Mosyakin, S.L. 2016. Nomenclatural notes on North American taxa of *Anemonastrum* and *Pulsatilla* (Ranunculaceae), with comments on the circumscription of *Anemone* and related genera. Phytoneuron 2016-79: 1–12. Published 12 December 2016. ISSN 2153 733X

NOMENCLATURAL NOTES ON NORTH AMERICAN TAXA OF *ANEMONASTRUM* AND *PULSATILLA* (RANUNCULACEAE), WITH COMMENTS ON THE CIRCUMSCRIPTION OF *ANEMONE* AND RELATED GENERA

SERGEI L. MOSYAKIN
M.G. Kholodny Institute of Botany
National Academy of Sciences of Ukraine
2 Tereshchenkivska Street
Kiev (Kyiv), 01004 Ukraine
inst@botany.kiev.ua

ABSTRACT

A pragmatic circumscription of *Anemone* L. and related genera of Ranunculaceae is discussed based on recent molecular phylogenetic results and traditional taxonomy. It is concluded that the monophyletic taxonomy of *Anemone* sensu lato can be achieved only by inclusion in *Anemone* of such readily recognized and morphologically distinguishable genera as *Clematis* L., *Hepatica* Mill., *Pulsatilla* Mill., and some others, which is hardly a practical approach. An alternative option, which is preferred here, is the recognition of several genera segregated from *Anemone* sensu lato. The taxa placed in *Anemone* in the *Flora of North America North of Mexico* should be now placed in at least four genera: *Anemone* sensu stricto, *Hepatica*, *Pulsatilla*, and *Anemonastrum* Holub (incl. *Anemonidium* (Spach) Holub, *Arsenjevia* Starod., *Tamuria* Starod., and *Jurtsevia* Á. Löve & D. Löve). New nomenclatural combinations for North American and some other taxa of *Anemonastrum* are validated: **Anemonastrum** sect. **Anemonidium** (Spach) Mosyakin, **comb. nov.** (*Anemone* sect. *Anemonidium* Spach), **Anemonastrum** [sect. *Anemonidium*] subsect. **Anemonidium** (Ulbr.) Mosyakin, **comb. nov.**, **Anemonastrum** [sect. *Anemonidium*] subsect. **Richardsonia** (Ulbr.) Mosyakin, **comb. nov.** (*Anemone* ser. *Richardsoniae* Ulbr.), **Anemonastrum canadense** (L.) Mosyakin, **comb. nov.** (*Anemone canadensis* L.; *Anemonidium canadense* (L.) Á. Löve & D. Löve), **Anemonastrum dichotomum** (L.) Mosyakin, **comb. nov.** (*Anemone dichotoma* L., *Anemonidium dichotomum* (L.) Holub), and **Anemonastrum richardsonii** (Hook.) Mosyakin, **comb. nov.** (*Anemone richardsonii* Hook., *Anemonidium richardsonii* (Hook.) Starod., *Jurtsevia richardsonii* (Hook.) Á. Löve & D. Löve). Three varieties of *Anemone narcissiflora* recognized in the *Flora of North America North of Mexico* are better accepted as three species: *Anemonastrum sibiricum* (L.) Holub, *A. villosissimum* (DC.) Holub, and *A. zephyrum* (A. Nelson) Holub. The North American taxon of the *Pulsatilla patens* (L.) Mill. group is recognized as a separate species *P. nuttalliana* (DC.) Bercht. & J. Presl; its nomenclature and synonymy are discussed and updated.

The phylogenetically natural and taxonomically rational circumscription of the genus *Anemone* L. and related taxa of Ranunculaceae Juss. tribe Anemoneae DC. is a long-debated issue. In particular, the genera *Hepatica* Mill., *Pulsatilla* Mill., *Knowltonia* Salisb., *Barneoudia* Gay, *Oreithales* Schltdl. (= *Capethia* Britton) and some others were readily recognized in many earlier and some recent taxonomic treatments (Britton 1892; Juzepczuk 1937; Steyermark & Steyermark 1960; Rasmussen 1979; Duncan & Keener 1991; Starodubtsev 1991; Tamura 1993; 1995; Tzvelev 2001, 2012; Malyshev 2005 etc.). In addition to those taxa, several other genus-level segregates of *Anemone* were proposed and/or recognized, such as *Anemonastrum* Holub, *Anemonidium* (Spach) Holub, *Anemonoides* Mill., *Arsenjevia* Starod., *Eriocapitella* Nakai, *Jurtsevia* Á. Löve & D. Löve, *Pulsatilloides* (DC.) Starod., *Tamuria* Starod. (Holub 1973, 1974; Starodubtsev 1991, 1995; Czerepanov 1995, Uotila 2001; Tzvelev 2001, 2012; Malyshev 2012 etc.), but their acceptance was more limited.

At present, following recent molecular phylogenetic results (Hoot & Palmer 1994; Hoot & al. 1994, 2012; Ehrendorfer 1995; Hoot 1995; Ehrendorfer & Samuel 2001; Schuettpelz & al. 2002; Wang & al. 2009; Meyer & al. 2010; Zhang & al. 2015b etc.), the genus *Anemone* is usually accepted in a wide sense, including all or almost all genera mentioned above. According to the recent taxonomic treatment heavily based on molecular phylogenetic patterns (Hoot & al. 2012), *Anemone* in the wide sense includes two subgenera, subg. *Anemonidium* (Spach) Juz. and subg. *Anemone*. Four sections are recognized in each subgenus: (1) sect. *Hepatica* (Mill.) Spreng., (2) sect. *Keiskea* Tamura, (3) sect. *Anemonidium* Spach, and (4) sect. *Omalocarpus* DC. [with subsect. *Omalocarpus* (DC.) Tamura and subsect. *Himalayicae* (Ulbr.) Tamura] in subg. *Anemonidium* and (1) sect. *Pulsatilloides* DC. (with 8 subsections), (2) sect. *Pulsatilla* (Mill.) DC., (3) sect. *Rivularidium* Jancz., and (4) sect. *Anemone* (with 6 subsections) in subg. *Anemone*. As a result of molecular phylogenetic studies, new combinations in *Anemone* were proposed for taxa earlier placed in *Knowltonia* (Manning & al. 2009) and *Pulsatilla* (Jiang & al. 2015), as well as some new combinations for infrageneric taxa (Hoot & al. 2012).

However, other molecular phylogenetic results and morphological data allow alternative phylogenetic patterns and different taxonomic solutions (Pfosser & al. 2011). The most important issue unresolved until recently was the proper phylogenetic placement of the large (ca. 250–300 species) and diverse genus *Clematis* L., position of which in some phylogenetic studies was controversial, either as sister to *Anemone* sensu lato or rooted in it. The new molecular phylogenetic results (Lehtonen & al. 2016) convincingly indicate that the clade of *Clematis* (incl. *Atragene* L.) and *Anemoclema* (Franch.) W.T. Wang (Wang 1964; Zhang & al. 2015; often treated earlier as *Anemone* subgen. *Anemoclema* (Franch.) Tamura or sect. *Anemoclema* Franch.: see Tamura 1995; Ziman & al. 2008, etc.) is in fact rooted in the grade of *Anemone* sensu lato (in the circumscription proposed by Hoot & al. 2012). In particular, Lehtonen & al. (2016) concluded that "*Anemone s.l.* is paraphyletic to *Anemoclema* + *Clematis*" and that "paraphyly of *Anemone s.l.* was strongly supported and evident under all studied parameter costs." They further commented that "an often assumed monophyly of a broadly defined *Anemone s.l.* apparently is an artefact caused by erroneous outgroup selection and poor sampling of non-focal groups." (Lehtonen & al. 2016: 840).

RATIONAL GENUS-LEVEL TAXONOMY OF *ANEMONE* SENSU LATO: A MODEST PROPOSAL

In view of new data it should be concluded that a monophyletic taxonomy of *Anemone* sensu lato can be achieved only by inclusion in *Anemone* of such readily recognized and morphologically distinguishable genera as *Clematis*, *Hepatica*, *Pulsatilla* and some others, which is hardly a practical approach, since the addition of *Clematis* to *Anemone* will require hundreds of new taxonomic combinations and possible new names. Moreover, both *Anemone* sensu lato and *Clematis* contain many important cultivated taxa and excessive changes in their nomenclature are not desirable.

An alternative option, which is strongly preferred here, is the recognition of several genera segregated from *Anemone* sensu lato. In my opinion, the following genera can be recognized, based on the clades revealed in Hoot & al. (2012) and in other molecular phylogenetic studies (Schuettpelz & al. 2002; Wang & al. 2009; Meyer & al. 2010; Zhang & al. 2015b etc.) as well as on some of the morphologically outlined groups (infrageneric taxa or segregate genera) recognized in recent taxonomic treatments (Starodubtsev 1991, 1995; Tamura 1993, 1995; Luferov 2001; Wang & al. 2001; Ziman & al. 2004, 2005, 2006a, 2006b, 2007, 2008, 2009, 2013; Ehrendorfer & al. 2009; Manning & al. 2009; Manning & Goldblatt 2013; Zhang & al. 2015b etc.).

1. *Hepatica* Mill.
2. *Anemonastrum* Holub in an expanded circumscription (including genera *Anemonidium*, *Arsenjevia*, *Jurtsevia*, and *Tamuria*), housing taxa placed by Hoot & al. (2012) in *Anemone* sect. *Keiskea*, sect. *Anemonidium*, and sect. *Omalocarpus*.

3. *Knowltonia* Salisb. (most probably the earliest available generic name applicable to this group) in a greatly expanded circumscription, corresponding to *Anemone* subg. *Anemone* sect. *Pulsatilloides* sensu Hoot & al. (2012) (including the genera *Barneoudia*, *Oreithales*, and *Pulsatilloides*).
4. *Pulsatilla* Mill. (including *Miyakea* Miyabe & Tatew.).
5. *Anemone* L. sensu stricto (including genera *Anemonoides*, *Anemonanthea* (DC.) Gray etc.).
6. *Anemoclema* (Franch.) W.T. Wang, the clade revealed as sister to *Clematis* (Zhang 2015a; Lehtonen & al. 2016), containing one morphologically distinct species, *Anemoclema glaucifolium* (Franch.) W.T. Wang (*Anemone glaucifolia* Franch., *Pulsatilla glaucifolia* (Franch.) Huth).

In any case, *Anemonastrum* is phylogenetically more distant from *Anemone* sensu stricto than *Pulsatilla* and *Knowltonia*, among others. It also differs from *Anemone* karyologically: *Hepatica* and *Anemonastrum* (revealed in most of molecular studies as sister groups) have the base chromosome number $x=7$, while the other genera have $x=8$.

It is not an unusual situation now when a widely recognized "traditional" genus is revealed, in view of new phylogenetic information, as a polyphyletic or paraphyletic group, which is exactly what happened to *Anemone*. Taxonomic solutions aimed at achieving monophyly of recognized genera in such cases vary widely — from submerging of several genera into one genus sensu lato to splitting of "traditional" genera into monophyletic segregates, and/or to dramatic re-circumscriptions of genera. A relevant example is *Aloe* L. (Asphodelaceae subfam. Alooideae or Xanthorrhoeaceae subfam. Asphodeloideae) and its relatives. Recent phylogenetic studies of that group clearly demonstrated that both *Aloe* and *Haworthia* Duval, as traditionally circumscribed, are widely polyphyletic (Treutlein & al. 2003; Daru & al. 2013; Grace & al. 2013; Manning & al. 2014 etc.). Several taxonomic options were discussed, but finally a solution with recognition of several "narrow" genera corresponding to major clades has been proposed (Grace & al. 2013; Manning & al. 2014). Another relevant example is *Chenopodium* L. sensu lato (see overviews in: Fuentes & al. 2012; Hernández-Ledesma & al. 2015). Numerous additional examples of taxonomic handling of similar cases from the European flora are discussed in Kadereit & al. (2016).

In many cases, such large-scale taxonomic and especially nomenclatural changes are psychologically disturbing, at least for some plant taxonomists and mainly for non-taxonomists using the taxonomic information. However, gradually such changes are becoming widely accepted, especially if they are supported by solid phylogenetic evidence. I expect, for example, that the proposal to re-circumscribe the genus *Knowltonia* (the name that was traditionally applied only to a morphologically rather distinct group of southern African taxa characterized by fleshy fruits and much-branched inflorescences — see Rasmussen 1979; Manning & al. 2009) to accommodate also the South American taxa earlier placed in genera *Barneoudia* and *Oreithales* plus some other taxa usually treated in several infrageneric groups of *Anemone* may cause some resistance or opposition, as happened with our earlier proposal to expand the limits of *Dysphania* R. Br. (the name earlier applied only to Australian taxa) to include all glandular-pubescent species of *Chenopodium* sensu lato occurring on almost all continents (Mosyakin & Clemants 2002, 2008; Clemants & Mosyakin 2003). However, at present the new concept of *Dysphania* is almost universally accepted, with some necessary minor adjustments (Fuentes & al. 2012; Uotila 2013; Hernández-Ledesma & al. 2015 etc.). Hopefully, the same will happen to the new concept of *Knowltonia* provisionally proposed here and to other re-circumscribed segregates of *Anemone*.

Main morphological characters and potential synapomorphies of the major clades of *Anemone* sensu lato were summarized by Hoot & al. (2012). More detailed discussion on diagnostic morphological characters is available from many recent taxonomic revisions of *Anemone* sensu lato (Starodubtsev 1991; Tamura 1993; Wang & al. 2001; Ziman & al. 2004, 2005, 2006a, 2006b, 2007,

2008, 2009, 2013; Ehrendorfer & al. 2009; Ren & al. 2009; Manning & al. 2009; Manning & Goldblatt 2013 etc.). New nomenclatural combinations and a more detailed morphological justification of the accepted genera and infrageneric taxa will be possible in parallel with the progress of an updated taxonomic revision of *Anemone* and related taxa now being prepared by Svetlana Ziman with several collaborators; they, however, at present prefer to keep *Anemonastrum* in *Anemone*, at the same time recognizing *Hepatica* and *Pulsatilla* as separate genera.

Meanwhile, I decided to propose here just a brief nomenclatural and taxonomic update to the treatment of *Anemone* in the *Flora of North America North of Mexico* (Dutton & al. 1997). The taxa placed in *Anemone* in that treatment should be now placed in at least four genera: *Anemone* sensu stricto, *Hepatica*, *Pulsatilla*, and *Anemonastrum*. *Hepatica* and *Pulsatilla* are accepted here in their traditional circumscription. I prefer an expanded circumscription of *Anemonastrum* as compared to the concept of this genus originally proposed by Holub (1973). The three groups corresponding to the clades recognized by Hoot & al. (2012) as sections of *Anemone* subg. *Anemonidium* can now be treated as sections of *Anemonastrum*. North American taxa belong to two sections, one of which can be further subdivided into subsections (see the new combinations below).

VALIDATION OF NEW COMBINATIONS

Anemonastrum Holub sect. **Anemonidium** (Spach) Mosyakin, **comb. nov.** *Anemone* sect. *Anemonidium* Spach, Hist. Nat. Vég. 7: 248. 1839. *Anemonidium* (Spach) Holub, Folia Geobot. Phytotax. (Praha) 9: 272. 1974. **TYPE**: **Anemonastrum dichotomum** (L.) Mosyakin, **comb. nov.** *Anemone dichotoma* L., Sp. Pl. 1: 540. 1753. *Anemonidium dichotomum* (L.) Holub, Folia Geobot. Phytotax. (Praha) 9: 272. 1974.

Anemone dichotoma was the only species originally included in this section by Spach (1839) and thus it is the type of the section.

Two North American species of *Anemonastrum* sect. *Anemonidium* can be placed in two subsections. The new combinations for these subsections and species are validated below.

Anemonastrum Holub [sect. *Anemonidium***]** subsect. **Anemonidium** (Spach) Mosyakin, **comb. nov.** *Anemone* sect. *Anemonidium* Spach, Hist. Nat. Vég. 7: 248. 1839.

Anemonastrum canadense (L.) Mosyakin, **comb. nov.** *Anemone canadensis* L., Syst. Nat., ed. 12, 3: 231. 1768. *Anemonidium canadense* (L.) Á. Löve & D. Löve, Taxon 31: 124. 1982.

Anemonastrum Holub [sect. *Anemonidium***]** subsect. **Richardsonia** (Ulbr.) Mosyakin, **comb. nov.** *Anemone* ser. *Richardsoniae* Ulbr., Bot. Jahrb. Syst. 37(2–3): 199. 1905. *Anemonidium* (Spach) Holub subgen. *Richardsonia* (Ulbr.) Starod., Vetrenitsy: sist. evol. 119. 1991. *Anemone* L. sect. *Richardsonia* (Ulbr.) Luferov, Byull. Glavn. Bot. Sada (Moscow) 182: 49. 2001. *Anemone* L. subgen. *Richardsonia* (Ulbr.) Luferov, Byull. Glavn. Bot. Sada (Moscow) 182: 49. 2001.

Jurtsevia Á. Löve & D. Löve, Bot. Not. 128: 511. 1976 [volume of 1975, published 1976].

Anemonastrum richardsonii (Hook.) Mosyakin, **comb. nov.** *Anemone richardsonii* Hook. in Richardson, Botanical Appendix to Franklin, Narr. J. Polar Sea, ed. 2, 21 (separate fascicle) [alternative pagination: Franklin, Narr. J. Polar Sea, ed. 2, Appendix 7: 749]. 1824; Hook., Fl. Bor.-Amer. 1(1): 6, tab. 4. 1829 (updated description). *Jurtsevia richardsonii* (Hook.) Á. Löve & D. Löve, Bot. Not. 128: 511. 1976 [volume of 1975, published 1976]. *Anemonidium richardsonii* (Hook.) Starod., Vetrenitsy: sist. evol. 119, 151. 1991.

It is widely accepted (Dutton & al. 1997; IPNI 2016 etc.) that *Anemone richardsonii* was described by Hooker in 1829 in the first issue of the first volume of his *Flora Boreali-Americana* (Hooker 1829). However, Hooker himself cited an earlier publication "Hook. in Frankl. 1st Journ. ed. 2. App. p. 21" (Hooker 1829: 6). Indeed, *A. richardsonii* was first validly described in a rare updated *Botanical Appendix* to the second edition of the *Narrative of a journey to the shores of the Polar Sea* (Richardson 1824). Petrovskiy (1971) cited the protologue of *A. richardsonii* as "Hook. in Franklin, Narr. J. Polar Sea, ed. 2, App. VII (1824) 749", but I was able to find only a separately paginated separate fascicle of the updated *Botanical Appendix*, which is available from the Biodiversity Heritage Library (see Literature Cited).

Anemonastrum Holub sect. **Anemonastrum**

This group is represented in North America by several taxa of the *Anemonastrum narcissiflorum* aggregate, which were treated in recent North American literature mainly as subspecies or varieties, or as separate species in many publications by Eurasian authors. Three varieties of *Anemone narcissiflora* were recognized in the *Flora of North America North of Mexico* (Dutton & al. 1997). In my opinion, these taxa are better treated as separate species, which are widely accepted in Eurasian literature (Juzepczuk 1931; Petrovskiy 1971; Starodubtsev 1991, 1995; Tzvelev, 2001, 2012; Malyshev 2005, 2012 etc.) and in the current online version of the *Annotated Checklist of the Panarctic Flora* (Elven 2016). Their nomenclature is updated and summarized below. Those preferring a wide concept of *Anemonastrum narcissiflorum* and the subspecies status of these taxa can use the names subsp. *sibiricum*, subsp. *villosissimum*, and subsp. *zephyrum* (as included in synonymy below); however, their species status is accepted here.

Anemonastrum sibiricum (L.) Holub, Folia Geobot. Phytotax. (Praha) 8: 165. 1973. *Anemone sibirica* L., Sp. Pl. 1: 541. 1753. *Anemone narcissiflora* L. subsp. *sibirica* (L.) Hultén, Acta Univ. Lund. n.s. (2. Afd.) 40: 734 [Fl. Alaska & Yukon 4: 734]. 1944. *Anemone narcissiflora* L. var. *sibirica* (L.) Tamura, Acta Phytotax. Geobot. 17: 115. 1958. *Anemonastrum narcissiflorum* (L.) Holub subsp. *sibiricum* (L.) Á. Löve & D. Löve, Bot. Not. 128: 511. 1976 [volume of 1975, published 1976].

Two additional subspecies of *Anemone narcissiflora* were described from North America by Hultén: subsp. *alaskana* Hultén (Acta Univ. Lund. n.s. (2. Afd.) 40: 733 [Fl. Alaska & Yukon 4: 733]. 1944) and subsp. *interior* Hultén (Acta Univ. Lund. n.s. (2. Afd.) 40: 734 [Fl. Alaska & Yukon 4: 734]. 1944). These taxa are evidently closely related to *Anemonastrum sibiricum* but their taxonomic status remains unresolved and they are in need of further study.

Anemonastrum villosissimum (DC.) Holub, Folia Geobot. Phytotax. (Praha) 11: 80. 1976. *Anemone narcissiflora* L. var. *villosissima* DC., Prodr. 1: 22. 1824. *Anemone villosissima* (DC.) Juz., Fl. URSS 7: 275. 1937. *Anemone narcissiflora* L. subsp. *villosissima* (DC.) Hultén, Acta Univ. Lund. n.s. (2. Afd.) 40: 732 [Fl. Alaska & Yukon, 4: 732]. 1944. *Anemonastrum narcissiflorum* (L.) Holub subsp. *villosissimum* (DC.) Á. Löve & D. Löve, Bot. Not. 128: 511. 1976 [volume of 1975, published 1976].

Anemonastrum zephyrum (A. Nelson) Holub, Folia Geobot. Phytotax. (Praha) 8: 165. 1973. *Anemone zephyra* A. Nelson, Bot. Gaz. 42: 51. 1906. *Anemone narcissiflora* L. subsp. *zephyra* (A. Nelson) Á. Löve, D. Löve & B.M. Kapoor, Arctic Alpine Res. 3: 149. 1971. *Anemonastrum narcissiflorum* (L.) Holub subsp. *zephyrum* (A. Nelson) W.A. Weber, Phytologia 41: 486. 1979. *Anemone narcissiflora* L. var. *zephyra* (A. Nelson) B.E. Dutton & Keener, Phytologia 77: 85. 1995 [volume of 1994, published 1995].

NORTH AMERICAN TAXA OF *PULSATILLA*: A NOMENCLATURAL UPDATE

Pulsatilla is represented in North America by two native species, the well-outlined *P. occidentalis* (S. Watson) Freyn (*Anemone occidentalis* S. Watson) and a more problematic taxon of the *P. patens* (L.) Mill. group. Some other taxa of *Pulsatilla* native to Eurasia may be expected in North America as occasional and local garden escapes. Native North American plants of the *Pulsatilla patens* aggregate were recognized by Dutton & al. (1997) as *Anemone patens* var. *multifida* Pritzel, which was described from Siberia (Pritzel 1841). The North American taxon has a very complicated synonymy and it is definitely not identical with the typical European–Western Asian *P. patens* sensu stricto (subsp. *patens*). Its correct name as a species of *Pulsatilla* is *P. nuttalliana* (DC.) Bercht. & J. Presl, which in a wide sense is also applicable to Siberian and northeastern Asian plants also treated as *P. nuttalliana* subsp. *multifida* (Pritz.) Aichele & Schwegler (1957; see also Petrovskiy 1971; Starodubtsev 1995; Kricsfalusy 2015; Elven 2016). Alternatively, if a very wide circumscription of *P. patens* is preferred and North American and Asian plants of the group are treated as belonging to the same taxon, the name *Pulsatilla patens* subsp. *multifida* (Pritz.) Zämelis can be applied (see Wang & Bartholomew 2001). An updated nomenclatural citation of *P. nuttalliana* and its synonyms and misapplied names is provided below; necessary nomenclatural explanations are also provided.

Pulsatilla nuttalliana (DC.) Bercht. & J. Presl, Přir. Rostlin, 1 (fasc. Ranunculaceae): 22. 1823. *Anemone nuttalliana* DC., Syst. Nat. 1: 193. 1817. *Anemone patens* L. var. *nuttalliana* (DC.) A. Gray, Manual Bot. N. United States, ed. 5: 36. 1867. *Pulsatilla patens* (L.) Mill. subsp. *nuttalliana* (DC.) Grey-Wilson, Pasque-Flowers. The Genus *Pulsatilla*, 163. 2014, nom. inval. (Art. 41.5 of ICN: McNeill & al. 2012; no direct reference to the place of publication: see IPNI 2016).

Heterotypic synonyms of *Pulsatilla nuttalliana*

Anemone patens L. var. *multifida* Pritz., Linnaea 15: 581. 1841. *Pulsatilla patens* (L.) Mill. subsp. *multifida* (Pritz.) Zämelis, Acta Horti Bot. Univ. Latv. 1: 98. 1926. *Pulsatilla multifida* (Pritz.) Juz., Fl. URSS 7: 296. 1937. *Anemone patens* L. subsp. *multifida* (Pritz.) Hultén, Acta Univ. Lund. n.s. (2. Afd.): 40: 738 [Fl. Alaska & Yukon 4: 738]. 1944. *Pulsatilla nuttalliana* (DC.) Bercht. & J. Presl subsp. *multifida* (Pritz.) Aichele & Schwegler, Feddes Repert. 60: 81. 1957. *Pulsatilla patens* (L.) Mill. var. *multifida* (Pritz.) S.H. Li & Y.H. Huang, Fl. Pl. Herb. Chin. Bor.-Or. 3: 163. 1975. *Pulsatilla patens* (L.) Mill. var. *multifida* (Pritz.) Kitag., Neolin. Fl. Manshur.: 305. 1979, comb. superfl.

Pulsatilla patens (L.) Mill. subsp. *asiatica* Krylov & Serg., Fl. Sibir. Occid. [Fl. Zapadnoi Sibiri] 5: 1165. 1931 (see the description in: Krylov 1931).

Pulsatilla ludoviciana A. Heller, Cat. N. Amer. Pl., ed. 2, 4. 1900, nom. illeg. (intended new combination based on illegitimate *Anemone ludoviciana* Nutt., but in fact a new name; type of *Clematis hirsutissima* Pursh excluded but *Anemone nuttalliana* DC. cited in synonymy).

Misapplied names for *Pulsatilla nuttalliana*

Pulsatilla hirsutissima (Pursh) Britton, Ann. New York Acad. Sci. 6: 217. 1891, p.p., quoad pl. (excluding the type of the basionym *Clematis hirsutissima* Pursh). *Pulsatilla patens* (L.) Mill. subsp. *hirsutissima* (Pursh) Zämelis, Acta Horti Bot. Univ. Latv. 1: 98. 1926, p.p., quoad pl. *Anemone hirsutissima* (Pursh) MacMill., Metasp. Minnesota Valley: 239. 1892, p.p., quoad pl. *Anemone hirsutissima* (Pursh) Makino, Bot. Mag. (Tokyo) 18 (No. 208): 69. 1904, comb. superfl., p.p., quoad pl.

Anemone ludoviciana Nutt., Gen. N. Amer. Pl. 2: 20. 1818, nom. illeg. (replacement name for *Clematis hirsutissima* Pursh).

Anemone wolfgangiana Besser in Rchb., Iconogr. Bot. Pl. Crit. 4: 41, tab. 351. 1826. *Pulsatilla wolfgangiana* (Besser) Rupr., Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg 12: 218. 1854. *Pulsatilla patens* (L.) Mill. var. *wolfgangiana* (Besser) Trautv. & C.A. Mey. in Middend., Reise Sibir. 1 (T. 2, Abt. 2: Fl. Ochot. Phaenog.): 7. 1856.

The authorship of the combination *Pulsatilla nuttalliana* has been often attributed to Sprengel (in Syst. Veg. ed. 16, 2: 663. 1825). However, Berchtold and J.S. Presl (1823) made this combination two years earlier. Their work *O Přirozenosti Rostlin aneb Rostlinář* was published in fascicles and later collected into three volumes. The first volume has a complicated pagination: it is not paged continuously but has 13 different groups of pages (Hunt Institute for Botanical Documentation 2016). *Pulsatilla* is treated in the fascicle *Rostliny Pryskýřnjkowité* (Ranunculaceae).

Dutton & al. (1997) commented that the "names *Pulsatilla hirsutissima* (Pursh) Britton and *P. ludoviciana* (Nuttall) A.Heller are illegitimate." It is certainly true for *Anemone ludoviciana* Nutt. because this name was proposed by Nuttall (1818) as an illegitimate new replacement name for *Clematis hirsutissima*, a species of a true *Clematis*, but the type of the replaced name has not been explicitly excluded (Art. 52.1 and 52.2 of ICN: McNeill & al. 2012). However, Heller (1900), when listing synonyms of his *Pulsatilla ludoviciana*, cited "*Pulsatilla hirsutissima* Britton, Ann. N.Y. Acad. Sci. 6: 217 1891; not *Clematis hirsutissima* Pursh". It means that he explicitly excluded the type of *C. hirsutissima* (which is also the type of the illegitimate name *Anemone ludoviciana*) and thus coined a new replacement name (not a new combination), but at the same time he cited as a synonym the name *Anemone nuttalliana* DC., thus anyway making his proposed new name illegitimate. In the *Annotated Checklist of the Panarctic Flora (PAF). Vascular Plants* (Elven 2016) the name *P. hirsutissima* is also considered "illegitimate because the given basionym is *Clematis hirsutissima* Pursh, Fl. Amer. Sept. 2: 385 (1813), a true *Clematis*." However, it is definitely **not** illegitimate: Britton in fact made a new combination (Art. 6.10 of ICN: McNeill & al. 2012) based on *C. hirsutissima* and thus his combination (as well as other combinations based on the same basionym) is just homotypic with its basionym (Art. 7.3 of ICN: McNeill & al. 2012) and thus is a legitimate nomenclatural synonym of *C. hirsutissima*, despite a long history of its (mis)application to a taxon of *Pulsatilla*.

Luferov (2004) listed the combination *Pulsatilla patens* subsp. *multifida* (Pritz.) Zämelis as an illegitimate name. However, I was unable to find any proof of its illegitimacy. When making his new combination, Zämelis (Zãmels 1926) indeed listed in its synonymy the name *Pulsatilla patens*, but with the reference to Ledebour, which in modern terms should be understood as "*Pulsatilla patens* sensu Ledebour in *Flora Altaica*, not (L.) Mill. sensu stricto." Moreover, that name is a combination based on a legitimate basionym.

The use of the epithet "*wolfgangiana*" to North American and East Asian taxa of *Pulsatilla* is an evident misapplication. *Anemone wolfgangiana* was first validly described by Besser (1826) in the fourth volume of Reichenbach's *Iconographia Botanica seu Plantae Criticae* (**not** in Reichenbach's *Iconographia Botanica Exotica*, as erroneously stated in IPNI 2016, and **not** by "Besser ex W.D.J. Koch" in the fourth volume of the third edition of J.C. Röhlings's *Deutschlands Flora* revised by W.D.J. Koch, as occasionally mentioned in some other sources). The syntypes (LE, KW, and probably in some other herbaria) are from Lithuania, near Vilnius (Besser's collections made "in Lithuania prope Vilnas", "bei Vilna in Litthauen": Besser 1826: 41). This taxon, which is often treated as a species of hybrid origin, is probably conspecific with *P. teklae* Zämelis [*P. patens* subsp. *teklae* (Zämelis) Zämelis]; it occurs in Central and Eastern Europe (Poland, Baltic states, Belarus, northern Ukraine, and northwestern European Russia) (Tzvelev 2001, 2012). The misapplication of names based on *A. wolfgangiana* for plants from northeastern Asia (and later from North America) was most probably initiated by Trautvetter and C.A. Meyer, who proposed the name "*Pulsatilla*

patens Mill. var. *Wolfgangiana* nob. — *Anemone Wolfgangiana* Bess. in litt." (Trautvetter & Meyer 1856: 7), which should be treated as a new combination made by indirect reference, and thus the name of this variety has the same type as *A. wolfgangiana* Besser. In IPNI (2016) this combination is cited with the incorrect authorship ("Trautv. & E.Mey.") and inaccurate citation of the place of publication ("Fl. Ochot. Phaenog. 1 abt 2: 7. 1856 [Jan 1856]; alt. title: in Middend., Reise Sibir. 1 (abt 2): 7. Jan 1856"). The second author of *Florula Ochotensis Phaenogama* was Carl Anton (Karl Andreëvich) von Meyer, **not** Ernst Heinrich Friedrich Meyer. This *Florula* … (which itself has no volumes or issues) was published in the **separately paginated** second issue or fascicle (Abtheilung) of the second part (Theil) of the first volume of Middendorff's *Reise in den äussersten Norden und Osten Sibiriens*, and the volume information should be cited accordingly.

ACKNOWLEDGEMENTS

I am grateful to Prof. Svetlana N. Ziman (Svitlana M. Zyman in Ukrainian transliteration; M.G. Kholodny Institute of Botany of the National Academy of Sciences of Ukraine, KW) for her valuable comments and long-term cooperation on *Anemone* sensu lato, to Elena V. Bulakh (KW) for providing copies of some publications, and to Guy Nesom for his editorial work on the manuscript.

LITERATURE CITED

Aichele, D. and H.-W. Schwegler. 1957. Die Taxonomie der Gattung *Pulsatilla*. Feddes Repert. 60(1–3): 1–230.

Berchtold, F. and J.S. Presl. 1823. O Přirozenosti Rostlin aneb Rostlinář, Vol. 1, fasc. Rostliny Pryskýřnjkowité (Ranunculaceae) (pp. 1–150). Jos. Krause, w Praze [Prague].

Besser, W.S.J.G. 1826. Decas tabularum trigesia sexta quam viro praeclarissimo W.S.I.G. Besser M.D. Prof. zool. et bot. Praef. Hort. Lyc. Volhyn. etc. D. D. D. auctor. Pp. 41–46, in H.G.L. Reichenbach. Iconographia Botanica seu Plantae Criticae, Vol. 4. Apud Fridericum Hofmeister, Lipsiae [Leipzig].

Britton, N.L. 1892. The American species of the genus *Anemone* and the genera which have been referred to it. Ann. New York Acad. Sci. 6: 215–238.

Clemants, S.E. and S.L. Mosyakin. 2003. *Dysphania, Chenopodium*. Pp. 267–299, in Flora of North America Editorial Committee (eds.). Flora of North America North of Mexico, Vol. 4. Oxford Univ. Press, New York & Oxford.

Czerepanov, S.K. 1995. Vascular Plants of Russia and Adjacent States (the former USSR). Cambridge Univ. Press, Cambridge.

Daru, B.H., J.C. Manning, J.S. Boatwright, O. Maurin, N. Maclean, H. Schaefer, M. Kuzmina, and M. van der Bank. 2013. Molecular and morphological analysis of subfamily Alooideae (Asphodelaceae) and the inclusion of *Chortolirion* in *Aloe*. Taxon 62: 62–76.

Duncan, T. and C.S. Keener. 1991. A classification of the Ranunculaceae with special reference to the Western Hemisphere. Phytologia 70: 24–27.

Dutton, B.E. and C.S. Keener. 1994 (published 1995). Three new combinations in *Anemone* (Ranunculaceae) from North America. Phytologia 77: 83–88.

Dutton, B.E., C.S. Keener, and B.A. Ford. 1997. *Anemone*. Pp. 139–158, in Flora of North America Editorial Committee (eds.). Flora of North America North of Mexico, Vol. 3. Oxford Univ. Press, New York & Oxford.

Ehrendorfer, F. 1995. Evolutionary trends and patterns in the Anemoninae (Ranunculaceae). Pl. Syst. Evol. 9 (Suppl.): 283–293.

Ehrendorfer, F. and R. Samuel. 2001. Contributions to a molecular phylogeny and systematics of *Anemone* and related genera (Ranunculaceae – Anemoninae). Acta Phytotax. Sinica 39: 293–307.

Ehrendorfer, F., S.N. Ziman, Ch. König, C.S. Keener, B.E. Dutton, O.N. Tsarenko, E.V. Bulakh, M. Boşcaiu, F. Médail, and A. Kästner. 2009. Taxonomic revision, phylogenetics and

transcontinental distribution of *Anemone* section *Anemone* (Ranunculaceae). Bot. J. Linn. Soc. 160: 312–354.

Elven, R. (ed.). 2016 Annotated Checklist of the Panarctic Flora (PAF). Vascular plants. <http://nhm2.uio.no/paf>

Fuentes-Bazan, S., P. Uotila, and T. Borsch. 2012. A novel phylogeny-based generic classification for *Chenopodium* sensu lato, and a tribal rearrangement of Chenopodioideae (Chenopodiaceae). Willdenowia 42: 5–24.

Grace, O.M., R.R. Klopper, G.F. Smith, N.R. Crouch, E. Figueiredo, N. Rønsted, and A.E. Van Wyk. 2013. A revised generic classification for *Aloe* (Xanthorrhoeaceae subfam. Asphodeloideae). Phytotaxa 76: 7–14.

Heller, A.A. 1900. Catalogue of North American Plants North of Mexico, Exclusive of the Lower Cryptogams (ed. 2). Lancaster, Pennsylvania.

Hernández-Ledesma, P., W.G. Berendsohn, T. Borsch, S. von Mering, H. Akhani, S. Arias, I. Castañeda-Noa, U. Eggli, R. Eriksson, H. Flores-Olvera, S. Fuentes-Bazán, G. Kadereit, C. Klak, N. Korotkova, R. Nyffeler, G. Ocampo, H. Ochoterena, B. B, R.K. Rabeler, A. Sanchez, B.O. Schlumpberger, and P. Uotila. 2015. A taxonomic backbone for the global synthesis of species diversity in the angiosperm order Caryophyllales. Willdenowia 45: 281–383.

Holub, J. 1973. New names in Phanerogamae 2. Folia Geobot. Phytotax. (Praha) 8: 155–179.

Holub, J. 1974. New names in Phanerogamae 3. Folia Geobot. Phytotax. (Praha) 9: 261–275.

Hooker, W.J. 1829. Flora Boreali-Americana, or, the Botany of the northern parts of British America: compiled principally from the plants collected by Dr. Richardson & Mr. Drummond on the late northern expeditions, under command of Captain Sir John Franklin, R.N. Vol. 1 (fasc. 1). Henry G. Bohn, London.

Hoot, S.B. 1995. Phylogenetic relationships in *Anemone* (Ranunculaceae) based on DNA restriction site variation and morphology. Pl. Syst. Evol. 9 (Suppl.): 295–300.

Hoot, S.B. and J.D. Palmer. 1994. Structural rearrangements, including parallel inversions, within the chloroplast genome of *Anemone* and related genera. J. Mol. Evol. 38: 274–281.

Hoot, S.B., A.A. Reznicek, and J.D. Palmer. 1994. Phylogenetic relationships in *Anemone* (Ranunculaceae) based on morphology and chloroplast DNA. Syst. Bot. 19: 169–200.

Hoot, S.B., K.M. Meyer, and J.C. Manning. 2012. Phylogeny and reclassification of *Anemone* (Ranunculaceae), with an emphasis on Austral species. Syst. Bot. 37: 139–152.

Hunt Institute for Botanical Documentation. 2016. Persons, Collections and Topics. Berchtold and Presl (1823–1835). <http://www.huntbotanical.org/library/show.php?2>

IPNI. 2016. The International Plant Names Index. Published on the Internet <http://www.ipni.org>.

Jiang, N., Zh. Zhou, K.-Y. Guan, and W.-B. Yu. 2015. Nomenclatural transfer of Chinese *Pulsatilla* to *Anemone* (Ranunculaceae). Nordic J. Bot. 33: 469–471.

Juzepczuk (Yuzepchuk), S.V. [Юзепчук, С.В.]. 1937. *Anemone*, *Hepatica*, *Potentilla*. Pp. 236–307, in V.L. Komarov [В.Л. Комаров] (series ed.) and B.K. Schischkin (Shishkin) [Б.К. Шишкин] (volume ed.). Flora of the USSR [Флора СССР], Vol. 7. Editio Academiae Scientarum URSS, Moscow & Leningrad. [In Russian].

Kadereit, J.W., D.C. Albach, F. Ehrendorfer, M. Galbany-Casals, N. Garcia-Jacas, B. Gehrke, G. Kadereit, N. Kilian, J.T. Klein, M.A. Koch, M. Kropf, C. Oberprieler, M.D. Pirie, C.M. Ritz, M. Röser, K. Spalik, A. Susanna, M. Weigend, E. Welk, K. Wesche, L.B. Zhang, and M.S. Dillenberger. 2016. Which changes are needed to render all genera of the German flora monophyletic? Willdenowia 46:39–91.

Kricsfalusy, V.V. 2015. Taxonomy and phylogeny of *Anemone patens* L. sensu lato (Ranunculaceae): A critical review. Thaiszia – J. Bot. 25: 153–164.

Krylov, P.N. [Крылов, П.Н.] (ed.). 1931. Flora Sibiriae Occidentalis [Флора Западной Сибири], Vol. 5. Editio Sectionis Tomskensis Societatis Botanicae Rossicae, Tomsk. [In Russian].

Luferov, A.N. [Луферов, А.Н.]. 2001. The genus *Anemone* L. (Ranunculaceae) in the flora of Russia [Род *Anemone* L. (Ranunculaceae) во флоре России]. Byull. Glavn. Bot. Sada (Moscow) [Бюллетень Главного ботанического сада] 182: 47–56. [In Russian].

Luferov, A.N. [Луферов, А.Н.]. 2004. A taxonomic synopsis of Ranunculaceae of the Far East of Russia [Таксономический конспект лютиковых (Ranunculaceae) Дальнего Востока России]. Turczaninowia 7(1): 5–84. [In Russian].

Malyshev, L.I. [Малышев, Л.И.]. 2005. Ranunculaceae. Pp. 20–35, in K.S. Baikov [К.С. Байков] (ed.). Conspectus Florae Sibiriae: Plantae Vasculares [Конспект флоры Сибири: сосудистые растения]. Nauka, Novosibirsk. [In Russian].

Malyshev, L.I. [Малышев, Л.И.]. 2012. Ranunculaceae. Pp. 31–55, in K.S. Baikov [К.С. Байков] (ed.). Conspectus Florae Rossiae Asiaticae: Plantae Vasculares [Конспект флоры Азиатской России: сосудистые растения]. Publishing House of the Siberian Branch of the Russian Academy of Sciences, Novosibirsk. [In Russian].

Manning, J.C. and P. Goldblatt. 2013. A taxonomic review of the dry-fruited species of *Anemone* (Ranunculaceae) in southern Africa. Bothalia 43: 1–13.

Manning, J.C., P. Goldblatt, and S.B. Hoot. 2009. The genus *Knowltonia* subsumed within *Anemone* (Notes on African plants: Ranunculaceae). Bothalia 39: 217–240.

Manning, J., J.S. Boatwright, B.H. Daru, O. Maurin, and M. van der Bank. 2014. A molecular phylogeny and generic classification of Asphodelaceae subfamily Alooideae: A final resolution of the prickly issue of polyphyly in the Alooids? Syst. Bot. 39: 55–74.

McNeill, J., F.R. Barrie, W.R. Buck, V. Demoulin, W. Greuter, D.L. Hawksworth, P.S. Herendeen, S. Knapp, K. Marhold, J. Prado, W.F. Proud'Homme van Reine, J.F. Smith, J.H. Wiersema, and N.J. Turland (eds.). 2012. International Code of Nomenclature for Algae, Fungi and Plants (Melbourne Code): Adopted by the Eighteenth International Botanical Congress, Melbourne, Australia, July 2011. Regnum Vegetabile 154: 1–274.

Meyer, K.M., S.B. Hoot, and M.T.K. Arroyo. 2010. Phylogenetic affinities of South American *Anemone* (Ranunculaceae), including the endemic segregate genera *Barneoudia* and *Oreithales*. Intern. J. Plant Sci. 171: 323–331.

Mosyakin, S.L. and S.E. Clemants. 2002. New nomenclatural combinations in *Dysphania* R. Br. (Chenopodiaceae): taxa occurring in North America. Ukrayins'k. Bot. Zhurn. [Український ботанічний журнал] 59(4): 380–385.

Mosyakin, S.L. and S.E. Clemants. 2008. Further transfers of glandular-pubescent species from *Chenopodium* subg. *Ambrosia* to *Dysphania* (Chenopodiaceae). J. Bot. Res. Inst. Texas. 2: 425–431.

Nuttall, T. 1818. The Genera of North American Plants, and a Catalogue of the Species, to the Year 1817. Printed for the author by D. Heartt, Philadelphia.

Petrovskiy, V.V. [Петровский, В.В.]. 1971. *Anemone*, *Pulsatilla*. Pp. 163–175, in A.I. Tolmatchev [А.И. Толмачев] (ed.). Flora Arctica URSS [Арктическая флора СССР], Fasc. 6 (Caryophyllaceae–Ranunculaceae). Nauka, Leningrad. [In Russian].

Pritzel, G.A. 1841. Anemonarum revisio. Linnaea 15: 561–698.

Rasmussen, H. 1979. The genus *Knowltonia* (Ranunculaceae). Opera Bot. 53: 1–44.

Ren, Y., H.-L. Chang, and P.K. Endress. 2010. Floral development in *Anemoneae* (Ranunculaceae). Bot. J. Linn. Soc. 162: 77–100.

Richardson, J. 1824. Botanical Appendix [to Narrative of a journey to the shores of the Polar Sea in the years 1819-20-21-22 by John Franklin. Ed. 2]. J. Murray, London. Available from Biodiversity Heritage Library: <http://dx.doi.org/10.5962/bhl.title.62374>

Schuettpelz, E., S.B. Hoot, R. Samuel, and F. Ehrendorfer. 2002. Multiple origins of southern hemisphere *Anemone* (Ranunculaceae) based on plastid and nuclear sequence data. Pl. Syst. Evol. 231: 143–151.

Spach, E. 1839. Histoire Naturelle des Végétaux. Phanerogames, Vol. 7. Librairie encyclopédique de Roret, Paris.

Starodubtsev, V.N. [Стародубцев, В.Н.]. 1991. Anemones: Systematics and Evolution [Ветреницы: систематика и эволюция]. Nauka, Leningrad. [In Russian].

Starodubtsev, V.N. [Стародубцев, В.Н.]. 1995. *Anemone*, *Anemonidium*, *Anemonastrum*, *Arsenjevia*, *Anemonoides*, *Pulsatilla*. Pp. 68–93, in S.S. Charkevicz (Kharkevich), [С.С. Харкевич] (ed.). Plantae Vasculares Orientis Extremi Sovietici [Сосудистые растения советского Дальнего Востока], Vol. 7. Nauka, St. Petersburg. [In Russian].

Steyermark, J.A. and C.S. Steyermark. 1960. *Hepatica* in North America. Rhodora 62 (No. 740): 223–232.

Tamura, M. 1993. Ranunculaceae. Pp. 563–583, in K. Kubitzki, J.G. Rohwer, and V. Bittrich (eds.). The Families and Genera of Vascular Plants, Vol. 2. Flowering Plants. Dicotyledons. Magnoliid, Hamamelid and Caryophyllid Families. Springer, Berlin, Heidelberg & New York.

Tamura, M. 1995. Phylogeny and classification of the Ranunculaceae. Pl. Syst. Evol. 9 (Suppl.): 201–206.

Trautvetter, E.R. and C.A. Meyer. 1856. Florula Ochotensis Phaenogama. Pp. 1–133, in A.Th. Middendorff. Reise in den äussersten Norden und Osten Sibiriens während der Jahre 1843 und 1844 mit Allerhöchster Genehmigung auf Veranstaltung der Kaiserlichen Akademie der Wissenschaften zu St. Petersburg ausgeführt und in Verbindung mit vielen Gelehrten, Bd. 1 (Einleitung, Klimatologie, Geognosie, Botanik), Theil 2 (Botanik), Abtheilung 2. Buchdruckerei der Kaiserlichen Akademie der Wissenschaften, St. Petersburg.

Treutlein, J., G.F. Smith, B.-E. Van Wyk, and M. Wink. 2003. Phylogenetic relationships in Asphodelaceae (subfamily Alooideae) inferred from chloroplast DNA sequences (rbcL, matK) and from genomic fingerprinting (ISSR). Taxon 52: 193–207.

Tzvelev, N.N. [Цвелев, Н.Н.]. 2001. Tribe Anemoneae. Pp. 77–95, in N.N. Tzvelev (ed.). Flora Europae Orientalis [Флора Восточной Европы], Vol. 10. Mir i Semia, Academia Chemico-Pharmaceutica Petropolitana, St. Petersburg. [In Russian].

Tzvelev, N.N. [Цвелев, Н.Н.]. 2012. *Anemonastrum*, *Anemone*, *Anemonidium*, *Anemonoides*, *Pulsatilla*, *Hepatica*. Pp. 111–118, in N.N. Tzvelev and D.V. Geltman [Д.В. Гельтман] (eds.). Conspectus Florae Europae Orientalis [Конспект флоры Восточной Европы]. Vol. 1. KMK Scientific Press, Moscow & St. Petersburg. [In Russian].

Ulbrich, E. 1905. Über die systematische Gliederung und geografische Verbreitung der Gattung *Anemone* L. [Part 1]. Bot. Jahrb. Syst. 37(2): 172–257.

Uotila, P. 2001. *Anemone*, *Anemonidium*. Pp. 300–305, 310, in B. Jonsell (ed.). Flora Nordica, Vol. 2. Chenopodiaceae to Fumariaceae. Bergius Foundation, Royal Swedish Academy of Sciences, Stockholm.

Uotila, P. 2013. *Dysphania* sect. *Botryoides* (Amaranthaceae s. lat.) in Asia. Willdenowia 43: 65–80.

Wang, W.T. 1964. Duo genera nova Ranunculacearum Sinensium. Acta Phytotax. Sinica 9: 103–107. [In Chinese, with Latin descriptions].

Wang, W.T. and B. Bartholomew. 2001. *Pulsatilla*. Pp. 329–333, in Z.Y. Wu, P.H. Raven, and D.Y. Hong (eds.). Flora of China, Vol. 6. Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis.

Wang, W.T., S.N. Ziman, and B.E. Dutton. 2001. *Anemone*. Pp. 307–328, in Z.Y. Wu, P.H. Raven, and D.Y. Hong (eds.). Flora of China, Vol. 6. Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis.

Wang, W., A.-M. Lu, Y. Ren, M.E. Endress, and Z.-D. Chen. 2009. Phylogeny and classification of Ranunculales: Evidence from four molecular loci and morphological data. Persp. Plant Ecol. Evol. Syst. 11: 81–110.

Zãmels [Zämelis], A. 1926. Beiträge zur Kenntnis der Formenkreisses *Pulsatilla patens* (L.) Mill. Acta Horti Bot. Univ. Latviensis 1: 81–108.

Zhang, Y., H.-H. Kong, and Q.-E. Yang. 2015a. Phylogenetic relationships and taxonomic status of the monotypic Chinese genus *Anemoclema* (Ranunculaceae). Pl. Syst. Evol. 301: 1335–1344.

Zhang, Y., Y. Hon, C. Ren, M. Tang, S. Hoot, and Q.-E. Yang. 2015b. Palynology, cytology, and molecular systematics of *Anemone* section *Begoniifolia* (Ranunculaceae). Pl. Syst. Evol. 301: 411–424.

Ziman, S.N., Y. Kadota, C.S. Keener, E.V. Bulakh, and O.N. Tsarenko. 2004. A taxonomic revision of *Anemone* L. subgenus *Anemonanthea* (DC.) Juz. sensu lato (*Ranunculaceae*). I–III. J. Jap. Bot. 79(1): 43–71; 79(3): 196–206; 79(5): 281–310.

Ziman, S.N., F. Ehrendorfer, Y. Kadota, C.S. Keener, O.N. Tsarenko, E.V. Bulakh, and B.E. Dutton. 2005. A taxonomic revision of *Anemone* L. section *Omalocarpus* DC. sensu lato (*Ranunculaceae*). I. J. Jap. Bot. 80: 282–302.

Ziman, S.N., F. Ehrendorfer, Y. Kadota, C.S. Keener, O.N. Tsarenko, E.V. Bulakh, and B.E. Dutton. 2006a. A taxonomic revision of *Anemone* L. section *Omalocarpus* DC. sensu lato (*Ranunculaceae*). II. J. Jap. Bot. 81: 1–19.

Ziman, S.N., C.S. Keener, Y. Kadota, E.V. Bulakh, and O.N. Tsarenko. 2006b. A revision of *Anemone* L. (Ranunculaceae) from the Southern Hemisphere. J. Jap. Bot. 81: 193–224.

Ziman, S.N., F. Ehrendorfer, C.S. Keener, W.T. Wang, S.L. Mosyakin, E.V. Bulakh, O.N. Tsarenko, B.E. Dutton, R.P. Chaudhary, and Y. Kadota. 2007. The revision of *Anemone* sect. *Himalayicae* (Ranunculaceae), with three new series. Edinburgh J. Bot. 64: 51–99.

Ziman, S.N., E.V. Bulakh, Y. Kadota, and C.S. Keener. 2008. Modern view on the taxonomy of the genus *Anemone* L. sensu stricto (Ranunculaceae). J. Jap. Bot. 83: 127–155.

Ziman, S.N., F. Ehrendorfer, C. König, C.S. Keener, B.E. Dutton, O.N. Tsarenko, E.V. Bulakh, M. Boscaiu, F. Médail, and A. Kästner. 2009. Taxonomic revision, phylogenetics and transcontinental distribution of *Anemone* section *Anemone* (Ranunculaceae). Bot. J. Linn. Soc. 160: 312–354.

Ziman, S.M., Y. Kadota, and O. Bulakh. 2013. Comparative-morphological approaches to the taxonomy of the genus *Anemone* L. (Ranunculaceae) [Порівняльно-морфологічні підходи до таксономії роду *Anemone* L. (Ranunculaceae)]. Ukrayins'k. Bot. Zhurn. [Український ботанічний журнал] 70(2): 152–157. [In Ukrainian].