Systematics of Berberis sect. Wallichianae (Berberidaceae) of Taiwan and Luzon with description of three new species, B. schaaliae, B. ravenii, and B. pengii

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Abstract

Berberis sect. Wallichianae are species of evergreen shrubs that in Taiwan are found in subalpine and montane-temperate areas and which have a notoriously controversial taxonomic history. Based on multivariate statistical analyses of morphometric data and an explicitly stated species criterion, the taxonomy of the group in Taiwan and its close relative in Luzon (B. barandana) is revised and their endemicity is evaluated by molecular data. In addition to the six species recognized in the Flora of Taiwan, 2nd ed. (i.e., B. aristatoserrulata, B. brevisepala, B. chingshuiensis, B. kawakamii, B. mingetsensis, and B. tarokoensis), B. hayatana (synonymized under B. mingetsensis) and B. nantoensis (synonymized under B. brevisepala) are reinstated, and three new species (B. pengii, B. ravenii, and B. schaaliae) are described and illustrated. Phylogenetic analyses using three chloroplast DNA sequence regions (rbcL, ycf6-psbM, and psbA-trnH) place all Taiwanese species and B. barandana in a strongly supported clade derived from within the continental Asian species of sect. Wallichianae, indicating their independent evolutionary history and supporting their endemic status.

Key words: chloroplast phylogeny, General Lineage Concept of species (GLCS), herbarium taxonomy, multivariate statistical analyses

Introduction


Taxonomic history of Berberis sect. Wallichianae of Taiwan

Within Berberis s.s., species characterized by evergreen and coriaceous leaves, fascicled or solitary flowers, and blue-black to black fruits have long been assigned to section Wallichianae Schneider (1905: 400; Schneider 1939, 1942, Ahrendt 1941, 1961, Chamberlain & Hu 1985, Harber 2012), a prominent group comprising more than 75 taxa distributed in highlands and mountains of India, Nepal, Bhutan, Myanmar, Vietnam, China, Taiwan, Java, Sumatra, and Luzon (Chamberlain & Hu 1985, Harber 2012). Across the distributional range of sect. Wallichianae, the species in Taiwan have attracted much attention for their extensive morphological variation (Mizushima 1954, Ahrendt 1961, Chamberlain & Hu 1985, Harber 2012). The extent of morphological diversity of the group in Taiwan was first recognized by Ahrendt (1941) and Schneider (1942) and later summarized in Ahrendt’s (1961) monograph where the seven recognized Taiwanese species were placed in six subsections. In contrast to Ahrendt’s (1961) treatment, however, Chamberlain & Hu (1985) recognized only four species in Taiwan, all placed in the series Barandanae (Schneider) Chamberlain & Hu (1985: 538) of the subsection Wallichianae. The various classifications of the Taiwanese Berberis sect. Wallichianae are summarized in Table 1.
Notes: The original set of Vidal’s specimens in Manila, including the holotype of *Berberis barandana* (Vidal 1911), was destroyed in a fire in 1897 (Stafleu & Cowan 1986, Calabrese & Velayos 2009). In revising the genus, Ahrendt (1961: 65) designated an isotype at K as the lectotype (“*Type K*”), rendering the isotypes at MA (Calabrese & Velayos 2009) and A as isoelectotypes. This Filipino endemic species had been allied with *B. kawakamii* (Merrill 1923); however, *B. barandana* can be easily distinguished from the latter by its ovate outermost sepals. LaFrankie (2010) also documents an unauthenticated report of *B. wallichiana* DC. (as *B. ‘wallichii’*) in the Philippines as well as a possible new species from Zambales Mountains, Luzon, neither with any specimen details. However, *B. wallichiana* is endemic to Nepal (Adhikari et al. 2010).


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