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New combinations and typification in *Shivparvatia* (Alsineae, Caryophyllaceae)

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Four new combinations in *Shivparvatia* (Alsineae, Caryophyllaceae) are made to accommodate placement of all currently recognized taxa of *Arenaria* subg. *Solitariae* within the genus *Shivparvatia*.

Keywords: *Arenaria,* nomenclature

Introduction

Sadeghian *et al.* (2015) completed the most recent, comprehensive analyses of *Arenaria* Linnaeus (1753: 423) in the broad sense. They confirmed the results of earlier studies by Harbaugh *et al.* (2010) and Greenberg and Donoghue (2011), showing that *Arenaria* s.s., *Eremogone* Fenzl (1833: 13), and *Odontostemma* Bentham ex G.Don (1831: 431) are each in different clades and are each monophyletic. In addition, they showed that *Arenaria* subg. *Solitariae* McNeill (1962: 128) is sister to *Odontostemma* and *Arenaria* subg. *Dolophragma* (Fenzl 1836: 63) McNeill (1962: 127) appears distantly related to any *Arenaria* species; both of these subgenera should also be excluded from *Arenaria* and treated as distinct genera. With only four names currently available in *Shivparvatia* Pusalkar & D.K.Singh (2015: 81), provided by Pusalkar & D.K.Singh (2015) for species found in India, four new combinations are required to allow placing the remaining taxa currently recognized in *Arenaria* subg. *Solitariae* within *Shivparvatia.*

Methods

The information about type specimens of the basionyms of the new combinations that I have included is based on examining protologues and searching major indices (Tropicos,org; JSTOR Global Plants) as well as websites of several individual herbaria, e.g. E, GH, and WU, for extant specimens. Herbarium abbreviations follow *Index Herbariorum* (Thiers 2017). I have examined a digital image from one (or more) of these sources for any specimen for which I cite a barcode in the type citations. In cases where specimen deposition is not clearly stated in a protologue, I have added "?" after the abbreviation where, based on information about the location of the herbarium where the author worked and/or deposited their herbaria (see Harvard University Herbaria & Libraries Index of Botanists), I expect, but cannot confirm, a type specimen should have been deposited.

Discussion

Arenaria subg. *Solitariae*[1] was described by McNeill (1962) to segregate an assemblage of six species. Williams (1895) described *Arenaria* sect. *Sikimmenses* F.N.Williams (1895: 600), but his concept, based chiefly on the presence of solitary flowers, both kept the taxa within subg. *Arenaria* and, in his later revision (1898), included the two taxa of this group that were known at that time as well four disparate species (including one from Peru) now placed in three genera; two in *Arenaria* and one each in *Odontostemma* and *Pseudocherleria* Dillenberger & Kadereit (2014: 451).

Pusalkar and Singh (2015) conducted a detailed study of *Arenaria* in the western Himalayan region of India, independently from Sadeghian *et al.* (2015), and came to similar conclusions about the need to place species typically included in *Arenaria* into segregate genera. Noting their opinion that using *Solitaria* (McNeill) Sadeghian & Zarre (2015: 667) as a genus would contradict Art. 20.2 of the International Code of Nomenclature (McNeill *et al.* 2012), they described

1 Subgenus *Solitaria* is to be corrected to "*Solitariae*" per Art. 60.12 of the International Code of Nomenclature (McNeill *et al.* 2012). *Solitaria* is a singular feminine adjective, contrary to Art. 21.2, which states that adjectival epithets of a subdivision of a genus must be plural, thus *Solitariae*; see Art. 21 Ex. 1 for an example involving another infrageneric name in *Arenaria*.

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Shivparvatia Pusalkar & D.K.Singh, about three months before Sadeghian *et al*. (2015) raised McNeill's subgenus to generic rank. Yao (2017) recently published combinations in *Solitaria* for the three species occurring in China; combinations in *Shivparvatia* are required for two reasons: *Solitaria* is a later name and, since *Solitaria* violates Art. 20.2 (see esp. Ex. 4 for examples involving similar terms), combinations made under *Solitaria* are invalid.

A key to the genera segregated in Sadeghian *et al.* (2015) can be found in both Rabeler & Wagner (2016) and Pusalkar & Singh (2015), with the latter key also including *Himgiria* Pusalkar & D.K.Singh (2015: 86) (= *Arenaria* sect. *Compressae* McNeill 1962: 118).

Taxonomic Treatment

Shivparvatia Pusalkar & D.K.Singh (2015: 81).

Type:—*Shivparvatia glanduligera* (Edgeworth in Hooker 1874: 240) Pusalkar & D.K.Singh (2015: 84).

= *Solitaria* (McNeill) Sadeghian & Zarre (2015: 667), *nom. inval*.; *Dichodon* (Bartling ex Reichenbach 1832: 785) Reichenbach (1841: 205) sect. *Sikkimensis* (F.N.Williams) Ikonnikov (1976: 116); *Arenaria* subg. *Solitariae* McNeill (1962: 128); *Arenaria* sect. *Sikkimenses* F.N.Williams (1895: 600).

Type:—*Solitaria ciliolata* (Edgeworth in Hooker 1874: 240) Sadeghian & Zarre (2015: 667)

Description:—Herbs perennial, sometimes densely branched, laxly cespitose, never pulvinate. Stems clustered and short. Leaf blades lanceolate to ovate-orbicular, remote or sometimes overlapping, but never imbricate in four rows, narrowed at base, margin usually somewhat hard and thickened. Flowers solitary, rarely in pairs, terminal, showy. Sepals linear or lanceolate, elliptic, to narrowly orbicular, veins indistinct, margin membranous and hardened (scarious in *S. glanduligera* (Edgeworth) Pusalkar & D.K.Singh, apex acute, acuminate, or obtuse. Petals white, pink, or violet, (1−) 1.5−2 times as long as sepals, obovate to obovate-elliptic. Stamens 10. Styles 3. Capsules ovoid, shorter than calyx, 6-valved or 6-toothed. Seven species distributed in Asia.

New Combinations

Shivparvatia forrestii (Diels) Rabeler, *comb. nov*.

Basionym:—*Arenaria forrestii* Diels (1912: 181).

Type:—CHINA. Yunnan: Lijiang Range eastern flank, in crevices of limestone cliffs, 11–12,000 ft, 27º 15'N, September 1906, *G. Forrest 2915* (holotype, E-00313711!).

Shivparvatia ludlowii (H.Hara) Rabeler**,** *comb. nov.*

Basionym:—*Arenaria ludlowii* H.Hara (1976: 129).

Type:—BHUTAN. Marlung (Upper Bumthang Chu district (per Grierson & Long, 1983): Tsampa, 14000 ft, 6 July 1949, *F. Ludlow, G. Sherriff & J. H. Hicks 19354* (lectotype, **designated here**, TI000010423!; isolectotype BM-000629101!)

Although Hara (1976) referenced one collection in the description of *A. ludlowii*, two specimens were designated "type in BM & TI", making them syntypes according to Article 9.5 and Article 40, note 1 of the International Code of Nomenclature (McNeill *et al.* 2012). Hara only annotated the TI sheet; while the BM sheet includes the original label and a packet including a dissection series of floral parts, there is no apparent evidence that he examined the BM sheet.

Shivparvatia ramellata (F.N.Williams) Rabeler, *comb. nov*.

Basionym:—*Arenaria ramellata* F.N.Williams (1909: 399).

Type:—CHINA. Xizang: Karoo-la, 15 miles from Lhassa, 13 August 1878, *Dungboo s.n,* (Kew # 1158) (holotype K000723909!).

Shivparvatia rhodantha (Pax & K. Hoffmann) Rabeler, *comb. nov*.

Basionym:—*Arenaria rhodantha* Pax & K. Hoffmann in Pax (1922: 366) .

Type:—CHINA. Sichuan: Batang-Litang, Ptschamu, rocks of Dschagala Pass, 5260 m, 22 August 1914, *H.W. Limpricht 2260* (lectotype, designated by Yao (2017), WU0046559!; isolectotype WRSL?). Remaining syntypes:—CHINA. Sichuan: Dege and Bejü, Hobo, Gato gomba, Rocks and rocky squares above Ngu Pass, 5200 m, *H.W. Limpricht 2137* (syntype, WRSL?); Rossäla Pass, between Taschü und Rati, 5000 m, *H.W. Limpricht 2272* (syntype, WRSL?).

Excluded taxa

Wu published the following three forms of *Arenaria forrestii* Diels that are treated as synonyms under *A. forrestii* in Wu *et al.* (2001) and Hassler (2016).

Arenaria forrestii Diels f. *cernua* (F.N.Williams) C.Y.Wu (1996: 204). ≡ *Arenaria glanduligera* Edgeworth var. *cernua* F.N.Williams (1909: 402).

Arenaria forrestii Diels f. *micrantha* (F.N.Williams) C.Y.Wu (1996: 204). ≡ *Arenaria glanduligera* var. *micrantha* F.N.Williams (1909: 402).

Arenaria forrestii Diels f. *roseotincta* (W.W.Smith) C.Y.Wu (1995: 168). ≡ *Arenaria roseotincta* W.W.Smith (1913:111).

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