

RESEARCH ARTICLE

## Genus *Aconitum* in Slovakia: a phenetic approach

Andriy Novikov \*

State Natural History Museum NAS of Ukraine, Teatralna str. 18, 79008 Lviv, Ukraine; novikoffav@gmail.com

\* Andriy Novikov formerly known as Andrew Novikoff starting from 2017 changed spelling variant of his name in accordance to legislation limitations

Received: 23.04.2017 | Accepted: 28.06.2017 | Published: 23.07.2017

---

### Abstract

Comprehensive investigation on herbarium material was realized and taxonomical structure of the genus *Aconitum* in Slovakia has been ascertained on the base of phenetic analysis. Three new taxa (i.e. *A. degenii* subsp. *degenii*, *A. moldavicum* subsp. *hosteanum*, and *A. moldavicum* nothosubsp. *confusum* stat. nov.) were rediscovered for this region, and for one of them the new status was proposed. Morphological variation of *A. anthora* and its subdivision onto infraspecific taxa (subsp. *anthora* and subsp. *jacquinii*) are discussed. The new key for identification and maps of distribution are represented.

**Keywords:** *Aconitum*, Slovakia, morphology, phenetics, distribution, taxonomy

---

### Introduction

In spite of long history of investigation, taxonomy of the genus *Aconitum* L. is still much discussed and remains unresolved. Many taxonomic problems arise from the notorious hybridity within the genus and subsequent origin of number of putative hybridogenic taxa, which form a morphological continuum between the parental taxa (Kadota 1987; Starmühler 2001). Another problem is that

different morphological traits of monkshoods were considered for genus taxonomy by different authors, and therefore very often taxonomic ranges vary significantly for the same taxonomic units (Götz 1967; Kmet'ová 1982; Skalický 1990; Kadota 1987; Voroshilov 1990; Tamura 1995; Tzvelev 2001). Recent revisions based on morpho-geographical concept of species (Davis & Haywood 1963) and concept of infraspecific differentiation (Skalický 1982) led to unification and progress

in taxonomy of the genus *Aconitum* in countries of Carpathian region (Mitka 2003, 2008a; Starmühler & Mitka 2001; Starmühler 2002; Mitka & Szajna 2009; Boroń 2010; Boroń *et al.* 2011; Novikoff & Mitka 2011; Sutkowska *et al.* 2013; Mitka *et al.* 2013, 2016; Novikoff *et al.* 2016; Waclawska-Ćwiertnia & Mitka 2016).

Accordingly to Flora of Slovakia (Kmeťová 1982), genus *Aconitum* here includes 7 taxa (*A. lycoctonum* L. em. Koelle, *A. moldavicum* Hacq., *A. variegatum* L., *A. lasiocarpum* (Rchb.) Gayer, *A. firmum* Rchb. subsp. *firmum*, *A. firmum* subsp. *moravicum* Skalický, and *A. anthora* L.). Kmeťová (1982) noted that in flora of Slovakia four subspecies of *A. lycoctonum* (subsp. *vulparia* (Rchb.) Schinz et Thell., subsp. *puberulum* (Ser.) Gayer, subsp. *thalianum* (Wall.) Gayer, and subsp. *penninum* (Ser.) Gayer) are sometimes distinguished mostly on the base of variation in pubescence. For example, subdivision of *A. lycoctonum* on subsp. *vulparia* and subsp. *puberulum* was accepted by Domin (1935), and subdivision of *A. lycoctonum* on subsp. *vulparia*, subsp. *puberulum*, and subsp. *penninum* – later by Dostál (1958). But Kmeťová (1982) did not accept such partition, arguing that considered traits make a morphological continuum in *A. lycoctonum*. She also noted that sometimes *A. lasiostomum* Rchb. is reported from adjacent regions, perhaps this species does not occur in Slovakia. For *A. moldavicum*, Kmeťová (1982) reported var. *australe* (Rchb. ex Baumg.) Grinț with villous carpels (“s chlpatými mechúrikmi”) from Eastern part of Slovakia. In the same time, she suggested that *A. moldavicum* subsp. *hosteanum* (Schur) Graebner et P. Graebner in Aschers. et Graebner most probably does not occur here, although it was reported for Czechoslovakia by Domin (1935) and Dostál (1958).

Domin (1935) and Skalický (1966) distinguished 3 species of aconites from *Variegatum* group (i.e. *A. variegatum*, *A. gracile* Rchb. and *A. dominii* Sillinger), which also were accepted by Dostál (1958), however in range of subspecies – subsp. *variegatum*, subsp. *gracile* (Rchb.) Gayer, and subsp. *dominii* (Sillinger) Dostál. consequently. Moreover,

in Skalický (1982) only *A. variegatum* is mentioned. Kmeťová (1982) mentioned in Flora of Slovakia three subspecies of *A. variegatum* (subsp. *gracile*, subsp. *dominii*, and subsp. *kotulae*), but concluded that they make morphological intermediations.

Kmeťová (1982) also mentioned that besides of *A. firmum*, for Slovakia *A. tauricum* Wulf. (Domin 1935; Skalický 1966) or *A. napellus* L. subsp. *tauricum* (Wulf.) Gayer (Dostál 1958) are sometimes considered. Finally, she noted that *A. anthora* is highly variable taxon and delimitation of var. *jacquinianum* G. Beck has poor taxonomic background.

Starmühler (2002) published the key for identification of Slovakian aconites with 14 taxa including 6 hybrids (*A. lycoctonum* subsp. *lycoctonum*, *A. moldavicum* subsp. *moldavicum*, *A. anthora* subsp. *anthora*, *A. variegatum* subsp. *variegatum* var. *variegatum*, *A. × pawlowskii* Mitka et Starmühl., *A. lasiocarpum* subsp. *kotulae* (Pawl.) Starmühl. et Mitka, *A. × lengyelii* Gayer nothosubsp. *lengyelii* (= *A. × berdaui* Zapal. nothosubsp. *berdaui* in accordance to Mitka (2003)), *A. × lengyelii* nothosubsp. *walasii* Mitka (= *A. × berdaui* nothosubsp. *walasii* (Mitka in Starmühler et Mitka) Mitka in accordance to Mitka (2003)), *A. firmum* subsp. *firmum*, *A. firmum* subsp. *moravicum*, *A. firmum* subsp. *maninense* (Skalický) Starmühl., *A. firmum* subsp. *firmum* × *A. firmum* subsp. *maninense*, *A. firmum* nothosubsp. *paxii* Starmühl., and *A. firmum* nothosubsp. *zapalowiczii* Starmühl.). In addition, Mitka (2003, 2008a) later reported for Slovakia 5 more taxa – *A. × cammarum* L. em. Fries, *A. × triste* (Rchb.) Gayer (also mentioned for Czechoslovakia by Domin (1935)), *A. lasiocarpum* subsp. *lasiocarpum*, *A. × gayeri* Starmühl. and *A. × hebegynum* DC.

Taking into account mentioned publications, the genus *Aconitum* in flora of Slovakia could be represented at least by 19 taxa. In this paper I provide results of investigations on morphological variability and taxonomic structure of this genus in Slovakia on the base of analysis of herbarium material and published works.

## Material and methods

Herbarium investigations were conducted in 2012–2013 in project frames of National Scholarship Programme of the Slovak Republic entitled “Taxonomy and chorology of the genus *Aconitum* L. (Ranunculaceae) in Slovakian flora”. Preliminary results of this study (supposed taxonomic structure of the genus in Slovakia) were published in 2013 (Novikoff 2013) and deposited online at <http://slovaconitum.myspecies.info/> (Novikoff 2013–2017). However, in 2017 obtained data were revised and reevaluated, all of taxonomic and phenetic studies were redone.

In general more than 3000 herbarium vouchers were analyzed from 7 main repositories (Append. 1): Institute of Botany SAS (SAV, Bratislava), Comenius University in Bratislava (SLO), Slovak National Museum (BRA, Bratislava), Slovak University of Agriculture in Nitra (NI), Technical University in Zvolen (ZV), Pavol Jozef Šafárik University (KO, Košice), and Museum of Tatra National Park (TNP, Tatranská Lomnica). From total number, 970 specimens were included into chorological database; 450 specimens were included in phenetic database and tested with 115 morphological traits (Tab. 1). For different taxonomic groups (*Lycotconum*, *Anthora*, *Cammarum* and *Aconitum*) inside the genus, different combinations of treats were applied for advanced partial analyses (Tab. 1). Additionally, main recent literature sources (Mitka & Starmühler 2000; Mitka 2003, 2008a) were analyzed for mention of *Aconitum* specimens from Slovakia nested in herbaria abroad. Finally, the maps from Flora of Slovakia (Kmeťová 1982) were digitized and extracted landmarks were applied in our research too (Append. 2).

For statistical analysis the Past 3.14 was used (Hammer *et al.* 2001). For correlation statistics linear  $r$  (Pearson's) was applied. For multivariate analysis UPGMA and Ward's clustering methods were applied in combination with Euclidian index of similarity and  $N = 100$  bootstrap support. For ordination non-metric multidimensional scaling was

applied in combination with Euclidian index of similarity.

Distribution maps were built in QGIS 2.18 (QGIS Development Team 2017) with WGS84 (EPSG: 4326) geographical coordinate system and after that transformed in J-TSK\_Krovak (EPSG: 102065) projection system, which is commonly applied in Slovakia for better visualization (Annoni *et al.* 2001). Maps from Kmeťová (1982) were imported to QGIS as independent geotiff layers with Polygonal 1 WGS 84 transformation mode, and after that separated layers with landmarks corresponding to points on that maps were generated.

For taxonomic verification IPNI (2017) and The Plant List (2017) databases were used. For developing of website, the free CMS Scratchpads 2.0 was applied (Smith *et al.* 2012).

The raw datasets of treats applied for phenetic analyses (S20, S21, S22, S23, S24, S25, S26, S27, S28) and database of analyzed specimens with generated coordinates of locations (S29 & S30) are freely available in Zenodo and I kindly welcome researchers to use them for any investigation purposes.

## Results

General analysis was performed for 450 samples and full dataset of 115 morphological traits (Tab. 1). Cluster analysis (both UPGMA and Ward's methods) showed good delimitation of main taxonomic groups (*i.e.* sections and subgenera) in the genus *Aconitum*, however in most cases did not allow discrimination of taxa on species and subspecies levels, as well as of some hybrid taxa (Figs. 1 & S1). Multidimensional scaling showed good delimitation of group *Lycotconum* by first two axes however did not show any good limits between this and other groups on second scatterplot. Groups *Anthora*, *Cammarum*, *Acomarum* and *Aconitum* were significantly overlapped (Fig. S2). Therefore I provided further statistical analyses on separated taxonomic groups representing sections with exclusion of uninformative traits.

**Table 1.** Initial set of analyzed morphological traits. For partial analyses: + – analyzed for full set of treats of separated taxonomic groups; \* – analyzed for limited set of traits selected for each of separated taxonomic groups.

| Nr | Group of traits        | Trait                                  | <i>Lycotconum</i> | <i>Anthora</i> | <i>Cammarum</i> | <i>Aconitum</i> |
|----|------------------------|--|-------------------|----------------|-----------------|-----------------|
| 1  | Helmets                | glabrous                               | +                 |                | +               | +               |
| 2  |                        | sparsely pubescent                     | +                 |                | +               | +               |
| 3  |                        | moderately pubescent                   | +                 |                | +               | +               |
| 4  |                        | densely pubescent                      | +                 |                | +               | +               |
| 5  |                        | with short curved trichomes            | +                 | +              |                 | +               |
| 6  |                        | with protruding straight trichomes     |                   | +              | +               | +               |
| 7  |                        | with mixed trichomes                   |                   | +              |                 | +               |
| 8  | Carpels                | glabrous                               | +                 |                | +               | +               |
| 9  |                        | ventral pubescent                      |                   |                | +               |                 |
| 10 |                        | dorsal pubescent                       | +                 |                | +               | +               |
| 11 |                        | sparsely pubescent                     | +                 |                | +               | +               |
| 12 |                        | densely pubescent                      | +                 |                | +               | +               |
| 13 |                        | with short curved trichomes            | +                 | +              |                 | +               |
| 14 |                        | with protruding straight trichomes     | +                 | +              | +               |                 |
| 15 | Stamens                | glabrous                               | +                 |                | +               | +               |
| 16 |                        | sparsely pubescent                     | +                 |                | +               | +               |
| 17 |                        | densely pubescent                      | +                 |                | +               |                 |
| 18 |                        | All pubescent                          | +                 |                |                 |                 |
| 19 |                        | Part of them pubescent                 | +                 |                |                 | +               |
| 20 | Upper part of pedicels | glabrous                               |                   |                | +               | +               |
| 21 |                        | pubescent only at receptacle           |                   |                |                 |                 |
| 22 |                        | sparsely pubescent                     |                   |                |                 |                 |
| 23 |                        | moderately pubescent                   |                   |                | +               | +               |
| 24 |                        | densely pubescent                      |                   |                | +               | +               |
| 25 |                        | with short curved trichomes            |                   | +              |                 | +               |
| 26 |                        | with protruding straight trichomes     |                   | +              | +               | +               |
| 27 |                        | with mixed trichomes                   |                   | +              |                 | +               |
| 28 | Lower part of pedicels | glabrous                               |                   |                | +               | +               |
| 29 |                        | sparsely pubescent                     |                   |                |                 | +               |
| 30 |                        | moderately pubescent                   |                   |                | +               | +               |
| 31 |                        | densely pubescent                      |                   |                | +               | +               |
| 32 |                        | with short curved trichomes            |                   | +              |                 | +               |
| 33 |                        | with protruding straight trichomes     |                   | +              | +               | +               |
| 34 |                        | with mixed trichomes                   |                   | +              | +               |                 |
| 35 | Bracteoles             | glabrous                               |                   |                | +               | +               |
| 36 |                        | ciliate (pubescent along margins only) |                   |                |                 | +               |
| 37 |                        | sparsely pubescent                     |                   |                | +               | +               |

Table 1. Continued.

| Nr | Group of traits                 | Trait                              | <i>Lycocotnum</i> | <i>Anthora</i> | <i>Cammarum</i> | <i>Aconitum</i> |
|----|---------------------------------|------------------------------------|-------------------|----------------|-----------------|-----------------|
| 38 | Bracteoles                      | moderately pubescent               |                   |                | +               | +               |
| 39 |                                 | densely pubescent                  |                   |                | +               | +               |
| 40 |                                 | with short curved trichomes        |                   | +              |                 | +               |
| 41 |                                 | with protruding straight trichomes |                   | +              | +               | +               |
| 42 | Inflorescence axes              | glabrous                           |                   |                | +               | +               |
| 43 |                                 | sparsely pubescent                 |                   |                | +               | +               |
| 44 |                                 | moderately pubescent               | +                 |                | +               | +               |
| 45 |                                 | densely pubescent                  | +                 |                | +               | +               |
| 46 |                                 | with short curved trichomes        |                   | +              | +               | +               |
| 47 |                                 | with protruding straight trichomes |                   |                | +               | +               |
| 48 |                                 | with mixed trichomes               |                   | +              |                 |                 |
| 49 | Stems                           | glabrous                           | +                 |                | +               | +               |
| 50 |                                 | sparsely pubescent                 | +                 |                | +               | +               |
| 51 |                                 | moderately pubescent               | +                 | +              | +               | +               |
| 52 |                                 | densely pubescent                  | +                 | +              |                 | +               |
| 53 |                                 | with short curved trichomes        | +                 |                |                 | +               |
| 54 |                                 | with protruding straight trichomes | +                 |                | +               | +               |
| 55 |                                 | with mixed trichomes               | +                 |                |                 |                 |
| 56 | Petioles                        | glabrous                           | +                 |                | +               | +               |
| 57 |                                 | sparsely pubescent                 | +                 |                |                 | +               |
| 58 |                                 | moderately pubescent               | +                 | +              | +               |                 |
| 59 |                                 | densely pubescent                  | +                 | +              |                 | +               |
| 60 |                                 | with short curved trichomes        | +                 |                |                 | +               |
| 61 |                                 | with protruding straight trichomes | +                 |                | +               | +               |
| 62 |                                 | with mixed trichomes               | +                 |                |                 |                 |
| 63 | Adaxial surface of leaf laminae | glabrous                           | +                 |                | +               | +               |
| 64 |                                 | pubescent along veins              | +                 |                |                 |                 |
| 65 |                                 | sparsely pubescent                 | +                 |                | +               | +               |
| 66 |                                 | moderately pubescent               | +                 |                |                 |                 |
| 67 |                                 | densely pubescent                  | +                 |                |                 |                 |
| 68 |                                 | with short curved trichomes        | +                 |                |                 | +               |
| 69 |                                 | with protruding straight trichomes | +                 |                | +               |                 |
| 70 | Abaxial surface of leaf laminae | glabrous                           | +                 |                | +               | +               |
| 71 |                                 | pubescent along veins              | +                 |                | +               | +               |
| 72 |                                 | sparsely pubescent                 | +                 |                |                 | +               |
| 73 |                                 | with short curved trichomes        | +                 |                |                 | +               |
| 74 |                                 | with protruding straight trichomes | +                 |                | +               |                 |
| 75 | Perianth color                  | pale yellow                        |                   | +              |                 |                 |
| 76 |                                 | yellow                             | +                 | +              |                 |                 |

Table 1. Continued.

| Nr  | Group of traits | Trait                                   | <i>Lycotconum</i> | <i>Anthora</i> | <i>Cammarum</i> | <i>Aconitum</i> |
|-----|-----------------|---|-------------------|----------------|-----------------|-----------------|
| 77  | Perianth color  | dirty blue                              | +                 |                |                 |                 |
| 78  |                 | violet                                  | +                 |                |                 |                 |
| 79  |                 | blue                                    |                   |                | +               |                 |
| 80  |                 | variegate                               |                   |                | +               |                 |
| 81  | Helmet shape    | bean-shaped                             |                   | +              |                 |                 |
| 82  |                 | crescent                                |                   |                |                 | +               |
| 83  |                 | hemispherical                           |                   | +              | +               | +               |
| 84  |                 | conical                                 |                   |                | +               | +               |
| 85  |                 | elongated conical                       |                   |                | +               |                 |
| 86  |                 | cylindrical                             |                   |                |                 |                 |
| 87  | Nectaries       | not reaching the top of helmet          |                   |                | +               | +               |
| 88  |                 | reaching the top of helmet              |                   |                | +               | +               |
| 89  |                 | spurs ecapitate / capitate              |                   |                |                 | +               |
| 90  |                 | spurs semi-spiral / curvedbackward bent |                   |                |                 |                 |
| 91  |                 | spurs coiled                            |                   |                |                 |                 |
| 92  |                 | spurs deflected bent                    |                   |                |                 |                 |
| 93  |                 | claws adjoined                          |                   |                |                 | +               |
| 94  |                 | claws outstanding                       |                   |                |                 | +               |
| 95  | Carpels         | 3                                       |                   |                | +               | +               |
| 96  |                 | 5                                       |                   |                | +               | +               |
| 97  | Stamens         | without protuberances                   |                   |                | +               | +               |
| 98  |                 | part of them with protuberances         |                   |                | +               | +               |
| 99  |                 | all of them with protuberances          |                   |                |                 | +               |
| 100 | Bracteoles      | reaching the receptacle                 |                   |                | +               | +               |
| 101 |                 | narrower than pedicels                  |                   |                | +               | +               |
| 102 |                 | as wide as pedicels                     |                   |                | +               | +               |
| 103 |                 | wider than pedicels                     |                   |                | +               | +               |
| 104 |                 | entire                                  |                   |                |                 | +               |
| 105 |                 | divided                                 |                   |                |                 | +               |
| 106 | Pedicels        | longer than flowers                     |                   |                | +               | +               |
| 107 | Inflorescences  | simple                                  | +                 | +              | +               | +               |
| 108 |                 | condensed compound                      | +                 | +              | +               | +               |
| 109 |                 | ramified compound                       | +                 | +              | +               | +               |
| 110 | Shoots          | orthotropic                             | +                 |                | +               |                 |
| 111 |                 | semirosulate                            |                   |                |                 |                 |
| 112 |                 | nonrosulate                             |                   |                |                 |                 |
| 113 | Leaves          | leaf to internode index > 3             |                   |                | +               | +               |
| 114 | Perianth        | deciduous after blooming                |                   |                |                 |                 |
| 115 | Life forms      | polycyclic monocarpous                  |                   |                |                 |                 |

***Lycoctonum* group**

152 specimens and 50 morphological traits selected among total 115 (Tab. 1, pluses) were analyzed. Neither cluster analysis (Figs. S3 & S4) nor multidimensional scaling (Fig. S5) did not show appropriated results, randomly mixing specimens from *A. moldavicum*, *A. lycoctonum* and *A. × triste* (*A. lycoctonum* × *A. moldavicum*). This explains by fact that these taxa are mainly differentiated by color of perianth, which is from dirty-blue to purple-violet in *A. moldavicum*, from whitish to yellow in *A. lycoctonum*, and yellowish-bluish in *A. × triste* (Skalický 1990; Mitka 2008a). In all three species, helmet is usually covered by short curved trichomes. But density of such pubescence significantly varies in *A. moldavicum*, where helmet can be even entirely glabrous or with only few sparsely distributed trichomes. While in studied specimens of *A. × triste* and *A. lycoctonum* helmets were always densely covered by curved trichomes.

In *A. lycoctonum* and *A. × triste* carpels can be either glabrous or covered by short curved trichomes. In *A. moldavicum* character of carpels' pubescence plays the key role for delimitation of subspecies. In *A. moldavicum* subsp. *moldavicum* carpels are glabrous. In *A. moldavicum* subsp. *hosteanum* carpels are entirely covered by short curved trichomes.

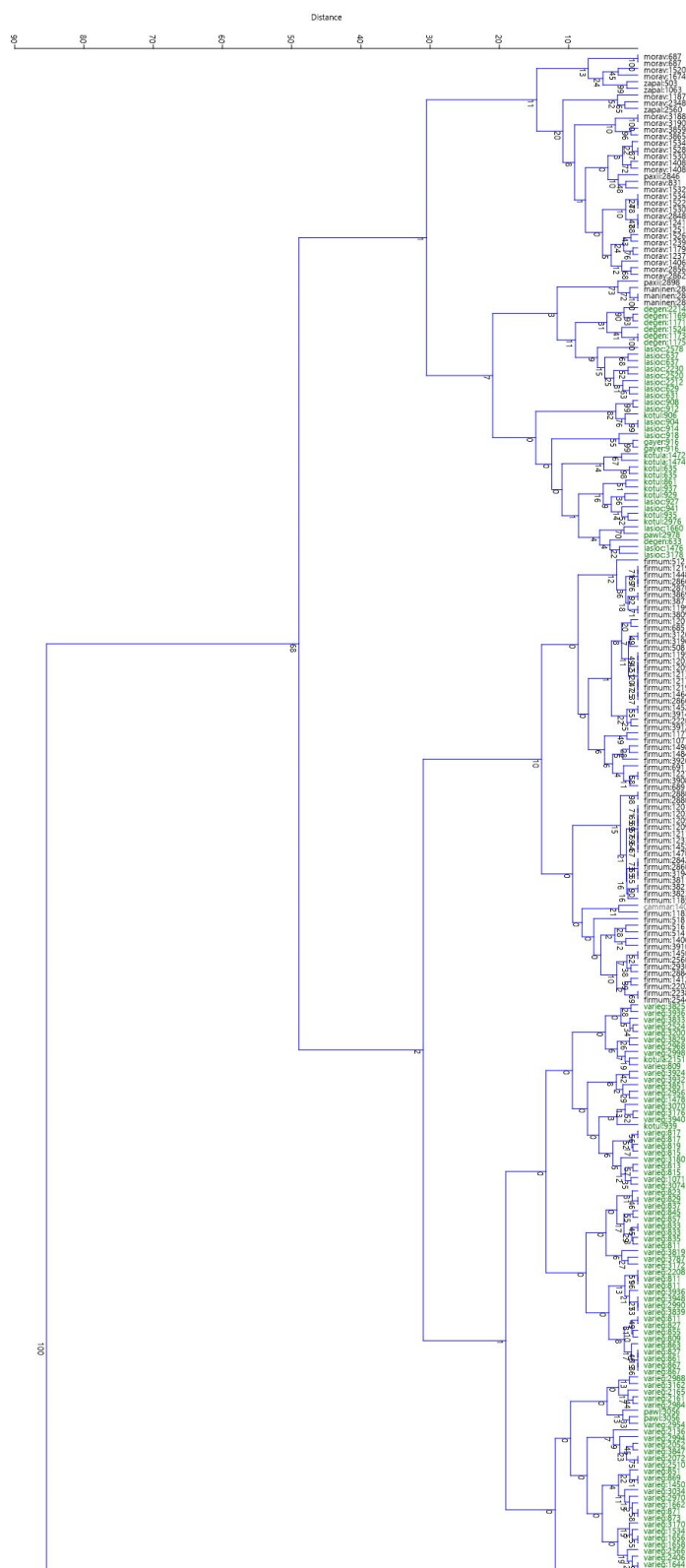
There are also several other hybrids distinguished on the base of perianth color and pubescence of carpels. For example, in *A. moldavicum* nothosubsp. *simonkaianum* (Gáyer) Starmühl. (*A. lasiostomum* × *A. moldavicum* subsp. *hosteanum*) carpels are villous – entirely covered by protruding long trichomes (Starmühler 1998; Mitka 2008a). In *A. × porcii* Starmühl. (*A. moldavicum* subsp. *moldavicum* × *A. moldavicum* nothosubsp. *simonkaianum*) helmet is purple-violet; carpels are with mixed (villous at the base and curved at upper part) pubescence (Starmühler 1998; Mitka 2008a). In *A. × baumgartenianum* Simonk. (*A. lasianthum* Simonk. × *A. moldavicum*) helmet is yellowish-bluish, glandular pilose and eglandular pubescent; carpels are entirely villous, with long

protruding trichomes (Mitka 2008a). A hybrid between *A. moldavicum* subsp. *hosteanum* and *A. moldavicum* subsp. *moldavicum* with “carpels at the backside and/or on the suture pilose” is also mentioned by Mitka (2008a).

However in recent personal communication, W. Rottensteiner (formerly W. Starmühler) noticed that he unsuccessfully tried to differentiate subtaxa among *A. moldavicum* on the base of carpels pubescence. So he concluded that “the pubescence of the carpels, which is very precious in other species, has no taxonomical value in *A. moldavicum*”. In particular, he treats *A. moldavicum* subsp. *hosteanum* as an endemic of Southern Carpathians distributed only in the highest altitudes and distinguished from *A. moldavicum* subsp. *moldavicum* by different pubescence of tepals. However, *A. moldavicum* subsp. *hosteanum* was found in Poland and Ukraine even in lower altitudes of subcarpathian region and growing in mixed populations with *A. moldavicum* subsp. *moldavicum* (Mitka 2003, 2008a, 2008b; Novikoff & Mitka 2011; Novikoff et al. 2016). Zapalowicz (1908) mentioned *A. hosteanum* Schur from Czywczyny and Gorgany Mts. in Ukraine. Tzvelev (2001) also applied type of carpels pubescence for differentiation of *A. hosteanum* among other taxa from *Lycoctonum* group and noted that it is distributed in Eastern Carpathians. So there is different understanding of taxonomic limits in *A. moldavicum*.

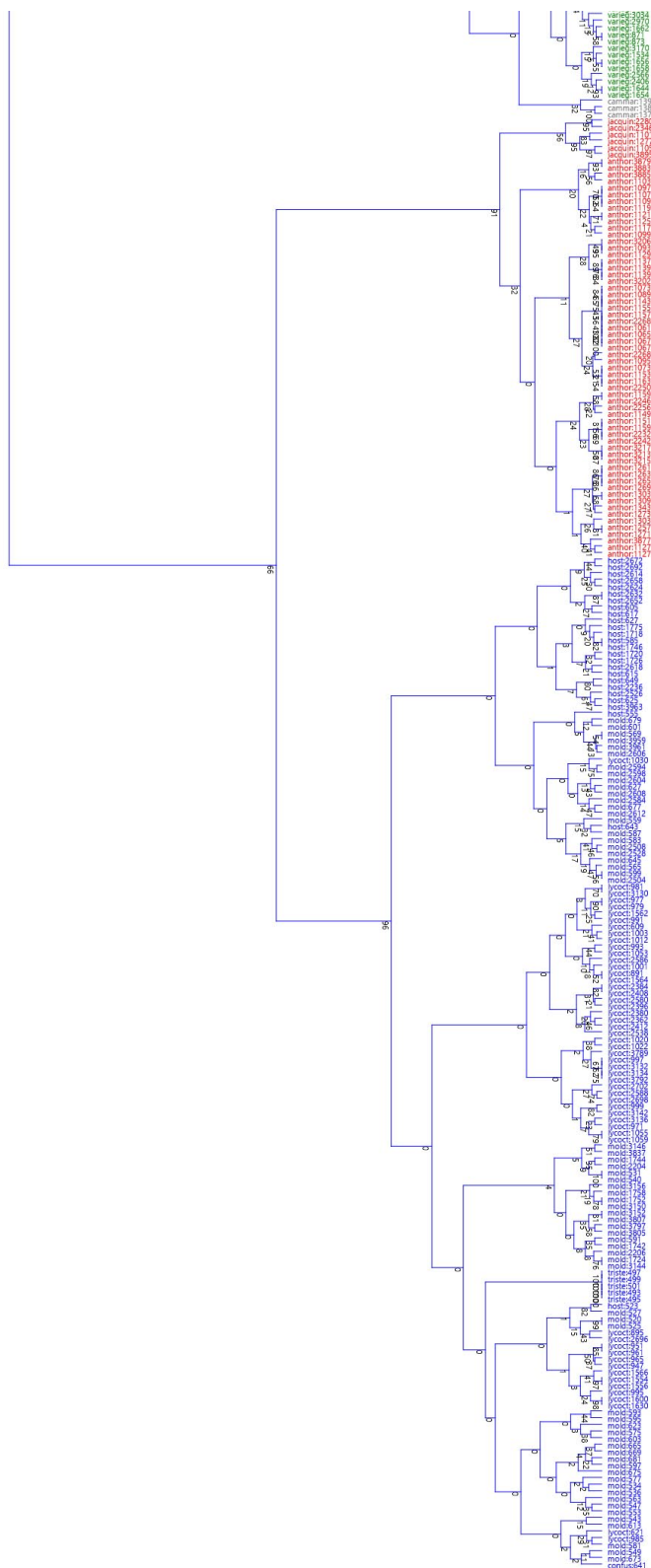
It is important to note that both Starmühler (2002) and Mitka (2008a) reported for Slovakia *A. lycoctonum* subsp. *lycoctonum*, although Kmeťová (1982) and some other researchers (Domin 1935; Dostal 1958; Skalický 1966, 1985; Tutin et al. 1993) mentioned for this region *A. lycoctonum* subsp. *vulparia*. In preliminary published results (Novikoff 2013) I used the name *A. lycoctonum* subsp. *vulparia*, however here for uniformity this taxon is considered as *A. lycoctonum* subsp. *lycoctonum* following Starmühler (1997, 2002) and Mitka (2003, 2008a). Moreover, Starmühler (1997) neotypified *A. lycoctonum* subsp. *vulparia* and chose the illustration from Reichenbach (1823–1827) with straight pubescence of the pedicel and the tepals. Such straight type of pubescence



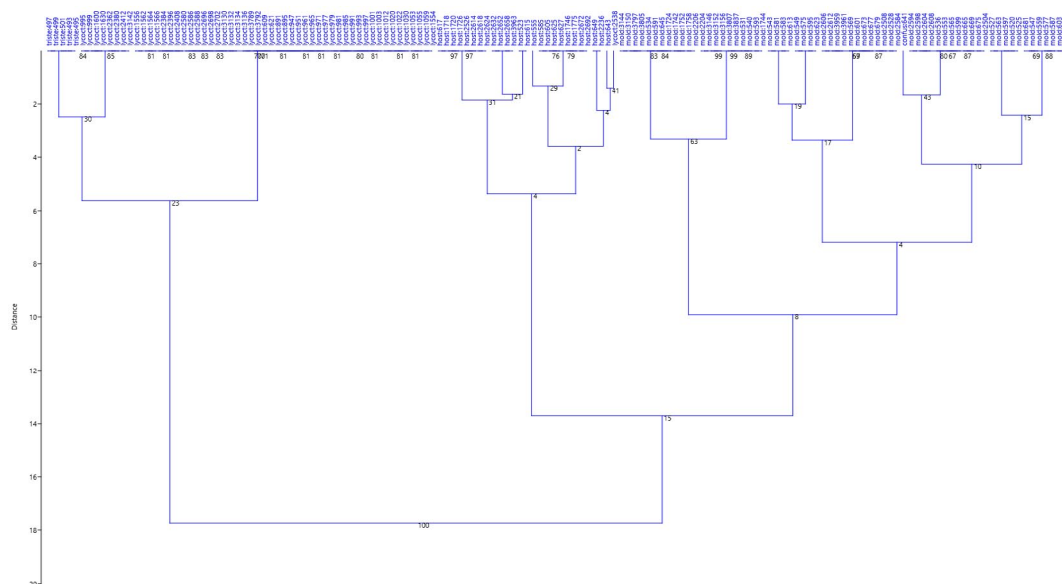


**Fig. 1.** Ward's dendrogram in combination with Euclidian distances for full dataset of treats and samples. **Blue** – group *Lycopodium*; **black** – group *Aconitum*; **grey** – group *Acomarum*; **green** – group *Cammarum*; **red** – group *Anthora*.





**Fig. 1.**  
Continued.



**Fig. 2.** Ward's dendrogram in combination with Euclidian distances for *Lycoctonum* group with dataset of 14 diagnostic traits.

is also seen in Reichenbach (1840), however contradicts with taxonomic interpretation of Czech and Slovakian researchers (Domin 1935; Dostal 1958; Skalický 1966, 1985) as well as revision of Tzvelev (2001). In particular, Tzvelev (2001), in opposition to Starmühler (1997), characterized *A. vulparia* by short curved trichomes covering inflorescence axes and pedicels, and *A. lycoctonum* – by straight trichomes.

Hence, I performed cluster analysis for 14 separated traits mentioned as diagnostic (Tab. 1, asterisks), which gave good results, but with low bootstrap support. In case of UPGMA, cluster *moldavicum* has been joined with cluster *lycoctonum* (Fig. S6), but in case of Ward's method of clustering (Fig. 2), the cluster *moldavicum* was attached with cluster *hosteanum*. In both cases, cluster *triste* was joined with cluster *lycoctonum*, and their samples were mixed on plot of multidimensional scaling (Fig. S7). Cluster *lycoctonum* was divided on two subclusters different by pubescence of carpels (glabrous in samples *lycoct*: 1554 – *lycoct*: 1556 or curved pubescent in samples *lycoct*: 3142 – *lycoct*: 995), however with low bootstrap support (Figs. 2

& S6). Cluster *moldavicum* is subdivided on several subclusters on the base of intensity of pubescence of helmet and variation of perianth color (dirt-blue or violet). Simultaneously, cluster *hosteanum* is divided on the base of variation in helmet and carpels pubescence, and coloration of perianth too.

At SAV herbarium I found one specimen of *A. moldavicum* with carpels covered on dorsal sides by protruding villous trichomes and reported also from Romania (Grințescu 1953). Preliminary I identified this specimen as *A. moldavicum* nothosubsp. *simonkaianum* (Novikoff 2013), however *A. moldavicum* nothosubsp. *simonkaianum* is characterized by protruding villous pubescence of entire carpels. Taking into account reports of Grințescu (1953) and Mitka (2008a) representing diagnostic features of mentioned taxa, name proposed by Grințescu (1953), and following current taxonomic hierarchy in *Lycoctonum* group, I believe that this specimen should be described as *A. moldavicum* nothosubsp. *confusum* (Grinț.) A. Novikov. Due its hybrid origin and low number of analyzed material, this specimen does not occupy any stable position neither

on dendrogram (Figs. 2, S3, S4, S6) nor on the multidimensional scatterplots (Figs. S5 & S7).

Correlation analysis reveals the only very strong dependence (Pearson's  $r = 0.85$ ) – between yellow coloration of perianth and dense pubescence of helmet, what characterizes the most of specimens from cluster *lycoctonum*.

Hence, *Aconitum* subgen. *Lycoctonum* (DC.) Peterm. sect. *Lycoctonum* DC. in flora of Slovakia is represented by 5 taxa: *A. lycoctonum* subsp. *lycoctonum*, *A. moldavicum* subsp. *moldavicum*, *A. moldavicum* subsp. *hosteanum*, *A. moldavicum* nothosubsp. *confusum* and *A. × triste*.

*A. lycoctonum* subsp. *lycoctonum* is well represented in herbaria of Slovakia (150 vouchers revealed). It is mostly distributed in mountain regions in western and central parts of Slovakia, and also has one documented location from eastern region near the border with Ukraine (Fig. 7). *A. moldavicum* subsp. *moldavicum* is represented by 195 herbarium vouchers. It is scattered predominantly in eastern and central mountain regions of Slovakia, however it has also several locations from western part of country (Fig. 8). Similarly, *A. moldavicum* subsp. *hosteanum* (74 investigated vouchers) is represented in eastern and central regions of Slovakia, however it is not going so far to the west (Fig. 8). *A. moldavicum* nothosubsp. *confusum* was collected just once and more than 50 years ago (Spišská Nová Ves; leg. Májovský J., 23.08.1955; SAV). Collector indicated on the label just a city Spišská Nová Ves, which is located in Hornádska Kotlina, however did not indicate any other details (Fig. 3). *A. × triste* was also collected only once in 2005 (Meliata, vlhke lesy; leg. Karasová E., 16.06.2005; SAV), and it is represented only by 5 vouchers in SAV herbarium (Fig. 8). Before this, *A. × triste* was reported for Slovakia by Skalický (1990) and whereupon by Mitka (2008a), however without indication of strict locations. Both hybrids, *A. moldavicum* nothosubsp. *confusum* and *A. × triste*, seem to be very rare for Slovakia and require further field expeditions.

### ***A. moldavicum* nothosubsp. *confusum* (Grinț.) A. Novikov, stat. nov. (Fig. 3)**

(*A. moldavicum* subsp. *hosteanum* × *A. moldavicum* subsp. *moldavicum*)

**Basionym:** *A. moldavicum* var. *confusum* Grinț. in Săvulescu, Flora Repub. Pop. Române 2: (677), 1953.

**Typus:** Reg.: Craiova: in pratis ad pagum Baia de Fier. (Grințescu 1953).

**Diagnostic characters:** Perianth from dirty-blue to violet, carpels villous (with long protruding trichomes) only on dorsal side or/and suture.

**Geographical distribution:** In Carpathians and adjacent regions. Rarely in the Western Carpathians and slightly often in the Eastern Carpathians; often in the Małopolska Upland (Poland), Opillya and Voronyaky (Ukraine) (Mitka 2008a).

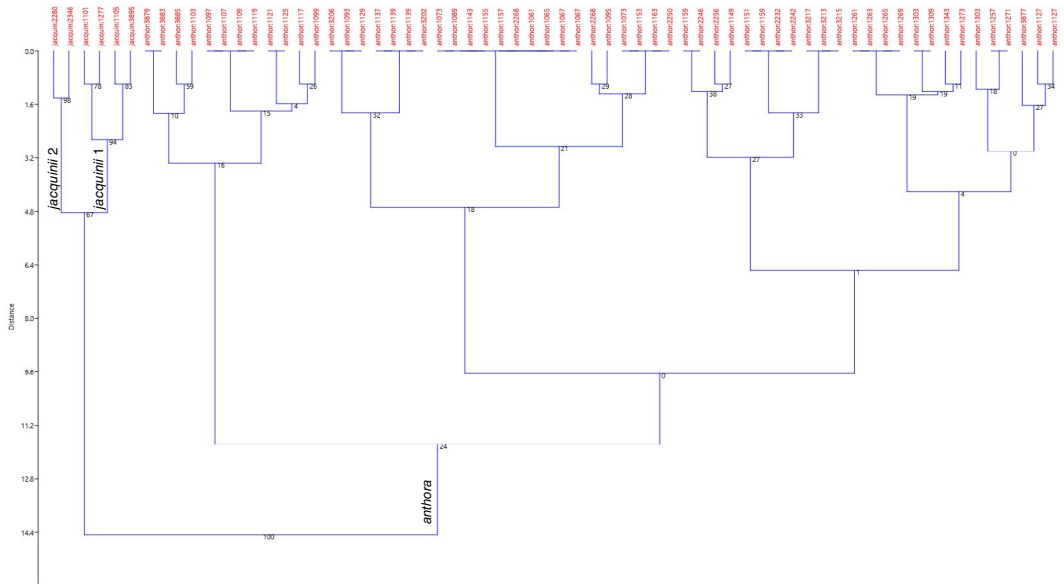
### ***Anthora* group**

*Aconitum* subgen. *Anthora* (DC.) Peterm. sect. *Anthora* DC. is represented in flora of Slovakia by single species, *A. anthora*, which is however characterized by high morphological variation. In general I had analyzed 152 specimens of *A. anthora* s.l., from which 66 specimens were included in further phenetic analysis. Among 115 total features I defined 26, which had variation for *A. anthora* and used them for next data processing (Tab. 1, pluses). Cluster analysis on the base of Ward's method revealed two clear groups – *anthora* and *jacquinii* (Fig. S8) with high bootstrap support. However UPGMA analysis showed that group *anthora* is not homogenous and consists from two main subclusters – *jacquinii* 1 and *jacquinii* 2 (Fig. 4). Cluster *anthora* is characterized by curved short trichomes covered helmet, pedicels, bracteoles, and inflorescence branches. Cluster *jacquinii* 1 is represented by samples with protruding villous trichomes on helmet, bracteoles and pedicels (in some observations pedicels in lower part had mixed cover consisting from curved and protruding trichomes), and with mixed trichomes on inflorescence axes. Cluster *jacquinii* 2 (samples *jacquinii*: 2280



Fig. 3. *A. moldavicum* nothosubsp. *confusum* (Grint.) A. Novikov, stat. nov. in SAV herbarium.





**Fig. 4.** Ward's dendrogram in combination with Euclidian distances for *Anthora* group with full dataset of traits.

and *jacquin*: 2346) is characterized by mixed pubescence of helmet and pedicels, protruding pubescence of bracteoles, and exclusively curved pubescence of inflorescence axes. Outstanding position of the cluster *jacquinii* 2 in Slovakia, while the shape of helmet and perianth colour (I do not consider here *A. pseudanthora* Błocki ex Pacz. with bluish or variegate perianth) are uninformative traits. Moreover, in cluster *jacquinii* 1 the variation from entire protruding to mixed pubescence of pedicels was observed, but there was no such variation in group *anthora* with always and entirely curved pubescent pedicels. Even on generalized dendrograms (Figs. 1 & S1), *jacquinii* samples are well delimited from other *anthora* samples with bootstrap support 96 (UPGMA) or 91 (Ward's method), with only two samples *jacquin*: 2280 and *jacquin*: 2346 occupying intermediate position between two main groups. Cluster *jacquinii* 2 (samples *jacquin*: 2280 and *jacquin*: 2346) most probably represent putative hybrid between *A. anthora* subsp. *anthora* and *A. anthora* subsp. *jacquinii*, which, however, requires detailed studies.

Correlation analysis revealed that curved pubescence of helmet is very strongly related to curved pubescence of pedicels (Pearson's  $r=1$ ), bracteoles (Pearson's  $r=1$ ), and inflorescence axes (Pearson's  $r=0.80$ ). In the same time, protruding pubescence of the helmet is strongly correlated with protruding pubescence of pedicels (for pedicels above bracteoles Pearson's  $r=1$ , and for pedicels below bracteoles Pearson's  $r=0.86$ ), protruding pubescence of bracteoles (Pearson's  $r=0.80$ ), and mixed pubescence of inflorescence axes (Pearson's  $r=1$ ). Mixed pubescence of helmet is very strongly correlated with mixed pubescence of pedicels (above bracteoles Pearson's  $r=1$ , and below bracteoles Pearson's  $r=0.81$ ). Pubescence type of carpels, stems and petioles do not show any (even moderate) correlations, as well as the shape of helmet, colour (yellow or pale yellow) of perianth and structure of inflorescence.

Therefore, I can conclude that pubescence type of helmet, pedicels, bracteoles and inflorescence are the most significant features illuminating 3 main morphotypes of *A. anthora* in Slovakia. Cluster *jacquinii* 2 (samples *jacquin*: 2280 and *jacquin*: 2346) most probably represent putative hybrid between *A. anthora* subsp. *anthora* and *A. anthora* subsp. *jacquinii*, which, however, requires detailed studies.

Taking into consideration that these plants grow in mixed populations (e.g., *jacquin*: 2280 was collected by J. Májovský in

1955 together with *anthor*:2276, *anthor*:2278 and *anthor*:2282), they can be considered as subspecies. Hence, cluster *jacquinii* 1 can be recognized as *A. anthora* subsp. *jacquinii*, and cluster *anthora* – as *A. anthora* subsp. *anthora*. Before, due to the taxonomic confusion, I erroneously reported for Slovakia *A. anthora* subsp. *eulophum* (Novikoff 2013), which does not occur here. *A. eulophum* Rchb. was reported by Reichenbach (1819, 1820) from Alps region including Liguria (France) and Helvetia (part of modern Switzerland), and is also often mentioned for Ukraine as independent taxon (Paczoski 1927; Visjulina 1953; Chopyk 1978; Andrienko & Peregrym 2012) or synonym of *A. anthora* (Tzvelev 2001; Didukh *et al.* 2004). Division of *A. anthora* onto subspecies for flora of Czechoslovakia was reported by Domin (1935), who recognized *A. anthora* subsp. *eu-anthora* and *A. anthora* subsp. *jacquinii* (Rchb.) Domin.

The problem with classification of *A. anthora* and related taxa has a long history starting from description by Linnaeus (1753). Reichenbach (1819, 1820, 1838, 1840) recognized several taxa in section *Anthoroideae* Rchb. viz *A. anthora*, *A. jacquinii* Rchb., *A. decandolii* Rchb., *A. anthoroideum* Rchb., *A. eulophum* Rchb. and *A. nemorosum* Rchb. He applied complex morphological analysis for delimitation of taxa, including pubescence of floral parts and shape of helmet. In particular, for Carpathians Reichenbach (1820) mentioned *A. jacquinii*, which, as he noted, differs by unique shape of helmet with elongated rostrum. In this paper Reichenbach (1820) also mentioned that *A. jacquinii* has glabrous helmets, what is very unusual for *Anthora* representatives from Carpathian region, and what I saw just once, in isolated refugial population in Stinka (Ukrainian Carpathians). However later Reichenbach (1840) published monograph containing illustration of *A. jacquinii* with villous helmet (Lám. LXXVII) and illustration of *A. anthora* γ *Jacquinianum* Rchb. (Lám. C) with glabrous flowers. Some of later researchers accepted level of species (Zapalowicz 1908; Paczoski 1927; Visjulina 1953) or level of subspecies Domin (1935) for this taxon, but in all cases authors

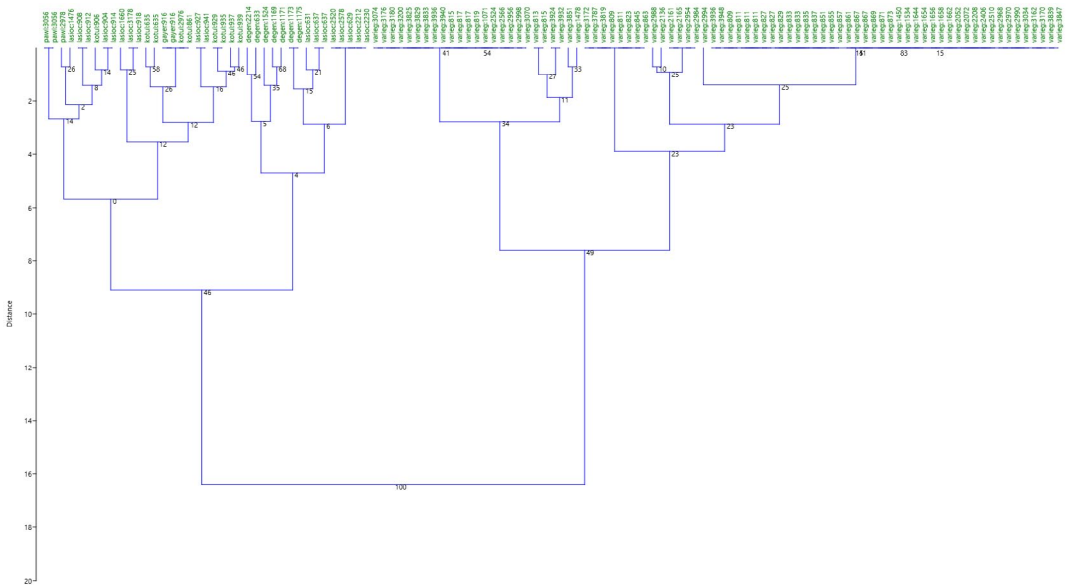
mentioned plants with helmet covered by protruding hairs contrasting with *A. anthora* (or *A. anthora* subsp. *anthora*) having curved pubescence of helmet. Same division is also accepted by Tzvelev (2001), who recognized *A. anthora* with pedicels and inflorescence axes covered exclusively by short curved trichomes, and *A. jacquinii* – by straight and mixed trichomes.

In our research, helmet shape showed high variation, however type of helmet pubescence seems to be a good discriminative trait for recognition of infraspecific taxa in *Anthora* group.

In general, *A. anthora* subsp. *anthora* is more widely represented in flora of Slovakia. I found 139 vouchers of *A. anthora* subsp. *anthora* in Slovakian herbaria sparsely collected from almost all territory of country (Fig. 9). *A. anthora* subsp. *jacquinii* there is represented only by 9 vouchers and occurs only in two main sites, one of which (Dreveník, obec Levoča) it shares with putative hybrid (represented by only 2 specimens in Slovakian herbaria) and other parental taxon – *A. anthora* subsp. *anthora* (Fig. 9).

### Cammarum group

*Aconitum* subgen. *Aconitum* sect. *Cammarum* DC. is one of the most diverse group in sense of morphological variability and taxonomic representativeness in Slovakia. I used 121 specimens for analysis of 68 morphological traits (Tab. 1, pluses). UPGMA clustering did not showed any appropriated results (Fig. S10). Clustering by Ward's method separated two main clusters representing mostly *A. variegatum* and *A. lasiocarpum* samples. However *A. degenii* Gayer and *A. × pawlowskii* were randomly nested in these two main clusters (Fig. S11) and scattered on multidimensional plot (Fig. S12). Therefore I performed analysis on limited number of 15 traits, which are considered diagnostic for this group (Tab. 1, asterisks). This allowed obtaining better results, but some samples of *A. lasiocarpum* subsp. *lasiocarpum* were nested among *A. degenii* specimens, while samples of



**Fig. 5.** Ward's dendrogram in combination with Euclidian distances for *Cammarum* group with dataset of 15 diagnostic traits.

*A. x pawlowskii* – among *A. lasiocarpum* subsp. *lasiocarpum* (Figs. 5 & S13). On the plot of multidimensional scaling, *A. x pawlowskii* was placed between its parental taxa *A. variegatum* and *A. lasiocarpum*, while *A. degenii* occupied marginal position (Fig. S14). The reason of such divergence of *A. degenii* samples was illuminated later – only cluster of *degen: 1173* and *degen: 1175* containing samples from Eastern part of Slovakia truly represents *A. degenii*, while other samples were misidentified and belong to *A. firmum* subsp. *maninense*.

Correlation analysis showed dependence of glabrous helmet with sutural pubescence of carpels (very strong, Pearson's  $r=0.94$ ), glabrous pedicels (strong, Pearson's  $r=0.84$  for upper and Pearson's  $r=0.75$  for lower part of pedicels), glabrous inflorescence axes (strong, Pearson's  $r=0.65$ ), what is typical for *A. variegatum*. There was also moderate positive correlation (Pearson's  $r=0.59$ ) between glabrous helmet and nectarines not reaching the helmet top, what also characterizes *A. variegatum*. *A. variegatum* has elongated conical helmet, while the shape of helmet in *A. lasiocarpum* varies. In the same time, *A. degenii* has often hemispherical or

slightly elongated helmet and glabrous carpels, what was reflected in strong positive correlation (Pearson's  $r=0.7$ ) between hemispherical helmet and glabrous carpels in my analysis too (Tab. 1).

Sect. *Cammarum* in flora of Slovakia is represented by 6 taxa: *A. variegatum* subsp. *variegatum*, *A. lasiocarpum* subsp. *lasiocarpum*, *A. lasiocarpum* subsp. *kotulae*, *A. x pawlowskii* (*A. lasiocarpum*  $\times$  *A. variegatum*), *A. degenii* subsp. *degenii* and *A. x gayeri* (*A. degenii*  $\times$  *A. lasiocarpum*).

*A. degenii* subsp. *degenii* is reported here for the first time for flora of Slovakia. All other taxa were already reported before (Mitka & Starmühler 2000; Starmühler 2002; Mitka 2003). Mitka (2003) also reported *A. x hebegynum* (*A. degenii*  $\times$  *A. variegatum*) for flora of Slovakia, however this taxon was later rediscovered and nested in *A. degenii* subsp. *degenii* as var. *intermedium* (Zapał.) Mitka (Ilnicki & Mitka 2011).

In total, I found in Slovakian herbaria 190 specimens of *A. variegatum* subsp. *variegatum* collected mostly from central Slovakia, however few samples also were collected from eastern



regions (Fig. 10). *A. lasiocarpum* subsp. *lasiocarpum* is represented by 18 (Fig. 11), and *A. lasiocarpum* subsp. *kotulae* – by 11 vouchers collected from central and eastern regions of Slovakia (Fig. 11). *A. × pawlowskii* was found in herbaria only twice (Fig. 12). *A. degenii* subsp. *degenii* in analyzed collections is represented only by 2 vouchers (Fig. 12), and *A. × gayeri* – by single specimen hosted in SAV (Fig. 12). However Mitka (2003) reported 1 more voucher of *A. × gayeri* from Bukovské Vrchy, which is deposited in herbarium of Jagiellonian University in Kraków (Rabia Skała, 1150 m, J. Mitka, P. Bochenek, J. Terray, 23.08.1995; KRA).

*A. lasiocarpum*, *A. × pawlowskii*, *A. degenii* and *A. × gayeri* are rare for flora of Slovakia. Last two taxa are distributed here on the edge of their natural range.

### Acomarum group

*Aconitum* subgen. *Aconitum* nothosect. *Acomarum* Starmühler in flora of Slovakia is represented by cultivated intersectional hybrid *A. × cammarum* (*A. napellus* [?] × *A. variegatum*). *A. × cammarum* was reported for Czechoslovakia by Skalický (1982), and also mentioned by Domin (1935) and Dostál (1958) as *A. × stoerckianum* (= *A. napellus* subsp. *neomontanum* (Wulfen) Gayer × *A. variegatum* subsp. *euvariegatum* Dostál). I did not include this taxon neither in morphological nor in chorological analyses, because it is ornamental plant and therefore there is low number of specimens (only 17 were observed) deposited in herbaria (Fig. 13). Sometimes *A. × cammarum* can be found escaped into the wild nature.

Skalický (1966) also reported for Czechoslovakia *A. × exaltatum* Bernh. ex Rchb. (*A. plicatum* Köhler ex Rchb. subsp. *plicatum* × *A. variegatum* subsp. *variegatum*), which is morphologically close to *A. × cammarum* (Mitka 2003). However, there are no mentions of this hybrid exactly from Slovakia.

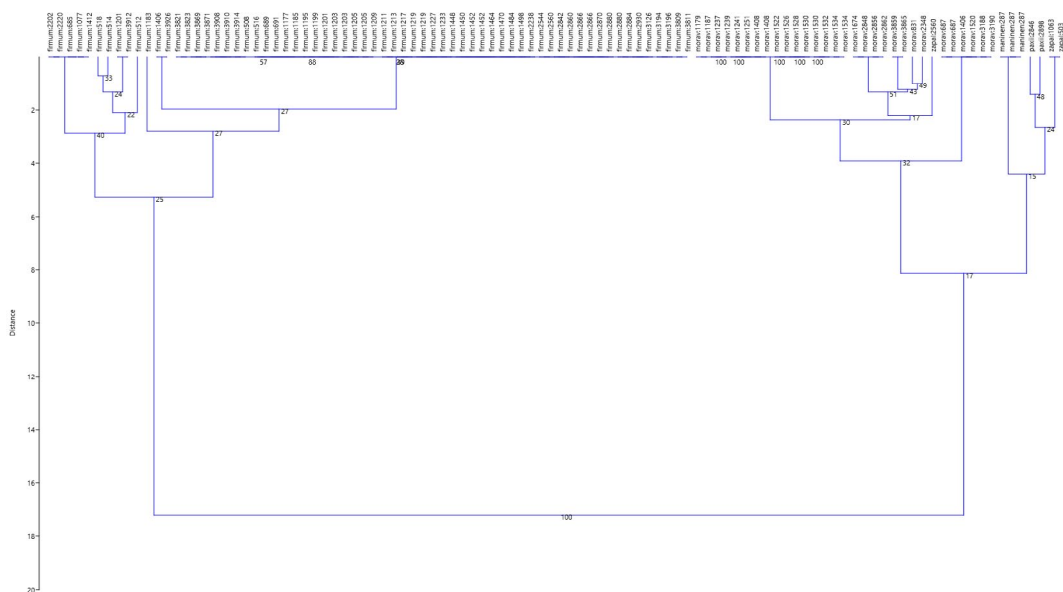
Starmühler (2002) mentioned for Slovakia two more taxa for this nothosection, however without details on their distribution – *A. × lengyelii* Gayer nothosubsp. *lengyelii*

(*A. firmum* subsp. *firmum* × *A. variegatum* subsp. *variegatum*) and *A. × lengyelii* nothosubsp. *walasii* Mitka (*A. firmum* subsp. *moravicum* × *A. variegatum* subsp. *variegatum*). Later these two nothotaxa were also mentioned in Starmühler & Mitka (2001), but only for territory of Poland and are not listed for Slovakia. In personal communication W. Rottensteiner also noted that these nothotaxa are highly possible to be found in Slovakia, since both parental taxa are present there.

In Mitka (2003) *A. × lengyelii* nothosubsp. *lengyelii* and *A. × lengyelii* nothosubsp. *walasii* were rediscovered as *A. × berdaui* Zapal. nothosubsp. *berdaui* and *A. × berdaui* nothosubsp. *walasii* (Mitka in Starmühler et Mitka) Mitka, respectively. Mitka (2003) listed only 2 specimens of *A. × berdaui* nothosubsp. *berdaui* from Slovakian Tatra Mts. (Wycieczka w Tatry Spiskie w r. 1878. *Aconitum napellus* L., Podspady nad Jaworzynką; leg. A. Rogalski, 25.07.1878.) and Slovenský Raj (Plantae exsiccatae regni Hungariae, Comit. Szepes, in m. Hollókő pr. Sztraczena; G. Lengyel, 01.08.1901; BP) (Fig. 13). In personal communication J. Mitka also provided me with two more recently rediscovered locations – one in Tatras (Tatras, Javorova Dolina; leg. A. Sutkowska, 18.08.2009; herb. J. Mitka) and other in Malá Fatra (Malá Fatra, Terchová; leg. J. Mitka, 31.07.2009; KRA 0464764). However, Mitka (2003) does not mention *A. × berdaui* nothosubsp. *walasii* for Flora of Slovakia. During our revision of Slovakian herbaria, I did not find specimens of *A. × berdaui*, and therefore this nothospecies is provided here on the base of reports of Starmühler (2002) and Mitka (2003) only. Presence and distribution of *A. × berdaui* nothosubsp. *walasii* in Slovakia still require confirmation in field.

### Aconitum group

I performed cluster analysis for 104 specimens and 82 morphological traits (Tab. 1, pluses), which revealed division of *Aconitum* subgen. *Aconitum* sect. *Aconitum* in flora of Slovakia on two main clusters – *firmum* and *moravicum* (Figs. S15 & S16). Cluster *firmum* includes



**Fig. 6.** Ward's dendrogram in combination with Euclidian distances for *Aconitum* group with dataset of 23 diagnostic traits.

*A. firmum* subsp. *firmum*. Cluster *moravicum* consisted mostly from *A. firmum* subsp. *moravicum* samples, but also included randomly dispersed samples of *A. firmum* subsp. *maninense*, *A. firmum* nothosubsp. *paxii* and *A. firmum* nothosubsp. *zapolowiczii* (Fig. S17). All samples of *A. firmum* subsp. *maninense* had localized position together, which also confirmed by multidimensional scaling, however they were nested inside the cluster *moravicum*. Therefore, I performed analysis for limited number of 23 morphological traits considered as diagnostic for *Aconitum* group and obtained trees were better fitting accepted taxonomic division – there were independent and clearly distinguished clusters of *A. firmum* subsp. *firmum*, *A. firmum* subsp. *moravicum* and *A. firmum* subsp. *maninense*, however hybrids (*A. firmum* nothosubsp. *paxii* and *A. firmum* nothosubsp. *zapolowiczii*) were still overlapped with other taxa (Figs. 6, S18 & S19).

For this limited number of 23 morphological traits I provided correlation analysis (Tab. 1, asterisks), which showed very strong positive correlation between glabrous helmet and glabrous pedicels (Pearson's  $r=0.9$  for pedicels

above bracteoles and Pearson's  $r=0.88$  for pedicels below bracteoles), glabrous bracteoles (Pearson's  $r=0.88$ ) and glabrous inflorescence axes (Pearson's  $r=0.88$ ), which are typical for *A. firmum* subsp. *firmum*. Similarly, this analysis showed very strong positive correlation between curved pubescent helmet and curved pubescent pedicels (Pearson's  $r=0.93$  for pedicels above bracteoles and Pearson's  $r=0.83$  for pedicels below bracteoles), curved pubescent bracteoles (Pearson's  $r=0.91$ ) and curved pubescent inflorescence axes (Pearson's  $r=0.87$ ), what characterizes *A. firmum* subsp. *moravicum*. Very strong positive correlation was found also for pilose pubescence of helmet and pilose pubescence of pedicels (Pearson's  $r=1$  both for pedicels above and below the bracteoles), and pilose pubescence of inflorescence axes (Pearson's  $r=0.86$ ); as well as strong positive correlation (Pearson's  $r=0.64$ ) – for pilose pubescences of helmet and bracteoles, what in general characterizes *A. firmum* subsp. *maninense*. Finally, strong positive correlation (Pearson's  $r=0.7$ ) was also shown for mixed pubescence of helmet and mixed pubescence of pedicels above the level of bracteoles, what

identifies *A. firmum* nothosubsp. *paxii*. This analysis did not reveal any strong or even moderate correlations for shape of helmet, which can vary from crescent to slightly conical even in the same inflorescence.

Starmühler (2002) and Starmühler & Mitka (2001) reported for Slovakia also hybrid between *A. firmum* subsp. *firmum* × *A. firmum* subsp. *maninense* with glabrous perianth and pilose pedicels, discovered on the base of single specimen deposited in herbarium of Natural History Museum in Sibiu, Romania (Hungaria, comitatus Szepes, Montes Bélaenses, in valle Drechslerhäuschen [Dolina siedmich prameňov valley] sub monte Stirnberg, alt. cca. 1400–1500 m, solo calc.; 01.09.1907; leg. E.G. Nyárady; SIB). However in Slovakian herbaria I did not found such specimens.

In total I found and analyzed 152 specimens of *A. firmum* in Slovakian herbaria. The most represented there is collection of *A. firmum* subsp. *firmum* counting 121 herbarium vouchers mostly from central Slovakia (Fig. 14). *A. firmum* subsp. *moravicum* is represented by 26 vouchers (Fig. 14). I found just few herbarium vouchers of *A. firmum* subsp. *maninense* in SLO, SAV and BRA herbaria (Fig. 14). Six more vouchers of *A. firmum* subsp. *maninense* are mentioned by Mitka (2003) from Vysoké Tatry and Stražovské vrchy, and deposited in herbaria SIB (Natural History Museum in Sibiu, Romania), PRC (Charles University in Prague, Czech Republic) and KRA (Jagiellonian University in Kraków, Poland). Moreover, Mitka et al. (2015) noted that *A. firmum* subsp. *maninense* is characterized by high genetic divergence and probably is a relict taxon isolated from other representatives of *Aconitum* group.

Morphologically *A. firmum* subsp. *maninense* is similar to *A. degenii* subsp. *degenii* and can be easily misidentified on the base of protruding glandular cover of floral parts.

*A. firmum* nothosubsp. *paxii* was represented only by 2 herbarium vouchers, and *A. firmum* nothosubsp. *zapalowiczii* – only by 3 specimens, one of which is mounted on the same herbarium sheet with *A. firmum* subsp. *firmum* (Fig. 14). Hence I can conclude that *Aconitum* subgen.

*Aconitum* sect. *Aconitum* in flora of Slovakia is represented by 5 *A. firmum* subspecies and one unnamed hybrid.

## Key for identification

1. Helmet cylindrical, about 2.5–3 times higher than wide; nectaries do not reach the top of helmet and have coiled spurs; leaf laminas incised less than ½, with very broad segments; semirostrate plants with rhizomes ..... 2

1\*. Helmet from crescent to elongated conical, but its height does not exceed 2.5 of width; nectaries reach or not the top of helmet, their spurs from semi-spiral curved to ecapitate; leaf laminas incised more than ½, with segments from broad to narrow linear; nonrostrate plants with tubers ..... 6

2. Perianth from white-yellowish to yellow; helmet densely covered by short curved trichomes; carpels glabrous or pubescent by short curved trichomes ..... *A. lycoctonum* subsp. *lycoctonum*

2\*. Perianth has other coloration ..... 3

3. Perianth yellowish-bluish; helmet densely covered by short curved trichomes; carpels glabrous or pubescent by short curved trichomes ..... *A. × triste*

3\*. Perianth from dirty-blue to purple-violet; helmet more or less covered by short curved trichomes or, rarely, glabrous ..... 4

4. Carpels glabrous ..... *A. moldavicum* subsp. *moldavicum*

4\*. Carpels pubescent ..... 5

5. Carpels entirely covered by short curved trichomes .... *A. moldavicum* subsp. *hosteanum*

5\*. Carpels have long protruding trichomes only on dorsal side or/and suture ..... *A. moldavicum* nothosubsp. *confusum*

6. Perianth from yellowish to yellow, persists after blooming; helmet hemispherical or slightly elongated, sometimes with protruded front part; nectaries reach the top of helmet, with semi-spiral curved spurs; leaves deeply incised, with very narrow linear segments; tubers from ovate to napiform, sometimes divided ..... 7
- 6\*. Perianth usually dark-blue, but sometimes violet, lilac, white or variegate, deciduous after blooming; nectaries reach or not the top of helmet, with spurs from backward bent to ecapitate; leaves incised near  $\frac{1}{2}$ – $\frac{2}{3}$ , with more or less broad segments; tubers from ovate to napiform ..... 9
7. Helmet, pedicel, and bracteoles covered by short curved trichomes; carpels covered by curved or protruding trichomes; inflorescence axes covered by short curved trichomes .....  
**A. *anthora* subsp. *anthora***
- 7\*. Pubescence type differs ..... 8
8. Helmet, pedicel, and bracteoles covered by protruding trichomes; carpels covered by protruding trichomes; inflorescence axes covered by mixed curved and protruding trichomes ..... **A. *anthora* subsp. *jacquinii***
- 8\*. Helmet and pedicels covered by mixed curved and protruding trichomes; bracteoles and carpels covered by protruding trichomes; inflorescence axes covered by curved trichomes ..... **A. *anthora* subsp. *anthora* × A. *anthora* subsp. *jacquinii***
9. Helmet from hemispherical to elongated conical; nectaries usually do not reach the top of helmet and have hooked or backward bent spurs; tubers ovate with short stolones or napiform; plants usually high with ramified inflorescences ..... 10
- 9\*. Helmet from crescent to hemispherical; nectaries reach the top of helmet and have capitate or ecapitate spurs; tubers napiform; plants usually low with compact or dense ramified inflorescences ..... 18
10. Helmet elongated conical, often with pronounced rostrum; tubers ovate with stolones ..... 11
- 10\*. Helmet from hemispherical to slightly elongate; tubers ovate or napiform ..... 14
11. Helmet usually glabrous, rarely covered by short solitary trichomes; pedicels and bracteoles glabrous; carpels have trichomes only along ventral sutures; inflorescence axes glabrous .....  
**A. *variegatum* subsp. *variegatum***
- 11\*. Helmet, pedicels (at least above the bracteoles) and bracteoles covered by protruding glandular (pilose) trichomes ..... 12
12. Pedicels and bracteoles entirely covered by protruding glandular trichomes; inflorescence axes covered by protruding pilose trichomes; carpels entirely pilose .....  
**A. *lasiocarpum* subsp. *lasiocarpum***
- 12\*. Pedicels covered by protruding glandular trichomes only above the bracteoles, below the bracteoles they are glandular and/or eglandular pubescent, sparsely glandular pilose or even glabrous. In very rare cases pedicels are entirely glabrous. Inflorescence axes have different cover, from sparsely pilose to glabrous ..... 13
13. Carpels entirely pilose ..... **A. *lasiocarpum* subsp. *kotulae***
- 13\*. Carpels have trichomes only along ventral sutures ..... **A. × *pawlowskii***
14. Helmet glabrous or only sparsely covered by protruding trichomes; carpels sterile; tubers napiform ..... 15
- 14\*. Helmet entirely covered by short protruding trichomes; pedicels and bracteoles covered by short protruding trichomes (sometimes less covered or glabrous in lower part of pedicels); tubers ovate ..... 17
15. Helmet glabrous; carpels glabrous and sterile; pedicels have trichomes just near the



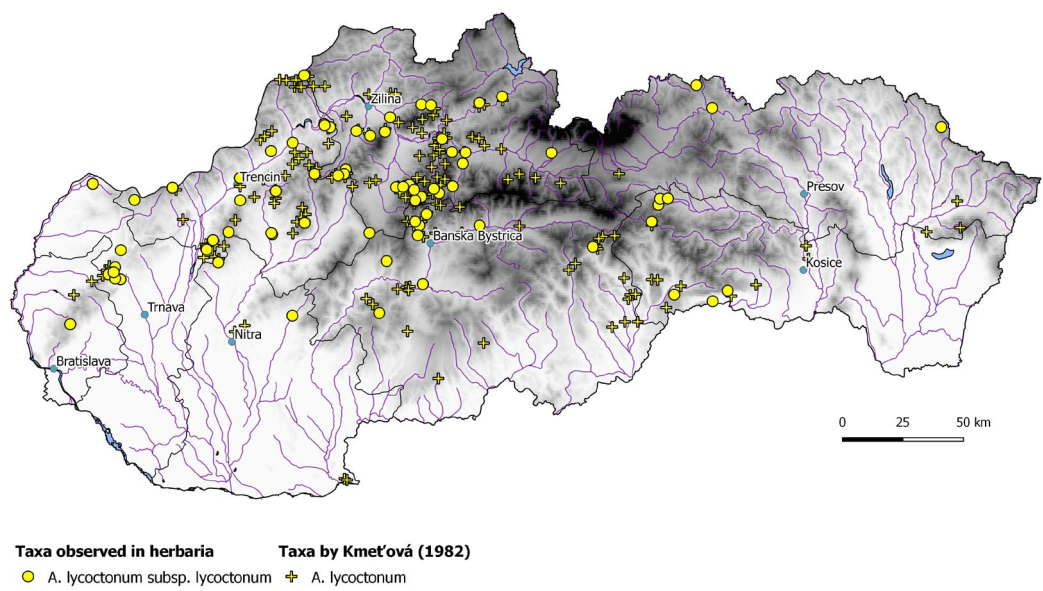


Fig. 7. Map of *Aconitum lycoctonum* distribution in Slovakia.

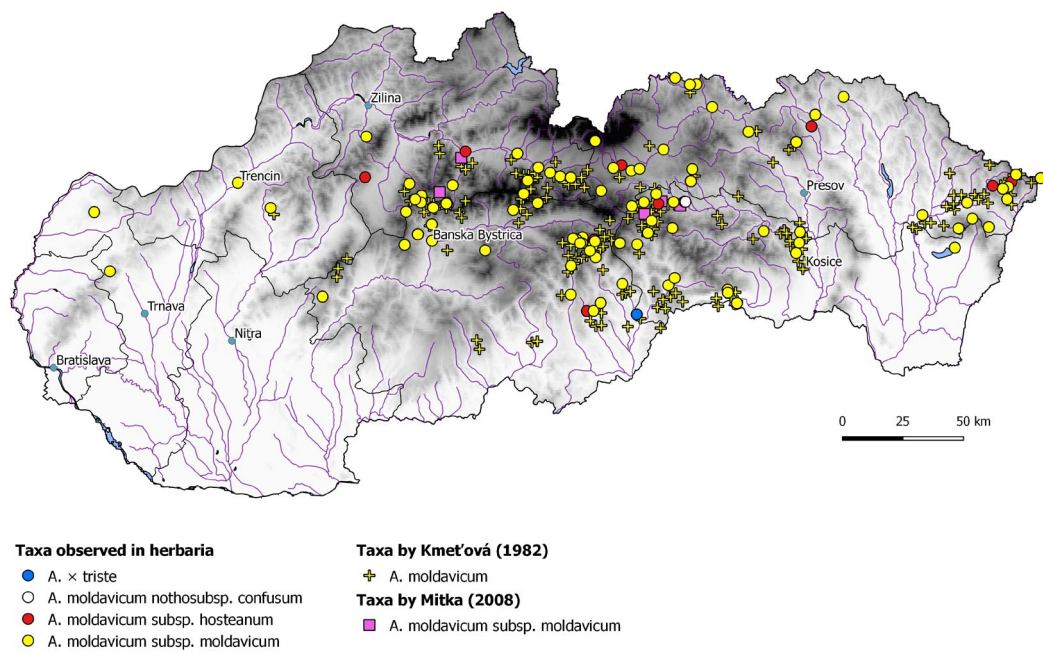


Fig. 8. Map of *Aconitum moldavicum* and *A. x triste* distribution in Slovakia.

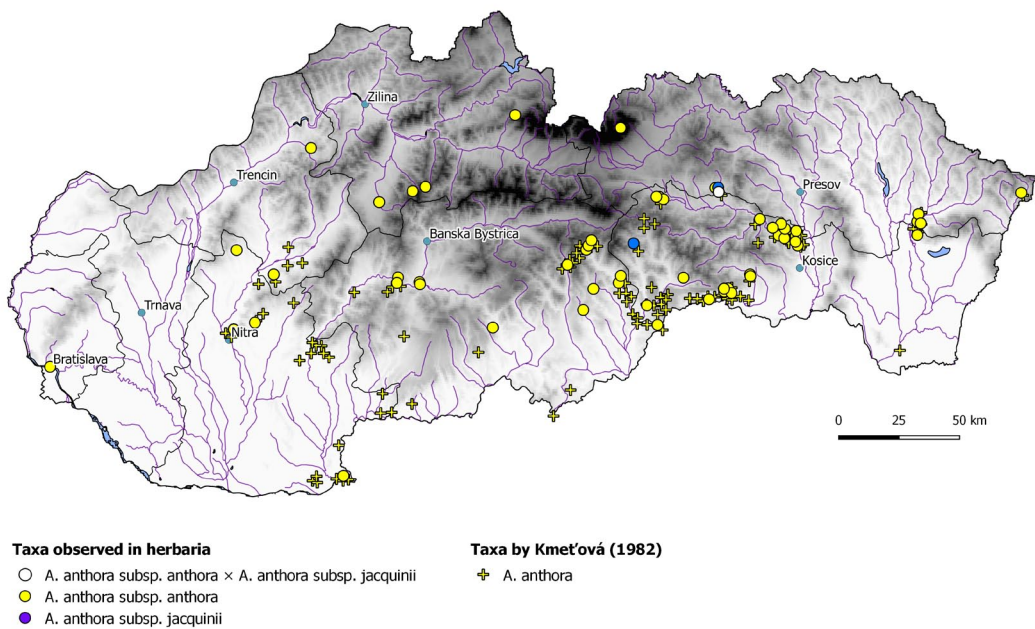


Fig. 9. Map of *Aconitum anthora* distribution in Slovakia.

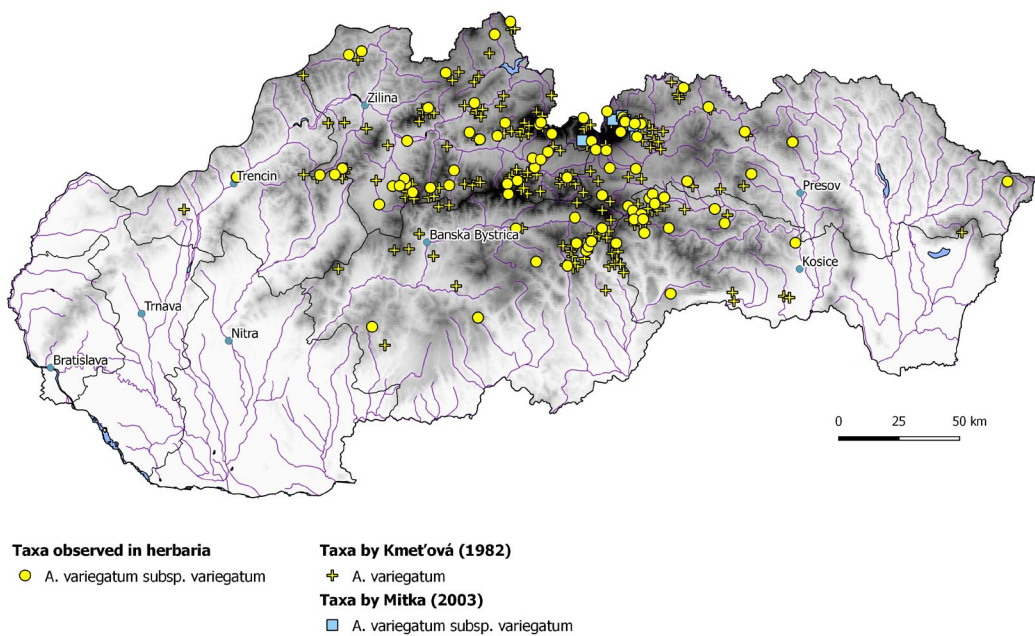


Fig. 10. Map of *Aconitum variegatum* distribution in Slovakia.

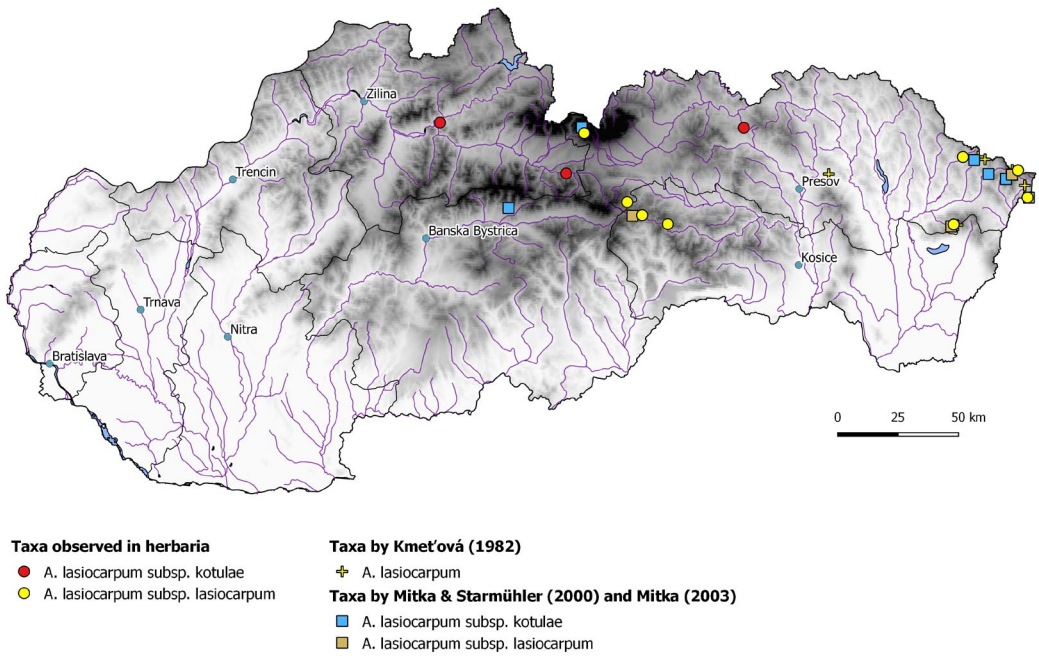


Fig. 11. Map of *Aconitum lasiocarpum* distribution in Slovakia.

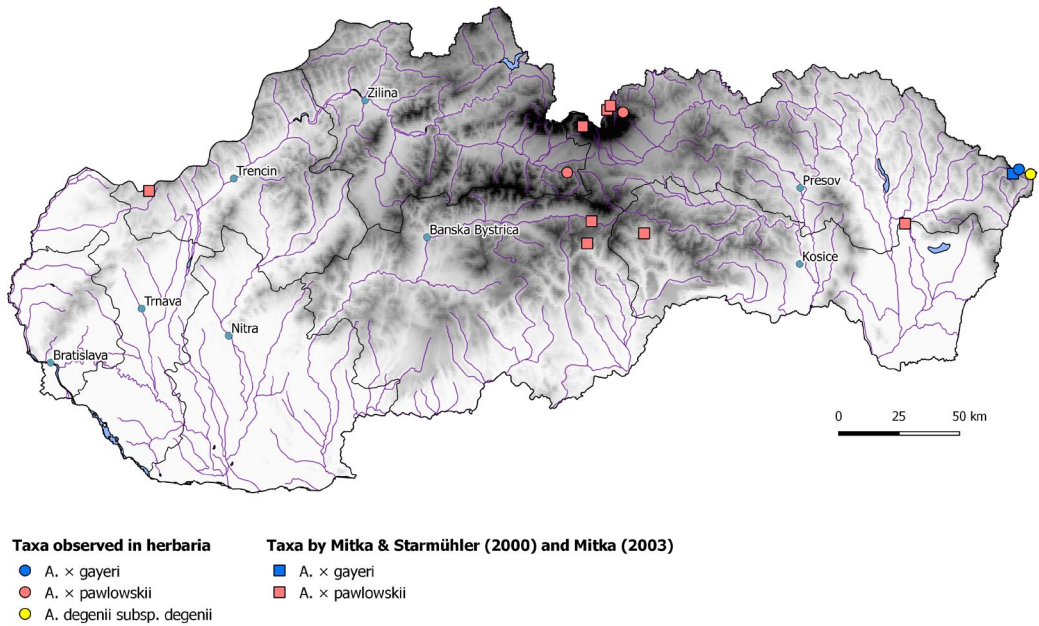


Fig. 12. Map of *Aconitum degenii*, *A. × gayeri* and *A. × pawlowskii* distribution in Slovakia.



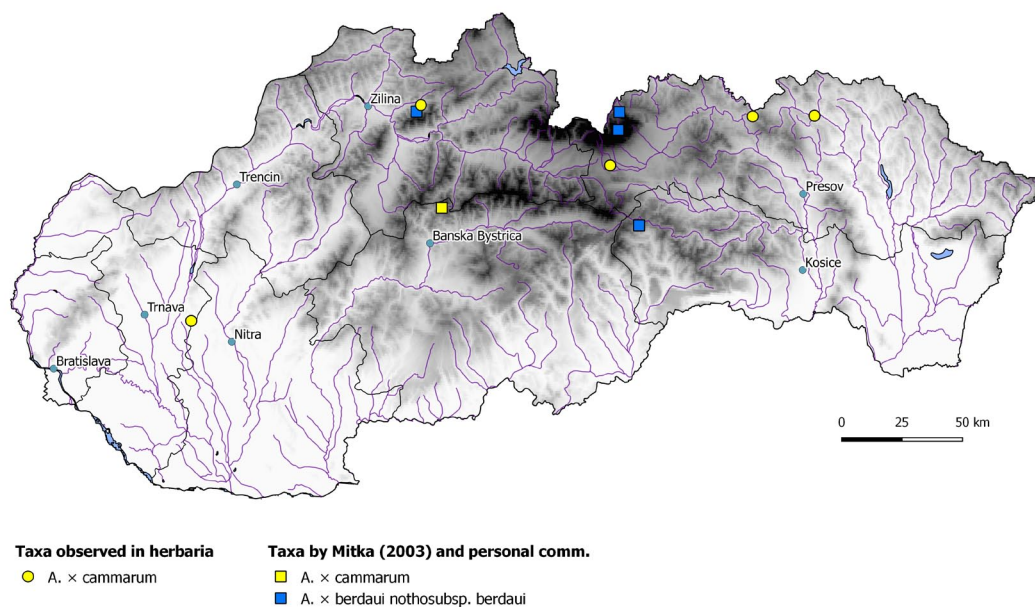


Fig. 13. Map of *Aconitum x cammarum* and *A. x berdaui* distribution in Slovakia.

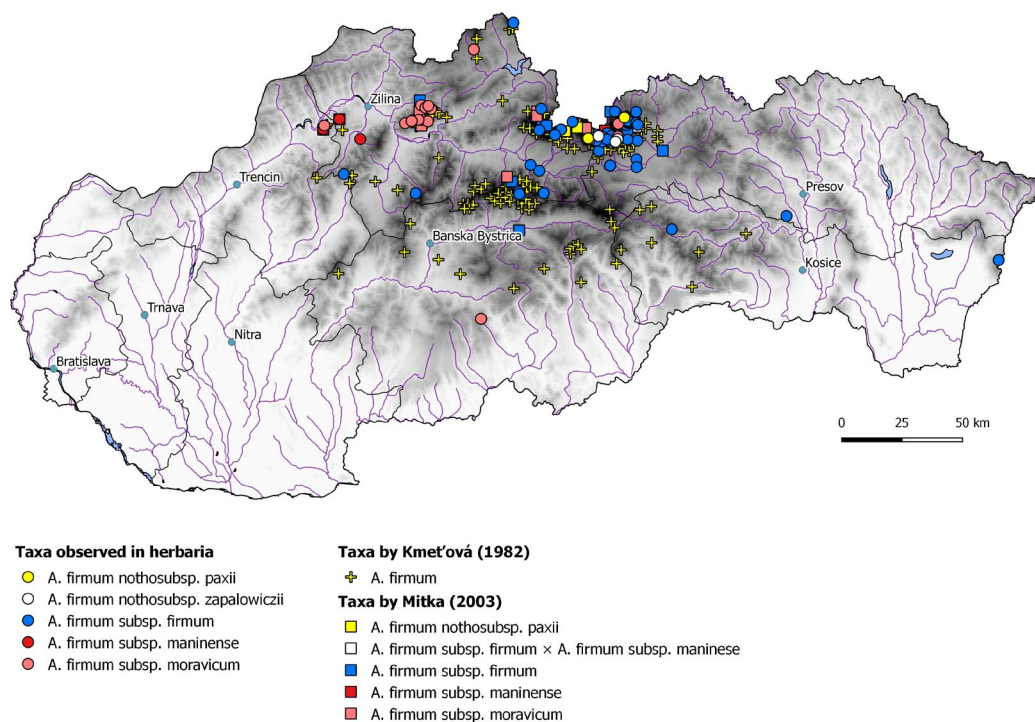


Fig. 14. Map of *Aconitum firmum* distribution in Slovakia.

receptacle; bracteoles glabrous or covered by solitary trichomes ..... *A. × cammarum*

**15\***. Helmet glabrous or only sparsely covered by protruding trichomes; carpels glabrous or pilose along ventral sutures, sometimes with solitary trichomes on dorsal side ..... **16**

**16.** Helmet, pedicels, bracteoles and inflorescence axes glabrous .....  
*A. × berdaui nothosubsp. berdaui*

**16\***. Helmet glabrous or only sparsely covered by protruding trichomes; pedicels and bracteoles covered by curved trichomes; inflorescence axes covered by short curved trichomes or almost glabrous ..... *A. × berdaui nothosubsp. walsii*

**17.** Carpels glabrous ... *A. degenii subsp. degenii*

**17\***. Carpels densely covered by protruding trichomes ..... *A. × gayeri*

**18.** Helmet glabrous ..... **19**

**18\*** Helmet covered by trichomes ..... **21**

**19.** Pedicels, bracteoles, and inflorescence axes glabrous; carpels glabrous or rarely pubescent on dorsal side ..... *A. firmum subsp. firmum*

**19\***. Pedicels covered by trichomes ..... **20**

**20.** Pedicels and bracteoles covered by mixed curved and protruding trichomes; inflorescence axes covered by mixed or curved trichomes; carpels glabrous or slightly pubescent .....  
*A. firmum nothosubsp. zapalowiczii*

**20\***. Pedicels at least in upper parts are covered by protruding pilose trichomes; iflorescence axes glabrous; carpels glabrous or slightly pubescent on dorsal side ..... *A. firmum subsp. firmum × A. firmum subsp. maninense*

**21.** Helmet, pedicels, bracteoles and inflorescence axes covered by short curved trichomes; carpels usually glabrouse, rarely pubescent by solitary curved trichomes .....  
*A. firmum subsp. moravicum*

**21\***. Type of pubescence differs ..... **22**

**22.** Helmet, pedicels, bracteoles and inflorescence axes covered by protruding pilose trichomes; carpels usually glabrous, rarely covered by pilose trichomes .....  
*A. firmum subsp. maninense*

**22\***. Helmet, pedicels, and bracteoles covered by mixed curved and protruding trichomes; inflorescence axes covered by mixed or curved trichomes; carpels glabrous or slightly pubescent ..... *A. firmum nothosubsp. paxii*

## Conclusions

This investigation showed that genus *Aconitum* in Slovakia is represented by 21 taxa of species and infraspecific levels, and probably contains two more unnamed hybrids belonging in general to 3 subgenera. Three new taxa for flora of Slovakia (*A. degenii* subsp. *degenii*, *A. moldavicum* subsp. *hosteanum* and *A. moldavicum* nothosubsp. *confusum* stat. nov.) have been ascertained, for one of which the new taxonomic status has been proposed. General taxonomic structure of the genus *Aconitum* in flora of Slovakia is next:

Subgen. *Lycotconum* (DC.) Peterm.  
Sect. *Lycotconum* DC.

Ser. *Lycotconia* Tamura et Lauene

*A. lycotconum* L. em. Koelle  
subsp. *lycotconum*

*A. × triste* (Rchb.) Gáyér

*A. moldavicum* Hacq.

subsp. *moldavicum*

subsp. *hosteanum* (Schur)

Graebner et P. Graebner in  
Aschers. et Graebner

nothosubsp. *confusum* (Grinț.)

*A. Novikov*, stat. nov.

Subgen. *Anthora* (DC.) Peterm.

Sect. *Anthora* DC.

*A. anthora* L.

subsp. *anthora*

subsp. *jacquinii* (Rchb.) Domin

subsp. *anthora × subsp. jacquinii*

Subgen. *Aconitum*Sect. *Cammarum* DC.Ser. *Variegata* Steinberg ex Starmühl.*A. variegatum* L.subsp. *variegatum*Ser. *Toxicum* (Rchb.) Mucher*A. lasiocarpum* (Rchb.) Gáyersubsp. *lasiocarpum*subsp. *kotulae* (Pawl.) Starmühl.  
et Mitka*A. degenii* Gáyersubsp. *degenii**A. × gayeri* Starmühl.Nothoser. *Toxigata* Starmühl.*A. × pawlowskii* Mitka et Starmühl.Nothosect. *Acomarum* Starmühl.*A. × cammarum* L. em. Fries*A. × berdaui* Zapał.nothosubsp. *berdaui*nothosubsp. *walasii* (Mitka in  
Starmühler et Mitka) MitkaSect. *Aconitum**A. firmum* Rchb.subsp. *firmum*subsp. *moravicum* Skalickýsubsp. *maninense* (Skalický)  
Starmühl.nothosubsp. *zapalowiczii* Starmühl.nothosubsp. *paxii* Starmühl.subsp. *firmum* × subsp. *maninense*

## Acknowledgements

I would like to thank to all people who helped in realization of this project and organization of my stay in Slovakia, especially to RNDr. Kornélia Goliašová, RNDr. Pavol Mereda and Prof. RNDr. Karol Marhold from Institute of Botany SAS.

I thank Prof., Dr. hab. Józef Mitka from Institute of Botany of Jagiellonian University in Kraków for years of help and support in my research activities, and particularly for help in this study with comments and for provided additional localities. I also thank Dr. Walter Rottensteiner from Graz for help in improvement of this paper, comments about distribution of aconites in Slovakia and discussion on taxonomy.

I thank so much to RNDr. Ján Kliment from Botanical Garden of Comenius University for help in improvement of distribution database and decryption of problematic labels, as well as for critical comments and advices.

I am thankful for different kind of help in realization of this investigation to Zuzana Kyselová from Tatras National Park, Jaroslav Vlcko from Technical University in Zvolen, Lenka Mártonfiová from Pavol Jozef Šafárik University, staff of herbarium of Comenius University in Bratislava, staff of herbarium of Slovak University of Agriculture in Nitra, and staff of herbarium of Slovak National Museum.

This study was supported by grant of National Scholarship Programme of the Slovak Republic for the Support of Mobility of Students, PhD Students, University Teachers, Researchers and Artists in 2012–2013.

## References

- Andrienko T.L., Peregrym M.M. 2012. Official lists of regional rare plants of administrative territories of Ukraine (reference book). Alterpress, Kyiv.
- Annoni A., Luzet C., Gubler E., Ihde J. (eds) 2001. Map projections for Europe. European Commission. Joint Research Centre.
- Boroń P. 2010. Taksonomia molekularna rodzaju *Aconitum* (Ranunculaceae) w Karpatach Zachodnich i Sudetach. Phd Thesis. Uniwersytet Jagiellorski, Wydział Biologii i Nauk o Ziemi, Kraków.
- Boroń P., Zalewska-Gałosz J., Sutkowska A., Zemanek B., Mitka J. 2011. ISSR analysis points to relict character of *Aconitum bucovinense* Zapał. (Ranunculaceae) at the range margin. *Acta Soc. Bot. Pol.* 80: 315–326.
- Chopyk V.I. 1978. Rare and endangered plants of Ukraine. The guide. Naukova Dumka, Kyiv. (In Russian)
- Davis P.H., Heywood V.H. 1963. Principles of angiosperm taxonomy. Edinburgh University Press, Edinburgh.
- Didukh Ya.P., Zyman S.M., Burda R.I., Korotchenko I.A. 2004. *Aconitum anthora* L. s. str. – Akonit protyotruyniy. In: Didukh Ya.P. (ed.), *Ecoflora of Ukraine*. Vol. 2: 97–98. Phytosociocentre, Kyiv.
- Domin K. 1935. Plantarum Čechoslovakiae enumeratio. *Preslia, Praha* 13–15: 1–305.
- Dostal J. 1958. Klíč k úplné květeně ČSSR. Nakladatelství ČSAV, Praha.

- Götz E. 1967.** Die *Aconitum variegatum*-Gruppe und ihre Bastarde in Europa. *Feddes Repert.* **76**: 1–62.
- Grințescu G. 1953.** *Aconitum* L. In: Săvulescu T., Flora Republicii Populare Române. **Vol. 2**: 460–511, 676–686.
- Hammer Ø., Harper D.A.T., Ryan P.D. 2001.** PAST: Paleontological statistics software package for education and data analysis. *Palaeontol. Electron.* **4** (1). [http://palaeo-electronica.org/2001\\_1/past/issue1\\_01.htm](http://palaeo-electronica.org/2001_1/past/issue1_01.htm)
- Ilnicki T., Mitka J. 2011.** Chromosome numbers in *Aconitum* sect. *Cammarum* (Ranunculaceae) from the Carpathians. *Caryologia* **64** (4): 446–452.
- IPNI 2017.** The International Plant Names Index. Published on the Internet <http://www.ipni.org/index.html>
- QGIS Development Team. 2017.** QGIS Geographic Information System. Open Source Geospatial Foundation Project. <http://www.qgis.org/>
- Kadota Y. 1987.** A revision of *Aconitum* subgenus *Aconitum* (Ranunculaceae) of East Asia. Sanwa Shoyaku Co., Utsunomiya.
- Kmet'ová E. 1982.** *Aconitum* L. In: Futák J., Bertová L. (red.), Flóra Slovenska. **T. III**: 76–97. Veda, Bratislava.
- Linnaeus C. 1753.** Species Plantarum. **T. 1**: 532. Holmiae.
- Mitka J. 2003.** The genus *Aconitum* L. (Ranunculaceae) in Poland and adjacent countries: A pheneticgeographic study. Institute of Botany of the Jagellonian University, Cracow.
- Mitka J. 2008a.** *Aconitum moldavicum* Hacq. (Ranunculaceae) and its hybrids in the Carpathians and adjacent regions. *Roczniki Bieszczadzkie* **16**: 233–252.
- Mitka J. 2008b.** Tojad Hosta. *Aconitum moldavicum* Hacq. subsp. *hosteanum* (Schur) Graebn. & P. Graebn. In: Mirek Z., Piękoś-Mirkowa H. (eds), Czerwona Księga Karpat Polskich. Rośliny naczyniowe: 78–79. Kraków.
- Mitka J., Starmühler W. 2000.** Phenetic variability of *Aconitum lasiocarpum* (Rchb.) Gayer (Ranunculaceae): extension of taxonomic and geografic borders. *Acta Soc. Bot. Pol.* **62** (2): 145–155.
- Mitka J., Szajna B. 2009.** A phenetic study on *Aconitum* × *hebegynum* DC. (Ranunculaceae) in the Eastern Carpathians. *Roczniki Bieszczadzkie* **17**: 253–266.
- Mitka J., Boroń P., Sutkowska A. 2013.** Holocene history of *Aconitum* in the Polish Western Carpathians and adjacent regions: long-distance migrations or cryptic refugia? *Mod. Phytomorphol.* **3**: 9–18. <https://doi.org/10.5281/zenodo.161587>
- Mitka J., Boroń P., Wróblewska A., Bąba W. 2015.** AFLP analysis reveals infraspecific phylogenetic relationships and population genetic structure of two species of *Aconitum* in Central Europe. *Acta Soc. Bot. Pol.* **84**: 267–276.
- Mitka J., Boroń P., Novikoff A., Wróblewska A., Binkiewicz B. 2016.** Two major groups of chloroplast DNA haplotypes in diploid and tetraploid *Aconitum* subgen. *Aconitum* (Ranunculaceae) in the Carpathians. *Mod. Phytomorphol.* **9** (Suppl.): 5–15. <https://doi.org/10.5281/zenodo.159700>
- Novikoff A.V. 2013.** Introduction to the taxonomy of the genus *Aconitum* L. (Ranunculaceae) in the flora of Slovakia. *Proc. of V Internat. Sci. Conf. (Sumy, 23-25 May 2013)*. **Vol. 1**: 303–306. (In Ukrainian)
- Novikoff A. 2013–2017.** Genus *Aconitum* L. (Ranunculaceae) in Slovakia. Published on the Internet. <http://slovaconitum.myspecies.info/>
- Novikoff A.V., Mitka J. 2011.** Taxonomy and ecology of the genus *Aconitum* L. in the Ukrainian Carpathians. *Wulfenia* **18**: 37–61.
- Novikoff A., Mitka J., Kuzyarin A., Orlov O., Ragulina M. 2016.** Some notes on the genus *Aconitum* in Chornohora Mts. *Mod. Phytomorphol.* **9** (Suppl.): 35–73. <https://doi.org/10.5281/zenodo.159703>
- Paczoski J. 1927.** *Aconitum*. In: W. Szafer (red.), Flora Polska. **T. 3**: 19–25. PWN, Warszawa–Krakow.
- Reichenbach H.G.L. 1819.** Uebersicht der Gattung *Aconitum*. Regensburg.
- Reichenbach H.G.L. 1820.** Monographia generis *Aconiti*. Sumtibus F.C.G. Vogelii, Lipsiae.
- Reichenbach H.G.L. 1823–1827.** Illustratio specierum *Aconiti* generis. Lipsiae.
- Reichenbach H.G.L. 1838.** Icones florum Germanicae et Helveticae. **Bd. I**. Sumtibus Ambrosii Abel, Lipsiae.
- Reichenbach H.G.L. 1840.** Icones florum Germanicae et Helveticae, simul Pedemontanae, Tirolensis, Istriacae, Dalmaticae, Austriacae, Hungaricae, Transylvanicae, Moravicae, Borussicae, Holsaticae, Belgicae, Hollandicae, ergo Mediae Europae. Apud Fridericum Hofmeister, Lipsiae.
- Skalický V. 1966.** Československé oměje (*Aconitum* L.). *Živa* **52/14** (6): 205–207.
- Skalický V. 1982.** Notula systematicae, diagnosticae et nomenclaturicae ad *Aconitum* generis investigationem pertinentes. *Preslia, Praha* **54**: 115–122.
- Skalický V. 1985.** Taxonomische und nomenklatorische Bemerkungen zu den Gattungen *Aconitum* L. und *Pulsatilla* Mill. *Preslia, Praha* **57**: 135–143.
- Skalický V. 1990.** Rod *Aconitum* na Československu. *Zprávy Českoslov. Bot. Spol.* **25** (2): 1–27.
- Smith V.S., Rycroft S., Scott B., Baker E., Livermore L., Heaton A., Bouton K., Koureas D.N., Roberts D. 2012.** Scratchpads 2.0: A virtual research environment infrastructure for biodiversity data. <http://scratchpads.eu>
- Starmühler W. 1997.** Typification of names in the genus *Aconitum*. *Feddes Repert.* **108**: 102–103.



- Starmühler W. 1998.** Ranunculaceae subtrib. Delphiniinae exsiccatae, Fasc. 3 (Nr. 41–60). *Fritschiana* **13**: 1–10.
- Starmühler W. 2001.** Die Gattung *Aconitum* in Bayern. *Ber. Bayer. Bot. Ges.* **71**: 99–118.
- Starmühler W. 2002.** Ranunculaceae subtrib. Delphiniinae exsiccatae, Fasc. 5 (Nr. 81–100). *Fritschiana* **30**: 1–12.
- Starmühler W., Mitka J. 2001.** Systematics and chorology of *Aconitum* sect. *Napellus* (Ranunculaceae) and its hybrids in the Northern Carpathians and Forest Carpathians. *Thaiszia* **10**: 115–136.
- Sutkowska A., Boroń P., Mitka J. 2013.** Natural hybrid zone of *Aconitum* species in the Western Carpathians: Linnaean taxonomy and ISSR fingerprinting. *Acta Biol. Cracov. Ser. Bot.* **55** (1): 114–126. <https://doi.org/10.2478/abcsb-2013-00015>
- Tamura M. 1995.** *Aconitum* L. In: Engler A., Prantl K. (eds), *Die natürlichen Pflanzenfamilien*: 274–291. Aufl. Dunker & Humblot, Berlin.
- The Plant List 2017.** Version 1.1. Published on the Internet. <http://www.theplantlist.org/>
- Tutin T.G., Akeroyd J.R., Chater A.O. 1993.** *Aconitum* L. In: Tutin T.G., Burges N.A., Chater A.O., Edmondson J.R., Heywood V.H., Moore D.M., Valentine D.H., Walters S.M., Webb D.A. (eds), *Flora Europaea*. 2<sup>nd</sup> ed. Vol. 1. *Psilotaceae to Platanaceae*: 254–256. Cambridge University Press, Cambridge, New York, Melbourne.
- Tzvelev N.N. 2001.** Borets – *Aconitum* L. In: Tzvelev N.N. (ed.), *Flora of Eastern Europe*. T. X: 55–66. Mir i semja, Saint-Petersburg. (In Russian)
- Visjulina O.D. 1953.** Rid 299. Akonit – *Aconitum* L. In: Klokov M.V., Visjulina O.D. (eds), *Flora of Ukrainian SSR*. Vol. 5: 56–70. Publishing of AS of Ukrainian SSR, Kyiv.
- Voroshilov V.N. 1990.** European species from genus *Aconitum* L. *Bull. Main Bot. Garden* **158**: 36–41. (In Russian)
- Wacławska-Ćwiertnia K., Mitka J. 2016.** Typification of Zapalowicz's names in *Aconitum* section *Aconitum*. *PhytoKeys* **58**: 119–126. <https://doi.org/10.3897/phytokeys.58.7110>
- Zapałowicz H. 1908.** Conspectus florae Galiciae criticus. T. 2: 205–237. Akademia Umiejętności, Kraków.

## Appendix 1. Specimens examined in herbaria

### *Aconitum lycoctonum* subsp. *lycoctonum*

SLOVAKIA: Muránsky hrad; leg. Hubová O., Kmetová E., 06.06.1968; (SAV). — Vrch Riečky [Mt. Vrchriečky near village Litmanová]; leg. Zahradníková K., 05.07.1972; (SAV). — Považský Inovec, Marhát, *Aceti-Fagetum*; 690 m a.s.l.; leg. Michalko J., Magic D., 03.06.1965; (SAV). — Veľká Fatra: Blatnická dolina, na svahu SE od Kečerovky [Kačárová]; 700 m a.s.l.; leg. Kováčiková, 20.09.1974; (SAV). — Veľká Fatra: Gaderská dolina; leg. Futák J., Jasičová M., 25.06.1963; (SAV). — Oravský Podzámok: vrch Skalka; 530 m a.s.l.; leg. Futák J., 08.07.1959; (SAV × 2 vouchers). — Bánovce nad Bebravou [?], *Calamagrostis*; 803 m a.s.l.; leg. Futák J., 12.07.1960; (SAV). — Manínska nížina, pri potoku, vápenec; 350 m a.s.l.; leg. Futák J., 05.06.1958; (SAV × 2 vouchers). — Orava: Podbieľ, Biela skala; leg. Futák J., Jasičová M., 24.06.1963; (SAV). — Ostrý kameň; leg. Maglocky Št., 09.08.1967; (SAV). — Lubochňa; leg. Futák J., Jasičová M., 23.06.1963; (SAV). — Veľká Fatra: [Kráľova studňa], svetlina v bučine pod chatou; 1100 m a.s.l.; leg. Grebenščikov O., 02.07.1953; (SAV). — Bánovce nad Bebravou [?], *Fagetum*; 750 m a.s.l.; leg. Futák J., 15.07.1960; (SAV). — Štubn. Teplice, Kostecká dol., svetliny; leg. Horák P., 13.07.1942; (SAV). — Smolenice – hrebeň. Malé Karpaty; leg. Krippelová T., 21.06.1960; (SAV × 3 vouchers). — Strážovská hornatina, dolomit, bučina; 540 m a.s.l.; leg. Futák J., 26.07.1961; (SAV × 4 vouchers). — Bánovce nad Bebravou [?], Kanisova skala, dolomit; 700 m a.s.l.; leg. Futák J., 15.07.1960; (SAV). — Záruby, hrebeň; 700 m a.s.l.; leg. Horák P., 07.1923; (SAV). — Tematínske kopce, Modriná; leg. Michalko J., 03.07.1957; (SAV). — pri Jablonici, okraj lesa; leg. Krippelová T., 07.1967; (SAV). — Strážovská hornatina; leg. Futák J., Hubová O., 21.05.1954; (SAV). — Malé Karpaty: vápencový hrebeň západne od zrucaniny Ostrý kameň v bučine; 500 m a.s.l.; leg. Kollár J., Zahradníková K., 12.06.1968; (SAV). — Stráž. vrchy, medzi obcami Mníchova Lehota a Kostolné Mitice na hrebni Maiková a Lapkov kameň, v lese pri ceste v bučine; 600 m a.s.l.; leg. Schidlay E., 01.08.1950; (SAV). — Vlhké... pod vrcholom Javořiny; leg. ?, 19.07.1911; (SAV). — Revúca [Liptovské Revúce]. Vel. Fatra; 1000 m a.s.l.; leg. Nábelek V., 07.1936; (SAV). — Slovenský raj: Sokolia dolina, dolná časť; 600 m a.s.l.; leg. Hubová O., 16.08.1962; (SAV). — Strečno; leg. Popovič, 21.06.1959; (SAV). — Tematínske kopce, pri potoku Kališťa za obcou Modrová; 220 m a.s.l.; leg. ?, 31.05.1957; (SAV). — Lubina: Veľká Javorina [Biele Karpaty] – pri turist. chate – prenesené na pokusný pozemok Bratislava–Patrónka (kultúra 3 roky); leg. Zahradníková K., 16.07.1963; (SAV). — Považský Inovec, kopce nad Tematínskym Podhradím, vápenec, lúčina; 500 m a.s.l.; leg. Michalko J., Zahradníková K., 08.07.1959; (SAV). — Rajecké Teplice, in monte Tlštá hora, in fageto; 450 m a.s.l.; leg. Schidlay E., 10.06.1947; (SAV). — Biele Karpaty, Vrbovce, les nad žel. stanicou Vrbovce, pod vrchom Stráň (550,3 m.m.n.), pri červenej turistickej značke (cesta M. Kudeříkové); 550 m a.s.l.; leg. Perný M., 12.06.1998; (SAV). — Strážovská hornatina, Strážov (k. 1240 m), lúčne porasty pri kóte; 1150 m

a.s.l.; leg. Kollár J., 21.07.1966; (BRA × 2 vouchers). — Pohoří Rokoše: Smrkový les pod vrcholem Rokoš; 950 m a.s.l.; leg. Dvořák J., 14.06.1979; (BRA). — Pohoří Rokoše: in fageto sub cacumine montis Rokoš; 960 m a.s.l.; leg. Dvořák J., 05.06.1975; (BRA). — Považský Inovec: dolina Kališťa na V od obce Modrová, pri lesnej ceste v rekr. stredisku; 240 m a.s.l.; leg. Mucina L., 26.06.1974; (BRA). — Slovenský raj: Prielom Hornádu, vápence; 550 m a.s.l.; leg. Hajdúk J., 11.06.1959; (BRA). — Malé Karpaty: Smolenice, les pod Havraňou skalou, tmavosivý vápenc; 400 m a.s.l.; leg. Vozárová M., 10.07.1996; (BRA × 2 vouchers). — Strážovské vrchy, dolina medzi V. Málenicou (909 m) a Rohatínom (832,4 m), v bučine; 520 m a.s.l.; leg. Michalková V., 26.05.2001; (BRA). — Liptovská Osada – Podsuchá; 700 m a.s.l.; leg. ?, 16.07.1972; (BRA). — Vel. Fatra: Čierny kameň –; 1400 m a.s.l.; leg. ?, 21.08.1968; (BRA). — Malé Karpaty: prope vici Smolenice, montis Záruby in iugo, ad terra calcareum; 730 m a.s.l.; leg. Michalko J., 08.08.1965; (BRA). — Stará Lehota – Kňazný vrch; leg. Maglocký Št., 13.08.1965; (BRA). — ober Harmanec; leg. ?, 09.07.1857; (BRA). — pri obci Topoľčianky; leg. Drévlackanský Fr., 19.06.1958; (BRA × 2 vouchers). — Na Nitr. Javorine [Panská Javorina] miestami; leg. Holuby J., 07.1864; (BRA). — Malé Karpaty, Trnava: in fageto sub arce Ostrý kameň prope pag. Biksard [today Buková village]; 500 m a.s.l.; leg. Valenta V., 18.07.1940; (BRA × 2 vouchers). — Kremnica, Bartoška; leg. Zechentner, ?; (BRA). — prope Banská Štiavnica – in declivibus borealis, orientalis montis Koelberg in fruticetis – solo humoso – planta sociabilis; leg. Hlavaček A., 29.05.1936; (BRA). — Ružomberok: in saxosis calcareis m. Vysoký grun supra pag. Lubochňa; 650 m a.s.l.; leg. Valenta V., 16.06.1971; (BRA). — Ilava: in convalle inter pagos Beluša et Mojtín; 340 m a.s.l.; leg. Valenta V., 29.06.1936; (BRA). — Prievidza: in fruticetis ad marginum silvae in m. Revan ad viam Gajdel – Fačkov; 850 m a.s.l.; leg. Valenta V., 11.07.1935; (BRA). — Západné Tatry: kataster obce Pribylina, okres Liptovský Mikuláš, vysokobylinné spoločenstvo okolo potôčkov v kroví; 850 m a.s.l.; leg. Horníčková J., 12.08.1982; (BRA). — Liptovské Revúce, Čierny kameň; leg. Grodkovský G., 13.07.1934; (BRA × 2 vouchers). — Veľká Fatra, Dedošova dolina, v bučine; 800 m a.s.l.; leg. Uhlířová J., 11.07.1994; (BRA). — Slovenský raj: Stratená, Dedinky, orientatio W, acclivitas 40°, substratum CaCO<sub>3</sub>, terra rendzina; 900 m a.s.l.; leg. Hajdúk J., 31.07.1956; (BRA). — Biele Karpaty, Veľká Javorina; leg. Záborský J., 20.08.1972; (SLO × 9 vouchers). — Biele Karpaty, Veľká Javorina, v lese; leg. Záborský J., 16.09.1972; (SLO). — Zlatnícka dolina pri Skalici, v lese; leg. Záborský J., 01.08.1972; (SLO × 2 vouchers). — Sever. Biele Karpaty, Pruské; leg. ?, 19.06.1989; (SLO × 3 vouchers). — Biele Karpaty, Veľká Javorina; leg. Záborský J., 14.09.1973; (SLO). — Skalica: Zlatnícka dolina; leg. Záborský J., 24.07.1965; (SLO × 3 vouchers). — Juž. Biele Karpaty, Skalica: Zlatnícka dolina; leg. Záborský J., 27.08.1984; (SLO × 2 vouchers). — Juž. Biele Karpaty, Skalica: Zlatnícka dolina; leg. Činčura F., Záborský J., 02.09.1984; (SLO). — Násyp pri Harmanci; leg. Záborský J., 30.06.1970; (SLO). — Biele Karpaty, Veľká Javorina; leg. Záborský J., 14.09.1973; (SLO × 3 vouchers). — Slovenský raj: Kysel; leg. ?, 27.06.1971; (SLO). — Biely Potok [part of town Ružomberok]; leg. ?, 25.06.1979; (SLO). — Nemecká – Hradisko; leg. Háberová I., 05.06.1975; (SLO). — Manínska úžina; leg. Háberová I., 04.06.1976; (SLO). — Palota; leg. Majzlanová E., 10.06.1977; (SLO). — Malá Fatra – sedlo pod Klakom; lesy v okolí chaty; leg. Činčura F., 13.07.1968; (SLO × 2 vouchers). — Veľká Fatra – lesy pri chate pod Δ Úplaz, smerom od Harmanca; leg. Činčura F., 04.07.1968; (SLO). — Malé Karpaty – Ostrý kameň; leg. Filová M., 08.07.1949; (SLO). — Harmanecká dolina; leg. Michalko J., 28.06.1952; (SLO). — Neresnícka dolina pri Zvolene – v lesoch vedľa cesty; leg. Činčura F., 14.06.1967; (SLO × 4 vouchers). — Rokoš vs. od Bánovce nad Bebravou; leg. Futák J., 04.07.1931; (SLO). — Veľká Fatra: dolina Bystrice pod Kráľovou studňou; leg. Futák J., 15.06.1947; (SLO). — Veľká Fatra: Majerova skala; leg. Futák J., 15.06.1947; (SLO). — Kopce a lúky nad Lubochňou; leg. Májovský J., 06.07.1951; (SLO). — Kozel – Biela skala, les; leg. Hollá D., 11.07.1968; (SLO). — Veľká Fatra: Gaderská dolina; leg. Májovský J., 21.06.1948; (SLO). — Malá Fatra; leg. Futák J., 11.06.1947; (SLO). — Harmanecká dolina; leg. Michalko J., 28.06.1952; (SLO). — Veľká Fatra: Horný Jelenec; leg. Futák J., 14.06.1947; (SLO). — Bučiny nad Riečkou a dolina B.B. [Banská Bystrica] vodovodu; leg. Májovský J., 29.06.1952; (SLO × 2 vouchers). — Zvolen; leg. Futák J., 07.1941; (SLO). — Reván; leg. Pantocsek J., 02.08.1902; (SLO). — Moravia Occidentalis. Ad confines Slovakiae: Javorníky, in pratis “Javornické louky”; 1056 m a.s.l.; leg. Říčan G., 07.1924; (SLO × 1 voucher, ZV × 1 voucher). — Juhoslovenský kras; leg. ?, 27.06.1964; (SLO). — Neresnícka dolina pri Zvolene – v lesoch vedľa cesty; leg. Činčura F., 14.06.1967; (SLO × 2 vouchers). — Veľká Fatra: Tlstá; leg. Exkurzia, 22.06.1948; (SLO). — Veľká Fatra: Dedošová dolina; leg. Májovský J., 21.06.1948; (SLO). — Rokoš: bučina na sev. svahu; 920 m a.s.l.; leg. Futák J., 28.07.1942; (SLO × 2 vouchers). — Malé Karpaty: Záruby – Buková; leg. Medovič J., 25.08.1955; (SLO × 3 vouchers). — Malé Karpaty: Veterlín; leg. Filová M., 04.07.1948; (SLO × 2 vouchers). — Malé Karpaty: Driny – Čelo; leg. Berta J., Medovič J., 24.08.1955; (SLO). — Strážovská hornatina, Rajcke Teplice, hrebeň na Tlstú horu, les; leg. Hallonová, 04.06.1977; (SLO). — Strážovská hornatina, Lietava, severný svah pod Lietavským hradom, les; leg. Hallonová, 17.06.1978; (SLO). — Remata – Roviny; leg. Takáč, 17.07.1962; (NI). — Stráž. vrchy: Uhrovské Podhradie, sedlo Rokoš; 945 m a.s.l.; leg. Eliáš P. jun., 22.07.2003; (NI). — Stráž. vrchy: Δ Baske, v lese pod chatou; leg. Eliáš P. jun., 23.07.2003; (NI × 2 vouchers). — M. Karpaty: Δ Záruby, hojne okolo turist. chodníka; 755 m a.s.l.; leg. Eliáš P. jun., 21.07.2010; (NI). — Silická planina, 620 m, “Fujančo”; Z, 15°; leg. ?, 17.05.1946; (NI). — Podsuchá – vzácné na úpätí stráne nad riekou pri letnom tábore; leg. ?, 10.07.1992; (NI). — Vápencové predhorie medzi Kysucou a Varínkou – Brodnianka – Tac-FQ, exp. V-Z, skl. 10–20°; 700 m a.s.l.; leg. Greštiak M., 13.06.1965; (ZV). — Homôľka; leg. Mikoláš V., 15.09.1984; (KO). — pod Tesnou ríznou [Tesná ríža – Malá Fatra]; leg. Mikoláš V., 18.08.1984; (KO). — Zádielska dolina; leg. Vojtáš A., 14.06.1968; (KO).

***Aconitum moldavicum* subsp. *moldavicum***

SLOVAKIA: Vernár; leg. ?, (SAV). — okres Bánovce nad Bebravou: Skupina Kňažného stola, medzi Ľutovom a Timoradzou; 525 m a.s.l.; leg. Futák J., 05.07.1956; (SAV). — Zádielska dolina: na strmých skalách; 450 m a.s.l.; leg. Schidlay E., 05.08.1954; (SAV). — bukový les v doline Čierneho Váhu; 800 m a.s.l.; leg. Futák J., 12.07.1957; (SAV × 2 vouchers). — na hrebeni vrchu Rígeľ medzi Čiernym Váhom a Svarínom, dolomit, smrečina; 850 m a.s.l.; leg. Futák J., 11.07.1957; (SAV). — Slovakia ...; 800 m a.s.l.; leg. Futák J., 19.08.1955; (SAV). — Veľká Fatra; 1180 m a.s.l.; leg. Hubová O., 27.05.1975; (SAV). — Pusté pole; leg. Futák J., 21.08.1973; (SAV). — Veľká Fatra: Majerova skala; leg. Nábelek V., 15.06.1947; (SAV). — Novoselica [Nová Sedlica] – Prikry – Stuzica. Rezervácia [Bukovské vrchy, NP Poloniny]; leg. Exkurzia, 16.07.1955; (SAV × 4 vouchers). — Okres Snina, Ruský Potok, Malý Bukovec; leg. Exkurzia, 16.07.1955; (SAV × 2 vouchers). — Nízke Tatry, ŠPR Ohnište, údolie potoka Šuštiacka; leg. Drábová J., Hrouda L., 16.07.1986; (SAV). — Humenská; leg. Maglocký Št., 19.05.1971; (SAV). — Studňa [Muránska planina]; leg. Futák J., Zahradníková K., 08.07.1970; (SAV). — Vihorlat, Jovsa, Jovsianska hrabina (štvorec 7198); 162 m a.s.l.; leg. Mráz P., 28.05.1998; (SAV). — Pusté pole; 1000 m a.s.l.; leg. Futák J., 13.07.1965; (SAV). — Muránska planina: Δ Vrbiarka; 740 m a.s.l.; leg. Šípošová H., Peniašteková M., 17.07.1980; (SAV). — Muránska planina; leg. Zahradníková K., 08.07.1970; (SAV). — Zádiel, Zádielska dolina; leg. Kmeťová E., 11.06.1969; (SAV). — Korytnica, okraj krovia; 800 m a.s.l.; leg. Schidlay E., 11.08.1941; (SAV × 2 vouchers). — Veľká Fatra, Horný Jelenec; leg. Futák J., 12.07.1965; (SAV). — Slizké; 410 m a.s.l.; leg. Kliment J., 10.06.1976; (SAV). — Striežovce; leg. Kliment J., 30.06.1976; (SAV × 2 vouchers). — Jelšava; leg. ?, 20.05.1934; (SAV). — Liptovská Teplička ?; 600 m a.s.l.; leg. Michalko J., 17.07.1972; (SAV). — Stratenská hornatina: roklina Suchá Belá / pri Hrabušiciach /; 600 m a.s.l.; leg. Hubová O., Tatarková G., 22.07.1966; (SAV). — Stratenská hornatina: roklina Veľký Sokol; 700 m a.s.l.; leg. Hubová O., Tatarková G., 22.07.1966; (SAV). — vrch Zámčisko pri Kvetnici, Tilio–Picetum; leg. Michalko J., 13.06.1984; (SAV). — Muránska plošina: Cigánka, JZ od obce Muráň, okraj lesa; 900 m a.s.l.; leg. Jasičová M., 19.06.1963; (SAV). — Vyšná Slaná, vrch Radzim; 920 m a.s.l.; leg. Hajdúk J., 05.08.1956; (SAV). — Studňa, Mochnatá; leg. Futák J., Zahradníková K., 08.07.1970; (SAV). — Veľká Fatra, vrch Krížna [+ sample from Čorna Ríká in Podkarpatská Rus ?]; leg. Nábelek V., 07.1936; (SAV). — dolina Lesnica [?]; 560 m a.s.l.; leg. Hubová O., 08.1962; (SAV). — Veľká Fatra: Gader, u potoka; leg. Schidlay E., 24.08.1936; (SAV). — Šturec [Veľká Fatra], južný svah pri cestárskom domčeku; leg. Futák J., 12.07.1965; (SAV). — Slovenské rudohorie – vrch Stolica – zadný Kyprov; leg. Kliment J., 11.08.1977; (SAV). — Vrch Riečky [Mt. Vrchriečky near village Litmanová]; leg. Zahradníková K., 05.07.1972; (SAV). — Liptovský Hrádok, na okraji lesa medzi krovím, dolomit, N; 700 m a.s.l.; leg. Futák J., 10.07.1957; (SAV). — Žiar [časť lúčanskej časti Malej Fatry]; 1010 m a.s.l.; leg. Futák J., 11.07.1957; (SAV). — Slovakia orientalis, in silvis caeduis supra Kavečany prope oppidum Košice, solo calcareo; 500 m a.s.l.; leg. Hlavaček A., 21.07.1950; (SAV). — Pieniny, Vysoké skalky, na SZ svahu pri hranici; leg. Michalko J., 22.08.1953; (SAV). — Slovenské rudohorie, vrch Radzim; 920 m a.s.l.; leg. Hajdúk J., 05.08.1956; (SAV). — Ďurkovec [Bukovské vrchy Mts] (okres Snina); leg. Májovský J., 05.10.1958; (SAV). — Spišská Nová Ves; leg. Májovský J., 23.08.1955; (SAV). — Riaba skala (okr. Snina); leg. Májovský J., 04.10.1958; (SAV). — Kráľova Lehota, skaly nad stanicou; leg. Futák J., Jasičová M., Zahradníková K., 22.06.1863; (SAV). — Maša [Hnúšťa]; leg. Rošetská K., 12.07.1954; (SAV). — V lese na Šturci u pasu; leg. Horák P., 13.07.1938; (SAV). — Malé Karpaty, Ostrý kameň; leg. Perný M., 23.10.1997; (SAV). — Muránske pohorie: in monte Veľká Stožka, in declivibus silvaticis; 1450 m a.s.l.; leg. Dvořák J., 23.07.1975; (BRA). — Nízke Tatry, Liptovský Hrádok, vrch Zapač – východná krovinatá stráň v lese; 700 m a.s.l.; leg. Horníčková J., 07.1983; (BRA × 3 vouchers). — Slovenský raj: Stratená, Dedinky, acclivitas 40°, substratum Ca, Mg, CO<sub>3</sub>, terra rendzina; 1000 m a.s.l.; leg. Hajdúk J., 17.07.1956; (BRA). — Slovenský raj: Dedinky, Hnilec, orientatio J, acclivitas ca. 35°, substratum calcareus, terra rendzina, Abieto–Fagetum vegetatio; 1000 m a.s.l.; leg. Hajdúk J., 23.07.1955; (BRA). — Stratenská hornatina, pri Dobšinskom hydrostave, kóta 921; leg. Hajdúk J., 19.07.1956; (BRA). — Slovenský raj: Dobšinská Maša, collis Skala, flumen Hnilec, orientatio V (E), substratum calcit + dolomit, terra rendzina čierna, vegetatio *Piceetum*; 1000 m a.s.l.; leg. Hajdúk J., 27.07.1955; (BRA). — Slovenský raj: Hrabušice, Veľký Sokol, substratum calcit carb., terra litozem, orientatio NW; 900 m a.s.l.; leg. Hajdúk J., 1956; (BRA). — Slovenský raj: Radzim, orientatio S (N), acclivitas ca. 40°, substratum calcit, terra rendzina, vegetatio *Abieto–Fagetum*; 940 m a.s.l.; leg. Hajdúk J., 13.08.1955; (BRA). — Slovenský raj: Vernár, dolomit, *Pulsatillo–Pinetum*; 1100 m a.s.l.; leg. Hajdúk J., 01.08.1955; (BRA). — Slovenské rudohorie, montes Muránska planina: in jugo saxoso ab arce Muráň ad orientem versus; 1040 m a.s.l.; leg. Vašák V., 18.07.1978; (BRA × 2 vouchers). — hrad Muráň; leg. ?, 27.06.1972; (BRA). — Brzotín – les, výstup na Silickú planinu; leg. ?, 23.06.1972; (BRA). — Bardejov; leg. Berganský J., 1923; (BRA). — Nízke Poloniny: in platis inter pag. Topoľa et Runina; 400 m a.s.l.; leg. Pišút I., 18.07.1962; (BRA × 2 vouchers). — Revúca, mont. Cigánka supra pag. Muráň; 800 m a.s.l.; leg. Valenta V., 09.07.1970; (BRA). — Nízke Tatry: Tále, na okraji riedkeho lesa pod silnicí; 750 m a.s.l.; leg. Dvořák J., 17.07.1972; (BRA). — Baba bei Lučivná; leg. Grodkovszký G., 26.06.1933; (BRA). — Tisovec, Voniaca; leg. Vraný V., 06.06.1922; (BRA). — N. Tatry, údolí Štiavnica; leg. Balthasar V., 07.1934; (BRA). — Muránska vrchovina: Javorníková dolina, vápencové svahy v horní časti doliny; 850 m a.s.l.; leg. Dvořák J., 08.08.1980; (BRA). — Zádielska dolina; leg. ?, 19.07.1956; (BRA). — Muráň; leg. ?, 04.07.1962; (BRA). — Bardejov: Zabavastrasse; leg. Berganský J., 17.06.1922; (BRA × 2 vouchers). — Bardejov: Baadgelände; leg. Berganský J., 18.08.1929; (BRA). — Bardejov: Kapitnoka; leg. Berganský J., 25.06.1927; (BRA × 3 vouchers). — Bardejov: Gresak Kert; leg. Berganský J., 10.06.1922; (BRA × 8



vouchers). — Bardejov: Teglam; leg. Berganský J., 14.05.1922; (BRA × 3 vouchers). — Bardejov: fúrdő erdő féle; leg. Berganský J., 14.06.1922; (BRA × 2 vouchers). — Bardejov: Bartfeld; leg. Berganský J., 28.06.1922; (BRA). — Bardejov: Alte Bleiche; leg. Berganský J., 30.05.1924; (BRA). — Bardejov: Moliterka; leg. Berganský J., 04.07.1927; (BRA × 3 vouchers). — Bardejov: Zabava; leg. Berganský J., 17.06.1922; (BRA). — Bardejov: vedľa potoka pri papierni; leg. Berganský J., 1924; (BRA). — Bardejov: Moliterka; leg. Berganský J., 09.06.1922; (BRA × 2 vouchers). — Bardejov; leg. Berganský J., 1925; (BRA × 3 vouchers). — Liptovský Hrádok, vrch Zapač, krovinaté úpatie, SV svah; 670 m a.s.l.; leg. Horníčková J., 20.06.1973; (BRA). — Bardejov: Rurná; leg. Berganský J., 12.06.1924; (BRA × 3 vouchers). — Bardejov: Kohlengrund; leg. Berganský J., 02.05.1924; (BRA × 3 vouchers). — Bardejov: Popova hura Gelände; leg. Berganský J., 25.05.1924; (BRA). — Slovenský raj: Dedinky, Gerava, Hnilec, orientatio W, acclivitas 25°, substratum CaCO<sub>3</sub>, terra rendzina; 1000 m a.s.l.; leg. Hajdúk J., 17.07.1956; (BRA). — Ružomberok – Biele skaly; leg. ?, 07.1964; (BRA). — Čergov – Bystrá, v bukovom lese na vrchole; leg. Májovský J., 20.06.1947; (SLO × 2 vouchers). — Sninský kameň, v bučinách na sev. svahu, *Aceri-Fagetum*; leg. Májovský J., 10.07.1967; (SLO). — Δ Sokol, v bučinách nad dedinou, skala; leg. Májovský J., 21.05.1968; (SLO). — Vihorlat [vrch], na hrebeni na okraji lesa pri chodníku; leg. Májovský J., 23.06.1961; (SLO). — Bučiny nad Riečkou a dolina B.B. [banskobystrického] vodovodu; leg. Májovský J., 29.06.1952; (SLO × 4 vouchers). — Čergov – Bystrá, na hrebeňoch v bukovom lese (pieskovce); 900 m a.s.l.; leg. Májovský J., 20.06.1947; (SLO). — Čierny Váh: na lúke Stará Poľana; leg. Ferjanec J., 26.07.1965; (SLO). — Skalky nad Dubovou; leg. Suchá D., 29.06.1952; (SLO). — Pohorie Čergov, Δ Bystrá, v bučine na hrebeni; leg. Májovský J., 20.06.1947; (SLO). — Pieniny: Vysoké Skalky –; leg. exkurzia, 19.07.1954; (SLO). — Muráň; leg. Michalko J., 08.07.1952; (SLO). — Cestou z Dlhej Lúky do Muráňa (okr. Revúca) [Muránska Dlhá Lúka]; leg. Opluštilová T., 08.1952; (SLO). — Muráň; leg. Futák J., 10.07.1944; (SLO). — Zádiel; leg. Futák J., 27.07.1949; (SLO × 2 vouchers). — Špania Dolina, Panský diel, Baláže; leg. Michalko J., 27.06.1952; (SLO × 4 vouchers). — Čergov – Solisko, v bukovom lese; leg. Májovský J., 24.06.1947; (SLO × 2 vouchers). — Nízke Tatry: pri Váhu medzi Lipt. Hrádkom a Lipt. Jánom, vápenec; leg. Futák J., 16.08.1944; (SLO). — Spišská Nová Ves, ad stationem viae ferr. “Štiavnik”; 600 m a.s.l.; leg. Suza J., 20.06.1931; (SLO). — Flora Leutschoviensis [Levoča], Dolina; leg. Greschik V., 08.1887; (SLO). — Flora Tatrae Magnae, Leutschovie [Levoča], Dolina; leg. Greschik V., 07.1942; (SLO). — Flora tatrae Magnae, Leutschovie [Levoča], Dolina; leg. Greschik V., 06.1944; (SLO × 3 vouchers). — Flora Tatrae Magnae, Leutschovie [Levoča], in convalle “Dolina”; leg. Greschik V., 06.1910; (SLO × 2 vouchers). — Kesmark [Kežmarok], Kleinwäldchen; leg. Greschik V., 06.1886; (SLO). — Flora tatrae Magnae, Leutschovie [Levoča], in convalle “Dolina”; leg. Greschik V., 07.1920; (SLO). — Flora Tatrae Magnae, Löcse [Levoča]: Löcsfűred [Levočské Kúpele]; leg. Greschik V., 06.1888; (SLO × 2 vouchers). — Čierny Váh – Δ Cudzenica pri Malej Lehotě, les; 750 m a.s.l.; leg. Vartíková E., 21.07.1972; (SLO × 2 vouchers). — Čierny Váh, lesy po hájovnu Niž. Chmelince, S exp.; 750 m a.s.l.; leg. Vartíková E., 18.07.1972; (SLO). — Nízke Tatry: Čierny Váh, Δ Gregové; 1000 m a.s.l.; leg. Vartíková E., 03.07.1974; (SLO). — Nízke Tatry, Δ Vysoké; 900 m a.s.l.; leg. Vartíková E., 04.07.1974; (SLO). — Nízke Tatry: Čierny Váh, Δ Gregové; 950 m a.s.l.; leg. Vartíková E., 03.07.1974; (SLO × 2 vouchers). — Nízke Tatry: Δ Muráň, Čierny Váh; 850 m a.s.l.; leg. Vartíková E., 09.07.1974; (SLO). — Korytnická dolina – svetlé, trávnaté miesta na lesných svahoch vedľa cesty smerom na Donovaly; leg. Činčura F., 06.07.1968; (SLO × 5 vouchers). — Veľká Fatra: Majerova skala; leg. Futák J., 15.06.1947; (SLO × 2 vouchers). — Slovakia ...; leg. Májovský J., 16.06.1949; (SLO). — Kopec medzi Kolbasovom a Uličom (okres Snina); leg. exkurzia, 14.07.1955; (SLO × 3 vouchers). — Muránska planina; leg. Svobodová Z., 1970; (NI). — Rybník (okres Rimavská Sobota): les na vápencovom podklade v doline potoka Drienek nad dedinou [now obec Revúca]; leg. Řehořek V., 31.05.1968; (NI × 2 vouchers). — Ľubietovský Vepor: paseka smerom na Tri Vody; leg. Svobodová Z., 10.06.1968; (NI). — Slovenský kras: Rožňava, skalky; leg. Kostúľ [?], 06.1936; (NI). — Spišská Nová Ves, ad stationem viae ferr. “Štiavnik”; 600 m a.s.l.; leg. Suza J., 20.06.1931; (NI). — Banskobystrická vrchovina, Radvaňská jamka – Varta, Banská Bystrica. Svahy nad Jamkou; 480 m a.s.l.; leg. Manica M., 01.06.1960; (ZV). — u Sivce; leg. Mikoláš V., 13.07.1962; (KO). — Kysak, sev. svahy Hradu; leg. Mikoláš V., 29.05.1999; (KO). — Veľká lúka [Muránska planina] – Cigánka; leg. Mikoláš V., 04.07.1984; (KO). — Turnianske sedlo – Erneho jask; leg. Mikoláš V., 19.06.1962; (KO). — Príkrá nad Spišskou Teplickou; leg. Paclová L., 28.06.1956; (TNP). — Slovenský raj, proti Letanovskému mlynu; leg. Odložilíková L., 30.06.1957; (TNP). — bei Poprad; leg. Scherfel A., 29.06.1979; (TNP).

### ***Aconitum moldavicum* subsp. *hosteanum***

SLOVAKIA: Košická kotlina, Zádiel; leg. Krippelová, 16.06.1966; (SAV). — Humenné: svahy nad potokom; leg. Michalko J., 22.06.1959; (SAV). — Nízke Tatry: Skalky pri Ružomberku, v kroví. 2 r.; leg. Nagy G., 06.1969; (SAV). — Nízke Poloniny, Runina – brehy “Plaša potoka” pred obcou; 450 m a.s.l.; leg. JZ, 21.08.1970; (SAV). — Slovenské rudohorie – vrch Stolica – zadný Kypřv; leg. Kliment J., 11.08.1977; (SAV). — Jovsa, les pri obci; leg. Michalková E., 17.06.1992; (SAV). — Liptovský Hrádok, na okraji lesa medzi krovím [?], dolomit, N; 700 m a.s.l.; leg. Futák J., 10.07.1957; (SAV). — v lese na vrchu Sokol [vrch v Žiari]; 950 m a.s.l.; leg. Futák J., 12.07.1957; (SAV). — Novosedlica – Príkrý – Stučka. Rezervácia [Bukovské vrchy, NP Poloniny]; leg. exkurzia, 16.07.1955; (SAV). — Slovenské rudohorie: Hrušovo, vápence; 350 m a.s.l.; leg. Hajdúk J., 21.05.1968; (BRA × 3 vouchers). — Bardejov; leg. Berganský J., 20.06.1929; (BRA). — Muránska vysočina, Muráň; leg. Skřivánek V., 06.07.1951; (BRA). — Slovenský raj: Dobšinská Maša, collis

na skalu, flumen Hnilec, substratum calcit, terra rendzine; 850 m a.s.l.; leg. Hajdúk J., 31.07.1956; (BRA). — Slovenské rudohorie, montes Muráňská planina: in jugo saxoso ab arce Muráň ad orientem versus; 1040 m a.s.l.; leg. Vašák V., 18.07.1978; (BRA). — Nízke Poloniny: brehy potoka "Plaša" pri križovatke na Runinu; 450 m a.s.l.; leg. Gallo A., 18.06.1970; (BRA). — Nízke Poloniny: in valle rivi inter pag. Topoľa et Runina, loco umbroso; 380 m a.s.l.; leg. Pišút I., 18.07.1962; (BRA). — Muráň, lesy; leg. Blatný T., 18.06.1947; (BRA). — Baba; leg. Grodkovský G., 26.06.1933; (BRA). — Bardejov; leg. Berganský J., 18.08.1929; (BRA). — Bardejov: Baadgelände; leg. Berganský J., 18.08.1929; (BRA). — Bardejov: Zabavastrasse; leg. Berganský J., 17.06.1922; (BRA). — Zádielská dolina; leg. ?, 19.07.1956; (BRA). — Hnilec, potok, vápencové skály, Z 20°; 900 m a.s.l.; leg. Marva V. [?], 06.07.1958; (BRA). — Bardejov: Zabavastrasse; leg. Berganský J., 17.06.1922; (BRA × 10 vouchers). — Bardejov: Kľušov; leg. Berganský J., 1925; (BRA). — Bardejov: Stationsgelände; leg. Berganský J., 12.06.1929; (BRA). — Bardejov: Baadgelände; leg. Berganský J., 18.08.1929; (BRA). — Bardejov; leg. Berganský J., ?; (BRA × 14 vouchers). — Bardejov; leg. Berganský J., 1927; (BRA). — Bardejov: Zabava; leg. Berganský J., 17.06.1922; (BRA). — Bardejov: Moliterka; leg. Berganský J., 20.06.1929; (BRA × 2 vouchers). — Bardejov: Kohlengrund; leg. Berganský J., 02.05.1924; (BRA). — Bardejov: Gresak Kert; leg. Berganský J., 10.06.1922; (BRA). — Slovenský raj: Hrabušice, Malý Sokol, horná časť, orientatio NW, acclivitas 40°, substratum Ca, Mg, CO<sub>3</sub>, terra rendzina, vegetatio *Acerion*; 700 m a.s.l.; leg. Hajdúk J., 07.08.1955; (BRA). — Čergov – Bystrá, v bukovom lese na vrchole; leg. Májovský J., 20.06.1947; (SLO). — Vihorlat [vrch], na hrebeni na okraji lesa pri chodníku; leg. Májovský J., 23.06.1961; (SLO). — Kopce medzi Darou [obec Dara] a Starinou (okr. Snina); leg. Exkurzia, 14.07.1955; (SLO). — Pieniny: Vysoké skalky; leg. exkurzia, 19.07.1954; (SLO). — Čergov – Šoltýsova hora v bukovom lese na vrchole; leg. Májovský J., 23.06.1947; (SLO × 2 vouchers). — Cestou na Muráňsku planinu; leg. Opluštilová T., 08.1952; (SLO). — Muráňská vysočina: Cigánka; leg. Futák J., 11.07.1944; (SLO). — Flora Tatrar Magnae, Leutschovie [Levoča], Dolina; leg. Greschik V., 07.1890; (SLO). — Flora Tatrar Magnae, Leutschovie [Levoča], in convalle "Dolina"; leg. Greschik V., 06.1910; (SLO). — Flora Leutschoviensis [Levoča], Dolina; leg. Greschik V., 07.1926; (SLO). — Flora Tatrar Magnae, Lőcse [Levoča]: Lőcsefüred [Levočské Kúpele]; leg. Greschik V., 06.1888; (SLO). — Korytnická dolina – svetlé, trávnaté miesta na lesných svahoch vedľa cesty smerom na Donovaly; leg. Činčura F., 06.07.1968; (SLO). — Hrabušice – Podlesok; leg. exkurzia, 08.07.1955; (SLO). — Baba [vrch] nad Svitom; 750 m a.s.l.; leg. Odložilková L., 13.07.1956; (TNP).

### ***Aconitum moldavicum* nothosubsp. *confusum***

SLOVAKIA: Spišská Nová Ves; leg. Májovský J., 23.08.1955; (SAV).

### ***Aconitum* × *triste***

SLOVAKIA: Meliata, vlhké lesy; leg. Karasová E., 16.06.2005; (SAV × 5 vouchers).

### ***Aconitum anthora* subsp. *anthora***

SLOVAKIA: Bukovské vrchy, Stinská, hraničný hrebeň; leg. Marhold K., 18.08.1988; (SAV). — Šivec [vrch]; leg. Futák J., 30.08.1950; (SAV). — Biela skala; leg. Futák J., 26.08.1950; (SAV × 2 vouchers). — Sokol pri Humennom; leg. Májovský J., 27.08.1950; (SAV). — Juhoslovenský kras: Felsőhegy [Horný vrch] pri Zádieli; leg. Michalko J., Popovič, 30.07.1956; (SAV). — Zádielská dolina, na strmých skalnatých svahoch na dne, sreby na dne údolia; 350 m a.s.l.; leg. Schidlay E., 05.08.1954; (SAV). — Vihorlat: [Humenský] Sokol, váp. skalky, *Fageto-Quercetum*; 300 m a.s.l.; leg. Michalko J., 26.08.1954; (SAV). — Slovenský raj: Skrik nad Letanovským mlynom, kroviny, exp. J.; 750 m a.s.l.; leg. Hubová O., 22.08.1961; (SAV × 2 vouchers). — Slovenské rudohorie, vrch Radzim, exp. J., skaly; 945 m a.s.l.; leg. Hajdúk J., 05.08.1956; (SAV). — Vihorlat: [Humenský] Sokol, váp. skalky, *Fageto-Quercetum*; 300 m a.s.l.; leg. Michalko J., 26.08.1954; (SAV × 2 vouchers). — Skalka, Jelšava; leg. ?, 02.08.1953; (SAV). — Zádielská dolina, na skalách na dne údolia; 420 m a.s.l.; leg. Schidlay E., 05.08.1954; (SAV). — Pohornádie: Skalky pri M. Vieske severne od Košíc; leg. Michalko J., 19.09.1956; (SAV). — Zádielská rokle; 400 m a.s.l.; leg. Horák P., 14.07.1936; (SAV). — Zvolen; 450 m a.s.l.; leg. Futák J., 20.08.1961; (SAV). — Kováčovské skály, Hronská Breznica; leg. Nábělek V., 09.1936; (SAV). — Zádielská dolina; leg. Krč J., 29.07.1954; (SAV). — Slovenský raj: Tomášovský výhľad; leg. Zahradníková K., 20.08.1961; (SAV). — Zádielská dolina; leg. Fabianková K., 12.09.1972; (SAV). — Malá Vieska – Trebejov; leg. Fabianková K., 23.08.1973; (SAV). — Jelšava; 510 m a.s.l.; leg. Kliment J., 28.08.1977; (SAV). — Slovakia Orientalis, ad saxa calcarea in valle Hájska dolina prope Háj apud opp. Košice; 350 m a.s.l.; leg. Hlavaček A., ?; (SAV). — Pohornádie: váp. skalky na Šivci pri Ružine, hrebeň; 780 m a.s.l.; leg. Michalko J., 23.08.1960; (SAV). — Bratislava, pestované v záhrade p. Černého (pochádza z okolia Parkána [Štúrovo]); leg. Schidlay E., 13.09.1944; (SAV). — Juhoslovenský kras: Zádielská dolina. V spodnej časti rokle; leg. Krippelová T., Zahradníková K., 26.09.1962; (SAV). — Zobor [vrch]; leg. Jasičová M., Fabianková K., 12.10.1972; (SAV). — Nitra – Zobor [vrch]; leg. ?, 24.07.1966; (SAV). — Zádielská dolina; leg. Krippelová T., 26.08.1966; (SAV). — Slovakia media, in fruticetis iugi montis Pešíanska prope Kotionem viae ferroviae Hronská Dúbrava, solo audes; 500 m a.s.l.; leg. Hlavaček A., 27.07.1956; (SAV). — Slovakia australis, distr. Plešivec, regio Slovenský kras: ad margines sylvae deciduae collis Čertova diera prope Domica, solo calcareo; 400 m a.s.l.; leg. Deyl M., 03.09.1933;

(BRA). — Gemerské rudohorie: na južnom svahu kopca Cíger na V od obce Jelšava; 320 m a.s.l.; leg. Gallo A., 30.08.1969; (BRA). — Kováčovské kopce; leg. ?, 09.09.1969; (BRA). — Humenské chrbáty: svah na Z od obce Oreské [okres Michalovce]; 220 m a.s.l.; leg. Gallo A., 03.10.1969; (BRA). — Slovenské rudohorie: Stolické vrchy, Brdárka, Vyš. Slaná, Radzim, orientatio medit., acclivitas 45°, substratum Ca, Mg, CO<sub>3</sub>, vegetatio *Spiraeum mediae*; 930 m a.s.l.; leg. Hajdúk J., 13.08.1955; (BRA). — Slovenské rudohorie: Stolické vrchy, Brdárka, Vyš. Slaná, Radzim, orientatio SW, acclivitas 20°, substratum Ca, Mg, CO<sub>3</sub>, terra rendzina, litozem, vegetatio *Spiraeum mediae*; 940 m a.s.l.; leg. Hajdúk J., 04.08.1957; (BRA). — Slovenský raj: Dedinky, Biele Vody – collis Geravy, Baranie rohy, orientatio J (S), acclivitas 10°, substratum calcit, terra litozem, vegetatio *Festucetum pallentis*; 1000 m a.s.l.; leg. Hajdúk J., 02.09.1956; (BRA × 2 vouchers). — Muráň; leg. Blatný T., 25.08.1950; (BRA). — Nitra, pod Zoborom; leg. ?, 20.09.1959; (BRA × 4 vouchers). — Kováčovské kopce, Kováčov; 320 m a.s.l.; leg. Valenta V., 25.08.1936; (BRA × 3 vouchers). — Revúca, Muráň; 925 m a.s.l.; leg. Valenta V., 11.08.1937; (BRA). — Hronská Breznica; leg. Nábelek V., 09.1936; (BRA). — Muráň: fensik [Muránska planina]; leg. ?, 08.1953; (BRA). — Muráň; leg. ?, 25.08.1950; (BRA). — Slovensko juž., Nitra, v lese na Zoboru; 350 m a.s.l.; leg. Plaskavka J., 06.08.1936; (BRA). — Nitra, pod Zoborom; leg. ?, 20.09.1959; (BRA × 8 vouchers). — Gemerské rudohorie: J svahy vrchu Dúbrava na S od obce Jelšava; 420 m a.s.l.; leg. Gallo A., 24.08.1970; (BRA). — Prieva Hornádu; leg. Májovský J., 05.09.1960; (SLO). — Slovenský kras: Hrušov, vápencové svahy; leg. Májovský J., Záborský J., 08.09.1960; (SLO). — Turniansky hradný vrch; leg. Májovský J., 15.09.1966; (SLO). — Turčiansky hradný vrch; leg. Májovský J., 15.09.1966; (SLO). — Hôrky a Vápenice (vápence južne od vrchu Ploská); leg. Eliáš P., 02.09.1968; (SLO × 2 vouchers). — Jelenec: gaštanica, v svetlom lese (dub, gaštan); leg. Májovský J., 07.10.1965; (SLO). — Tisovec, Δ Čeremošná, v bučinách hrebeňa od kameňolomu na Δ Martinová, čistinky; 850 m a.s.l.; leg. Májovský J., Magic D., 18.08.1970; (SLO × 2 vouchers). — Klátova Nová Ves, Skalka, posled. vrch na hrebeni J Δ Kostrín; 440 m a.s.l.; leg. Kováčiková, 19.09.1972; (SLO). — Veľká Lodina, vrch Babiná, *Quercetum pubescentis*; leg. Futák J., 08.09.1946; (SLO). — Kováčovské kopce [now pohorie Burda], medzi Kováčovom a Kamendinom; leg. Futák J., 22.08.1948; (SLO × 3 vouchers). — Zádielska dolina; leg. Futák J., 27.07.1949; (SLO). — Šivec, pri obci Ružín; leg. Futák J., 30.08.1950; (SLO). — Dreveník, obec Levoča; leg. Májovský J., 27.08.1955; (SLO × 3 vouchers). — Kysak, Trebejov, Malá Vieska [now Družstevná pri Hornáde]; leg. Bosáčkova E., 11.09.1956; (SLO × 3 vouchers). — Margecany: Kurtova skala; leg. Bosáčkova E., 12.09.1956; (SLO). — Kysak; leg. Futák J., 10.09.1946; (SLO). — Dvorník pri obci Spišské Podhradie; leg. Futák J., 11.09.1946; (SLO). — Sokol pri Humennom; leg. Májovský J., Michalko J., 14.09.1950; (SLO × 3 vouchers). — Zobor [vrch] pri Nitre, v lese; 350 m a.s.l.; leg. Futák J., 23.07.1942; (SLO). — medzi Budčou a Dúbravou, okres Zvolen; leg. Futák J., 18.07.1933; (SLO). — Slovakia ...; leg. ?, 08.1941; (SLO). — Slovakia ...; leg. Futák J., 15.09.1948; (SLO). — Krásna Hôrka pri Rožňave; leg. Futák J., 24.08.1947; (SLO × 2 vouchers). — Juhoslovenský kras, Hrušov, I časť; leg. Futák J., 03.09.1949; (SLO). — Juhoslovenský kras, Hrušov, II časť; 580 m a.s.l.; leg. Futák J., 03.09.1949; (SLO × 2 vouchers). — Dreveník; leg. ?, 08.1889; (SLO). — Muránska planina, Δ Cigánka; leg. Záborský J., 25.09.1984; (SLO). — Δ Sokol – exp. S–V; leg. Hudáková, 20.08.1975; (SLO). — Δ Sokol – skaly, exp. V–J; leg. Hudáková, 29.07.1975; (SLO). — Δ Podskalka, skaly, exp. V; leg. Hudáková, 07.08.1974; (SLO). — Δ Podskalka, skaly, exp. V; leg. Hudáková, 18.08.1975; (SLO). — Δ Podskalka, skaly, exp. V; leg. Hudáková, 18.08.1975; (SLO). — Váp. skala nad Jasovom; leg. Jurko A., 20.08.1950; (SLO). — Mladina v horu nad ?; leg. Záborský J., 10.08.1959; (SLO × 3 vouchers). — Vrch pri obci Veľká Lodina; leg. Futák J., 25.08.1947; (SLO). — Ružín na záp. od Kysaku; leg. Futák J., 04.09.1946; (SLO × 3 vouchers). — Malá Lodina; leg. Futák J., 08.09.1946; (SLO). — Belá hora; leg. Jurko A., 07.08.1959; (SLO). — Vihorlat: Sokol, rúbaň po *Quercus*, vápenec, J svah; leg. Michalko J., 14.09.1950; (SLO × 6 vouchers). — Sokol pri Humennom; leg. Májovský J., Michalko J., 27.08.1950; (SLO). — Vihorlat: Dupne [Dúpná jaskyňa], v *Quercus*; 300 m a.s.l.; leg. Michalko J., 11.09.1953; (SLO). — Nitra, Δ Zobor; leg. Svobodová Z., 08.07.1955; (NI × 2 vouchers). — Pov. Inovec, Topolčany: Závada, juž. svah Δ Vinište, v riedkom poraste, pospolite asi 300 rastl.; 400 m a.s.l.; leg. Eliáš P. jun., 10.09.2004; (NI). — distr. Nitra: in locis stepposis fruticosisque monti Zobor apud opp. Nitra, solo calcareo; 550 m a.s.l.; leg. Osvačilová V., 13.09.1953; (NI). — distr. Nitra: in rupibus ad decl. septentr. sub summa montis Zobor supra opp. Nitra, solo andesitico; 550 m a.s.l.; leg. Osvačilová V., 11.07.1953; (NI). — Kozlica – Jánova Ves; leg. Takáš, 14.09.1962; (NI). — Zádiel, hor. č.; leg. Mikoláš V., 23.08.1984; (KO). — Plešivec – Hrad; leg. Mikoláš V., 12.09.1984; (KO). — Ružinské skaly; leg. Mikoláš V., 20.08.1959; (KO). — Muránska planina – Hrad; leg. Mikoláš V., 24–25.08.1959; (KO × 2 vouchers). — Turňa – pod hradom; leg. Vojtúň A., 04.08.1966; (KO). — Jasovská skala; leg. Vojtúň A., 20.08.1977; (KO). — Zádiel, prvý balkón [Zádielska tiesňava]; leg. Vojtúň A., 22.09.1967; (KO). — Kurtova skala u Margecan; leg. Pavlová L., 25.07.1957; (TNP).

### *Aconitum anthora* subsp. *jacquinii*

SLOVAKIA: Slovenské rudohorie, vrch Radzim, exp. J., skaly; 945 m a.s.l.; leg. Hajdúk J., 05.08.1956; (SAV). — Spišské kotliny: Spišský hradný vrch; leg. Marciová, 19.08.1996; (SAV). — Slovenské rudohorie: Stolické vrchy, Brdárka, Vyš. Slaná, Radzim, orientatio medit, acclivitas 40°, substratum Ca, Mg, MgCO<sub>3</sub>, terra rendzina, litozem, vegetatio *Spiraeum mediae*; 940 m a.s.l.; leg. Hajdúk J., 26.08.1955; (BRA). — Dreveník, obec Levoča; leg. Májovský J., 27.08.1955; (SLO). — in saxis meridionalis ad Dreveník; leg. Greschik V., 08.1910; (SLO). — in monte Dreveník; leg. Greschik V., 07.1910;

(SLO). — Dreveník; leg. Vojtůň A., 26.09.1964; (KO). — Kirchdrauf – Drewnyik [Dreveník]; leg. Scherfel A., 08.08.1924; (TNP). — in Garten, Drewnyik [Dreveník]; leg. Scherfel A., 08.1891; (TNP). — Drewnyik [Dreveník]; leg. Waldebrenner, ?; (TNP).

### ***Aconitum anthora* subsp. *anthora* × *A. anthora* subsp. *jacquinii***

SLOVAKIA: Dreveník, obec Levoča; leg. Májovský J., 27.08.1955; (SLO). — in monte Dreveník; leg. Greschik V., 07.1910; (SLO).

### ***Aconitum variegatum* subsp. *variegatum***

SLOVAKIA: Slovenské rudohorie: Galmus, okr. Sp. N. Ves, pravá strana Belej, v úžľabine; leg. Hajdúk J., 22.08.1959; (SAV). — Tatry. Faixová a Votrubova chata; leg. Horák P., 25–26.08.1937; (SAV). — Liptovská kotlina: Pribylina; leg. Futák J., 18.09.1970; (SAV × 2 vouchers). — Slovenské rudohorie – vrch Stolica – zadný Kyprov; leg. Kliment J., 11.08.1977; (SAV). — Slovenský raj: Suchá Belá, vápencová roklina; leg. Zarzycki, Zahradníková K., 14.09.1970; (SAV). — Čergov; leg. Flašíková, 21.05.1969; (SAV). — M. F. [Malá Fatra], Klak, cesta na Čičmany; leg. Zahradníková K., 23.07.1975; (SAV). — Veľká Fatra: Blatnická dolina; leg. Zahradníková K., 27.08.1972; (SAV × 2 vouchers). — Belianske Tatry, Kotlina – Skalné vráta; leg. Michalko J., Zahradníková K., 07.08.1972; (SAV). — Slovakia ...; leg. Ptačovský J., 11.09.1954; (SAV). — Biela skala [in massif of Sivý vrch?], in sylve in alpestr; 1385 m a.s.l.; leg. Schidlay E., 09.09.1953; (SAV). — Pusté Pole; leg. Peniašteková M., 21.08.1973; (SAV × 3 vouchers). — Nízke Tatry, sev.-vých. Pustia, Ilanovská dolina; leg. Zahradníková K., 16.10.1962; (SAV × 2 vouchers). — Chočské pohorie, Prosiecka dolina; leg. Zahradníková K., Jasičová M., 10.08.1966; (SAV). — Nízke Tatry, vch Siná; leg. Zahradníková K., Fabianková [Goliašová] K., 15.08.1972; (SAV × 2 vouchers). — Západné Tatry, Biela skala; leg. Marhold K., 08.07.1986; (SAV). — Pilsko, Babia hora; leg. Futák J., Magic D., 10.08.1964; (SAV). — pod vrcholom Klenovského Vepra (Slovenské rudohorie); leg. Letz R., 23.08.1993; (SAV). — vrch Sitno; leg. Zahradníková K., 08.07.1972; (SAV). — Slovenský raj: Stratená hornatina, substrat calcit; 900 m a.s.l.; leg. Hajdúk J., 09.08.1956; (BRA). — Vys. Tatry; leg. Szép R., 20.08.1904; (BRA). — Slovenský raj, Stratené vrchy. Dobšiná. Andrejisko, hrebeň Andrejiská. Orientatio SN, acclivitas 30°, substratum calcit, terra rendzina, vegetatio *Abieto–Fagetum*; 1200 m a.s.l.; leg. Hajdúk J., 09.08.1956; (BRA). — Západné Tatry: Liptovský Hrádok, krovitý breh – Džadovica; 680 m a.s.l.; leg. Horníčková J., 25.08.1976; (BRA). — Slovenský raj: Vernár, dolomit, rendzina, Pinetum sylv.; 1000 m a.s.l.; leg. ?; (BRA). — Slovenský raj: Hnilec, orientatio V(E), substratum calcit; 850 m a.s.l.; leg. Hajdúk J., 31.07.1956; (BRA). — Stratená hornatina, Vernár, juž. exp., vápence; 1000 m a.s.l.; leg. Hajdúk J., 16.08.1956; (BRA). — Nízke Poloniny: brehy "Plaša potoka" pri križovatke na Runinu; 450 m a.s.l.; leg. Gallo A., 21.08.1970; (BRA). — Ružomberok: in convalle rivi Lubochňanka ad dom. tenat. Vých. Tajch; 800 m a.s.l.; leg. Valenta V., 16.08.1940; (BRA). — Bel. Tatry: Murán; 1500 m a.s.l.; leg. Nábelek V., 07.1936; (BRA). — Bel. Tatry: in declivibus supra pag. Tatranská Kotlina; 1000 m a.s.l.; leg. Valenta V., 08.08.1936; (BRA × 2 vouchers). — Vysoké Tatry: Bielovodská dolina; 1700 m a.s.l.; leg. Drévlackanský Fr., 07.10.1962; (BRA). — Horná Nitra, cestou M. Klákk – V. Klák, na horských lúkach; 1350 m a.s.l.; leg. Drévlackanský Fr., 14.08.1963; (BRA × 3 vouchers). — Dobšiná, pri jaskyni; leg. ?, 07.08.1962; (BRA × 2 vouchers). — Slovenský raj: Stratené vrchy, Dobšiná, Vernár, collis Kopanec, od cesty Stratená – Hrabušice ca. 250 m, orientatio J (S), acclivitas ca 30°, substratum calcit, terra rendzina, vegetatio *Cephalanthero–Fagetum*; 1100 m a.s.l.; leg. Hajdúk J., 16.08.1956; (BRA). — Slovenský raj: Stratená, Vernár, collis Havrania skala, orientatio 35° J (S), substratum calcit, terra rendzina, vegetatio *Aceretum pseudoplatani*; 1000 m a.s.l.; leg. Hajdúk J., 03.08.1955; (BRA). — Slovenský raj: Stratené vrchy, Stratená, collis Roveň (Havrania skala), substratum CaCO<sub>3</sub>, terra rendzina, vegetatio *Fagetum*; 1000 m a.s.l.; leg. Hajdúk J., 24.08.1956; (BRA). — Slovenský raj: Stratená, collis Andrejisko, na vrchole kopca, orientatio N, acclivitas 20°, substratum calcit, terra rendzina, vegetatio zmiešaný les; 1100 m a.s.l.; leg. Hajdúk J., 01.08.1956; (BRA). — Slovenský raj, Stratená hornatina, Dobšinská Maša, horná časť prehody, orientatio S (N), substratum calcit, terra rendzina, vegetatio *Abieto–Fagetum*; 900 m a.s.l.; leg. Hajdúk J., 31.07.1956; (BRA). — Slovenský raj: Dobšiná, collis Andrejisko, od ľadovej jaskyne 2,8 km, orientatio S (N), acclivitas ca 30°, substratum calcit, terra rendzina, vegetatio *Cephalanthero–Fagetum*; 1000 m a.s.l.; leg. Hajdúk J., 09.08.1956; (BRA). — Nízke Tatry: vápencové svahy nad Trangošskou dolinou pod "Kozími chrbátmi"; 1750 m a.s.l.; leg. Dvořák J., 11.07.1966; (BRA). — Nízke Tatry: Prostredná dolina, na okraji olšiny poblíž Kyslé; 750 m a.s.l.; leg. Dvořák J., 15.07.1972; (BRA). — Stratená; leg. ?, 09.08.1949; (BRA). — Tisovec (Voniaca); leg. ?, 12.08.1948; (BRA). — Dobšiná, pri jaskyni; leg. ?, 07.08.1962; (BRA). — Strážovská hornatina, Strážov (k. 1214 m), lúčne porasty pri kóte; 1150 m a.s.l.; leg. Kollár J., 21.07.1966; (BRA). — Staškov, v záhrade; leg. ?, 26.08.1960; (BRA × 3 vouchers). — Slovenský raj, na pravom brehu Bieleho potoka; leg. Vyparina St. [?], 16.08.1958; (BRA). — Slovenský raj, na pravom brehu Bieleho potoka, 1,5 km južne od Sokolovej doliny; 600 m a.s.l.; leg. Vyparina St. [?], 16.08.1958; (BRA). — Horná Nitra, cestou M. Klák – V. Klák, na horských lúkach; 1350 m a.s.l.; leg. Drévlackanský Fr., 14.08.1963; (BRA × 3 vouchers). — Veľká Fatra, in convalle fluvii Lubochňanka ad dom. tenat. Vých. Tajch; 800 m a.s.l.; leg. Valenta V., 16.08.1940; (BRA). — Brezno; leg. Zechentner, ?; (BRA). — Ružomberok – Biele skaly; leg. Hodoval V., ?; (BRA). — Cestou na Čergov; leg. Drévlackanský Fr., 09.08.1957;



(BRA × 5 vouchers). — Muránska planina: Muráň, hradný vrch, nádvorie hradu; leg. Kochjarová J., 06.08.1985; (BRA). — Liptovská Osada – Podsúchá, Vel. Brankov, pod Kuruckou skalou; leg. ?, 16.07.1972; (BRA). — Vel. Fatra – Čierny kameň; 1400 m a.s.l.; leg. [Horváthová ?], 21.08.1968; (BRA). — Nízke Tatry: Pusté Pole, na brehu menšieho rybníka poblíž hájovny; 850 m a.s.l.; leg. Dvořák J., 17.08.1976; (BRA). — Chočské pohorie: Veľký Choč; leg. ?, 06.1964; (BRA). — Tisovec, Voniaca; leg. Blatný T., 12.08.1948; (BRA). — Veľká Fatra: Gaderská dolina, in fundo vallis, ad marginae silvae; leg. Uhlířová J., 18.09.1993; (BRA × 2 vouchers). — Vysoké Tatry: Tatranské Matliare, SV od osady, dlhý les a mokriny, podmáčaná smrečina; 850 m a.s.l.; leg. Vozárová M., 23.08.1995; (BRA). — Slovenský raj: ústie doliny Veľký Sokol za hájovňou; 800 m a.s.l.; leg. Gallo A., 24.08.1971; (BRA). — Veľká Fatra: Tlstá, vrchol; leg. Bernátová [?], 02.09.1976; (BRA). — Belanské Tatry: cestou z Tatranskej Kotliny; leg. Májovský J., 04.09.1960; (SLO). — Muránska planina, Δ Cigánka (hrad); leg. Záborský J., 25.09.1984; (SLO). — Dolina Kysel (Slovenský raj); leg. Hejná, Rošetzká, 21.08.1951; (SLO). — Dolina Kysel (Slovenský raj); leg. Hejna, Rošetzká, 21.08.1951; (SLO × 3 vouchers). — Δ Solisko, na okraji lesa, pri hrebeňovom chodníku, in *Nardetum*; 1000 m a.s.l.; leg. Májovský J., 07.1955; (SLO × 4 vouchers). — Oravská Polhora: vystup na Babiu horu?; leg. Futák J., 25.08.1964; (SLO). — Západ. Tatry: Rohácke plesá; leg. Šomšák L., 08.1972; (SLO). — Veľká Fatra: Bukovina [Bukovinka]; leg. Michalková V., 05.09.1962; (SLO). — Poprad; leg. Šmarda J., Paclová L., 11.09.1956; (SLO). — Vysoké Tatry: Zadné Medodoly; 1350 m a.s.l.; leg. Májovský J., 20.09.1967; (SLO × 5 vouchers). — Vysoké Tatry: Zadné Medodoly, pri lesnej ceste do Javoriny, v smrečine; 1350 m a.s.l.; leg. Májovský J., 20.09.1967; (SLO). — Skala na V. Fatre, vápence; 1100 m a.s.l.; leg. Futák J., 11.08.1942; (SLO). — Záp. Beskydy: Oravská Lesná, Juzikovka; leg. Murín A., 25.07.1983; (SLO × 2 vouchers). — Jastub na skalkach v lese; leg. Májovský J., 18.09.1947; (SLO). — Roszutec [Veľký Rozsutec]; leg. Futák J., 23.08.1943; (SLO). — Tatr. Kotlina; leg. Futák J., 28.08.1954; (SLO × 2 vouchers). — Belianske Tatry: Ždiarska Vidla – Havran; leg. Májovský J., 23.08.1957; (SLO × 2 vouchers). — Turzovka; leg. Halbová I., 20.08.1962; (SLO). — Lúky pod Vys. Tatrami, cestou z Podbanska na Štrbské Pleso; leg. Pastýrik L., Májovský J., 27.08.1941; (SLO × 2 vouchers). — Flora Leutschoviensis [Levoča]; leg. Greschik V., 07.1890; (SLO). — Leutschovia [Levoča], Gr. Rehberg; leg. Greschik V., 07.1918; (SLO). — Flora Leutschoviensis [Levoča], Dolina; leg. Greschik V., 07.1889; (SLO). — Flora Tatrae Magnae, Leutschovia [Levoča]; leg. Greschik V., 07.1928; (SLO). — Flora Tatrae Magna, Leutschovia [Levoča], in silvae Kienwald; leg. Greschik V., 07.1900; (SLO). — Flora Tatrae Magnae, Leutschovia [Levoča], in silvus elesioribus; leg. Greschik V., 08.1928; (SLO). — Leutschovia [Levoča], in [Wäldern ?]; leg. Greschik V., 07.1918; (SLO). — Vysoké Tatry: Téryho chata; leg. Futák J., 18.08.1946; (SLO). — Vyšné Hágy, rašelinisko; leg. Futák J., 26.08.1954; (SLO × 2 vouchers). — Juhoslovenský kras, Silická planina; leg. Futák J., 05.09.1946; (SLO). — Tatr. Kotlina; leg. Futák J., 28.08.1954; (SLO). — Slovenský raj: na lúčke pod Lipovcom [planina Lipovec] nad potokom; leg. Ferjanec J., 04.09.1962; (SLO × 4 vouchers). — Čierny Váh: na lúke Stará Polana; leg. Ferjanec J., 26.07.1965; (SLO). — Údolie Čierneho Váhu; leg. Májovský J., 18.08.1957; (SLO × 7 vouchers). — Údolie Čierneho Váhu; leg. Májovský J., 18.08.1957; (SLO). — Orava: Polhora kúpele; leg. Jurko A., 16.09.1955; (SLO × 6 vouchers). — Fatra Major: in valle "Žarnovická dolina" non procul a p. Dolná Štubňa [now Turčianske Teplice], in declivibus; 600 m a.s.l.; leg. Brižický G., Červeňová Ž., 18.08.1940; (SLO). — Veľká Fatra: Tlstá; leg. Hrivnáková, 20.08.1954; (SLO). — Čierny Váh – pri horárni Biely Potok; 830 m a.s.l.; leg. Vartíková E., 15.09.1972; (SLO). — Jamnícka Dolina – v kosodrevine; leg. ?, 09. 1981; (NI). — Lúčky [okres Ružomberok]; leg. Svobodová Z., 04.09.1973; (NI × 2 vouchers). — Muránska vysočina: Veľká Stožka; leg. Sillingier P., 11.08.1937; (NI). — Bielske Tatry: Drabina [near Kobyly vrch]; leg. Domin K., 22.08.1937; (NI). — Bielske Tatry: Ivanka; leg. Domin K., 29.08.1937; (NI). — Kľak; leg. Takáč, 06.09.1962; (NI). — in monte Kľak; leg. Brancsik K., 07.1900; (NI). — Pieniny (Vysoké Skalky), Strážany; 1052 m a.s.l.; leg. Magic D., 19.08.1963; (ZV). — v doline potoka nad obcou Olcnavá; leg. Šmíd I., 20.08.1990; (KO × 2 vouchers). — úd. Kvačanské rokle; leg. Mikoláš V., 19.09.1984; (KO). — sev. a sv. svahy pod Kľakom; leg. Mikoláš V., 15.08.1984; (KO). — Homôľka (Lúč. MF); leg. Mikoláš V., 15.09.1984; (KO). — str.-sp. č. úd. od haj. Vonžovec – červ./žltá; leg. Mikoláš V., 18.09.1984; (KO). — Vavrišovo; leg. ?, 19.08.1960; (KO). — Tokáreň; leg. Mikoláš V., 14.08.1958; (KO). — Muránska planina – Hrad; leg. Mikoláš V., 24–25.08.1959; (KO × 6 vouchers). — úd. Dudliavky – Kamenné Vráta; leg. Mikoláš V., 16.08.1984; (KO × 2 vouchers). — Olcnavá, pri potoku v doline Raj, cca. 1 km nad dedinou; leg. Šmíd I., 20.08.1990; (KO). — Belanské Tatry, chodník Kopské sedlo – Zadné Medodoly; leg. Najvarová Š., 30.08.1968; (TNP). — Belanské Tatry, Dolina Siedmich prameňov, Lavínový žľab; 1450 m a.s.l.; leg. Odložilíková L., 12.08.1955; (TNP). — Belanské Tatry, Dolina Siedmich prameňov, Lavínový žľab; 1500 m a.s.l.; leg. Odložilíková L., 01.09.1955; (TNP × 3 vouchers). — Západné Tatry: Tichá Dolina, pod Štrkami; leg. Šmarda J., 25.08.1955; (TNP). — Belanské Tatry, Zadné Medodoly, nad Bránkou; 1210 m a.s.l.; leg. Paclová L., Šoltésová A., 31.08.1989; (TNP × 2 vouchers). — Belanské Tatry, nad chatou Plesnivec v Doline Siedmich prameňov; 1350 m a.s.l.; leg. Šoltés R., Šoltésová A., 11.09.1974; (TNP). — Západné Tatry: Tichá Dolina, pod Štrkami; leg. Paclová L., 25.08.1957; (TNP). — Belanské Tatry, Dolina Čiernej vody (Rakúskej); 900 m a.s.l.; leg. Odložilíková L., 14.08.1955; (TNP). — Belanské Tatry, Červená hlina; 1370 m a.s.l.; leg. Odložilíková L., 21.08.1955; (TNP). — Belanské Tatry, Dolina Čiernej vody (Rakúskej); 980 m a.s.l.; leg. Odložilíková L., 09.09.1955; (TNP). — Bad Lucsivna [Lučivná]; leg. Scherfel A., 08.1891; (TNP). — Poprad; leg. Scherfel A.; (TNP).

***Aconitum lasiocarpum* subsp. *lasiocarpum***

SLOVAKIA: Užská hornatina: Rabia skala, pieskovec, skalky, južný svah; 1190 m a.s.l.; leg. Michalko J., 08.1956; (SAV × 4 vouchers). — Vihorlat, vrch Vihorlat, *Calamagrostidetum arundinaceae*; 1050 m a.s.l.; leg. Michalko J., 26.07.1967; (SAV). — pod vrcholom Stinskej; leg. Marhold K., 18.08.1988; (SAV). — vrch Vihorlat, tesne pod vrcholom; leg. Michalko J., 27.08.1963; (SAV). — Slovenské rudohorie: Slovenský raj. Stratená, Dobšiná. Andrejisko. Orientatio S(N), acclivitas 35°, substratum calcit, terra rendzina, vegetatio *Fagetum*; 1100 m a.s.l.; leg. Hajdúk J., 09.08.1956; (BRA). — Slovenský raj, Stratská hornatina. Stratená, Strat. pila. Hnilec, Vodná nádrž. Orientatio S2, NW, acclivitas 50°, substratum  $\text{CaCO}_3$ , terra litozem, rendzina, vegetatio *Piceetum calcicolum*; 840 m a.s.l.; leg. Hajdúk J., 31.07.1956; (BRA). — Slovenský raj, Stratské vrchy. Dobšiná. Andrejisko, hrebeň Andrejiská. Orientatio SN, acclivitas 15°, substratum calcit, terra rendzina, vegetatio *Abieto-Piceetum*; 1200 m a.s.l.; leg. Hajdúk J., 09.08.1956; (BRA). — Nízke Beskydy: Osadné, nad Δ Čereniny v bučine, pri hranici; leg. Májovský J., 29.09.1975; (SLO). — Vysoké Tatry: Kriváň; leg. Májovský J., 21.08.1957; (SLO). — Vihorlat [vrch], lúky (typu *Calamagrostion*) na najvyššom vrchole, J; 1060 m a.s.l.; leg. Májovský J., Michalko J., 10.09.1953; (SLO). — Slovakia; leg. ?, ?; (SLO × 3 vouchers). — Nízke Beskydy: Osadné, pri chodníku štátnej hranice na Δ Čereniny, nízky zárasť *Salix caprea*; 950 m a.s.l.; leg. Májovský J., 29.09.1975; (SLO). — Nízke Tatry, Slovenský raj: Javorina nad Vernárom; leg. Sillinger P., 06.08.1931; (NI).

***Aconitum lasiocarpum* subsp. *kotulae***

SLOVAKIA: Pusté Pole; leg. Futák J., 21.08.1973; (SAV). — Užská hornatina: Rabia skala, pieskovec, skalky, južný svah; 1190 m a.s.l.; leg. Michalko J., 08.1956; (SAV × 2 vouchers). — Vihorlat, pod vrcholom vrchu Vihorlat; leg. Michalko J., 27.08.1963; (SAV × 2 vouchers). — vrch Vihorlat, tesne pod vrcholom; leg. Michalko J., 27.08.1963; (SAV × 4 vouchers). — Šíp [vrch], obec Stankovany; 1100 m a.s.l.; leg. ?, 23.08.1975; (BRA). — Čierny Váh: na lúke Stará Poľana; leg. Ferjanec J., 26.07.1965; (SLO).

***Aconitum* × *pawlowskii***

SLOVAKIA: Čierny Váh: na lúke Stará Poľana; leg. Ferjanec J., 26.07.1965; (SLO). — Belianske Tatry: Ždiarska Vidla – Havran; leg. Májovský J., 23.08.1957; (SLO).

***Aconitum degenii* subsp. *degenii***

SLOVAKIA: Slovakia orientalis, Pri chyžke u potoku Stuzica; leg. Šmidt[?], 13.08.1964; (SAV × 2 vouchers).

***Aconitum* × *gayeri***

SLOVAKIA: medzi Čolom a Rabiou skalou, vo Fagete pod hranicou; leg. Šmidt[?], 15.08.1964; (SAV).

***Aconitum* × *cammarum***

SLOVAKIA: Bardejov; leg. Berganský J., 06.08.1928; (BRA × 7 vouchers). — Bardejov: Wachterhof; leg. Berganský J., 25.07.1924; (BRA). — Bardejov: Roch-Vorgelände; leg. Berganský J., 09.10.1929; (BRA). — Pri železničnej stanici Čirč; leg. ?, 30.07.1957; (BRA). — Sasinkovo, v zahrade; leg. ?, 30.06.1963; (BRA × 2 vouchers). — Vrátna [dolina]; leg. Brančík K., 08.1904; (SLO). — Felka [Veľká, Tatry]; leg. Scherfel A., 10.08.1924; (TNP × 2 vouchers). — Felka eig. Garten [Veľká, Tatry]; leg. Scherfel A., 14.08.1923; (TNP × 3 vouchers).

***Aconitum firmum* subsp. *firmum***

SLOVAKIA: Belianske Tatry; 1250 m a.s.l.; leg. Futák J., 14.07.1861; (SAV). — Slavkovský potok [Vysoké Tatry]; leg. Grebenščikov O., 07.08.1954; (SAV). — Vysoké Tatry, Zelené pleso hezin; 1550 m a.s.l.; leg. Hubová O., 23.06.1969; (SAV × 2 vouchers). — Vysoké Tatry, Velická dolina, Velické pleso; 1700 m a.s.l.; leg. Fabianková, 09.09.1974; (SAV). — TANAP, Biely Váh dolina; 1350 m a.s.l.; leg. Futák J., 27.08.1957; (SAV). — Lúč. Malá Fatra, vrch Reváň; 1100 m a.s.l.; leg. Schidlay E., 20.08.1949; (SAV). — Belianske Tatry, Javorina, Zadné Koperšady (Zadné Medodoly) v smrečine; 1400 m a.s.l.; leg. Schidlay E., 09.08.1946; (SAV). — Vihorlat: Popričný vrch, v sedole; leg. Šramko E., 08.1953; (SAV). — Pilsko, Babia hora; leg. Futák J., 11.08.1964; (SAV). — Djumbier [Dumbier], svahy; leg. Ptý [Ptačovský], 09.1928; (SAV). — Vihorlat: V ridoli potoka; leg. Šramko E., 08.1953; (SAV). — Vys. Tatry, Velická dolina; leg. Futák J., 08.08.1962; (SAV). — B.T., Široká dolina, dolná časť; 1500 m a.s.l.; leg. Flašíková, Hubová O., 02.08.1971; (SAV × 2 vouchers). — Bel. Tatry: Faixová; leg. Ptý, 22.07.1939; (SAV). — Bel. Tatry: pri Bielom plese (smerom na Belanskú kopu); 1600 m a.s.l.; leg. Zahradníková K., Šípošová H., 19.08.1980; (SAV × 3 vouchers). — Vysoké Tatry: N svahy

Kežmarského štítu nad Zeleným plesom; 1600 m a.s.l.; leg. Zahradníková K., 07.08.1969; (SAV). — Vysoké Tatry: cestou na Kriváň; leg. Zahradníková K., 15.08.1970; (SAV). — Vysoké Tatry: južný svah Jahňacieho štítu; 2000 m a.s.l.; leg. Zahradníková K., 09.08.1969; (SAV). — Vysoké Tatry: Kriváň; leg. Zahradníková K., Jasičová M., 11.08.1966; (SAV). — Votrubova chata; leg. Ptý, 07.1941; (SAV). — V kleči u Popradského plesa; leg. Ptý, 07.1939; (SAV). — Záp. Beskydy: Babia hora; leg. Zahradníková K., 21.07.1973; (SAV). — Vysoké Tatry: Furkotská dolina – Wahlenbergovo pleso – Bystré sedlo; leg. Zahradníková K., 13.08.1970; (SAV). — Tatry: Faixová a Votrubova chata; leg. Horák P., 25–26.08.1937; (SAV). — [Chočská] Fatra, Biela Skala; 1600 m a.s.l.; leg. Futák J., 24.08.1966; (SAV × 3 vouchers). — Slovakia borealis: montes Vysoké Tatry, ad ripas lacus “Popradské pleso” in *Pineto mughi*, solo granitico; 1640 m a.s.l.; leg. Hlavaček A., ?; (SAV). — Západné Tatry: Osobitá, Suchá dolina, pri potoku; 1000 m a.s.l.; leg. Futák J., 15.07.1965; (SAV × 2 vouchers). — Vys. Tatry; leg. Szép R., 20.08.1904; (BRA). — Vys. Tatry; 2000 m a.s.l.; leg. ?, 07.1936; (BRA). — Vys. Tatry: ad margines sylvae, Štrbské Pleso et Vyš. Hágy; 1200 m a.s.l.; leg. Valenta V. 01.08.1935; (BRA). — Nízke Tatry: pramenitý svah pod vrcholom Krupovy hole; 1550 m a.s.l.; leg. Dvořák J., 07.08.1973; (BRA). — Vysoké Tatry; leg. Berganský J., 28.08.1928; (BRA × 2 vouchers). — Vysoké Tatry; leg. Vaslora L. [?], 07.08.1952; (BRA). — Vysoké Tatry: Javorová dolina; 1900 m a.s.l.; leg. Drévlackanský Fr., 12.10.1962; (BRA). — Štrbské pleso; leg. Černý J., 08.07.1924; (BRA). — Slovenské rudohorie: Volovské vrchy, Slovenský raj. Dedinky, Mlynky, collis Kukla, flumen Hnilec. Orientatio N, acclivitas 35°, substratum silik.+carb., vegetatio *Mugedio–Aconitetea*; 980 m a.s.l.; leg. Hajdúk J., 18.07.1956; (BRA). — Vysoké Tatry: montis Satan; leg. Weber F., 08.1936; (BRA). — Vysoké Tatry: montis Končistá; 2450 m a.s.l.; leg. Weber F., 08.1925; (BRA). — Bielské Tatry: montis Tokárna; 1200 m a.s.l.; leg. Weber F., 08.1936; (BRA). — Vysoké Tatry: ad lac. Ladové pleso; leg. Weber F., 08.1925; (BRA). — Bielské Tatry: montis Havran; leg. Weber F., 08.1936; (BRA). — Vysoké Tatry: montis Vel. Vysoká; 2400 m a.s.l.; leg. Weber F., 08.1925; (BRA). — Tatry; leg. Scherfel A., ?; (BRA). — Belanské Tatry: Tat. Kotlina – “Zadné Meďodoly”; 1400 m a.s.l.; leg. Z., 07.08.1969; (BRA). — Záp. Tatry: Bystrá dolina, ad ripam rivi “Bystrý”; 1300 m a.s.l.; leg. Dvořák J., 28.07.1976; (BRA). — Orava – Osobitá; leg. Magdolenová S., 08.1967; (BRA). — Bielske Tatry; leg. ?, 07.08.1970; (BRA). — Žiarska dolina; leg. ?, 31.07.1942; (BRA). — Vysoké Tatry: Česká dolina, kamenité svahy nad Českým plesom [now Ťážké pleso]; 1620 m a.s.l.; leg. Dvořák J., 07.09.1974; (BRA). — Záp. Tatry: Bystrá dolina, ad ripam rivi “Bystrý”; 1300 m a.s.l.; leg. Dvořák J., 28.07.1976; (BRA). — Vysoké Tatry; 950 m a.s.l.; leg. Kavka V., 15.07.1930; (BRA). — Vysoké Tatry: Kriváň; leg. Májovský J., 21.08.1957; (SLO). — Vysoké Tatry: cestou z Popradského na Žabie plesá; leg. Gálisová E., 23.08.1956; (SLO). — Nízke Tatry: Ohnište; leg. Májovský J., 20.07.1957; (SLO). — V. Tatry: Velická dolina; leg. Schidlay E., 10.10.1952; (SLO). — V. Tatry: Hincovo pleso; leg. Háberová I., 16.07.1968; (SLO). — Záp. Beskydy: Babia hora; leg. Murín A., 27.07.1983; (SLO × 2 vouchers). — Rašelinisko Mutné (okres Námestovo); leg. Májovský J., 30.07.1955; (SLO). — Kamenné vráta; leg. Futák J., 19.08.1946; (SLO × 3 vouchers). — Belianske Tatry: hrebeň; leg. Futák J., 09.07.1946; (SLO). — Tatranská Lomnica: Kežmarskej Źlaby, okolie; leg. Futák J., 08.07.1946; (SLO). — Popradské pleso; leg. Futák J., 23.08.1943; (SLO). — Zlomisková dolina, Ladové pleso, V. Tatry; leg. Futák J., 26.08.1943; (SLO). — Belianske Tatry: Javorina; leg. Futák J., 14.07.1946; (SLO). — Belianske Tatry: Tristárska dolina; leg. Futák J., 14.07.1946; (SLO × 3 vouchers). — Vysoké Tatry: Litvorová kotlina; leg. Vartíková E., 28.09.1971; (SLO × 2 vouchers). — Vysoké Tatry: circum l. d. “Zelené pleso”; leg. Nábělek V., 12.08.1940; (SLO × 2 vouchers). — Belské Tatry: sev. svah Hlúpeho; leg. Futák J., 21.08.1943; (SLO). — Jánska dolina, JZ svahy Ohništa, nad lesom na trávnatých svahoch a v suti; leg. Májovský J., 15.07.1967; (SLO × 2 vouchers). — Javorová dolina pri Javorine vo V. Tatrách; leg. Futák J., 17.08.1943; (SLO). — Dolina Mlynica vo V. Tatrách; leg. Futák J., 25.08.1943; (SLO × 4 vouchers). — Belianske Tatry: Zadné Koperšady; leg. Nábělek V., 12.08.1940; (SLO). — Kamenné vráta; leg. Futák J., 19.08.1946; (SLO). — Žiarska dolina: hojne na prameniskách a popri potokoch v pásme kosodreviny; leg. ?, 16.08.1992; (NI). — montes Vysoké Tatry: in valle Zlomisko, solo granitico; leg. Osvačilová V., 14.08.1951; (NI). — Belianske Tatry: Tristárska dolina; leg. Eliáš P. jun., 1998; (NI × 2 vouchers). — Račkova dolina; leg. Mikoláš V., 08.1956; (KO). — Sliezsky Dom vo V.T. [horský hotel na prahu Velickej doliny vo Vysokých Tatrách]; leg. Vojtún A., 03.08.1969; (KO × 2 vouchers). — ud. Bocianky, str.–sp. časť; leg. Mikoláš V., 15.08.1984; (KO). — Račkova dolina; leg. Mikoláš V., 08.1956; (KO). — Priehyba pod Krivánom [vo Vysokých Tatrách]; leg. Vojtún A., 16.07.1968; (KO × 2 vouchers). — Západné Tatry: v kosodrevine pod Tomanovským sedlom; 1650 m a.s.l.; leg. Šoltésová A., 18.09.1974; (TNP). — Bujačí Vrch – južný svah, v kosodrevine; 1800 m a.s.l.; leg. Šoltés R., Šoltésová A., 11.09.1974; (TNP). — Belanské Tatry. Bujačí Vrch, medzi Malým a Veľkým Košiarom; 1850 m a.s.l.; leg. Šoltésová A., 17.09.1974; (TNP). — Belanské Tatry. Bujačí Vrch, pod Veľkým Košiarom; 1850 m a.s.l.; leg. Šoltésová A., 17.09.1974; (TNP). — V. Tatry. V. Studená dol.; leg. Paclová L., 29.08.1954; (TNP). — V. Tatry. Velická dol.; leg. Najvarová Š., 23.07.1968; (TNP). — Vysoké Tatry: pri značovaní denníku zo Šalvejového prameňa na Zelené pleso; leg. Najvarová Š., 27.07.1967; (TNP). — Velická dolina, Kvetnica; 1820 m a.s.l.; leg. Odložilíková L., 06.07.1954; (TNP). — Vysoké Tatry. Veľká Studená dol.; 1610 m a.s.l.; leg. Odložilíková L., 15.08.1954; (TNP). — Belanské Tatry, pod Siedmimi prameňmi; 1230 m a.s.l.; leg. Odložilíková L., 08.08.1956; (TNP). — Mengsdorfer [Mengusovce]; leg. Scherfel A., 08.1923; (TNP × 2 vouchers). — Felka [Poprad-Veľká] eig. Garten [Veľká, Tatry]; leg. Scherfel A., 08.1923; (TNP). — Felka eig. Garten [Veľká, Tatry]; leg. Scherfel A., 08.1923; (TNP). — Mengsdorfer [Mengusovce]; leg. Scherfel A., 13.07.1924; (TNP). — Salbauffal; leg. Scherfel A.; (TNP). — Gwostar [?]; leg. Scherfel A., 07.1880; (TNP).



***Aconitum firmum* subsp. *moravicum***

SLOVAKIA: Malá Fatra, vrch Chleb; leg. Nábělek V., 29.08.1942; (SAV). — Malá Fatra, Šútovská dolina; leg. Zahradníková K., 22.07.1973; (SAV). — Vysoké Tatry, popri turistickom chodítku z Kriváňa na Tri studničky (po zelenej značke); 2300 m a.s.l.; leg. Peniašteková M., 20.08.1987; (SAV). — Manínska úžina (v jej prvej – dolnej polovici); leg. Schidlý E., 08.09.1945; (SAV). — Krivánska Malá Fatra: hrebeňovka V. Kriváň – Biele skaly – Suchý; 1500 m a.s.l.; leg. Futák J., Jasičová M., Zahradníková K., 11.09.1964; (SAV × 2 vouchers). — Krivánska Malá Fatra: Snilovská dolina – pri potoku; leg. Letz R., 1994; (SAV). — Malá Fatra: Malý Kriváň, v porastoch kosodreviny; 1600 m a.s.l.; leg. Grebensčík O., 22.09.1954; (SAV). — Vysoké Tatry: Bielovodská dolina; 1700 m a.s.l.; leg. Drévlackanský Fr., 07.10.1962; (BRA). — ad valle Studenec ad pedem m. Malý Kriváň; leg. Holuby J., 29.07.1896; (BRA). — [Krivánska] Malá Fatra. Veľký Rozsutec; leg. Drévlackanský Fr., 11.07.1961; (BRA). — ad valle Vrátna; leg. Brancsik C., 09.1898; (BRA). — Malá Fatra: in saxis montis Rásutec [Rozsutec] supra pag. Štefanová; leg. Weber F., 07.1935; (BRA). — Fatra Minor: in declivibus saxosis m. Kriváň; 1500 m a.s.l.; leg. Brižický J., 27.08.1940; (SLO). — Malá Fatra: Kriváň; leg. Činčura F., 19.07.1971; (SLO × 4 vouchers). — Rašelinisko Mutné (okres Námestovo); leg. Májovský J., 30.07.1955; (SLO × 2 vouchers). — Kamenné vráta; leg. Futák J., 19.08.1946; (SLO). — Javorová dolina pri Javorine vo V. Tatrách; leg. Futák J., 17.08.1943; (SLO). — Rozsutec – horná hranica lesa; leg. ?, 09.1981; (NI). — Horné diery; leg. Mikoláš V., 18.08.1984; (KO). — Horné diery (Kriv. MF); leg. Mikoláš V., 12.09.1984; (KO). — Vysoké Tatry: pri značkovanom chodníku zo Šalvejového prameňa na Zelené pleso; leg. Najvarová Š., 27.07.1967; (TNP).

***Aconitum firmum* subsp. *maninense***

SLOVAKIA: Kamenné vráta; leg. Futák J., 19.08.1946; (SLO). — Manín [vrch]; leg. Futák J., 25.08.1971; (SAV). — Súľov; leg. Futák J., 25.08.1971; (SAV). — Žilina. In saxosis calcareis in convalle Sedlovina et Kopaná ad Kunerad; 700 m a.s.l.; leg. Valenta V., 28.07.1937; (BRA).

***Aconitum firmum* nothosubsp. *paxii***

SLOVAKIA: Fatra Minor: in declivibus saxosis m. Kriváň; 1500 m a.s.l.; leg. Brižický J., 27.08.1940; (SLO). — Belianske Tatry: Tristárska dolina; leg. Futák J., 14.07.1946; (SLO).

***Aconitum firmum* nothosubsp. *zapalowiczii***

TANAP, dolina Bieleho Váhu, pri potoku; 1250 m a.s.l.; leg. Futák J., 27.08.1857; (SAV). — Vys. Tatry, Velická dolina, pri jazierku; 1825 m a.s.l.; leg. Futák J., Hubová O., 06.08.1962; (SAV). — V. Tatry: Hincovo pleso; leg. Háberová I., 16.07.1968; (SLO).

## Appendix 2. Specimens cited in published sources

***Aconitum moldavicum* subsp. *moldavicum***

SLOVAKIA: Spišská Nová Ves (ad stationem viae ferr. “Štiavnik”), 600 m; leg. J. Suza, 20.06.1931; (KRA 003671); source: Mitka (2008a). — Tomašovská Belá, nad potokiem w lesie bukowym; leg. K. Oklejewicz, 07.08.2004; (KRA); source: Mitka (2008a). — Stratená, Fagetum; leg. J. Mitka, 18.07.2006; (KRA); source: Mitka (2008a). — Liptovské Revúce, near torrent; leg. J. Mitka, 23.07.2006; (KRA); source: Mitka (2008a). — Liptovský Ján, Jánska dolina, ok. 800 m; leg. J. Mitka, 20.08.2007 (KRA); source: Mitka (2008a).

***Aconitum variegatum* subsp. *variegatum***

SLOVAKIA: Północne obrzeże wapienne, Kopieniec Wielki, górna część łąk Hali Koprowej; leg. H. & T. Tacik, 18.08.1966; (KRAM); source: Mitka (2003). — Comit. Szepes, in apertis piceetorum “Gähe Leit” supra Tátrabarlagligent; leg. A. Boros, 24.8.1938; (BP); source: Mitka (2003). — Kiczora od strony Dol. Międzyzściennej, przerzedzony, skalisty las, wapień, 1100-1200 m; leg. B. Pawłowski, 22.07.1939; (KRA); source: Mitka (2003). — Eisernes Thor, 1550 m; leg. F. Pax, 21.08.1905; (BP); source: Mitka (2003). — wycieczka w Spiskie Tatry w 1878, Dolina między Hawranem a Nową ku szczytowi Czamego Wierchu; leg. A. Rogalski, 28.07.1878; (KRAM); source: Mitka (2003).

***Aconitum lasiocarpum* subsp. *lasiocarpum***

SLOVAKIA: Bieszczady Zach.: Rabia skala, wśród zarośli z *Rubus idaeus*, 1150 m; leg. P. Bochenek, J. Mitka, 23.08.1995; (KRA); source: [Mitka \(2003\)](#). — Stinska, na skraju *Fagetum* wśród *Rubus idaeus*; P. Bochenek, leg. J. Mitka, 24.08.1995; (KRA); source: [Mitka \(2003\)](#). — Stinka, 1093 m; leg. Z. Dolezalova, ?; (PRC); source: [Mitka \(2003\)](#). — Wyhorlat; leg. C. Chyzer, 21.08.1879; (BP); source: [Mitka \(2003\)](#). — Comit. Gömör, in apertis silv. pedis montis Hanneshöhe prope Ladová jaskyňa, 900 m; leg. A. Boros, 03.09.1955; (BP); source: [Mitka \(2003\)](#).

***Aconitum lasiocarpum* subsp. *kotulae***

SLOVAKIA: Nízke Tatry, Tále; leg. J. Mitka, 19.08.2007; (KRA 0464740); source: Mitka, personal communication. — Wyhorlat, ex herbario doctoris Cornelii Hyzer; leg. ?, 21.08.1879; (BP); source: [Mitka & Starmühler \(2000\)](#) and [Mitka \(2003\)](#). — In monte Vihorlat, 1074 m; leg. F. Belšán, 25.07.1936; (PRC); source: [Mitka & Starmühler \(2000\)](#) and [Mitka \(2003\)](#). — Rabia skala, 1150; leg. J. Mitka, P. Bochenek, J. Terray, 23.08.1995; (KRA); source: [Mitka & Starmühler \(2000\)](#) and [Mitka \(2003\)](#). — Rabia skala, cota 1168; leg. J. Soják, 23.08.1963; (KRAM); source: [Mitka & Starmühler \(2000\)](#) and [Mitka \(2003\)](#). — Slov. orient, montes Poloninské Karpaty, in monte Rabia skala supra pagum Nová Sedlica, 1160 m; leg. J. Soják, 20.08.1963; (PR); source: [Mitka & Starmühler \(2000\)](#) and [Mitka \(2003\)](#). — Slov. orient, montes Poloniny, ad cacumen montis Čereniny supra pagum Zvala; 933 m; leg. J. Soják, 21.08.1963; (PR); source: [Mitka & Starmühler \(2000\)](#) and [Mitka \(2003\)](#). — Na skale Rabia skala, trig. 1168 m; leg. J. Šourek, 18.07.1957; (PR); source: [Mitka & Starmühler \(2000\)](#) and [Mitka \(2003\)](#). — Výslunna škála nad Runinou; 1150 m; leg. J. Šourek, 7.08.1957; (PR); source: [Mitka & Starmühler \(2000\)](#) and [Mitka \(2003\)](#). — montes Poloniny, ad cacumen jugi inter pagos Zvala et Ruské, c. 1000 m; leg. J. Soják, 21.08.1963; (PR); source: [Mitka & Starmühler \(2000\)](#) and [Mitka \(2003\)](#). — Nízke Poloniny, Runina, výslunné skály na Rabia skale, 1150 m; leg. J. Soják, 6.08.1957; (PR); source: [Mitka & Starmühler \(2000\)](#) and [Mitka \(2003\)](#). — Dol. Koprowa [Kôprová dolina] – skraj lasu, ok. 1300 m, leg. B. Pawłowski, 19.8.1925; (KRAM-Pawłowski 320228, Paratypus); source: [Mitka & Starmühler \(2000\)](#) and [Mitka \(2003\)](#).

***Aconitum* × *pawłowskii***

SLOVAKIA: Dol. Koprowa (górna), zarośla mieszane; leg. J. Trela, 19.08.1825; (KRA); source: [Mitka & Starmühler \(2000\)](#) and [Mitka \(2003\)](#). — Tatras, Kôprová dolina; leg. K. Zahradníková, M. Jasičová, 13.08.1966; (SAV); source: [Mitka & Starmühler \(2000\)](#) and [Mitka \(2003\)](#). — Belianske Tatry, Lysá Polana; leg. K. Zahradníková, M. Jasičová, 14.08.1966; (SAV); source: [Mitka & Starmühler \(2000\)](#) and [Mitka \(2003\)](#). — apud rivulorum Javorový potok supra pag. Javorina (Tatranská Javorina), 1050 m; leg. J. Dostál, 15.08.1955; (PR); source: [Mitka & Starmühler \(2000\)](#) and [Mitka \(2003\)](#). — Nízke Tatry, Dudlavá skala; leg. V. Knebllová, 08.09.1955; (PR); source: [Mitka & Starmühler \(2000\)](#) and [Mitka \(2003\)](#). — Dobsinai jegbevlong szkecenei völgy [jégbarlang, Sztraczenai völgy?] leg. D. Filarszky, 23.08.1911; (BP); source: [Mitka & Starmühler \(2000\)](#) and [Mitka \(2003\)](#). — Křižovatka; leg. A.G., 27.05.1970; (KO); source: [Mitka & Starmühler \(2000\)](#) and [Mitka \(2003\)](#). — Hrad Mt.; leg. ?, 24.08.1959; (KO 13340); source: [Mitka & Starmühler \(2000\)](#) and [Mitka \(2003\)](#). — Údolie Dudlavky (ad Kamenná vrata); leg. V. Mikoláš, 16.08.1984; (KO); source: [Mitka & Starmühler \(2000\)](#) and [Mitka \(2003\)](#).

***Aconitum* × *gayeri***

SLOVAKIA: Rabia skala, 1150 m; leg. J. Mitka, P. Bochenek, J. Terray, 23.8.1995; (KRA); source: [Mitka \(2003\)](#).

***Aconitum* × *cammarum***

SLOVAKIA: Veľká Fatra, Donovaly; leg. J. Mitka, 27.07.2007; (KRA 0347248); source: Mitka, personal communication.

***Aconitum* × *berdaui***

SLOVAKIA: Tatras, Javorová dolina; leg. A. Sutkowska, 18.08.2009; (herb. J. Mitka); source: Mitka, personal communication. — Malá Fatra, Terchová; leg. J. Mitka, 31.07.2009; (KRA 0464764); source: Mitka, personal communication. — Wycieczka w Tatry Spiskie w r. 1878. *Aconitum napellus* L., Podspady nad Jaworzynką; leg. A. Rogalski, 25.07.1878; (KRAM 13348); source: [Mitka \(2003\)](#). — Plantae exsiccatae regni Hungariae, Comit. Szepes, in m. Hollókő pr. Sztraczena; leg. G. Lengyel, 01.08.1901; (BP); source: [Mitka \(2003\)](#).

***Aconitum firmum* subsp. *firmum***

SLOVAKIA: pod szczytem Łomnicy; leg. H. Zapalowicz, 12.08.1908; (KRAM); source: [Mitka \(2003\)](#). — in subalpinis

montium Magas-tatra supra Kešmark: Tokarna Zóltó; leg. L. Simonkai, 7-8.07.1890; (BP); source: [Mitka \(2003\)](#). — Hinszko [lake Hincó]; leg. D. Filarszky, Kümmerle, 07.08.1909; (BP); source: [Mitka \(2003\)](#). — [Vysoké and Západné Tatry Mts.] bélei Tiefergrund; leg. Magócsy, ?; (BP); source: [Mitka \(2003\)](#). — [Vysoké and Západné Tatry Mts.] ad lacum Buckholz [Buchholz ?], 1950 m; leg. G. Lengyel, 04.08.1931; (BP); source: [Mitka \(2003\)](#). — im Kleinkohlachtale, Hohe Tatra; leg. A. Margittai, 28.7.1930; (M); source: [Mitka \(2003\)](#). — Breznóbánya, Zadny Uplaz; leg. S. Kupcok, 02.08.1904; (PR); source: [Mitka \(2003\)](#). — ad Javorinam, in alt. c. 900 m; leg. G. Lengyel, 17.07.1931; (BP); source: [Mitka \(2003\)](#). — Alpenkessel zwischen Nový und Havran; leg. K. Ronniger, 09.07.1918; (W); source: [Mitka \(2003\)](#). — Fatra: Hungaria, comitatus ad confin. Árva et Trencsén, montes Kriván Fatrae, in declivibus montis Roszudec, alt. c. 1300 m, solo dolomitico; leg. E. Nyárády, 27.07.1907; (SIB); source: [Mitka \(2003\)](#). — Fatra, Terchová; leg. K. Domin, 01.08.1918; (PRC); source: [Mitka \(2003\)](#). — in rupestribus “Magas Fáttra” loco “Bartya” [*A. firmum* Rchb., rev. G. Gayer]; leg. L. Simonkai, ? 08.1904; (BP); source: [Mitka \(2003\)](#). — Comit. Árva, in pineti infra locus “Rohačsi savak” – alpinum liptoviensium, c. 1500 m [*A. tatrae* Borb., rev. G. Gayer 1913]; leg. A. Jávorka, 22.08.1911; (BP); source: [Mitka \(2003\)](#). — [Roháče Mts.], Liptauer Alpen, Rohacs [Roháč], 1600 m [*A. napellus* L. var. *tauricum* (Rchb.) Ser., rev. De Rapaics]; leg. F. Pax, 14.08.1905; (BP); source: [Mitka \(2003\)](#). — Comit. Liptó, Tatra Inf., in valle Lucsany ad Deményfalven; leg. G. Lengyel, 25.07.1928; (BP); source: [Mitka \(2003\)](#).

### ***Aconitum firmum* subsp. *moravicum***

SLOVAKIA: Montes Liptovské Tatry, in alpinis Osobitá, alt. c. 1580 m, solo calcareo; leg. M. Deyl, 07.07.1938; (PR); source: [Mitka \(2003\)](#). — Roháče, u Zverovky; leg. Kopecký, 06.08.1968; (PR); source: [Mitka \(2003\)](#). — Hungaria, comitatus Liptó, montes Tatrae Liptoviensae, in saxis “Javor” in parte superiore vallis Tycha, alt. cca. 1500 m, solo calc.; leg. E. Nyárády, 01.08.1907; (SIB); source: [Mitka \(2003\)](#). — Siná, 1500–1550 m; leg. P. Sillinger, 27.07.1930; (PRC); source: [Mitka \(2003\)](#). — in lapidosis in declivi merid. montis Chleb, cca. 1600 m, solo calcareo; leg. J. Soják, 04.08.1950 (PR); source: [Mitka \(2003\)](#). — Fatra – Kriván [*A. napellus* L. var. *multifidum* Koch. var. *canescens* (Schleich.) Rapaics, det. Rapaics; leg. ?, 13.08.1889; (BP); source: [Mitka \(2003\)](#). — [Malá] Fatra, Terchová; leg. K. Domin, 01.08.1918; (PRC); source: [Mitka \(2003\)](#). — Slovakia, Malá Fatra, Révalov, Révalovská dolina, along torrent 1150–1200 m; leg. J. Mitka, 02.09.2001; (KRA); source: [Mitka \(2003\)](#).

### ***Aconitum firmum* subsp. *maninense***

SLOVAKIA: Galicia, ad pedem montis Tatrae Magnae, in valle Poduplaski, alt. c. 1000 m, solo granitico; leg. E. Nyárády, 27.07.1908; (SIB); source: [Mitka \(2003\)](#). — [Súľovské vrchy] Manínská soutěska, Súľov; leg. K. Domin, 01.08.1920; (PRC); source: [Mitka \(2003\)](#). — Manín (SW od Súľovských vrchov), ok. 400 m; leg. Skalický, Skalická, 27.07.1973; (PRC); source: [Mitka \(2003\)](#). — Manín, Strážovské vrchy Mts., Manínska užina, in oak-hornbeam forest *Tilio-Carpinetum* along a torrent; leg. J. Mitka, 03.09.2001; (KRA); source: [Mitka \(2003\)](#). — Slovakia, Manín, Strážovské vrchy Mts., Manínska užina, on steep stone slope; leg. J. Mitka, 03.09.2001; (KRA); source: [Mitka \(2003\)](#).

### ***Aconitum firmum* nothosubsp. *paxii***

SLOVAKIA: Montes Liptovské hole, mons Červené vrchy, in locis lapidosis calcareis rupium Javorové skalky, alt. 1450 m [*A. firmum* (Rchb.) Neill. mutatio – cum pilis adscendentibus copissimus, rev. V. Skalický]; leg. J. Dostál, 21.08.1930; (PRC); source: [Mitka \(2003\)](#). — Liptovské hole, Tichá dolina; leg. P. Svoboda, 07.08.1935; (PR); source: [Mitka \(2003\)](#).

### ***Aconitum firmum* subsp. *firmum* × *A. firmum* subsp. *maninense***

SLOVAKIA: Belianske Tatry Mts.: Comitatus Szepes, Contes Bélaenses, in valle Drechslerhäuschen sub monte Stirnberg, alt. c. 1400–1500 m; leg. E.G. Nyárády, 01.09.1907; (SIB); source: [Mitka \(2003\)](#).