



## *Gaultheria stapfiana* (Ericaceae), a species to be recognized: insights from morphology, leaf anatomy and pollen morphology

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### Abstract

This study, based on an investigation of morphology (as assessed through field and herbarium studies), leaf anatomy (stomata and vein islets), and pollen morphology (LM and SEM) reveals that *Gaultheria stapfiana* Airy Shaw is a distinct species and not a variant within of the *G. hookeri* C.B. Clarke as proposed by Ruizheng & P.F. Stevens (2005). Line drawings, photographs of living plants and specimens, photographs of leaf anatomical characters, and pollen of *G. stapfiana* and its allies, show that this species is clearly delimited from both *G. hookeri* and *G. fragrantissima* Wall.

**Key words:** *Gaultheria stapfiana*, *G. hookeri*, Ericaceae, exomorphology, leaf anatomy, pollen morphology

### Introduction

*Gaultheria stapfiana* Airy Shaw (Fig. 1 & 4A–B) was described by Airy Shaw (1952) based on a specimen from Yunnan (China) collected by George Forrest in 1919 (*No.* 18021, K!). This species is similar to *G. fragrantissima* Wall. var. *racemosa* Hook.f. ex C.B. Clarke, which was treated as a heterotypic synonym of *G. stapfiana* by Airy Shaw (1952). *Gaultheria fragrantissima* var. *racemosa* was collected by J. D. Hooker (1849) from Darjeeling and described by C. B. Clarke (1882). Clarke rightly distinguished Hooker's specimen (K!) from var. *racemosa* mainly due to the presence of long racemes (10–12.7 cm long), narrow lanceolate leaves (110 × 12 mm), and median bracteoles. Hooker's specimen was also distinguished from *G. hookeri* C.B. Clarke by the presence of smaller bracts, sparsely pubescent branches, and a tall habit (not dwarf like *G. hookeri*).

Airy Shaw (1952) accepted *Gaultheria stapfiana* as a new species and distinguished it from its two close allies, *G. fragrantissima* (Fig. 3 & Fig. 4E–F) and *G. hookeri* (Fig. 2 & Fig. 4 C–D), on the basis of its sparsely pubescent branches, oblanceolate, obovate to oblong-elliptic lamina, bract that are longer than those of *G. fragrantissima* but shorter than those of *G. hookeri*, bracteoles median on the pedicel (as in *G. hookeri*) and arborescent habit (like *G. fragrantissima*, but not shrubby as in *G. hookeri*). Airy Shaw (1952) described several overlapping characters between *G. stapfiana* and *G. hookeri*, such as lamina size (4–14 × 1–4.5 cm), raceme length (2–5 cm), bract length (3–5 mm), bracteole position (median), corolla length (3–4 mm), nature of the stamens (1–2 mm long), ovary (globose, tomentose) and fruits (capsule enclosed in a fleshy bluish-purple calyx, ovoid). Based on the above overlapping characters, Ruizheng & P.F. Stevens (2005) treated *G. stapfiana* as a synonym of *G. hookeri* var. *hookeri* in *Flora of China*.

After Airy Shaw (1952), workers like Sealy (1973), Middleton (1991a; 1991b), Ruizheng & Stevens (2005), Panda (2008) and Panda et al. (2009) worked on *Gaultheria stapfiana*. As a result of revisionary work on Indian Ericaceae conducted as part of the Flora of India Project (1999–2004; which involved morphological investigations, see Table 1) as well as laboratory-based studies of leaf anatomy (i.e., leaf-stomata, Fig. 5, leaf areolar pattern, Fig. 6) and pollen morphology (Fig. 7) conducted from 2008–2010, evidence shows that *G. stapfiana* Airy Shaw is a good species and not a synonym of *G. hookeri*.