Phytotaxa 201 (1): 001–026
www.mapress.com/phytotaxa/

Article

ISSN 1179-3155 (print edition)
PHYTOTAXA
ISSN 1179-3163 (online edition)

http://dx.doi.org/10.11646/phytotaxa.201.1.1

New species, taxonomic renovations, and typifications in *Gaultheria* series *Trichophyllae* (Ericaceae)

PETER W. FRITSCH[1,2], LU LU[1,3], HONG WANG[3] & DE-ZHU LI[3]

[1]*Both authors contributed equally to this work*

[2]*Department of Botany, California Academy of Sciences, 55 Music Concourse Drive, San Francisco, California 94118-4503, USA. Email: pfritsch@calacademy.org*

[3]*Key Laboratory for Plant Diversity and Biogeography of East Asia; Plant Germplasm and Genomics Center, Germplasm Bank of Wild Species, Kunming Institute of Botany, CAS, Kunming 650201, China. Email: lulu@mail.kib.ac.cn; wanghong@mail.kib.ac.cn; dzl@mail.kib.ac.cn*

Abstract

Expeditions to the Gaoligong Mountains and Biluo Snow Mountains in western Yunnan Province, China have uncovered new taxonomic information about the species of *Gaultheria* series *Trichophyllae* (Ericaceae) that are known to occur in these ranges. Based on these data, we describe two species as new to science (**G. ciliisepala** and **G. stenophylla**) and elevate four varieties (*Chiogenes suborbicularis* var. *albiflorus*, *G. sinensis* vars. *crassifolia* and *major*, and G. *trichophylla* var. *obovata*) to the species level (as **G. albiflora**, **G. crassifolia**, **G. major**, and **G. obovata**, respectively). We provide a lectotype and a revised description for **G. eciliata** because the type was discovered to also include individuals of *G. albiflora*. Similarly, we provide a lectotype and a revised description for **G. sinensis** because the type was discovered to also include an individual of *G. crassifolia*; moreover, the protologue of *G. sinensis* includes paratypes of three other species. Illustrations and photographic images of living plants in the field are included for all species. Our additions and changes raise the number of species recognized in *G.* series *Trichophyllae* from 10 to 16, with more to be expected as the Himalaya-Hengduan Mountains are further surveyed for these plants.

Introduction

Gaultheria Kalm ex Linnaeus (1753: 395) series *Trichophyllae* Airy Shaw (1941: 308) (Ericaceae: Vaccinioideae: Gaultherieae) is a group of diminutive evergreen shrublets endemic to the Himalaya-Hengduan Mountains of eastern Asia. Like most members of *Gaultheria*, the species of this series possess a capsule that is surrounded by an expanded and fleshy calyx, and most or all contain oil of wintergreen, i.e., methyl salicylate, detectable as a sweet odor or taste upon damage to various organs, typically rhizomes, stems, leaves, or fruits. Within *Gaultheria* the group is characterized by the combination of leaves generally less than 1 cm long, solitary axillary flowers, paired apical bracteoles, and five calyx and corolla lobes. *Gaultheria* series *Trichophyllae* has consistently been recovered as monophyletic in molecular phylogenetic studies (Bush *et al.* 2009; Lu *et al.* 2010; Fritsch *et al.* 2011). In the most recent global classification of *Gaultheria* (Middleton 1991), it is placed together with three other series [*G.* series *Hispidulae* Airy Shaw (1941: 308), series *Novaguineenses* D.J.Middleton (1991: 236), and series *Pernettyoideae* D.J.Middleton (1991: 237)] in *G.* section *Chiogenopsis* D.J.Middleton (1991: 235). In molecular phylogenetic studies, however, the series forms part of a "core East Asian" clade and is sister to a "*G. leucothoides* sensu lato" clade, a group comprising the members of *G.* series *Leucothoides* (Airy Shaw 1941: 308) D.J.Middleton (1991: 254) and those from several smaller series (Lu *et al.* 2010).

The most recent global taxonomic treatment of the taxa comprising *Gaultheria* series *Trichophyllae* is that of Airy Shaw (1941), who recognized seven species and several other vaguely defined varieties. Airy Shaw noted that this treatment was considered to be provisional, in light of the relatively few collections made up to then. Various subsequent taxonomic additions and other changes (see, e.g., Xu 1981; Long 1988; Fang and Stevens 2005; Fritsch *et al.* 2008) have resulted in the current recognition of ten species. Fritsch *et al.* (2008) considered *G. hypochlora* Airy

Accepted by Zhi-Qiang Zhang: 2 Jan. 2015; published: 25 Feb. 2015

Zhang Ming-Ying, and Chen Xiao-Tao for field assistance; the staff of the Gaoligong Shan National Nature Reserve for permits and field logistical support; and Alan Chou for the illustrations. This study was supported by grants from the National Geographic Society (148057) and the U.S. National Science Foundation (DEB-0717711 and DEB-0103795) to P.W.F., and a grant from the National Natural Science Foundation of China (31100163) to L.L.

References

Airy Shaw, H.K. (1941) XLIII—Studies in the Ericales: IV. Classification of the Asiatic species of *Gaultheria*. *Kew Bulletin* 1940: 306–330.

Anonymous (1914) Diagnoses specierum novarum in herbario Horti Regii Botanici Edinburgensis cognitarum (Species chinenses.) LI–CII. *Notes from the Royal Botanic Garden Edinburgh* 8: 173–212.

Anonymous (1933) Diagnoses specierum novarum in herbario Horti Regii Botanici Edinburgensis congitarum. *Notes from the Royal Botanic Garden Edinburgh* 18: 17–36.

Bush, C.M., Lu, L., Fritsch, P.W., Li, D.-Z. & Kron, K.A. (2009) Phylogeny of Gaultherieae (Ericaceae: Vaccinioideae) based on DNA sequence data from *matK*, *ndhF*, and nrITS. *International Journal of Plant Sciences* 170: 355–364. http://dx.doi.org/10.1086/596330

Fang, R.C. (1999) New taxa of Ericaceae from China. *Novon* 9: 162–178. http://dx.doi.org/10.2307/3391793

Fang, R.C. & Stevens, P.F. (2005) *Gaultheria*. *In*: Wu, Z.Y. & Raven, P.H. (Eds.) *Flora of China: Myrsinaceae through Loganiaceae*. Vol. 14. Science Press, Beijing & Missouri Botanical Garden Press, St. Louis, pp. 464–475.

Fritsch, P.W., Zhou, L.H., Lu, L. & Bartholomew, B. (2008) The flowering plant genus *Gaultheria* (Ericaceae) in the Gaoligong Shan, along the border region of China and Myanmar. [Ser. 4] *Proceedings of the California Academy of Sciences* 59: 147–214.

Fritsch, P.W., Lu, L., Bush, C.M., Cruz, B.C., Kron, K.A. & Li, D.-Z. (2011) Phylogenetic analysis of the wintergreen group (Ericaceae) based on six genic regions. *Systematic Botany* 36: 990–1003. http://dx.doi.org/10.1600/036364411X604994

Handel-Mazzetti, H. (1924). Plantae novae Sinenses, diagnosibus brevibus descriptae (23). *Anzeiger der Akademie der Wissenschaften in Wien. Mathematische-naturwissenchaftliche Klasse* 60: 180–187.

IUCN Standards and Petitions Subcommittee (2014) *Guidelines for using the IUCN Red List categories and criteria*. Version 11. Prepared by the Standards and Petitions Subcommittee. Available from: http://www.iucnredlist.org/documents/RedListGuidelines.pdf.

Linnaeus, C. (1753) *Species plantarum*. Vol. 1. Impensis Laurentii Salvii, Holmiae, 560 pp.

Long, D.G. (1988) Notes relating to the flora of Bhutan: XIII. *Notes from the Royal Botanic Garden Edinburgh* 45: 327–335.

Lu, L., Fritsch, P.W., Cruz, B.C., Wang, H. & Li, D.-Z. (2010) Reticulate evolution, cryptic species, and character convergence in the core East Asian clade of *Gaultheria* (Ericaceae). *Molecular Phylogenetics and Evolution* 57: 364–379. http://dx.doi.org/10.1016/j.ympev.2010.06.002

Middleton, D.J. (1991) Infrageneric classification of the genus *Gaultheria* L. (Ericaceae). *Botanical Journal of the Linnean Society* 106: 229–258. http://dx.doi.org/10.1111/j.1095-8339.1991.tb02293.x

Panda, S. (2005) New record of *Gaultheria sinensis* J.Anthony from Sikkim Himalaya. *Journal of Economic and Taxonomic Botany* 29: 212–214.

Royle, J.F. (1833–1840) *Illustrations of the botany of the Himalayan Mountains*. Vol. 1. W.H. Alland, London, 472 pp.

Stuessy, T.F. (2008) *Plant taxonomy: the systematic evaluation of comparative data.* Ed. 2. Columbia University Press, New York, 568 pp.

Xu, T.Z. (1981) Preliminary study of classification on Chinese *Gaultheria*. *Acta Botanica Yunnanica* 3: 417–434.

Xu, T.Z. (1984) Taxonomy and phytogeography of *Chiogenes* Salisbury. *Acta Botanica Yunnanica* 6: 39–42.

Zhou, L.H., Fritsch, P.W. & Bartholomew, B. (2006) The Symplocaceae of Gaoligong Shan. [Ser. 4] *Proceedings of the California Academy of Sciences* 57: 387–431.