

TAXONOMIC AND NOMENCLATURE NOTES ON BALKAN COLUMBINES (*AQUILEGIA* L., RANUNCULACEAE)

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The endemic species *Aquilegia grata* Maly ex Zimmeter was originally described from Mt Orjen in south-western Montenegro, in the nineteenth century. At that time, a specimen collected by J. Pančić from western Serbia was erroneously designated as a paratype. This claim was later accepted and the majority of the authors and collectors mentioned this plant from the canyons of western Serbia, eastern Bosnia and northern Montenegro. Other authors thought that the species *A. amaliae* Heldr. ex Boiss. grew in this area, which was also incorrect. On the basis of the original herbarium material and the recently collected material from Mt Orjen, it became clear that the populations of the mentioned area (outside this mountain) actually belong to a new, still undescribed species. The name of the subspecies previously described from this area, *A. grata* subsp. *nikolicii* Niketić, was taken for the basionym. After the validation of the name, the taxon was raised to a specific rank as *A. nikolicii* (Niketić) Niketić & Cikovac. Two varieties are recognised within the species. Two new chorological records from western Serbia are also reported.

Key words: plant taxonomy, *Aquilegia*, Balkan Peninsula, endemic species

INTRODUCTION

This paper deals with problem to the taxonomy and nomenclature of some Dinaric species (western Balkan) in the genus *Aquilegia*. While the European species of the genus *Aquilegia* L. belong to particular phylogenetic group (Fior *et al.* 2013) and the south-eastern part of their geographic range produces one of the centres of the global generic diversity (Nold 2003), significant studies on the taxonomy of these columbines is lacking and their recent diversification remains unresolved (Fior *et al.* 2013). In the area of the Balkan Peninsula they can be differentiated into two groups separated morphologically and ecologically (Skalińska 1964). The first group includes mesophilous montane and subalpine species (such as *A. vulgaris* L. and *A. nigricans* Baumg.) with elongated follicles tapering gradually at the top. The second one includes mostly vicarious (oro)submediterranean calcicole chasmophytes which express more xerophilous adaptations (e.g. *A. ottonis* Orph. ex Boiss. and *A. kitaibelii* Schott) with broader follicles tapering abruptly at the top.

MATERIAL AND METHODS

Field investigations and collecting of herbarium material were carried out in Montenegro, western Serbia and eastern Bosnia and Herzegovina. Additional material was examined in herbarium collections (BEO, BEOU, BP, SARA, W, WU). The study and revision of the material was done according to the assessment of morphological characters and observed ecological and spatial patterns. Besides the field survey, checking and revision of the herbarium material, relevant literature sources were used for identification, taxonomic interpretation and spatial overview of the overall distribution of the investigated taxa. The taxonomic concept is based on surveyed herbarium material and literature data. Nomenclature changes have been made in agreement with ICB (McNeill *et al.* 2012). Distribution of taxa has been mapped on UTM grid system 34T (10×10 km grid).

RESULTS AND DISCUSSION

One of the critical taxa, *A. grata* Maly ex Zimmeter, is an endemic columbine of the south-eastern Dinaric Alps (Montenegro, Bosnia and Herzegovina and Serbia). On the basis of present knowledge, it is closely related to *A. ottonis* (Niketić 1992) which belongs to the aforementioned probably relictic group (Lakušić 1980). F. Maly discovered this columbine in 1864 in the present part of south-western Montenegro, in the area of Mt

Orjen (“Crivoscie”). The plant was described by Zimmeter (1875) after he had cultivated it for a few years in the Botanical Garden in Vienna:

Aquilegia grata Maly ex Zimmeter in Jahres-Ber. Staats-Ober-Realsch. Steyr 5: 21 (1875) (Fig. 1)

≡ *A. vulgaris* subsp. *grata* Brühl, Journ. Asiatic Soc. Bengal, 61(2): 299 (1893)

≡ *A. ottonis* Orph. ex Boiss. var. *grata* (Maly ex Zimmeter) Rapaics in Bot. Közlem. 8: 131 (1909)

The type specimens from Mt Orjen and the Botanical Garden were not exactly indicated in the protologue¹, but Zimmeter (1875) mentioned a specimen of the same taxon from western Serbia (Mokra Gora, leg. J. Pančić, May-1868, WU), originally identified as [Italian] *A. thalictrifolia* Schott & Kotschy. Specifying of this ‘paratype’ was probably both wrong and unnecessary given the significant incongruence between the original description of *A. grata* collected on Mt Orjen (concolorous flowers etc.) and examined traits in specimens found outside this Dinaric mountain (bicolorous flowers etc.) (Lakušić 1980, Niketić 1992). Following this record (Mokra Gora), similar columbines were subsequently found in eastern Bosnia, northern Montenegro and western Serbia (Malý 1908, Lakušić 1980, Lakušić & Redžić 1989, Niketić 1992, Gajić & Niketić 1992, as *A. grata*), but field observations at the ‘classical locality’ on Mt Orjen were not investigated. Some authors and collectors treated these plants as [Greek] *A. amaliae* Heldr. ex Boiss. (Hayek 1924, Cullen & Heywood 1964, Gajić 1970, Regula-Bevilacqua 1973, Greuter *et al.* 1989). It was suspected that there are actually two different taxa mentioned in Zimmeter’s protologue, but due to the lack of type specimens², this assumption has not been proven yet. Fortunately, well preserved exsiccates from the Botanical Garden in Vienna were revealed in BP a few years ago (*A. grata*, Dalmatia, in montibus Krivošije, cult. in horto Maly Vindobonac, 1889. jun 9, Dedit: Maly, Simonkai L., rev. B. Yauli [illegible] “prob. Hybr. *A. einseleana* × ? (cult. (non *A. grata!*)”, BP!), and even more, similar plants from Mt Orjen were recollected recently, very close to the type locality (leg. P. Cikovac). Fruits of these plants resemble those from the ‘*A. vulgaris-nigricans* group’ and similarities in ecological and other morphological traits are also obvious, which is not the case with plants from the remaining (northern) populations. It should be also borne in mind that the population from Mt Orjen is spatially and ecologically isolated

¹ Zimmeter (1875) pointed out only that exsiccates are contained in Bischof Heinald’s collection.

² Material from the Botanical Garden in Vienna is found in Pančić’s herbarium (leg. F. Maly, 2053 BEOU), but it is very scarce (Niketić 1992).

from northern populations – subadriatic oromediterranean woodland habitats (*Seslerio autumnalis-Abieti-Fagetum*) versus saxicolous communities in subcontinental canyons (*Amphoricarpetalia, Arabidetalia flavescens*)³.



Fig. 1. - *Aquilegia grata* Maly ex Zimmeter from south-western Montenegro (Mt Orjen). Photo by P. Cikovac.

Based on the above, the presence of a particular species is to be expected in northern populations. Niketić (1992) has already described a separate taxon from that region, *A. grata* subsp. *nikolicii* Niketić. It is questionable whether this name was validly published in accordance with ICN (McNeill *et al.* 2012: Art. 40.7) or not. Actually, in the paragraph with data on the type specimen an associated herbarium collection was not specified (Niketić 1992: 57). However, an acronym for a collection (BEO) was mentioned in the signatures of Figures 1 and 2 (Niketić 1992: 61). In any case, validation and designation of the name are presented now:

Aquilegia grata Maly ex Zimmeter subsp. *nikolicii* Niketić in Glasnik Prirodnjačkog muzeja u Beogradu B47: 57.

Holotype (validated and designated here): Serbia occident. – Bajina Bašta: fluv. Drina (scopulus apud pag. Perućac); in glareosis calcareis; exp. N; alt. c.a. 250 m; leg. M. Niketić, 11-Jun-1991 (A14 BEO).

Isotype: BEOU, W.

³ *A. grata* from Mt Orjen is also morphologically and ecologically separated from sympatric *A. dinarica* Beck, a saxicolous and frigidophilous altimediterranean species seen only in open habitats (*Micromerion croatica*).

This subspecies should be raised to a specific level, in accordance with the proposed taxonomic concept:

Aquilegia nikolicii (Niketić) Niketić & Cikovac, comb. et stat. nov. (Fig. 2)
 ≡ *A. grata* Maly ex Zimmeter subsp. *nikolicii* Niketić in Glasnik Prirod-
 njačkog muzeja u Beogradu B47: 57 (validated and designated in this paper)
 – *A. grata* auct., non Maly ex Zimmeter 1875



Fig. 2. - *Aquilegia nikolicii* (Niketić) Niketić & Cikovac from western Serbia:
 a) *A. n.* var. *nikolicii* from the Drina River canyon in vicinity of Bajina Bašta
 (Peručac village); b-d) *A. n.* var. *pancicii* Niketić from the Beli Rzav canyon in
 vicinity of Mokra Gora (Kršanje village).

Photo by M. Niketić.

Description:

For a detailed description and iconography see Turrill (1935, sub *A. grata*). For morphological differences between *A. nikolicii* and related species (*A. grata* from Mt Orjen, *A. ottonis* and *A. dinarica*) see Niketić (1992: 60, sub *A. grata*).

Variability:

Niketić (1992) recognized two subspecies in that area (*A. grata* subsp. *nikolicii* and *A. g.* subsp. *grata*). However, subsequent field investigations and herbarium inspection have shown that both taxa can occasionally be found at the same locations. Consequently these subspecies must be lowered to the rank of varieties:

a) *A. nikolicii* var. *nikolicii*

– *A. amaliae* sensu Pančić in Dodatak Flori Kneževine Srbije: 105 (1884), non Heldr. ex Boiss. (1854); auct.

Description: Basal and cauline leaves finely hairy above and beneath, rarely glabrous above; without or with very thin glandular hairs. For other diagnostic details see Niketić (1992: 58, sub *A. grata* subsp. *nikolicii*).

Upper surface of leaves glabrous - *A. nikolicii* f. *calvescens* (Niketić) Niketić, comb. nova; basyon. *A. grata* f. *calvescens* Niketić op. cit.: 58. Holotype (see Niketić l.c., validated and designated here): A15 BEO.

b) *A. nikolicii* var. *panicii* Niketić, var. nov.

– *A. viscosa* sensu Pančić in Österr. Bot. Zeit. 17: 168 (1867), non Gouan (1765)

– *A. thalictrifolia* sensu Pančić in Flora Kneževine Srbije: 117 (1874), non Schott & Kotschy (1853)

– *A. panicii* sensu Regula-Bevilacqua in Trinajstić, Analitička Flora Jugoslavije 1(2): 364 (1973), non Degen (1905)

– *A. grata* subsp. *grata* sensu Niketić op. cit.: 58

Holotype: Serbia occident. – in rupestribus calcareis ad Mokra Gora; leg. J. Pančić, May-1868, sub *A. thalictrifolia*, rev. V. Borbás 1854, sub *A. ottonis*, rev. A. Zimmer 1871, sub *A. grata* (033938 WU).

Description: The whole plant is dense glandular viscid. For other diagnostic details see Niketić (1992: 58, sub *A. grata* subsp. *grata*).

Distribution:

A. nikolicii is an east Illyrian endemic species apparently limited to the moist canyons from the Drina River Basin, in eastern Bosnia, northern Montenegro and western Serbia (Fig. 3). Only one population, at the easternmost locality, reached the catchment area of the Western Morava River

(Potpećka Cave near Užice, western Serbia, DP14). Species are known from ca. 30 localities distributed in 15 UTM grid squares 10×10 km.

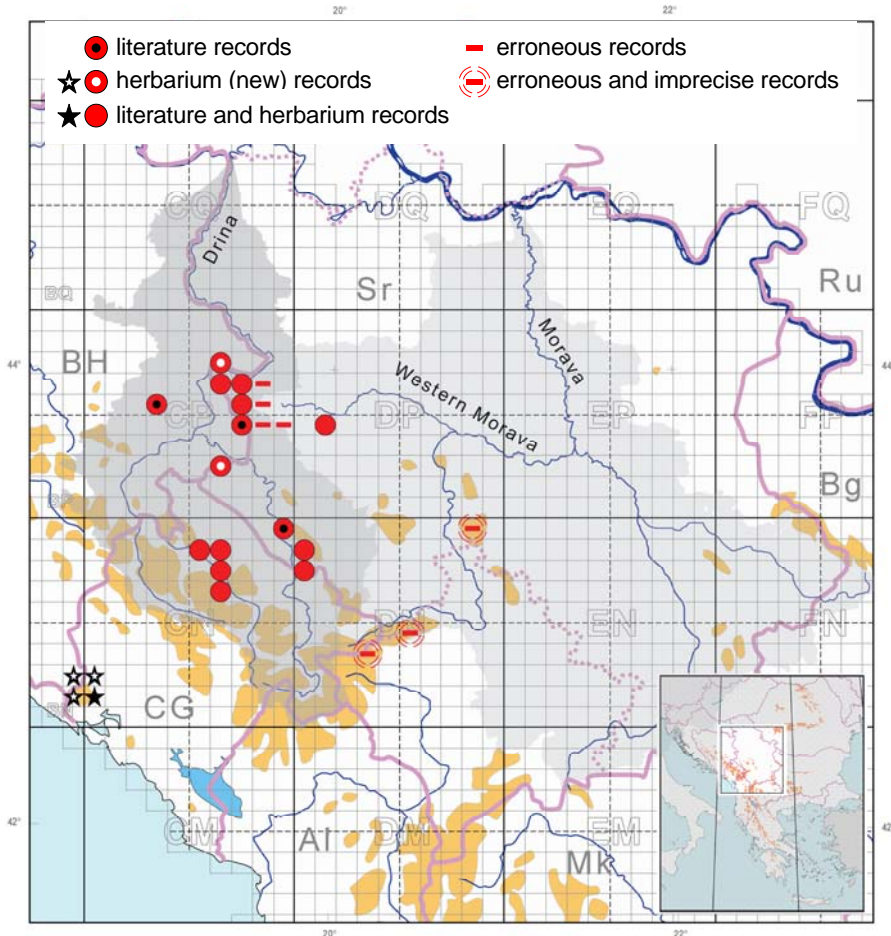


Fig. 3. - Distribution of *Aquilegia grata* (stars) and *A. nikolicii* (circles) on a 10×10 km UTM grid map (UTM Zone 34T). New records include findings that so far have not been registered in the literature for individual UTM squares. Catchments of the Drina and Morava rivers are shaded.

New records for Serbia:

Western Serbia, Mt Tara: canyon of the Grlac Stream, rocks, 300 m, limestone, CP67, coll./det. M. Niketić, S. Jovanović, G. Tomović 03-Jul-1998 (19980711 BEO, 12583 BEOU).

Western Serbia, Priboj: Sjeverin village (canyon of the Sutjeska River), rocks, 400-450 m, limestone, CP62, coll./det. M. Niketić, G. Tomović 13-Aug-2008 (20080804 BEO, 27986 BEOU).

Ecology:

It grows between 250 and 1200 *m s.m.* in the zones of *Ostrya carpinifolia*, *Pinus nigra*, *Fagus sylvatica*, *Picea omorika* or in mixed forests. Usually prefers limestone rock crevices and screes in moist and shady places. It is a member of the chasmophytic community *Centaureo derwentanae-Seslerietum tenuifoliae* (Gajić & Niketić 1992).

IUCN threatened status:

In the global IUCN Red List of Threatened Plants (Walter & Gillett 1998) *A. grata* [s.l.] has rare status (R). It could be assumed that the same estimation applies to *A. nikolicii*, given that the majority of populations previously treated as *A. grata* actually belong to this species. The species has a vulnerable status (VU) in accordance with newer IUCN categories (estimated here).

CONCLUSIONS

There are three taxonomic issues to resolve concerning the name *A. grata* (Niketić 1992). The first of them is settled now, as it has been shown that the population from Mt Orjen and other populations (previously treated as *A. grata*) actually belong to two different species: *A. grata* and *A. nikolicii*. The two remaining questions are: “whether it [*A. grata*] represents an infraspecific category or a synonym of some other taxon – or the reverse –; or, is it perhaps an independent taxon” (Niketić 1992). In particular it seems to be closely related to *A. nigricans* which is also recorded for Mt Orjen (Malý & Bjelčić 1949). However, *A. grata* differs in having smaller mauve-violet flowers, shorter laminae (6-7 *mm* long), shorter spur (16-18 *mm* long), a more pronounced projection of its stamens, a sometimes erect flower, foliage segments inserted to only 1/3 of the leaflet, greyish green (not whitish) lower leaflet colour and rounded oblong lobes (not toothed with rounded oblong teeth). Therefore, the taxonomy and distribution of *A. grata* (currently known only from Mt Orjen) will be the subject of further research.

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REFERENCES

- Fior, S., Li, M., Oxelman, B., Viola, R., Hodges, S. A., Ometto, L., Varotto, C. (2013): Spatiotemporal reconstruction of the *Aquilegia* rapid radiation through next-generation sequencing of rapidly evolving cpDNA regions. - *New Phytologist* 198(2): 579-592.

- Gajić, M., Niketić, M. (1992): Rod *Aquilegia* L. In: Sarić, M. (ed.): Flora Srbije ed. 2, 1: 290-299. – Srpska Akademija nauka i umetnosti, Odeljenje prirodno-matematičkih nauka, Beograd. [In Serbian]
- Greuter, W., Burdet, H. M., Long, G. (1989): Med-Checklist 4. – Conservatoire et Jardin botaniques de la Ville de Genève, Med-Checklist Trust of OPTIMA, Genève.
- Hayek, A. (1924): Prodromus Florae Peninsulae balcanicae 1(2). - **Feddes. Repert. (Beih.)** 30(1): 161-352.
- Lakušić, R. (1980): Dvadesetpet novih vrsta u flori Crne Gore. - **Glasnik Republičkog zavoda za zaštitu prirode i Prirodnjačkog muzeja, Titograd** 13: 15-21. [in Montenegrin with English Abstract]
- Lakušić, R., Redžić, S. (1989): Flora i vegetacija vaskularnih biljaka u refugijalno-reliktnim ekosistemima kanjona rijeke Drine i njenih pritoka. - **Crnogorska akademija nauka i umjetnosti, Glasnik Odeljenja prirodnih nauka** 7: 107-206. [in Montenegrin with English Summary]
- Malý, K. (1908): Beitrage zur Kenntniss der illyrischen Flora. - **Magyar Botanikai Lapok** 7(4-8): 203-240.
- Malý, K., Bjelčić Ž. (1949): Prilog poznavanju flore okoline Dobruna kod Višegrada. – **Godišnjak Biološkog instituta u Sarajevu** 2(1-2): 3-16. [in Serbo-croatian]
- McNeill, J., Barrie, F. R., Buck, W. R., Demoulin, V., Greuter, W., Hawksworth, D. L., Herendeen, P. S., Knapp, S., Marhold, K., Prado, J., Prud'homme van Reine W. F., Smith, G. F., Wiersema, J. H., Turland, N. J. (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 Vegetabilia** 154: i-xxx, 1-208.
- Niketić, M. (1992): A taxonomical-chorological differentiation of species *Aquilegia grata* F. Maly ex Zimmeter and *Aquilegia ottonis* Orph. ex Boiss. (Ranunculaceae). - **Glasnik Prirodnjačkog Muzeja u Beogradu** B47: 53-66.
- Nold, R. (2003): Columbines. *Aquilegia*, *Paraquilegia* and *Semiaquilegia*. – Timber Press, Cambridge.
- Regula-Bevilacqua, L. (1973): *Aquilegia* L. In: Trinajstić, I. (ed.): Analitička flora Jugoslavije 1(2): 359-367. – Institut za botaniku Sveučilišta u Zagrebu, Zagreb. [In Croatian]
- Skalińska, M. (1964): Studies in the origin of some European species of *Aquilegia*. - **Acta Biologica Cracoviensia, Series Botanica** 7: 1-23.
- Turrill, W. B. (1935): *Aquilegia grata*. - **Curtis's Botanical Magazine** 158: Tab. 9405.
- Walter, K. S., Gillett H. J. (eds) (1998): 1997 IUCN Red List of Threatened Plants. – IUCN, Gland, University Press, Cambridge.
- Zimmeter, A. (1875): Verwandtschafts-Verhältnisse und geographische Verbreitung der in Europa einheimischen Arten der Gattung *Aquilegia*. - **Jahresbericht der k.k. Staats-Ober-Realschule Steyr** 5: 1-66.

**ТАКСОНОМСКИ И НОМЕНКЛАТУРНИ ПРИЛОЗИ О БАЛКАНСКИМ
КАНДИЛКАМА (*AQUILEGIA* L., *RANUNCULACEAE*)**

МАРЈАН НИКЕТИЋ, ПАВЛЕ ЦИКОВАЦ, ВЛАДИМИР СТЕВАНОВИЋ

РЕЗИМЕ

Ендемична врста *Aquilegia grata* Maly ex Zimmeter првобитно је описана са планине Орјен у југозападној Црној Гори (Zimmeter 1875), при чему је као паратип погрешно наведен примерак из западне Србије којег је сакупио Ј. Панчић. Ова тврдња је касније прихваћена и од већине аутора и сакупљача који су врсту наводили и за кањоне западне Србије, источне Босне и северне Црне Горе (Maly 1908, Lakušić 1980, Lakušić & Redžić 1989, Niketić 1992, Gajić & Niketić 1992). Други аутори су сматрали да је на овом подручју заправо заступљена врста *A. amaliae* Heldr. ex Boiss. (Hayek 1924, Cullen & Heywood 1964, Gajić 1970, Regula-Bevilacqua 1973, Greuter *et al.* 1989), што такође није било исправно. На основу увида у изворни хербарски материјал, као и материјал недавно сакупљен са планине Орјен, постало је јасно да популације на наведеном подручју (изван ове планине) заправо припадају новој, још неописаној врсти. Име подврсте претходно описане са овог подручја, *A. grata* subsp. *nikolicii* Niketić, употребљено је као базионим. Након извршене легализације имена, таксон је подигнут на ранг врсте, *A. nikolicii* (Niketić) Niketić & Sikovac. У оквиру врсте издвојена су два варијетета. Такође су наведена и два нова локалитета са подручја западне Србије.