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Nomenclatural clarifications for names in *Boschniakia*, *Kopsiopsis* and *Xylanche* (Orobanchaceae)

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Abstract

Phylogenetic evidence agrees with splitting *Boschniakia* C. A. Meyer *sensu lato* into three genera, *Boschniakia*, *Kopsiopsis* and *Xylanche*. In this study, we clarified some nomenclatural confusion concerning these three genera. The authorship of both *Boschniakia* and *B. glabra* is ascribed to C. A. Meyer, not C. A. Meyer ex Bongard or Bongard. *Kopsiopsis hookeri* (Walp.) Govaerts is the correct replacement name for the illegitimate name *Orobanche tuberosa* Hook. (1834), non Vell. (1829). Both *Xylanche* and *X. himalaica* were simultaneously validated in 1890.

Key words: *Boschniakia*, *Kopsiopsis*, nomenclature, *Xylanche*

Boschniakia C. A. Meyer *sensu lato* comprises four species. Whereas *B. rossica* (Cham. & Schltdl.) B.Fedtsch. is widely distributed throughout north temperate Asia and northwestern North America, *B. hookeri* Walp. and *B. strobilacea* A.Gray are endemic to western North America, and *B. himalaica* Hook.f. & Thomson is restricted to the Himalaya region and China. During his revision of the genus *Orobanche* L., Beck von Mannagetta (1890) transferred the two North American endemic species to *Orobanche* sect. *Kopsiopsis* Beck merging them into a single species *O. hookeri* (Walp.) Beck (≡ *Orobanche tuberosa* Hook., non Vell. in 1829). Furthermore, Beck von Mannagetta (1890) proposed the new genus *Xylanche* Beck on the basis of *B. himalaica* in the identification key for Orobanchaceae (p. 58): "Placentae 3. Calyx cupuliformis truncatus. Laciniae labii inferi minutissimae" [sic]. In his full revision of Orobanchaceae, Beck von Mannagetta (1930) raised *O.* sect. *Kopsiopsis* to an independent genus *Kopsiopsis*, now accepting two species *K. tuberosa* (Hook.) Beck (≡ *K. hookeri* (Walp.) Govaerts) and *K. strobilacea* (A.Gray) Beck. In the same revision, *Boschniakia* contained *B. glabra* C.A.Mey. ex Bongard and *B. handelii* Beck, whereas *Xylanche* included *X. himalaica* (Hook.f. & Thomson) Beck and *X. kawakamii* (Hayata) Beck. It is confusing that Beck von Mannagetta (1930) described the three-placenta species *B. handelii* Beck under the genus *Boschniakia* instead of *Xylanche*. Based on careful comparison of specimens, Smith (1933) provided a more detailed description of *X. himalaica* and demonstrated that both *B. handelii* and *X. kawakamii* are conspecific with *X. himalaica*.

Phylogenetic relationships of *Boschniakia sensu lato* have been addressed in molecular phylogenetic studies using nrITS (Wolfe *et al.* 2005), *PhyA* (Bennett & Mathews 2006) and *rps2* (Park *et al.* 2008). Unambiguously, all species fall into the non-photosynthetic clade (clade III of Bennett & Mathews 2006). Monophyly of *Boschniakia sensu lato* is, however, clearly rejected (see Park *et al.* 2008): both nrITS and *rps2* data suggest three distinct lineages, whereas *PhyA* data indicate the presence of two distinct lineages (*B. himalaica* was not included in this study). Only *B. hookeri* and *B. strobilacea* are congruently identified as monophyletic group. The phylogenetic heterogeneity of *Boschniakia sensu lato* agrees with the taxonomic treatment by Beck von Mannagetta (1930), who recognized three genera *Boschniakia*, *Kopsiopsis* and *Xylanche*. In this study, we clarify some nomenclatural confusion concerning these three genera and the correct names of their species.

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Boschniakia

Boschniakia C.A.Mey. in Bongard (1833: 159)—Type: *Boschniakia glabra* C.A.Mey., nom. illeg. (≡ *B. rossica* (Cham. & Schltdl.) B. Fedtsch.))

Boschniakia rossica (Cham. & Schltdl.) Fedtschenko (1910: 896) ≡ *Orobanche rossica* Cham. & Schltdl. (1828: 132-134) ≡ *Boschniakia glabra* C.A.Mey. in Bongard (1833: 159), nom. illeg. (Article 52.1) ≡ *Orobanche glabra* (C.A.Mey.) W. J. Hooker (1834: 91), nom. illeg.—Type: Kamtschadalis. *Uktschutsch. s.n.* (LE).

The authorship of *Boschniakia* and/or *B. glabra* is ascribed to A. G. H. Bongard by some researchers (e.g. Fischer 2004; Wolfe *et al.* 2005) and in several indices, including the Index Nominum Genericorum (ING), the International Plant Name Index (IPNI) and Tropicos databases (accessed on 17 October, 2012). In the protologue, Bongard (1833: 159) clearly used "*mspt*." (manuscriptum) to denote description for the only species *B. glabra* provided by C. A. Meyer. Both *Boschniakia* and *B. glabra* were validated on the basis of the single description under Article 38.5 (McNeill *et al.* 2012). Therefore, the correct authorship of both *Boschniakia* and *B. glabra* is C. A. Meyer, not C. A. Meyer ex Bongard or Bongard. Nevertheless, *B. glabra* is a superfluous name because the legitimate name *Orobanche rossica* was listed in the synonymy (Article 52.1).

Kopsiopsis

Kopsiopsis (Beck) Beck in Engler (1930: 304) ≡ *Orobanche* sect. *Kopsiopsis* Beck (1890: 74, 85)—Type: *Kopsiopsis hookeri* (Walp.) Govaerts (≡ *Boschniakia hookeri* Walp.).

Kopsiopsis hookeri (Walp.) Govaerts (1996: 14) ≡ *Boschniakia hookeri* Walpers (1844: 479) ≡ *Orobanche hookeri* (Walp.) Beck (1890: 85) ≡ *Orobanche tuberosa* Hooker (1834: 92), nom. illeg., non Vellozo (1829: 257) ≡ *Boschniakia tuberosa* Jepson (1925: 954), nom. illeg. ≡ *Kopsiopsis tuberosa* Beck in Engler (1930: 304), nom. illeg.—Type: N.W. Coast of America, *A. Menzies s.n.* (K).

Kopsiopsis strobilacea (A.Gray) Beck in Engler (1930: 306) ≡ *Boschniakia strobilacea* A.Gray (1856: 118)—Type: United States of America. California: Yuba County, 23 May, 1854, *J. M. Bigelow s.n.* (holotype, GH, barcode 00071672!; isotype, NY).

When establishing *Orobanche* sect. *Kopsiopsis*, Beck von Mannagetta (1890) had recognized that *Orobanche tuberosa* Hooker (1834: 92) is a later homonym of *O. tuberosa* Vellozo (1829: 257). Therefore, on the basis of *B. hookeri*, Walpers (1844: 479) proposed a combination *O. hookeri*, which is a replacement name for *O. tuberosa* Hook. Later, Beck von Mannagetta (1930: 304) adopted the illegitimate combination "*K. tuberosa* (Hook.) Beck" in his separated genus *Kopsiopsis*. Under this situation, "*K. tuberosa* Beck" cannot be adopted as a new name based on the same type (Article 58.1), because it was a superfluous name by citing *B. hookeri* and *O. hookeri* in the synonymy. Moreover, the replacement name "*B. tuberosa* Jeps." (1925: 954) also must be rejected as a new name, because *B. strobilacea* was listed in the synonymy.

Xylanche

Xylanche Beck (1890: 58)—Type: *Xylanche himalaica* (Hook. f. & Thomson) Beck.

Xylanche himalaica (Hook. f. & Thomson) Beck (1890: 58) ≡ *Boschniakia himalaica* Hooker & Thomson (1884: 327)—Syntypes: India. Garwhal and Kumaon, *Strach. & Winterb. s.n.* (K); India. Sikkim, *J. D. Hooker s.n.* (K; isosyntype, E, bacorde E00273644!), *C.B. Clarke s.n.* (K).

= *Boschniakia handelii* Beck in Engler (1930: 328)—Syntypes: China. Yunnan, *Handel-Mazzetti 4148, 7059, 9285, 9531* (WU)

= *Xylanche kawakamii* (Hayata) Beck (1930: 330) ≡ *Boschniakia kawakamii* Hayata (1914: 19)—Type: China. Taiwan: Yushan, Oct., 1909, *T. Kawakami & S. Sasaki* ***s.n.*** (TI).

The valid publication date of *Xylanche* Beck is considered to be 1893 (author note: the correct publication as, Beck von Mannagetta 1895: 132) by some researchers (e.g. Fischer 2004) and in the ING, IPNI and Tropicos databases (accessed on 17 October, 2012). Actually, Beck von Mannagetta (1890: 58) annotated *Xylanche* as "n. g." and he provided the diagnostic characters in the identification key, thus fulfilling the requirements under Article 32.1 and 36.1. The combination *X. himalaica* was denoted in the footnote (Beck von Mannagetta 1890: 58). Therefore, both *Xylanche* and *X. himalaica* were simultaneously validated in 1890.

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