Nordic Journal of Botany 33: 582–585, 2015
doi: 10.1111/njb.00837, ISSN 1756-1051

Subject Editor: John Parnell. Editor-in-Chief: Torbjörn Tyler. Accepted 20 April 2015

Gaultheria gonggashanensis sp. nov. (Ericaceae) from Sichuan, China

Peter W. Fritsch, Lu Lu and Hong Wang

P. W. Fritsch, Dept of Botany, California Academy of Sciences, 55 Music Concourse Drive, San Francisco, CA 94118-4503, USA. – L. Lu (lulu@mail.kib.ac.cn), H. Wang, Key Laboratory for Plant Diversity and Biogeography of East Asia; Plant Germplasm and Genomics Center, Germplasm Bank of Wild Species, Kunming Inst. of Botany, Chinese Academy of Sciences, CN-650201 Kunming, PR China.

Gaultheria gonggashanensis P. W. Fritsch & Lu Lu, a new species from western Sichuan Province, China, is described and illustrated. This species belongs to *Gaultheria* ser. *Trichophyllae* Airy Shaw and is most similar to *G. sinensis* J. Anthony, but differs by its longer stem setae, glabrous petioles and leaf blade midveins adaxially, thick-chartaceous to subcoriaceous leaf blades, larger calyx lobes, and smaller anther thecae. The species is known with certainty only from the Hailuo Valley on the east slope of Mount Gongga in the Daxue Range.

Gaultheria Kalm ex L. ser. *Trichophyllae* Airy Shaw (Ericales: Ericaceae: Vaccinioideae: Gaultherieae) is a clade of diminutive evergreen shrublets endemic to the Himalaya-Hengduan Shan of eastern Asia (Airy Shaw 1941, Middleton 1991, Lu et al. 2010). Species in this group share the characters of leaves generally less than 1 cm long; paired bracteoles situated at the apex of the pedicel; axillary, solitary, and pentamerous flowers; and an accrescent fleshy mature fruiting calyx that surrounds a delicate capsule. They typically grow in damp and shallow soils among mosses and on rocks in subalpine coniferous forests and alpine scrublands and meadows between 2400–4500 m a.s.l.

As part of our investigations into the taxonomy and evolution of this group (Lu et al. 2010, Fritsch et al. 2015), we examined two herbarium specimens collected in 1941 and 1980 that appeared to represent an undescribed species. The 1980 collection cited a locality from Gonghe Village in Luding County of western Sichuan Province, China (the other cited only the regional-scale locality of Sikong Province, which is now part of Sichuan). This village is situated near the base of the Hailuo Valley and its confluence with the Moxi River on the eastern slope of Mount Gongga, the highest point in Sichuan Province at 7556 m a.s.l. The specimen cited an elevation of 3200 m a.s.l., which is far higher than the village at ca 1650 m a.s.l. On a field expedition to western Sichuan in 2011, we found *Gaultheria* plants in the Hailuo Valley at 3196 m a.s.l., just above the current terminus of the Hailuogou Glacier, that match the morphology of the 1941 and 1980 specimens.

Although the 1941 and 1980 specimens were collected in fruit, there are still no data on the morphology of the mature fruit in the living state, knowledge about which is often important for Gaultheria delimiting species (Fritsch et al. 2015). Nonetheless, based on the available data from vegetative, floral, mature dried fruit, and immature living fruit characters, we are confident that the known collections represent an undescribed species; we thus describe and illustrate this species here as new to science. On the basis of the data in Fritsch et al. (2015), this discovery raises the known number of species in *G.* ser. *Trichophyllae* to 17.

Gaultheria gonggashanensis P. W. Fritsch & Lu Lu sp. nov. (Fig. 1–2)

Haec species Gaultheriae sinensi J. Anthony simillima, sed ab eo setis caulum 0.44–0.76 mm longis, petiolorum atque costis laminarum abaxialibus glabris, laminis crassiusculis vel coriaceis, lobis calycium 3.0–3.5 × 2.5–2.7 mm, thecis antherarum 0.3–0.6 mm longis differt.

Type: China. Sichuan Province: [Moxi Township], Luding County, east slope of Gongga Shan, Hailuogou Glacier Park, west of Moxi, 29.56506N, 101.98169E, 3196 m a.s.l., 15 Sep 2011, L. Lu and P. W. Fritsch LL-2011-33 (holotype: KUN, isotypes: CAS, CDBI, E).

Etymology

The epithet *gonggashanensis* refers to Mount Gongga, to which the species may be endemic.

Description

Prostrate-ascending shrublet with stems to 10 cm long from horizontal stolons, hermaphroditic. Current-year branchlets pale green, to 4.7 cm long, with sparse white puberulence and uncinate or ascending straight setae; longer setae 0.44–0.76 mm long. Internodes among largest leaves averaging 0.9–1.4 mm. Petioles 0.5–1.0 mm long, abaxially glabrous, adaxially glabrous or with sparse ascending setae,

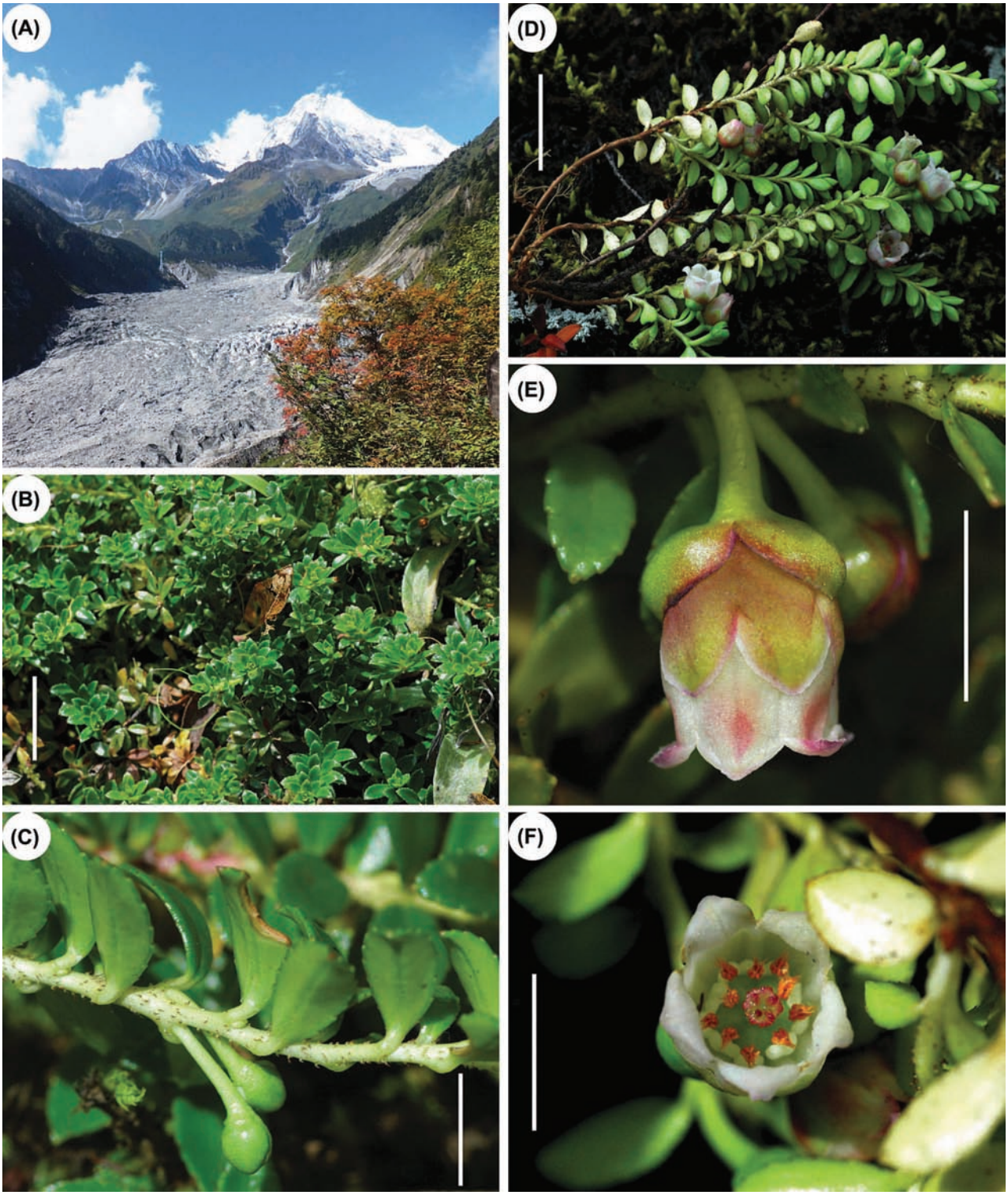

Figure 1. Images of *Gaultheria gonggashanensis* sp. nov. and its habitat. (A) habitat of *G. gonggashanensis*, with Hailuogou Glacier in the foreground and Mount Gongga in the background, (B) habit, (C), branchlet and flower buds, (D) branchlets with flowers, (E) flower, lateral view, (F) flower, apical view. Photographs: (A) from L. Lu; (B)–(F) from P. W. Fritsch. Scale bars: (B), (D) = 2 cm, (C), (E), (F) = 5 mm.

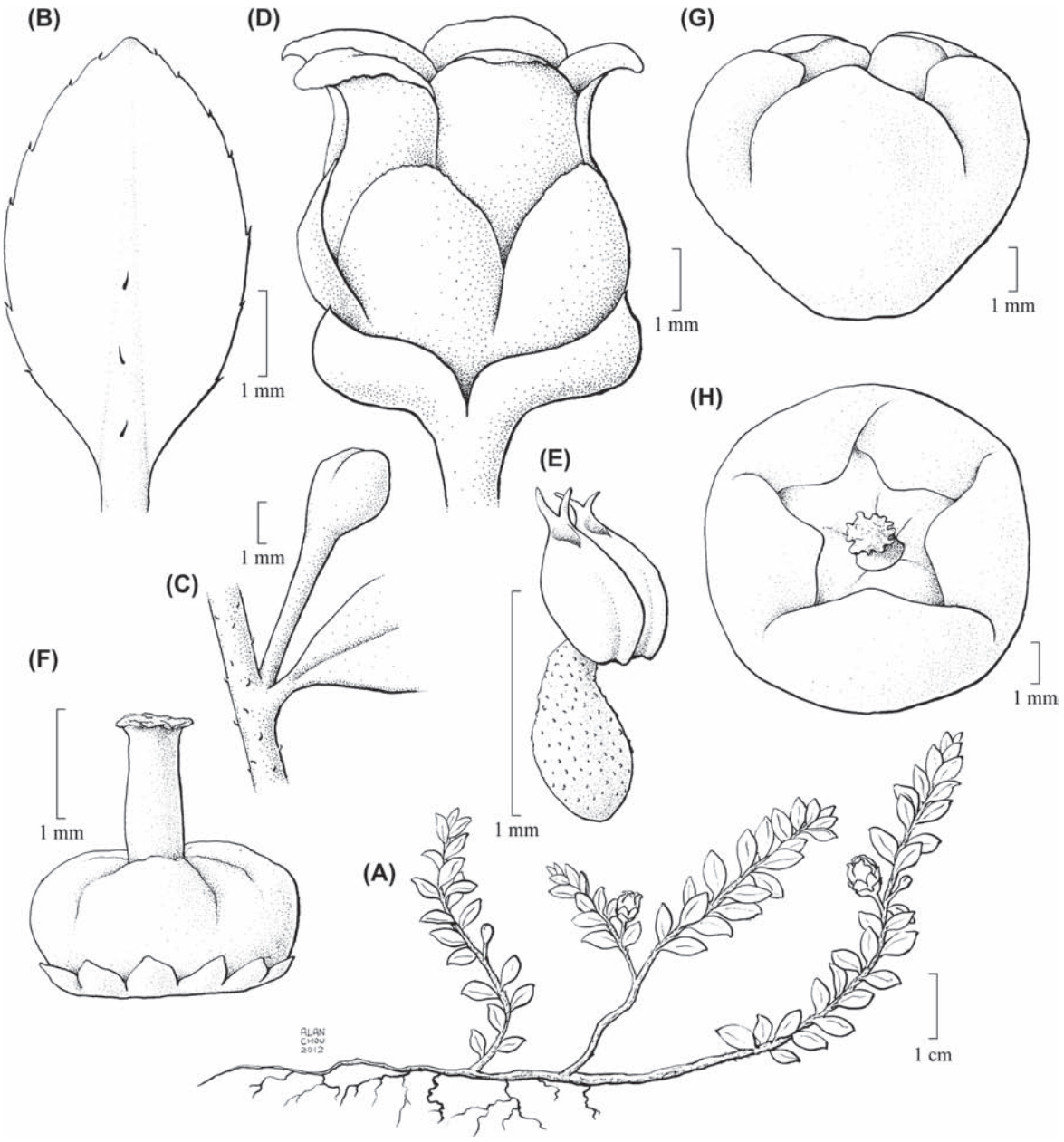

Figure 2. *Gaultheria gonggashanensis* sp. nov. (A) habit, flowering plant, (B) leaf, abaxial view, (C) section of branchlet with leaf base in adaxial view, and flower bud, (D) flower with subtending bracteoles and part of pedicel, (E) stamen, (F) nectar glands and gynoecium, (G) fruit, lateral-oblique view, (H) fruit, apical view. (A)–(F) from L. Lu and P. W. Fritsch LL-2011-33, and images of the living plant; (G)–(H) from S. Y. Hu s.n.

their margins entire. Longer leaf blades narrowly elliptic or oblanceolate, 5.7–9.5 × 2.5–3.5 mm, 2.3–2.9 times as long as wide, thick-chartaceous to subcoriaceous, planar, abaxially dull pale green except glossy green near margin, at least some leaves with 1 to 7 appressed or ascending setae scattered on midvein (longer setae 0.20–0.44 mm long), adaxially glossy green, glabrous; midvein abaxially raised, not thickened immediately below apical gland, adaxially impressed; secondary veins abaxially obscure or faintly 1 to 3 on each side of midvein, adaxially obscure or faintly 1 to 4 on each side of midvein; base narrowly cuneate; margin serrulate throughout, slightly thickened, slightly revolute; marginal teeth (setae) 6 to 8 per side, all oriented off leaf surface, the longer 0.18–0.24 mm long; apex obtuse, at tip with planar or slightly downward-pointing apical gland. Overwintering flower bud pedicels 3.0–4.5 mm long, glabrous; overwintering flower buds subglobose laterally, 2.3–3.0 × 2.3–2.6 mm, 1.0–1.2 times as long as wide, glabrous; bracteoles not keeled, their margins eciliolate. Flowers 5–7 mm long. Calyx green flushed dull pink, 3.5–4.0 mm long; lobes broadly ovate-deltoid, 3.0–3.5 × 2.5–2.7 mm, glabrous on both sides, with eciliolate, erose apex. Corolla white, campanulate, ca 5.0 × 5.7–7.0 mm; lobes flushed pink medially, 1.3–1.7 × 2.3–3.0 mm. Stamens 10; filaments gradually dilated to below middle, 0.7–1.0 mm long; anthers with cells 0.3–0.6 mm long and with 2 awns per theca, 0.20–

0.44 mm. Fruiting pedicel 3.0–4.5 mm long. Immature fruit (field obs.) open, pale blue; mature fruit (known only in dry state) 6.5–8.5 × 8.5–9.0 mm, with calyx lobes 3.5–4.5 × 4.0–5.0 mm, eciliolate, erose.

Distribution, habitat and phenology

Gaultheria gonggashanensis is known with certainty only from the Hailuo Valley on the east slope of Mount Gongga. This mountain, also known as Mount Konggar or Minya Konka, comprises part of the Daxue Range, which in turn is part of the Hengduan Shan, a complex system of mountain ranges in western Sichuan and northwestern Yunnan that forms the transition zone between the Tibetan Plateau and the lower elevations to the east. The species is recorded from a steep moist open scree slope mixed with rocks and boulders, on moss above *Rhododendron* forest, growing on clay loam with black humus among glacial outwash on metamorphic bedrock at 3196–3200 m a.s.l. We observed individuals of the species flowering in September.

Conservation status

Gaultheria gonggashanensis is known from just three collections, only two of which have sufficient label information to assess their geographic location beyond the regional scale. The 1980 collection housed at CDBI, which indicates a locality of Gonghe Village at 3200 m a.s.l., was presumably collected not at the village itself, which is situated at ca 1650 m a.s.l., but above it at 3200 m a.s.l. Because Gonghe Village lies at the base of the Hailuo Valley, this specimen was likely collected in this valley. We found a population of the species at nearly that same elevation (3196 m a.s.l.) in the Hailuo Valley, and so our collection and the one made in 1980 may well represent one and the same locality. The third collection, made in 1941, has no locality information other than Sikong Province (now western Sichuan). On the basis of the single known location with precise geographic coordinates, the area of occupancy is 4 km^2, as calculated with the aid of GeoCAT (Bachman et al. 2011). We therefore recommend an IUCN Standards and Petitions Subcommittee (2014) classification of 'Critically Endangered' (CR): B2ab(iv). Further surveys in the Hailuo Valley and adjacent valleys are warranted to better document the extent of occurrence and area of occupancy of this species.

Similar species

Gaultheria gonggashanensis is most similar to *G. sinensis* J. Anthony in its general leaf size and shape, number of leaf marginal setae, presence and number of leaf midvein setae abaxially, overwintering flower bud pedicel length and bud bracteole size and shape, and eciliolate calyx lobes, among other characters. However, it differs from *G. sinensis* by its stem setae 0.44–0.76 mm long (versus 0.26–0.48 mm), petioles and leaf blade midveins glabrous adaxially (versus with sparse white puberulence), leaf blades thick-chartaceous to subcoriaceous (versus subcoriaceous to coriaceous), calyx lobes 3.0–3.5 × 2.5–2.7 mm (versus 1.5–2.7 × 1.6–2.5 mm), and anther cells 0.3–0.6 mm long (versus 0.6–0.8 mm long). Additionally, its geographic distribution differs from that of *G. sinensis*, the latter occurring in western Yunnan Province, southern Xizang Province (Tibet), India (Arunachal Pradesh), and Myanmar (Kachin; Fritsch et al. 2015).

We observed individuals of the new species growing intermingled with plants of *Gaultheria trichophylla* Royle var. *tetracme* Airy Shaw, from which they can easily be distinguished vegetatively by leaf blade marginal setae (the longer setae on each individual) 0.18–0.24 mm long (versus 0.6–1.1 mm).

Additional specimens examined (paratypes)

China. Sichuan Province: Sikong Province, precise locality not specified, 1941, S. Y. Hu s.n. (KUN); Moxi Township, Luding County, Qiang-Huo-Peng, Gonghe Village, 3200 m a.s.l., 14 Sep 1980, collector not indicated, 23523 (CDBI).

Acknowledgments – The authors thank the curators of A, BM, CDBI, E, GH, K, and P for loans to CAS or access to herbarium material; the Kunming Inst. of Botany for a two-month Visiting Professor for Senior International Scientists scholarship to PWF in 2013; and Alan Chou for the illustration. This study was supported by the National Natural Science Foundation of China (31100163) to L. L.

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