry reddish when young in vivo, glabrous, with persistent calyx lobes.

Phenology

Flowering December–March of next year and fruiting in May–June.

Distribution and habitat

Agapetes stenosepala is only distributed in Putao District, Kachin State, Myanmar. It grows epiphytically on tree branches at an elevational range of 570–1158 m.

Additional specimens examined

Myanmar, Kachin State, Putao District: Naungmung Township, buffer zone of Hkakaborazi National Park, along road through Kasankhu, 27°34′4.1″N, 97°46′10.3″E, 570 m, 9 Jun 2017 (young fr.), K. Armstrong et al. 2838 (NY [02653811]); Sumprabum Sub-Division, hills 1/4 mile E of Kanang, pathside, 1158 m, 15 Jan 1962 (fl.), J. Keenan et al. 3424 (E [E00706382]); from Ngalumgdan to Sa Lu Thi, E side of Mali Kha River, 900 m, 23 Mar 2009 (fl.), N.-H. Xia et al. 1845 (IBSC); Naungmung Township, streamside of Nam Tisang, 27°30′20.46″N, 97°48′44.44″E, 520 m, 6 Dec 2014 (fl.), J.-W. Li et al. 395 (HITBC).

Discussion

When Airy Shaw (1968) published *A. odontocera* var. *stenosepala* Airy Shaw, he stated that it differs from the nominate variety in having calyx lobes 5–6 mm long (versus 2–3 mm; as 'sepals' in the text). However, besides this there are many other vegetative and reproductive characters that delimit var. *stenosepala* from var. *odontocera*, e.g. leaf petiole absent or up to 3 mm long (versus 2–11 mm), leaf blade margin entire (versus serrate), inflorescence type corymb-like racemose (versus fasciculate), corolla lobe color green (versus dark red or very rarely pink), filaments glabrous (versus puberulous to pilose) and stigma capitate (versus truncate; Table 2). Thus, *A. odontocera* var. *stenosepala* is here treated as a distinct species.

Checklist of Agapetes *recorded for Myanmar*

We provide a list of *Agapetes* species recorded for Myanmar updated from that in Kress et al. (2003), incorporating the treatments herein (Table 3). Insofar as possible by reference to previous studies and herbarium specimens, we update the geographic distribution in Myanmar for some species for which Kress et al. (2003) either provided no locality or indicated a wide distribution that seems unreasonable (Kress et al. did not include vouchers). We also indicate the names in Kress et al. (2003) that are synonyms and their accepted names (Table 4). The record of *A. auriculata* Hook. f. from Martaban (the region now known as the Karen Hills or the Kayah-Karen Mountains), Myanmar reported by Brandis (1906) is a misidentification of *A. brandisiana* W. E. Evans (Airy Shaw 1935). *Agapetes auriculata* is only distributed in India and Bhutan. Airy Shaw (1958) reported *A. saligna* (Hook. f.) Hook. f. from Kachin, Myanmar by citing the specimen *F. Kingdon-Ward 20748* (BM) with uncertainty about its identification. As Airy Shaw pointed out, this specimen has a much shorter peduncle and smaller calyx lobes, and it should be identified as *A. putaoensis* Y. H. Tong & N. H. Xia (Tong and Xia 2014), a species described 55 years later. Thus, *A. saligna* is not known from Myanmar. We cannot find any citation of specimens of *A. affinis* (Griff.) Airy Shaw (including its synonym *A. glabra* (Griff.) C. B. Clarke) from Myanmar in the literature. Although we include this species in the list, we consider its presence in Myanmar dubious. With the updated list and the discovery of *A. oligodonta* accounted for, the number of *Agapetes* species recorded from Myanmar is now 56 with nine varieties and one form (Table 3). As more montane areas of Myanmar are explored, we expect this number to increase substantially in the foreseeable future.

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Author contributions

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Data availability statement

There are no additional data to this paper.

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