The taxonomic circumscription of *Aconitum* subgenus *Aconitum* (Ranunculaceae) in Europe

Józef Mitka¹,*, Andriy Novikov², Walter K. Rottensteiner³

¹Jagiellonian University in Kraków, Institute of Botany, Botanical Garden, Kopernika 27, 31-501 Kraków, Poland
²State Natural History Museum NAS of Ukraine, Teatralna str. 18, Lviv 79008, Ukraine
³Klosterwiesgasse 12, A-8010 Graz, Austria

*Corresponding author. E-mail: j.mitka@uj.edu.pl

Abstract. In this article, we present a revised taxonomic circumscription of *Aconitum* subg. *Aconitum* (Ranunculaceae) in Europe. In total, the subgenus contains some 250 species with the major center of diversity in Eastern Asia. Altogether 94 taxa (species and infraspecific taxa, including hybrids) occur in Europe. Among them, 22 are native species, and 28 are nothospecies (including hybrid formulae). The research is based on former (since Linnaeus) and recent species diagnoses integrating herbarium and field studies carried out in the Alps, Carpathians, Balkans, Spanish Sierra Nevada, Sudetes, and Corsica. The subgenus includes three sections in Europe: the diploid sect. *Cammarum*, the tetraploid sect. *Aconitum*, and the monospecific, allopolyploid sect. *Angustifolium*. Additionally, a triploid, hybridogenous nothosection *Acomarum* (sect. *Aconitum × sect. Cammarum*) is presented. For each species, type citation, a concise morphological description, including infraspecific variation and hybridization, geographical distribution, and iconography sources are given. Also, a key to the determination of all taxa is presented. The proposed system scrutinizes former and recent species concepts and gives a base for further studies on the genus’ phylogeny and biotechnology.

Keywords: *Aconitum*, geographical distribution, Europe, hybrids, Linnaean taxonomy, nomenclature, species concept.

INTRODUCTION

The genus *Aconitum* L. (monkshood) comprises ca. 300–400 species distributed in temperate regions of the northern hemisphere, with a center of diversity in the eastern Himalaya, southwestern China, and Japan (Kadota 1987; Li and Kadota 2001; Luo et al. 2005). From a total number of ca. 250 species belonging to the subgenus *Aconitum*, 22 species may be found in Europe, with eight species occurring exclusively in the Carpathian and Balkans Mts (Boroń et al. 2020). The subgenus includes both the “temperate” forest (diploid) and “cold” high-mountain (tetraploid) species, which are differentiated both morphologically (Starmühler 1998; Mitka 2003; Novikoff...
and Mitka 2011) and cytogenetically (Ilńicki and Mitka 2009, 2011).

Genera *Aconitum* L., *Delphinium* L., *Consolida* (DC.) S.F Gray, *Aconitella* Schacht, and *Staphisagria* J. Hill form the monophyletic tribe Delphiniae Schröd., subtribe Delphiniiinae Bentham & Hook. f. (Tamura 1993; Keener et al. 1999; Turland and Barrie 2001; Jabbour and Renner 2011a, b). Zygomorphic flowers and the presence of diterpene alkaloids turned out to be the synapomorphies to this taxonomic group (Johansson 1995; Jabbour et al. 2009, 2014). Genus *Aconitum* consists of the following monophyletic subgenera: subg. *Aconitum*, subg. *Fletcherum* (Tamura) Y. Hong & Q.E. Yang, subg. *Galeata* (Rapaics) Y. Hong & Q.E. Yang, and subg. *Lycoctonum* (DC.) Peterm. (Kita et al. 2000; Utelli and Ito 2000; Luo et al. 2005; Jabbour and Renner 2011b; Hong et al. 2017). The monophyly and taxonomic rank of subg. *Anthora* (Rapaics) Peterm. is unclear and deserves further studies (Novikoff and Mitka 2015). The endemic of the Qinghai–Tibetan Plateau *A. gymnandrum* Maximowicz has been recently transferred from the monotypic *Aconitum* subg. *Gymnaconitum* (Stapf) Rapaics to an independent genus *Gymnaconitum* (Stapf) Rapaics to an independent genus *Gymnaconitum* (Stapf) Rapaics. It

*Aconitum* subg. *Aconitum* is known for its remarkable morphological plasticity and notorious hybridization, leading to difficulties in the circumscription of taxa (Kadota 1981; Tutin et al. 1993; Sutkowska et al. 2013, 2017a, b). To clarify the sectional treatment of the subgenus, we used both cytogenetic and morphological criteria (Starmühler 1996b, 2000; Ilńicki and Mitka 2009, 2011; Joachimiak et al. 1999; Mitka and Starmühler 2000; Novikoff and Mitka 2011).

The subgenus *Aconitum* in Europe has basic (monoploid, i.e., in a single complete set of chromosomes) number *x* = 8 and ploidy levels 2x, 3x, 4x, and 6x. It consists of the diploid sect. *Cammarum* DC. (2n (2x) = 16), the triploid nothosection *Aconarum* Starm. (2n (3x) = 24), the tetraploid sect. *Aconitum* (2n (4x) = 32), and the monospecific hexaploid sect. *Angustifolium* (Seitz) Rottensteiner, represented by the allopolyplid *A. angustifolium* Rchb. (2n (6x) = 48) (Seitz 1969; Zielinski 1982a, b; Simon et al. 2001; Ilńicki and Mitka 2009, 2011).

Section *Aconitum* includes high-mountain species that inhabit open sites in the subalpine and alpine zones. Section *Cammarum* is represented by forest species, which usually are distributed in montane (up to ca. 1150–1200 m above sea level), foreland and lowland/upland areas (Mitka 2000, 2002; Novikoff and Mitka 2011). Intersectional hybrids (*Aconitum* sect. *Aconitum × Aconitum* sect. *Cammarum*) are circumscribed within nothosect. *Acomarum* Starm. (Waclawská-Čwiertnia and Mitka 2016; Starmühler 2001).

We also include to the list *A. carmichaelii* from the section *Euchylodea* with 2n (4x) = 32, 2n (6x) = 48 or, often, 2n (8x) = 64 (Yang 1996; Li and Kadota 2001). In Europe, *A. carmichaelii* is used as an ornamental plant, while in China (native area) it is mostly cultivated for medicinal purposes (Yu et al. 2016; Zhao et al. 2017).

In the present article, we propose an annotated Linnaean taxonomic system of *Aconitum* subg. *Aconitum* in Europe. It is based on the classical works by Reichenbach (1819, 1821, 1827, 1840), Gáyer (1906, 1909, 1911, 1912), Götz (1967), Seitz (1969), Skalický (1982), and Flora Europaea (Tutin et al. 1993), supplemented by our recent systematic studies carried out in the Alps, Carpathians, Sudetes, and Balkans.

We adopt the following taxonomic treatment of *Aconitum* subgenus *Aconitum* in Europe (see also Appendix):

*Aconitum* L. subg. *Aconitum*

1. Sect. *Aconitum*
   1A. Subsect. *Aconitum* [syn. sect. *Napellus* Wolf (DC.) subsect. *Napellus* (Wolf) Rapaics]
      1a. Ser. *Aconitum*  
      1b. Ser. *Castellana* Rottensteiner, ser. nov.  
      1c. Ser. *Taurica* Mucher ex Starm.  
      1d. Nothoser. *Acorica* Mucher ex Starm. (ser. *Aconitum × ser. Taurica*)

1B. Subsect. *Burnatii* Rottensteiner  

2. Sect. *Cammarum* DC.  

2A. Subsect. *Cammarum* (DC.) Rapaics  
   2a. Ser. *Variegata* Steinberg ex Starm.  
   2b. Ser. *Toxica* (Rchb.) Mucher  
   2c. Nothoser. *Toxigata* Starm. (ser. *Toxica × ser. Variegata*)

3. Nothosect. *Acomarum* Starm. (sect. *Aconitum × sect. Cammarum*)

4. Sect. *Angustifolium* (Seitz) Rottensteiner, stat. nov.

5. Sect. *Euchylodea* Rchb.

5a. Ser. *Japonica* (Nakai) Kadota

MATERIAL AND METHODS

We have evaluated all recognized taxa from the *Aconitum* subg. *Aconitum* distributed in Europe based on our experience of many years of field investigations, morphological and biogeographical studies, as well as analysis of herbarium material. For each taxon, we provided comprehensive data on its distribution and morphological characteristics. We reviewed all available
sources for taxon synonymy and type citations. Basing on morphological data, a binary key for the identification of the representatives of the subgenus *Aconitum* has been developed.

The chromosome numbers were investigated in the Carpathians and Sudetes Mts (Joachimiak et al. 1999; Ilnicki and Mitka 2009, 2011; Mitka et al. 2007) or taken from the on-line DCDB database (http://hdl.handle.net/2445/95875; Bosch et al. 2016).

**RESULTS**

**Key to the taxa of Aconitum subgenus Aconitum in Europe**

1. Root napiform; stem ± stiff upright, rarely ± flexuous (*A. sect. Burnatii*); cauline leaves usually without reticulate venation; seeds smooth to transverse wrinkled or with transverse lamellae on one side, the uppermost segment of the leaf lobe with two, rarely with 4–6 teeth............... 2

1.* Root globose; stem upright to bent to overhanging or spreading-climbing, flexuous; cauline leaves with reticulate venation; seeds always with transverse lamellae on one side, the uppermost segment of the leaf lobe, located in its middle, with 4–12 teeth.................sect. *Cammarum* ....35

2. Carpels sterile.........................................................nothosect. *Acon-marum* (*A. sect. Aconitum × A. sect. Cammarum*)............ 3

2.* Carpels fertile ..........................................................14

3. Hood outside glabrous (or with just some single hairs) .................................................................4

3.* Hood outside hairy ................................................11

4. Cauline leaves net-veined.....*A. superbum × A. variegatum*

4.* Cauline leaves not net-veined.................................5

5. Pedicel glabrous or with just some single hairs at the top; filaments glabrous or just sparsely pilose...............6

5.* Pedicel hairy at least above the bracteoles; filaments ± densely pilose........................................7

6. Carpels mostly completely glabrous ....................

6.* Carpels pilose on the suture,...............................*A. × berdaui* nothosubsp. berdaui (*A. firmum* subsp. *firmum × A. variegatum* subsp. *variegatum*)

7. Pedicels with glandular hairs.................................8

7.* Pedicels without glandular hairs ................................9

8. Pedicel pilose with strict glandular hairs ...............

8.* Pedicel pilose with curved and s-formed glandular hairs........

8. **Pedicel pilose with curved and s-formed glandular hairs**

9. Pedicels above the bracteoles with curved and crisp and strict hairs...*

9.* Pedicels above the bracteoles only with curved and crisp hairs

9. **Pedicels above the bracteoles only with curved and crisp hairs**

10. Bracteoles triangular to linear, 2–5 mm long.............

10.* Bracteoles lanceolate to spatulate, 5–7 mm long........

11. Cauline leaves net-veined.....*A. superbum × A. vitosanum*

11.* Cauline leaves not net-veined.........................12

12. Tepals outside with only eglanular hairs..................

13.* Tepals outside with curved glandular hairs and strict glandular hairs...*

13. **Tepals outside with curved glandular hairs and strict glandular hairs**

14. Cauline leaves with uppermost leaf segments only 1–3 (–4) mm broad; tepals light blue to whitish; hood ± triangular; seeds with transverse lamellae........................................

14.* Cauline leaves with uppermost leaf segments only 1–3 (–4) mm broad; tepals light blue to whitish; hood ± triangular; seeds with transverse lamellae........................................

15. Stem at least in the inflorescence region flexuous (zigzag); inflorescence axis, pedicels and tepals outside glandular pilose..........................subsect. *Burnatii*....16

15.* Stem stiff, upright; inflorescence axis, pedicels and tepals outside with a different pubescence

16. Hood about as broad as high..........................*A. maninense*

16.* Hood distinctly broader than high...........................17

17. Stem in the lower third glabrous; cauline leaves almost glabrous; nectary spur globose..........................*A. pentheri*
17.* Stem in the lower third pubescent or pilose; cauline leaves densely pilose; nectary spur hooky..............................................18
18. Stem in the lower third pubescent; cauline leaves with narrow segments; pedicels straight; filaments glabrous or pilose.................................................................A. burnatii
18.* Stem in the lower third pilose; cauline leaves with broad segments; pedicels bent; filaments always pilose..................................A. nevadense
19. Nectary spur elongated and bent backward.........................ser. Castellana … A. castellanum
19.* Nectary spur not elongated and not bent backward ...... 20
20. Nectary spur distinctly globose; tepals outside glabrous to densely pubescent..............................A. corsicum
20.* Nectary accephalous; tepals outside glabrous or only sparsely pubescent....................................................ser. Taurica…21
21. Nectary claw erect or only slightly curved at the top...........A. firmum
21.* Nectary claw distinctly curved........................................22
22. Caulline leaves net-veined..................................................23
22.* Caulline leaves not net-veined .........................................30
23. Tepals outside densely curved and crisped eglandular pubescent, plant above 2 m high..................A. superbum
23.* Tepals outside with a different pubescence or glabrous...
....................................................................................A. firmum
24. Tepals outside densely curved and crisped eglandular pubescent and glandular pilose, bracteoles divided............A. firmum subsp. skerisorae
24.* Tepals outside glabrous or hairy.......................................25
25. Tepals outside and pedicels glabrous.................A. firmum
a. Bracteoles all similar, undivided, lanceolate...subsp. fissurae
  a.* Bracteoles of lower flowers bigger and divided...........b
b. Bracteoles of lower flowers in ± deeply divided...............subsp. firmum
  b.* Bracteoles of lower flowers only bigger or just little divided..............................nothosubsp. fissianum (subsp. firmum × subsp. fissurae)
25.* Tepals outside and pedicels eglandular pubescent hairy.....
  a. Pedicels eglandular pubescent..........................................................A. firmum subsp. moravicum
    a.* Pedicels below the bracteoles glabrous.............................A. firmum subsp. moravicum × A. variegatum subsp. variegatum
    b.* Carpels glabrous.....................................................................d
    c. Bracteoles 2–3 (–4) mm long ....nothosubsp. polatschekii (subsp. formosum × subsp. lobeli)
    c.* Bracteoles (3–) 5–8 (–20) mm long ...nothosubsp. seitzii (subsp. lobeli × subsp. napellus)
  b.* Carpels sparsely pubescent on the ventral side...........fo. bucovinense
  a.* Carpels pubescent .......................................fo. orthotricha
26. Pedicels glandular pilose only above bracteoles....................A. ×mariae nothosubsp. mariae (A. firmum subsp. firmum × A. maninense)
26.* Pedicel with a different pubescence...........................27
27. Pedicels curved and crisped eglandular and glandular pubescent, mainly above the bracteoles, tepals outside glabrous...........A. ×nanum (A. bucovinense × A. firmum)
27.* Pedicel with a different pubescence..........................28
28. Pedicels sparsely glandular pubescent only above the bracteoles..........A. ßzzarnohorensi (A. firmum × A. ×nanum)
28.* Pedicels with a different pubescence.......................29
29. Pedicels and tepals outside curved and crisped eglandular pubescent and glandular pilose......A. ×mariae nothosubsp. paxii (A. firmum subsp. moravicum × A. maninense)
29.* Pedicels only sparsely curved and crisped eglandular pubescent and glandular pilose, mainly just above the bracteoles, tepals outside glabrous...A. ×zapalowiczii (A. firmum × A. ×mariae nothosubsp. paxii)
30. Pedicels densely curved and crisped eglandular and glandular pubescent ...........................................A. bucovinense
  a. Carpels glabrous or rarely pilose on the ventral side...........
  ..........................................................................................fo. bucovinense
  a.* Carpels pubescent .......................................fo. orthotricha
30.* Pedicels eglandular hairy.............................................31
31. Caulline leaves with linear to narrow lanceolate segments, the uppermost 2–4 mm broad, longly acuminate; flowers mauve to mauvish-blue; hood 18–20 mm high from base...A. anglicum
  a. Carpels densely pubescent; often with bulbils in the lower leaves..............................................subsp. lobeli
    a.* Carpels glabrous or just sparsely pubescent on the backside; never with bulbils..............................b
    b. Carpels sparsely pubescent on the backside...............c
    b.* Carpels glabrous......................................................d
7. Aconitum
A. napellus
A. nevadense
A. ×maninense
A. ×polatschekii
A. ×mariae
A. ×nanum
A. ×taurica
A. ×ppolatschekii
d. Filaments of stamens toothed .................................................. subsp. lusitanicum

d.* Filaments of stamens not toothed ...................................... e

e. Bracteoles (3–) 5–8 (–20) mm long; carpels 3 (–4)..................
........................................................................... subsp. napellus

e.* Bracteoles shorter; carpels 2–3 ........................................ f

f. Bracteoles 1–2 (–3) mm long; carpels 2–3.................................
........................................................................... subsp. formosum

f.* Bracteoles (2–) 3 (–4) mm long; carpels (2–) 3 .......... notho-
subsp. hinterhuberi (subsp. formosum × subsp. napellus)

32. Tepals outside always glabrous.............................. ser. Taurica

A. Stem rigid, bracteoles linear to lanceolate 2–5 (–7) mm,
carpels 3; tepals outside always glabrous. A. tauricum

a. Pedicels with strict and crisped, glandular or eglandu-
lar hairs above the bracteoles; carpels often sparsely
pubescent on the suture .................... subsp. latemarense

a.* Pedicels with only few hairs on the top or glabrous;
carpels mostly glabrous................................. b

b. Pedicels with solitary hairs at the top; carpels mostly
glabrous...............................nothosubsp. hayekianum (subsp.
latemarense × subsp. tauricum)

b.* Pedicels glabrous; carpels glabrous....subsp. tauricum

I. Inflorescence with many, ± long side racemes....
........................................................................... var. eustachyum

I.* Inflorescence without or only with few short
side racemes............................................ var. tauricum

i. Nectaries and filaments glabrous....fo. tauricum

i.* Nectaries and filaments ± densely pilose ......
........................................................................... fo. tausericum

A.* Stem weekly ramified, bracteoles triangular to lin-
ear, 1–2 (–3) mm long; carpels 2 (–3) ...... A. clusianum

32.* Tepals outside sparsely hairy.......................... 33

33. Bracteoles triangular to linear, 1–2 (–3) mm long; carpels
2 (–3) ............................................................... A. plicatum

a. Pedicels eglandular pubescent, carpels glabrous.........
........................................................................... subsp. plicatum

a.* Pedicels eglandular and/or glandular pilose; carpels pubes-
cent............................................................... subsp. sudeticum

33.* Bracteoles linear, lanceolate or spathulate, 3–5 (–8) mm
long; carpels 2–3........................................... 34

34. Bracteoles situated always shortly below the flower at the
top of the pedicel; carpels (2–) 3.................................
........................................................................... A. ×teppneri (A. napellus × A. tauricum)

a. Carpels glabrous......................................................... b

a.* Carpels sparsely pubescent on the backside .............. c

b. Pedicels sparsely curved and crisped eglandular pubes-
cent............................................................... nothosubsp. teppneri (A.
apellus subsp. napellus × A. tauricum subsp. tauricum)

b.*Pedicels glandular and eglandular curved and crisped
pubescent and pilose............................... nothosubsp. kernerii (A.
apellus subsp. napellus × A. tauricum subsp. latemarense)

c. Pedicels sparsely curved and crisped eglandular pubes-
cent............................................................... nothosubsp. goetzii (A.
apellus subsp. lobelii × A. tauricum subsp. tauricum)

c.* Pedicels glandular and eglandular curved and crisped
pubescent and pilose............................... nothosubsp. haderlappii (A.
apellus subsp. lobelii × A. tauricum subsp. latemarense)

34.* Bracteoles situated distant from the flower, below to or in
the middle of the pedicel; carpels 2–3.........................
........................................................................... A. ×bavaricum (A. napellus × A. plicatum)

a. Carpels glabrous............................... nothosubsp. bavaricum (A. napellus
subsp. napellus × A. plicatum)

a.* Carpels sparsely pubescent on the backside ..............
........................................................................... nothosubsp. lusenense (A. napellus subsp. lobelii × A.
plicatum)

35. Pedicels and tepals outside glabrous or eglandular pubes-
cent............................................................... ser. Variegata......36

35.* Pedicels and tepals outside glandular pilose or very rarely
glabrous (A. degenii subsp. rhaeticum, A. toxicum subsp.
bucegiense) .................................................... 39

36. Pedicels eglandular curved pubescent; carpels glabrous or
pubescent on the backside

a. bracteoles at the middle of pedicel or below ............
........................................................................... sect. Euchylodea...A. carmichaeli

a.* bracteoles in the upper part below flower.............. 37

36.* Pedicels mostly glabrous; tepals outside always glabrous;
carpels glabrous or pilose on the suture....................... 38

37. Pedicels and tepals outside eglandular curved pubescent;
carpels mostly pubescent on the backside...... A. vitosanum

37.*Pedicels sparsely eglandular curved pubescent; tepals out-
side glabrous; carpels mostly glabrous............................. A. ×aquilonare (A. variegatum × A. vitosanum)

38. Hood not much higher than broad; claws of the nectaries
strongly curved; spurs of the nectaries mostly reaching the
top of the hood; carpels 3, glabrous .................... A. vivantii

38.* Hood distinctly higher than broad; claws of the nectaries
upright; spurs of the nectaries not reaching the top of the
hood; carpels 3–5, glabrous or pilose on the suture........
........................................................................... A. variegatum
a. Carpels 3, glabrous.......................... subsp. nasutum

b. Carpels 3–5, pilose at least on the suture..............

c. Bracteoles 2–3 (–5) mm long, linear to narrow lanceolate; carpels always 3.................. var. carniolicum
d. Leaf sheaths underside pubescent; pedicels sparsely pubescent below the bracteoles; carpels pilose on the suture and often also on the backside........var. stiriacum
d.* Leaf sheaths underside glabrous; pedicels glabrous; carpels only pilose on the suture........... var. variegatum

c.* Bracteoles 4 (–4) mm long, spathulate, ovate or leaflike; carpels (3–) 5.............................

d. Pedicels and tepals outside only with straight glandular hairs........................................ d

c. Pedicels and tepals outside also or only with curved glandular hairs.....................................

d. Pedicels and tepals outside with curved and straight glandular hairs............................... nothosubsp. nyaradjanum (subsp. crispulum × subsp. toxicum)
d.* Pedicels and tepals outside only with curved glandular hairs........................................ subsp. crispulum

42. Bracteoles linear to narrow ovate..........................43

43. Pedicels and tepals outside with straight, curved and s-formed glandular hairs.......................... A. ×pilosiusculum (A. degenii × A. pilipes)

43. Pedicels and tepals outside only with straight glandular hairs.............................................

44. Bracteoles narrow ovate or spathulate, with branching veins.................... A. ×dragulescuanum (A. degenii × A. toxicum)

a. Pedicels, bracteoles and tepals outside only with straight glandular hairs................ nothosubsp. dragulescuanum (A. degenii subsp. degenii × A. toxicum subsp. toxicum)

b. Pedicels sparsely glandular pilose, mainly above the pedicel............................................

c. Pedicels, bracteoles and tepals outside with curved and straight glandular hairs............... nothosubsp. grintescuanum (A. degenii subsp. degenii × A. toxicum subsp. crispulum)

d. Pedicels and tepals outside without branching veins......................................................

45. Nectary claw distinctly curved; nectary spur capitate or slightly recurved.............. A. degenii

a. Tepals outside glabrous............................................. b

b. Pedicels glabrous.............................................. c

b.* Pedicels sparsely glandular pilose, mainly above the bracteoles.............................. nothosubsp. lippertianum (subsp. paniculatum × subsp. rhaeticum)

c. Bracteoles linear, situated about in the middle of the pedicel........................................ subsp. paniculatum

I. Nectaries and filaments glabrous........ var. laxiflorum

I.* Nectaries glabrous or pilose; filaments ± densely pubescent........................................ var. turrachense

c.* Bracteoles lanceolate to spathulate, situated at the top of the pedicel..............................

d. Carpels 5, densely pilose.................. subsp. valesiacum

e.* Carpels 3–5, mostly glabrous................................. f

f. Pedicels below the bracteoles almost glabrous; carpels 3–5, mostly glabrous........... nothosubsp. gandogeri (subsp. paniculatum × subsp. valesiacum)
45.* Pedicels below the bracteoles sparsely to densely glandular pilose; carpels 3–5 mostly + densely pubescent/pilose; carpels 3, glabrous ...................... nothosubsp. variegatum

46. Hood distinctly higher than broad; nectary claw upright; pedicels sparsely crisped and s-formed glandular pilose, mainly above the bracteoles; carpels (3–) 5 mostly + densely pubescent/pilose; carpels 3–5, pilose only on the suture .......... subsp. austriacum × A. degenii

47.* Pedicels sparsely straight glandular pilose, mainly above the bracteoles; carpels 3–5, pilose only on the suture .......... A. ×pawlowskii (A. lasiocarpum × A. variegatum)

48. Bracteoles narrow, without reticulate veination .......... 49

48.* Bracteoles broad spatulate to narrow ovate, with reticulate veination ........................................... 50

49. Tepals outside sparsely glandular pilose; carpels 3–5.............. A. ×xhebechnum (A. degenii × A. variegatum)

49.* Tepals outside glandular pilose and eglandular pubescent; carpels 3............. A. ×tuschticicum (A. degenii × A. vitosanum)

50. Carpels glabrous or pilose on the suture.......................... A. ×bartokianum (A. toxicum × A. variegatum)

a. Pedicels and tepals outside curved glandular pilose; carpels glabrous .......... nothosubsp. rapaicsianum (A. toxicum subsp. crispulum × A. variegatum subsp. nasutum)

a.* Pedicels and tepals outside straight glandular pubescent .............................................................. b

b. Carpels glabrous .......... nothosubsp. bartokianum (A. toxicum subsp. toxicum × A. variegatum subsp. nasutum)

b.* Carpels pilose on the suture................................. A. ×pawlowskii (A. toxicum × A. variegatum subsp. variegatum)

50.* Carpels entirely pubescent....A. lasiocarpum × A. toxicum

---

**TAXONOMIC TREATMENT**

*Aconitum* L. sect. *Aconitum* subsect. *Aconitum* ser. *Aconitum* in Europe is represented by six species, four nothospecies, and one hybrid formula; ser. *Castellana* Rottensteiner – by single species; ser. *Taurica* Mucher ex Starm. – by two species; nothoser. *Acorica* Starm. (ser. *Aconitum × ser. Taurica*) – by one species and two nothospecies (Mitka et al. 2017).

*Aconitum* sect. *Aconitum* subsect. *Burnatii* Rottensteiner consists of four endemic species distributed in the Sierra Nevada, Maritine Alps, French Massif Central, Balkans, and Western Carpathians (Rottensteiner 2018).

*Aconitum* sect. *Cammarum* DC. ser. *Variegata* Steinberg ex Starm. in Europe comprises three species and one nothospecies; ser. *Toxica* (Rchb.) Mucher is represented by four species, three nothospecies, and one hybrid formula; nser. *Toxigata* Starm. (ser. *Toxica × ser. Variegata*) – by five nothospecies.

*Aconitum* sect. *Angustifolium* Rottensteiner consists of one species (Seitz 1969).

*Aconitum* nothos sect. *Aconitum* ser. *Aconitum* × *Aconitum* sect. *Cammarum* consists of seven nothospecies and four hybrid formulae (Starmüller 2001; Waclawska-Cwietnina and Mitka 2016).

---

1. – Sect. *Aconitum*

1A. – Subsect. *Aconitum*

Description

Hood falciform, hemispherical, i.e., above rostrum wide-convex, or rounded-conic, 1–1.5 times higher than wide; claws of the nectaries bent and reaching the top of the hood, spurs of the nectaries acetalous, capitate or slightly bent, reaching the top of hoods; carpels 2–3, inflorescence axis, pedicels and tepals outside eglandular, glandular/eglandular pubescent/pilose or glabrous; leaves divided into 3 or 7 lobes and dissected to the base, the uppermost leaf segment linear to ovate, sometimes with 1–2 teeth; nectary spur capitate; seeds without membranous lamellae or rugulose, black to black-brown, with one or three longitudinal wings, then one wing more developed than the other two; root fusiform.

1a. – Ser. *Aconitum*

Type species: *A. napellus* L.

Diagnostic characters: nectary spur distinctly globose; tepals outside glabrous to densely pubescent.
**Aconitum anglicum** Stapf, Curtis’s Bot. Mag. 151: tab. 9088. 1926

Iconotype: Stapf, Curtis’s Bot. Mag. 151: tab. 9088, 1926.

Synonyms: *A. napellus* auct., *A. napellus* L. subsp. *napellus* (sensu Seitz 1969).

Distribution: Southwest and West England and East Wales.

Diagnostic characters: tubers up to 9 cm, by 3 cm at the top; stem with fine curled hairs; leaves 5- to 3-partite, deeply laciniate with lobes linear to narrowly linear-lanceolate and acuminate, the uppermost 2–4 mm wide, almost glabrous; pedicels (1–) 2 (–3) cm long, quite erect; flowers mauve to mauvish-blue, minutely downy, covered eglandular pubescent; hood 18–20 mm high from the base; lower tepals strongly deflexed; lateral tepals 12–17 mm; claws of the nectaries curved almost horizontal, with a capitate spur; filaments hairy; carpels 3, glabrous.

Iconography: Stapf (1926); Ross-Craig (1948); Clapham et al. (1957).

Literature: Seitz (1969); Starmühler (1998).

Hybrids: unknown.

**Synonyms:**

-(sensu Rehman 1969) – Wulfen subsp. *orthotricha* (Gaéy, Magyar Bot. Lap. 9: 168. 1909)

Type citation: did not provided by the author.

Typus: not designated.

Synonyms: none.

**Diagnostic characters:** carpels pubescent.

Hybrids:

a) *Aconitum ×nanum* (Baumg.) Simonk., Enum. Fl. Transsylv.: 64. 1887

Type citation: “In mtb. Csibesz et Arszuluj.”

Typus: lectotype, (Romania) in m. Arszuluj (1812) – CL-Baumgarten 4745!

Synonyms: *A. napellus* L. var. *nanum* Baumg., *A. tauricum* Wulfen subsp. *nanum* (Baumg.) Gaéy, *A. tauricum* Wulfen subsp. *nanum* (Baumg.) Grinț.

Hybrid origin: *A. bucovinense × A. firmum.*

**Diagnostic characters:** hoods glabrous, pedicels eglandular and glandular pubescent.

b) *Aconitum ×czarnohorense* (Zapal.) Mitka, The genus *Aconitum* in Poland and adjacent countries: 77. 2003

Type citation: “W Górah Pokucko-Marmaroskich, szczególnie na Czarnej Horze i w Alpach Rodneńskich w krainie kosodrzew.”

Typus: lectotype, (Romania) in m. Arszuluj (1812) – CL-Baumgarten 4745!

Synonyms: *A. napellus* L. var. *czarnohorense* Zapal., *A. napellus* L. var. *czarnohorense* Zapal. fo. *czarnohorense* Zapal., *A. napellus* L. var. *czarnohorense* Zapal. fo. *amoenum* Zapal., *A. napellus* L. var. *czarnohorense* Zapal. fo. *glabratum* Zapal., *A. napellus* L. var. *czarnohorense* Zapal. fo. *hovranianum* Zapal., *A. napellus* L. var. *czarnohorense* Zapal. fo. *nanum* Zapal. non Baumg., *A. napellus* L. em Skalicky var. *czarnohorense* Zapal. fo. *rodenense* Zapal., *A. napellus* L. var. *czarnohorense* Zapal. fo. *tenuisectum* Zapal., *A. napellus* L. em Skalicky var. *czarnohorense* Zapal. fo. *turkulense* Zapal.

Hybrid origin: *A. bucovinense × A. ×nanum.*

**Diagnostic characters:** hoods glabrous, pedicels below bracteoles glandular pubescent or glabrous.

Iconography: (Mitka 2003: 179, fig. 12E); Novikoff and Mitka (2011: 49. fig. 5K).

**Lower taxa:**

a) fo. *bucovinense*

**Diagnostic characters:** carpels glabrous or, rarely, pilose on the dorsal side.
The taxonomic circumscription of *Aconitum* subgenus *Aconitum* (Ranunculaceae) in Europe

19

tum Rapaics., *A. napellus* L. subsp. corsicum (Gáyer) W. Seitz, *A. pyramidalum* Mill. var. corsicum (Gáyer) P. Fourn.

Distribution: Corsica.

**Diagnostic characters**: hood and pedicels densely pubescent, inflorescence erect, in lower part ramified; claws of the nectaries capitate or acaule, reaching the top of the hoods; filaments pilose; bracteoles linear to linear-lanceolate 3–5 mm; carpels glabrous; the uppermost leaf segment 2–4 mm wide.

Iconography: Jeanmonod and Gamisans (2007).

Literature: Gáyer (1909); Starmühler (1998).

Hybrids: unknown.

*Aconitum firmum* Rchb., Uebers. Aconitum: 20. 1819

Type citation: “in Carpathorum tractu Townson!, Genersch! Kitaibel!, Wahlenberg!, Sadler! in Transsilvania Baumgarten! in Carinth. Alp. Fladnitz, v. Vest!”

Typus: iconotype, “Rchb., Mon. Acon.: 85, Tab. XIV, fig. 1, 1821” (Skalicky 1990).

Synonyms: *A. flerovii* Steinb. in Komarov, *A. palatifidum* Rchb., p.p., *A. romanicum* Wołoszczak, *A. tatrae* Borb., *A. koelleanum* Rchb. var. *firmum* (Rchb.) Rchb., *A. napellus* L. var. *firmum* (Rchb.) Pawl., *A. napellus* L. var. *babiogorense* Zapal. fo. *babiogorense*, *A. napellus* L. var. *babiogorense* Zapal. fo. *subfissum* Zapal., *A. napellus* L. var. *carpaticum* Zapal. fo. *carpaticum*, *A. napellus* L. var. *subtatrense* Zapal. fo. *subtatrense*, *A. napellus* L. var. *subtatrense* Zapal. fo. *abnorme* Zapal., *A. napellus* L. var. *subtatrense* Zapal. fo. *latisectum* Zapal., *A. napellus* L. var. *tatrense* Zapal., *A. skerisorae* auct., non Gáyer, *A. tauricum* auct. Fl. Carpathorum, non Wullen.

Distribution: Carpathian Mts, Apuseni Mts, Balkans, Central Russian Highlands.

**Diagnostic characters**: bracteoles (2.5–) 3–17 mm long, at least those of the lowest flowers in terminal raceme divided or at least toothed; pedicels and tepals outside glabrous (subsp. *firmum*, subsp. *fissurae*, and nothosubsp. *fussianum*), curved and crisped eglandular pubescent and glandular pilose (subsp. *skerisorae*), or eglandular pubescent (subsp. *moravicum*); bracteoles 2–5 (–7) mm long, whetothed toothed nor divided; stamens glabrous (subsp. *firmum*) or villose (subsp. *fissurae* and nothosubsp. *fussianum*).

Iconography: Bauhin (1671: 183); Reichenbach (1821: t. xiv, fig. 1); Mitka (2003: 178); Novikoff and Mitka (2011: 49).

Literature: Skalicky (1990); Starmühler (1998); Starmühler (2000); Starmühler and Mitka (2001); Mitka (2003); Starmühler (2010); Novikoff and Mitka (2011); Mitka et al. (2017).

Lower taxa:

a) subsp. *firmum*

**Diagnostic characters**: pedicels and tepals outside glabrous; bracteoles ± deeply divided; stamens glabrous.

b) subsp. *fissurae* Nyár., Enum. Pl. Cheia Turzii: 132. 1939

Type citation: “[Romania] Transsilvania, Cheia Turzii, Repezieul caprelor; Nr. 435214; 06.09.1936; leg. E.I. Nyáriódy (CL)” (Starmühler and Mitka 2001).

Typus: lectotype, Cl. 435214.

Synonyms: *A. romanicum* Wołoszczak, *A. flerovii* Steinb. in Komarov.

**Diagnostic characters**: pedicels and tepals outside glabrous; bracteoles entire or slightly toothed; stamens villose.

c) subsp. *skerisorae* (Gáyer) Starm., Siebenbürg. Arch. 36: 18. 2000

Type citation: “Plantae Hungariae exsiccatae, Comit. Kolozs, in lapidosis fl. Melegszamos ad pag. Melegszamos, Nr. 60705; 17.07.1904 leg. Z. Zsák (BP); A. skerisorae Gáy., rev. Gáyer 1910” (Starmühler 2000).

Typus: neotype, BP 60705.

Synonyms: *A. skerisorae* Gáyer, *A. tatrae* Borbás var. *skerisorae* Soó, *A. napellus* Rchb. subsp. *skerisorae* Seitz non Gáyer (Soó 1972).

**Diagnostic characters**: pedicels and tepals outside eglandular pubescent and glandular pilose; bracteoles from lanceolate to divided; stamens villose or rarely glabrous.

d) subsp. *moravicum* Skalický, Preslia 54 (2): 115 1982

Type citation: “[Czech Republic] Beskydy, u cesty na západ, svaahu Smrku, 1025 m, Nr. 322; 27.07.1943; leg. R. Kurka (PCR) ” (Starmühler and Mitka 2001)

Typus: holotype, PCR 322.

Synonyms: *A. napellus* L. subsp. *firmum* (Rchb.) Gáyer var. *carpaticum* Maloch.

**Diagnostic characters**: pedicels and tepals outside eglandular pubescent; bracteoles at least those of the lowest flowers divided or at least toothed, rarely undivided; stamens mostly pilose.

e) nothosubsp. *fussianum* Starm. (*A. firmum* subsp. *firmum* × *A. firmum* subsp. *fissurae*) – see hybrids of *A. firmum*.

Hybrids:

a) *Aconitum firmum* nothosubsp. *fussianum* Starm., Siebenbürg. Arch. 36: 17. 2000
Diagnostic characters: tepals outside glabrous; bracteoles toothed or lobed; stamens villose.

b) Aconitum ×nanum (Baumg.) Simonk. (A. bucovinense × A. firmum) – see A. bucovinense.

c) Aconitum ×czarnohorensis (Zapal.) Mitka (A. firmum × A. ×nanum) – see A. bucovinense.

d) Aconitum ×mariae Rottensteiner, Mitka & Novikov, nothospec. (hybr.). nov.

Type: [Slovakia] Hungary, comitatus Szepes, Montes Bélaenses, in valle Drechslerhäusern sub monte Stirnberg, alt. cca. 1400–1500 m, solo calc.; 01.09.1907; leg. E.G. Nyárády (holotype, SIB).

Diagnosis
A. ×mariae differs from A. firmum by glandular pilose pedicels and differs from A. maninense by glabrous tepals.

Description
Inflorescence axis glabrous, pedicels glandular pubescent and pilose, often only above the bracteoles, bracteoles linear, lanceolate, spathulate or even divided, situated in the upper half of the pedicel, tepals outside glabrous, filaments of the stamens glabrous or sparsely pilose, carpels glabrous or sparsely pilose on the backside.

Hybrid origin: A. firmum s.str. × A. maninense.

Eponymy
This new Aconitum hybrid is named after a distinguished botanist, our friend and colleague from the Institute of Botany of the Jagiellonian University in Kraków, Professor Maria Zając (1955–2018).

e) Aconitum ×mariae Rottensteiner, Mitka & Novikov nothosubsp. paxii (Starm.) Mitka, comb. nov.

Basionym: A. firmum Rchb. nothosubsp. paxii Starm. in Starmühler & Mitka, Thaiszia 10 (2): 127, 2001.

Type citation: "Polen, Galizien, Nord-Karpaten, Hohe Tatra (Tatry Wysokie), S-Ufer vom Großen Fischsee (Morskie Oko), N 49°11.64’, E 20°04.12’, 1395 m alt.; Hochstaudenflur; 13.08.1997; leg. U. et W. Starmühler" (Starmühler and Mitka 2001).

Type: holotype, GZU 000232750.

Synonyms: none.

Hybrid origin: A. firmum subsp. firmum × A. firmum subsp. fissingae.

Diagnostic characters: tepicls curved and crisped eglandular pubescent and glandular pilose.

Iconography: Mitka (2003: 178, fig. 11E).

f) Aconitum ×zapalowiczii (Starm.) Mitka, Studia University Babeș-Bolyai, Biologia, 62: 166. 2017

Basionym: A. firmum Rchb. nothosubsp. zapalowiczii Starm. in Starmühler & Mitka, Thaiszia 10 (2): 128, 2001.

Type citation: "Polen, Galizien, Nord-Karpaten, Hohe Tatra (Tatry Wysokie), S-Ufer vom Großen Fischsee (Morskie Oko), N 49°11.64’, E 20°04.12’, 1395 m alt.; Hochstaudenflur; 13.08.1997; leg. U. et W. Starmühler" (Starmühler and Mitka 2001).

Type: holotype, GZU 000232751.

Synonyms: none.

Hybrid origin: A. firmum × A. ×mariae nothosubsp. paxii.

Diagnostic characters: pedicels only sparsely curved and crisped eglandular pubescent and glandular pilose, mainly just above the bracteoles.

Iconography: Mitka (2003: 178, fig. 11F).

Aconitum napellus L., Sp. Pl. ed. 1, 1: 352. 1753

Type citation: "in Helvetia, Bavaria, Gallia".

Type: lectotype in Herb. Clifford: 214, A. 3, sheet A, BM 000628795 (Seitz 1969).

Synonyms: A. autumnale Clus. ex Rchb., A. bernhardianum Rchb., p.p., A. compactum Rchb., A. eminens Koch. ex Rchb., A. laxum Rchb., A. linnaeanus Gayer, A. lobelianum Rchb., A. meyeri Rchb., A. neomontanum Wulffen, A. neubergense Clus. ex Rchb., A. pyramidale Mill. ex Rchb., A. strictum Bernh., A. vulgare DC., Delphinium napellus (L.) Baill.

Distribution: Alps, Pyrenees, Iberian Peninsula, Bohemian Massif.

Diagnostic characters: inflorescence axis, pedicels and hoods outside pubescent; filaments not toothed; nectaries bent horizontal, spur of nectaries capitate; inflorescence rigid or loose/ramified; bracteoles (3–) 5–8 (–20) mm long and carpels (2–) 3, densely pubescent (subsp. lobelii) or carpels sparsely pubescent on the backside only (nothosubsp. seitzii); carpels glabrous, bracteoles linear to lanceolate, rarely spathulate (4–) 5–8 (–15) mm long (subsp. napellus), 1–2 (–3) mm long (subsp. formosum); or nectaries hardly bent; filaments ± toothed, carpels 2–3 (subsp. lusitanicum); bracteoles (2–) 3 (–4) mm long and carpels (2–) 3 glabrous (nothosubsp. hinterhuberi) or carpels sparsely pubescent on the backside (nothosubsp. polatschekii).
Iconography: Matt., New Kreuterb.: 472, fig. D, 1563; Clus. Rar. Pl. Hist. 2: 96 pro Aconit. Lycocyt. vi. Napellus vulgar., 1601; Jacq. Fl. Austr. v. 4, t. 381, 1776.

Literature: Cappelletti and Poldini (1984); Molero and Blanché (1986); Mucher (1991a); Starmühler (1999); Starmühler (2001); Starmühler (2002).

Lower taxa:

a) subsp. napellus

**Diagnostic characters:** carpels 3 (–4), glabrous; bracteoles linear to lanceolate, rarely spathulate (4–) 5–8 (–15) mm; filaments not toothed.

b) subsp. lobelii Mucher, Phyton (Horn) 31(1): 130. 1991

Type citation: "Ostalpen, Steiermark, Salzkammergut, Totes Gebirge, Loser, Panoramastraße, Hochstaudenflur, 1020 m, 9.8.1989, leg W. Mucher [GZU]" (Mucher 1991c).

Typus: holotype, GZU 000274111. Isotypes, GJO, GZU 000274112 – GZU 000274117, W, WU.

Synonyms: A. lobelianum Host, p.p., non Rchb., A. lobelianum (Rchb.) Host. in Gáyer, p.p.

**Diagnostic characters:** carpels (2–) 3, densely pubescent; bracteoles linear to lanceolate, (3–) 5–8 (–20) mm; filaments not toothed, pilose.

c) subsp. formosum (Rchb.) Gáyer in Hegi, Fl. Mitteleur. 3: 498. 1912

Type citation: “Salzburger Alpen (Untersberg, Schafberg)” (Gáyer 1912: 498)

Typus: iconotype, “Reichenbach 1825, Ill. Spec. Acon. Gen., icon. 65” (Starmühler 1997b).

Synonyms: A. formosum Rchb., A. napellus L. [var.] formosum (Rchb.) Koch, A. napellus [var.] β hemisphaericum fo. formosum (Rchb.) Beck.

Iconography: Gáyer (1912: 499, fig. 655 a–c).

**Diagnostic characters:** carpels 2–3, glabrous; bracteoles linear to lanceolate, only 1–2 (–3) mm long; filaments not toothed.

b) subsp. lusitanicum Rouy, Le Naturaliste 6: 405. 1884

Type citation: “Prov. de Tras-os-montes: environ de Bracança, à San Martin ho d’Augueira. – Sept. 1854. – leg. E. Schmitz” (Rouy 1884).

Typus: not designated.

Synonyms: none.

**Diagnostic characters:** carpels 2–3, glabrous; filaments toothed.

e) nothosubsp. hinterhuberi (A. napellus subsp. formosum × A. napellus subsp. napellus) – see hybrids of A. napellus.

f) nothosubsp. polatschekii (A. napellus subsp. formosum × A. napellus subsp. lobelii) – see hybrids of A. napellus.

Hybrids:

a) Aconitum napellus L. nothosubsp. hinterhuberi Starm., Fritschiana 18: 12. 1999

Type citation: “Aconitum brauneanum, Untersberg, 1825, leg. Hinterhuber (WU-Keck). Dieser Beleg wurde bereits von Seitz 1966 als "A. napellus ssp. hians gegen ssp. neomontanum" revidiert” (Starmühler 1999).

Typus: holotype, WU-Keck.

Synonyms: none.

Hybrid origin: A. napellus subsp. formosum × A. napellus subsp. lobelii.

**Diagnostic characters:** carpels (2–) 3, glabrous; bracteoles (2–) 3 (–4) mm long; filaments of stamens not toothed.

b) Aconitum napellus L. nothosubsp. polatschekii Mucher ex Starm., Fritschiana 18: 13. 1999

Type citation: "Ostalpen, Steiermark, Mariazellerland, Südufer des Hubertussees an der niederösterreichischen Grenze, feuchte Wiese, 840 m; 04.08. 1989; leg. W. Mucher" (Starmühler 1999).

Typus: holotype, GZU 000274119. Isotype, W.

Synonyms: none.

Hybrid origin: A. napellus subsp. formosum × A. napellus subsp. lobelii.

**Diagnostic characters:** carpels (2–) 3 sparsely pubescent on the backside; bracteoles (2–) 3 (–4) mm long.

c) Aconitum napellus L. nothosubsp. seitzii Mucher ex Starm., Fritschiana 18: 14. 1999

Type citation: "Ostalpen, Steiermark, Mariazellerland, in der Walster, Bachufer beim Kaiser Franz Josef Denkmal 810 m; 04.08.1989; leg. W. Mucher” (Starmühler 1999).

Typus: holotype, GZU 000274118. Isotype, W.

Synonyms: none.

Hybrid origin: A. napellus subsp. lobelii × A. napellus subsp. napellus.

**Diagnostic characters:** carpels (2–) 3 sparsely pubescent on the backside; bracteoles (3–) 5–8 (–20) mm long.

c) Aconitum superbum Fritsch, Verh. K.K. Zool.-Bot. Ges. Wien 45: 370. 1895

Type citation: “Mala Vrata unweit vom Berge Koprivnica zwis-
Diagnostic characters: plant 200–300 cm high; inflorescence axis, pedicels and hoods outside eglandular pubescent; leaves on the lower side with distinct reticulate venation, the uppermost leaf segment ovate; filaments pilose; carpels 2 (–3) glabrous.

Iconography: Seitz (1969: 16).

Literature: Fritsch (1895); Gáyer (1909).

Hybrids:

a) A. superbum × A. variegatum – more studies required.

b) A. superbum × A. vitosanum – more studies required.

1b. – Ser. Castellana Rottensteiner, series nova

Type species: A. castellanum (Molero & Blanché) Rottensteiner.

Diagnosis

Spurs of nectaries are elongated and backward bent.

Description

Monotypical series with only one species, separated from the other series of subsection Aconitum by the unique character of the elongated and backward bent spur of the nectaries.

Aconitum castellanum (Molero & Blanché) Rottensteiner, stat. nov.

Basionym: A. napellus L. subsp. castellanum Molero and Blančé, Anal. Jardin Bot. Madrid 41: 213. 1984.

Type citation: "Laguna del Marquesado, 30S XK1349, loco humidum umbroaque – in populeto – ad 1400 m, J. Molero et A. Rovira die 20-VIII-1983 legerunt".

Typus: holotype, BCF 71554.

Distribution: Iberian Peninsula.

Diagnostic characters: stem and leaves glabrous or glabrescent; inflorescence ramified, curved eglandular pubescent; hood hemispheric-falciform; nectaries hardly curved, spur of the nectaries elongated and bent backward; filaments not dentate, pilose; carpels 3–5, glabrous.

Iconography: Molero and Blančé (1986: 238).

Literature: Molero and Blančé (1984), Molero and Puig (1990).

Hybrids: unknown.

1c. – Ser. Taurica Mucher ex Starm.

Type species: A. tauricum Wulfen

Diagnostic characters: inflorescence simple or shortly ramose; bracteoles triangle to linear, glabrous or at margins ciliate; hood and pedicels glabrous; nectary spur acaulous or hardly capitulate.

Aconitum clusianum Rchb., Mon. Aconit.: 91. 1821

Type citation: "Bohemian Sudetes: Aupaground".

Typus: iconotype: Reichenbach, Mon. Aconit. Tab. III, 1. 1821

Distribution: Sudetes, Bohemian Massif.

Diagnostic characters: plant 30–150 cm high, inflorescence weakly ramified, hood falciform or rounded-conic, pedicels glabrous; carpels 2 (–3) glabrous; spur of nectaries acaulous or capitulate; bracteoles triangle to linear 1–2 (–3) mm long; filaments pilose; the uppermost leaf segment ovate or lanceolate-ovate 3–5 mm wide.

Iconography: Reichenbach (1821: tab. XIII, fig. 1); Mitka (2003, 177: fig. 1D).

Literature: Mitka (2003).

Hybrids: unknown.
The taxonomic circumscription of Aconitum subgenus Aconitum (Ranunculaceae) in Europe

Iconography: Clusii Histor. Rarior. Plant p. XCV, n. IV, 1601; Reichenbach (1827: t. 63).

Literature: Mucher (1993a); Starmühler (2001).

Lower taxa:

a) subsp. tauricum var. tauricum fo. tauricum

Diagnostic characters: inflorescence compact, without or with only a few short side racemes; pedicels, carpels, nectaries and filaments glabrous.

b) subsp. tauricum var. tauricum fo. taurericum (Rchb.) Gáyer, Magyar Bot. Lap. 8: 145. 1909

Type citation: none.

Type: not designated, probably iconotype is Rchb. Acon. Acon.: 87, tab. 12, figs. 2, 3, 1820.

Synonyms: A. taureicum Rchb., A. tauricum Wulfen in Koelle subsp. taureicum (Rchb.) Grinț.

Diagnostic characters: inflorescence ramified; pedicels with solitary hairs or glabrous; carpels mostly glabrous.

c) subsp. tauricum var. eustachyum (Rchb.) Starm., Hladnikia 6: 42. 1996

Type citation: none.

Type: not designated, probably iconotype is Monogr. Aconit. 76, tab. 15, fig. 3, 1820.

Synonyms: A. eustachyum Rchb., A. napellus L. subsp. eustachyum (Rchb.) Gáyer in Hegi. A. napellus L. [var.] eustachyum (Rchb.) Fiori.

Diagnostic characters: inflorescence ramified; pedicels with solitary hairs or glabrous; carpels mostly glabrous.

d) subsp. latemarense (Degen & Gáyer) Starm., in W.Maurer, Fl. Steiermark 1: 84. 1996

Type citation: “Tirol: in lapidosis subalpinis ad pedem mon-tis Latemar prope Karersee, alt. ca.1600–1800 m, 30.VIII.1906, Degen”.

Type: not designated.

Synonyms: A. latemarense Degen & Gáyer, A. tauricum Wulfen in Koelle var. latemarense (Degen & Gáyer) Mucher.

Diagnostic characters: pedicels with mixed glandular and eglandular pubescence; carpels often sparsely pubescent on the suture.

e) nothosubsp. hayekianum (A. tauricum subsp. latemarense × A. tauricum subsp. tauricum) – see hybrids of A. tauricum.

Hybrids:

a) Aconitum ×acutatum Rchb. (A. tauricum × A. variega-tatum) – see nsect. Acomarum.

b) Aconitum ×mielichhoferi Rchb. (A. degenii × A. tau-ricum) – see nsect. Acomarum.

c) Aconitum tauricum Wulfen in Koelle nothosubsp. hayekianum (Gáyer) Grinț. in Savulescu, Flora Reipub-llicii Populară Române, 2: 475. 1953

Type citation: “Sanntaler Alpen” (Gáyer 1911)

Type specimens: not designated.

Synonyms: A. dolomiticum Hayek, p.p., A. ranunculifolium Rchb. var. dolomiticum Evers, p.p.

Hybrid origin: A. tauricum subsp. latemarense × A. tauricum subsp. tauricum.

Diagnostic characters: pedicels with solitary hairs at the top; carpels mostly glabrous.

d) Aconitum pilipes × A. tauricum – see nothosect. Aco-marum.

1d. – Nothoser. Acoria Mucher ex Starm. (Aconitum ser. Aconitum × Aconitum ser. Taurica)

Type species: A. plicatum Rchb., designated here.

Diagnostic characters: spur of nectaries accephalous or hardly capitate, hoods pilose.

Aconitum plicatum Köhler ex Rchb., Uebers. Aconitum: 29. 1819

Type citation: “In Sudetis Koehler!”.

Type: iconotype in Reichenbach. Icon. Fl. Germ. Helv., Vol. 4: Icon. T. 98, Nr. 4708d. 1840 (Starmühler 1997a).

Synonyms: A. amoenum Rchb., A. bernhardianum Rchb., p.p., A. callibotryon Rchb., A. hians Rchb., A. koehleri Rchb., A. laetum Rchb., A. multifidum Koch ex Rchb., A. rigidum Rchb.

Distribution: Sudetes, Bohemian Massif, Bavarian Alps.

Diagnostic characters: plant 30–150 cm high, inflorescence weakly ramified, hood falciform or rounded-conic, carpels glabrous, pedicels eglandular pubescent (subsp. pilipes) or glandular/eglandular pilose (subsp. sudetica); carpels 2 (–3) glabrous; spur of nectaries accephalous or capitulate; bracteoles triangle to linear 1–2 (–3) mm long; filaments pilose; uppermost leaf segment ovate or lanceolate-ovate 3–5 mm wide.

Iconography: Mattioli (1563: 472, fig. D); Clusius (1601: 96, pro Aconit. Lycoct. vs. Napellus vulgaris); Jacquin (1776: t. 381); Reichenbach (1840: 48, fig. 4708 d); Mitka (2003: 177).

Literature: Cappelletti and Poldini (1984); Molero and Blanché
Lower taxa:

a) subsp. *plicatum*

*Diagnostic characters*: pedicels eglandular pubescent; carpels glabrous.

d) *Aconitum ×teppneri* Mucher ex Starm., Ber. Bayer. Bot. Ges. 71: 107. 2001, nothosubsp. *teppneri*

Type citation: "Ostalpen, Steiermark, Hochschwab, Schönleiten, Latschengebüschen, 1680 m, 22.8.1989, leg. W. Mucher (GZU)" (Starmühler 2001).

Typus: holotype, GZU 000274190. Isotypes, GZU 000274195, GZU 000274196, W, WU.

Synonyms: none.

Hybrid origin: *A. napellus* subsp. *napellus × A. tauricum* subsp. *tauricum.*

*Diagnostic characters*: pedicels sparsely curved and crisped eglandular pubescent, carpels glabrous.

e) *Aconitum ×teppneri* Mucher ex Starm. nothosubsp. *haderlappii* Mucher ex Starm., Fritschiana 30: 14. 2002

Type citation: "Österreich, Steiermark, Totes Gebirge, Pühringer Hütte – Salzofen, 21.8.1934, leg. W. Möschl (GZU)" (Starmühler 2002).

Typus: holotype, GZU 000274189.

Synonyms: none.

Hybrid origin: *A. napellus* subsp. *lobelii × A. tauricum* subsp. *latemarense.*

*Diagnostic characters*: pedicels glandular and eglandular curved and crisped pubescent; carpels sparsely pubescent on the backside.

f) *Aconitum ×teppneri* Mucher ex Starm. nothosubsp. *kernerii* Starm., Fritschiana 30: 15. 2002

Type citation: "Aconitum dolomiticum A. Kerner ex Hayek, Flora stiriaca excisata Nr. 845, Stiria inferior [Slovenija, Štajerska], in uliginosis prope refugium Kocbekhütte in monte Molička planina in Alpibus Lithopolitanis (Sanntaler-sive Steineralpen), solo calcareo, 1760–1800 m s.m.; 08.1905 et 1907; leg. A. Hayek et L. Derganc (GZU)" (Starmühler 2002).
The taxonomic circumscription of *Aconitum* subgenus *Aconitum* (Ranunculaceae) in Europe

Typus: holotype, GZU. Isotypes, GZU 000274195, GZU 000274196, LJU, WU.

Synonyms: *A. dolomiticum* Hayek, p.p., *A. ranunculifolium* Rchb. var. *dolomiticum* Evers, p.p.

Hybrid origin: *A. napellus* subsp. *napellus × A. tauricum* subsp. *latemarense.*

**Diagnostic characters:** pedicels glandular and eglandular curved and crisped pubescent and pilose, carpels glabrous.

**1B. – Subsect. Burnatii** Rottensteiner

Type species: *A. burnatii* Gáyer.

**Description**

Differs from subsection *Aconitum* (series *Aconitum*) by the flexuous zigzag stem (at least in the region of the inflorescence) and by glandular pilose inflorescence.

*Aconitum burnatii* Gáyer, Magyar Bot. Lap. 8: 141. 1909

Type citation: "Alpes Maritimae. Italia, au Col de la Madonna d. Fenestre (Bourgeau pl. alp. mar. n. 13 – W)." 

Typus: not designated.

Synonyms: *A. divergens* Pančić subsp. *burnatii* (Gáyer) W. Seitz, *A. delphinense* Gáyer, *A. napellus* L. subsp. *burnatii* (Gáyer) J.-M. Tison.

Distribution: Maritime Alps, France (Massif Central).

**Diagnostic characters:** stem in the lower third pubescent; leaves densely pubescent; the uppermost leaf segment (2–) 3–4 mm wide; pedicels straight; bracteoles linear to obovate-lanceolate and then divided; hood as broad as high, rounded-conic or hemispherical; spur of nectaries hooked; filaments glabrous or sparsely pilose; carpels glabrous or pubescent.

Iconography: Molero and Blanché (1986: 238).

Literature: Seitz (1969); Seitz (1970); Rottensteiner (2018).

Hybrids: unknown.

*Aconitum maninense* (Skalický) Mitka, Studia Universitatis Babeş-Bolyai, Biologia, 62, Sp. Iss. 2017

Basionym: *A. firmum* Rchb. subsp. *moravicum* Skalický var. *maninense* Skalický, Preslia 57: 136, 1985.

Type citation: "Proles localis (natio) angustiarum Maninska úžina et Kostelecká úžina inter Považská Bystrica et Súl’ov."

Typus: holotype, PRC 725!

Distribution: Western Carpathians.

**Diagnostic characters:** stem in the lower third glabrous; leaves sparsely pubescent, the uppermost leaf segment 4–6 mm wide; pedicels straight to bent; bracteoles linear to obovate-lanceolate and then divided; hood as broad as high, rounded-conic or hemispherical; spur of nectaries hooked; filaments glabrous or sparsely pilose; carpels glabrous or pubescent.

Iconography: Hayek (1917).

Hybrids: a) *Aconitum ×mariae* Rottensteiner, Mitka & Novikov (nothospec. nov.) nothosubsp. *mariae* (*A. firmum* subsp. *firmum × A. maninense*) – see *A. firmum.*

b) *Aconitum ×mariae* Rottensteiner, Mitka & Novikov nothosubsp. *paxii* (Starm.) Mitka comb. nov. (*A. firmum* subsp. *moravicum × A. maninense*) – see *A. firmum.*

*Aconitum nevadense* Uechtr. ex Gáyer, Magyar Bot. Lap. 8: 180. 1909

Type citation: "Sierra Nevada. (Willkomm n. 321 – W), Aleazaba (M. Jimenes – K)."

Typus: not designated.

Distribution: Sierra Nevada, Pyrenees.

Synonym: *A. occidentale* Timb. Lagr. f. ex Gáyer

**Diagnostic characters:** stem in the lower third pubescent; leaves densely pubescent, uppermost leaf segment (2–) 3–4 mm wide; pedicels bent; bracteoles triangle or linear 1–3 (–4) mm long; hood broader than high, falciform; spur of nectaries capitate; filaments pilose; carpels glabrous or pilose.

Iconography: Molero and Blanché (1986: 236).

Literature: Gáyer (1909); Rottensteiner (2018).

Hybrids: unknown.

*Aconitum pentheri* Hayek, Ann. Nat. Hofmus. 31: 68. 1917

Type citation: "In monte Žlep prope Ipek, 1800 m.s.m., leg. A. Penther."

Typus: iconotype in Hayek, Ann. Nat. Hofmus. 31: Taf. 1, 1917.

Synonym: *A. divergens* Pančić nom. illeg. p.p., *A. burnatii* Gáyer subsp. *pentheri* (Hayek) Jalas.

Distribution: Balkans.

**Diagnostic characters:** stem in the lower third glabrous; leaves ± glabrous, the uppermost leaf segment 3–5 mm wide; pedicels bent; bracteoles triangle or linear 1–3 (–4) mm long; hood broader than high, falciform; spur of nectaries capitate; filaments pilose; carpels glabrous or pilose.

Iconography: Hayek (1917).
2. – Sect. **Cammarum** DC.

2A. – Subsect. **Cammarum** (DC.) Rapaics

**Description**

Leaves divided into 3 or 5 lobes and dissected to the base, uppermost leaf segment ovate or linear with more than two teeth; hoods conical, i.e., above rostrum distinctly elongated, 1.6–2.5 times higher than wider, rarely hemispherical, i.e., above rostrum wide-convex; claws of the nectaries erect or slightly bent, mostly not reaching the top of the hood; spurs of nectaries backward bent or semi-spiral coiled, do not reach the top of hoods; carpels 3 or 5; seeds with membraneous 4–6 lamellae and with one conspicuously winged edge, goldish to light brown; root globose.

2a. – Ser. **Variegata** Steinberg ex Starm.

Type species: *A. variegatum* L.

**Diagnostic characters**: indumentum glabrous or eglandular pubescent.

*Aconitum variegatum* L., Sp. Pl. ed. 1: 532. 1753

Type citation: "In Italiae, Bohemiae montibus". Tyypus: lectotypic, Herb. Linn. No. 695.8, LINN (Götz 1967). Synonyms: *A. cammarum* Jacq., *A. bernhardianum* Wallr., *A. dominii* Sill., *A. gracile* Rchb., pp., *A. judenbergense* Rchb. (Gáyer), *A. macranthum* Rchb., *A. rostratum* Bernh.

Distribution: Montane and submontane areas of Europe (Alps, Balkans, Sudetes, Transilvania), descending to the lowlands. In Central Europe, it attains the eastern limit of the geographical distribution in the West Carpathians.

**Diagnostic characters**: inflorescence axis and tepals outside glabrous; hoods conical; filaments glabrous or sparsely pilose; stalks of nectaries erect, glabrous or sparsely pilose; carpels glabrous (subsp. *nasutum*), pilose on the suture (subsp. *variegatum*) or only sparsely pilose on the top of the suture (nothosubsp. *podobnikianum*), pedicel glabrous and bracteoles spathulate to incised (var. *variegatum*) or bracteoles filiform to narrow lanceolate (var. *carniolicum*), or pedicel at least under the bracteoles sparsely pubescent (var. *stiriacum*).

Iconography: Clusius (1601: 98, *pro Aconit. Lycoc. × Thora Italica*); Reichenbach (1827: t. 34; 1840: t. 82 fig. 4682); Novikoff and Mitka (2011: 44).

2b. – Sect. **Aconitum** (L.) DC.

**Diagnostic characters**: bracteoles short, only 2–3 (5) mm long, linear to narrow lanceolate; carpels always only 3, densely pilose along the suture.

a) subsp. **variegatum** var. **variegatum**

**Diagnostic characters**: bracteoles (4) 5–8 (25) mm long, spathulate, ovate or leaflike; carpels 3–5, densely pilose only along the suture; pedicels glabrous.

b) subsp. **variegatum** var. **carniolicum** Starm., Fritschiana 10: 1. 1997

Type citation: "Slowenien, Krain, ENE Laibach (Ljubljana), etwa 3 km NW Sagar (Zagorje), im Tal vom Kotredesch-Bach (Kotredesˇčica) E der Ruine Gallenberg (Gamberk), 460 m alt., Gf 9855/2; Gebüsch; 31.08.1996; leg. A. Podobnik; det. W. Starmühler (LU)" (Starmühler 1997a). Tyypus: holotype, LJU. Isotypes, CL, GJO, GZU, IBF, JACA, KL, KRA, LE, LI, LG, LJM, M, MEL, NY, OSC, PE, Herb. PODOBNIK, SIB, Herb. STARMÜHLER, TBI, TNS, TK, W, WU, Z.

Synonyms: none.

**Diagnostic characters**: bracteoles (4) 5–8 (25) mm long, spathulate, ovate or leaflike; carpels 3–5, densely pilose along the suture.

Iconography: Mucher (1992: 145, fig. 1).

c) subsp. **variegatum** var. **stiriacum** Mucher, Verh. Zool.-Bot. Ges. Österreich 129: 144. 1992

Type citation: “Österreich, Steiermark, Koralpe, Seekar, Hochstaufen-flur, 1915 m, 11.9.1991, leg. W. Mucher, GZU” (Mucher 1992)

Tyypus: holotype, GZU 000206408. Isotypes, GZU 000206409 – GZU 000206420, KL, KRA, W, WU, Herb. MUCHER.

Synonyms: none.

**Diagnostic characters**: bracteoles (4) 5–8 (25) mm long, spathulate, ovate or leaflike; pedicels sparsely pubescent below the bracteoles; carpels (3–) 5, pilose on the suture and often also on the backside.

Iconography: Mucher (1992: 145, fig. 1).

d) subsp. **nasutum** (Fischer ex Rchb. em. Rupr.) Götz, Feddes Repert. 76 (1–2): 36. 1967

Type citation: “Saxonia metalifera” (Reichenbach 1823: tab. IX, fig. 2).

Tyypus: not designated, probably iconotype is Rchb. Illustr. Spec. Aconit., tab. IX, fig. 2, and tab. X, 1823. Synonyms: *A. nasutum* Fischer ex Rchb., pp.

**Diagnostic characters**: carpels 3, glabrous.
The taxonomic circumscription of *Aconitum* subgenus *Aconitum* (Ranunculaceae) in Europe

e) nothosubsp. **podobnikianum** – see hybrids of *A. variegatum*.

Hybrids:

a) *Aconitum × austriacum* Mucher. (*A. pilipes × A. variegatum*) – see nothoser. *Toxigata*.

b) *Aconitum × aquilonare* A. Kerner ex Gáyer, Magyar Bot. Lapok 10: 201. 1911

Type citation: “Croatia – Fužine. *Borbás – HUW*” (Gáyer, 1911).

*Type citation:* “Croatia – Fužine.

Hybrids: *A. × aquilonare* A-Kern. ex Gáyer (*A. variegatum × A. vitosanum*) – see *A. variegatum*.

**Aconitum vivantii** Rottensteiner, **nom. nov.**

*Basionym: A. variegatum subsp. pyrenaicum* Vivant & Delay, Bull. Soc. Bot. France, Lettres Bot. 127: 501, 1981. There is a new name necessary in the rank of a species because the name *A. pyrenaicum* is already occupied by a taxon from the subgenus *Lycocotonum*.

*Type citation:* “haute vallée d’Aspe (Pyr.-Atl.) en amont du hameau des Forges d’Abel. … vers 1700 m d’altitude au-dessus de la hetraie-sapinère d’Esplungère …”.

*Typus: not designated. Synonyms: none.*

Distribution: Pyrenees: Navarra, Guipúzcoa (Spain).

**Diagnostic characters:** inflorescence axis and tepals outside glabrous; pedicels almost always glabrous or very rarely sparsely pubescent just below flowers; hoods hemispherical or rounded-conic; filaments glabrous; nectaries strongly bent, mostly reaching the top of the hood, glabrous; carpels 3, glabrous.

Iconography: Penev and Simeonovski (1970: 63).

**2b. – Ser. Toxica** (Rchb.) Mucher

*Type species:* *A. toxicum* Rchb.

**Diagnostic characters:** indumendum glandular pilose.

**Aconitum degenii** Gáyer, Magyar Bot. Lap. 5: 123. 1906

*Type citation:* “Comit. Beszterce-Naszód: in lapidosis, umbrosis ad cacumen montis calcarei Craciunel prope Rodnam; in lapidosis graminis montis calc. Galarin; secus rivos montanos ad Rodna-Borberek; Comit. Csk: in montibus calcareis Öcsém et Nagy-Hagymás; Comit. Máramaros: Oberhalb der Luhyer Klause Hoverla im Fichtenwalde; Comit. Torda-Aranys: in valle Csepilor sub alpe Nagy-Bihar; Comit. Kolozs: ad margines silvarum prope Vlegyásza”.

*Typus: lectotype, CL-Soós! Synonyms: A. hebegynum auct. Fl. Carpathorum non DC., A. molle Rchb., A. paniculatum Lam., p.p. (nom. inval.). Distribution: Alps, Carpathians, Balkans.*

**Diagnostic characters:** hood rounded-conic; carpels (3–) 5 pubescent (subsp. *vallesiicum*) or glabrous, pedicels...
and petals glandular pilose, bracteoles in the middle of pedicels (subsp. *paniculatum*), filaments glabrous (var. *laxiflorum*) or pubescent (var. *turrachense*), pedicels and petals glabrous (subsp. *rhaeticum*); bracteoles in the upper part of the pedicels or just below flower (subsp. *degenii*), spur of nectaries semi-spiral coiled (fo. *degenii*) or capitate (fo. *craciunelense*); pedicels below bracteoles and hood ± glabrous (var. *intermedium*).

Iconography: Mucher (1993a: 55); Novikoff and Mitka (2011: 46).

Literature: Mucher (1993a); Starmühler (1996d, 1996e); Ilnicki and Mitka (2011); Novikoff and Mitka (2011); Ziman et al. (2015).

Lower taxa:

a) subsp. *degenii* var. *degenii* fo. *degenii*

*Diagnostic characters*: bracteoles lanceolate to spathulate, in the upper part of pedicel; pedicels below the bracteoles densely glandular pilose; tepals outside glandular pilose; hood ± hemispheric; carpels 3, glabrous.

b) subsp. *degenii* var. *degenii* fo. *craciunelense* Gáyer, Magyar Bot. Lap. 5: 126. 1906

Type citation: "Comit. Besztercze-Naszódl: ad cacumen montis Craciunel. (Degen, H.D.)."

Type specimens: not designated.

Synonyms: none.

*Diagnostic characters*: bracteoles lanceolate to spathulate, in the upper part of pedicel; pedicels below the bracteoles densely glandular pilose; tepals outside glandular pilose; hood cymbiform; carpels 3, glabrous.

c) subsp. *degenii* var. *intermedium* (Zapał.) Mitka, Carolologia 64(4): 449. 2011

Type citation: "Plaj między Molodą a Jajcem nad Łomnicą, Tomnatek w Polenicy Popowiczowskiej, Jablonica na Przesmyku Tatarskim (Wołoszczak), Jawornik koło Mikuliczyna (Rehman), Bystrzec pod Czarną Horą (Sleńdziński)" (Zapałowicz 1908b: 221).

Type: lectotype, KRAM 132196 (Mitka 2003).

Synonyms: *A. hebegynum* auct. Fl. Carpathorum, non DC., *A. paniculatum* Lam. var. *prutense* Zapał., *A. paniculatum* fo. *latiusculum* Zapał.

*Diagnostic characters*: bracteoles lanceolate to spathulate, in the upper part of pedicel; pedicels below the bracteoles only sparsely glandular pilose; tepals outside glandular pilose; carpels 3, glabrous.

d) subsp. *paniculatum* (Arcang.) Mucher var. *turrachense* (Mucher) Mucher, Phyton (Horn) 33 (1): 63. 1993

Type citation: "OSTALPEN, Steiermark, Gurktaler Alpen, 2 km südlich von Predlitz, Gebüschaum, 1020 m, 26.8.1989, leg. W. Mucher (GZU)" (Mucher 1993a).

Type: holotype, GZU 000274182. Isotypes, GJO, GZU 000274183, GZU 000274185 – GZU 000274188, W. Paratype, GZU 000274184.

Synonyms: *A. paniculatum* Lam. subsp. *paniculatum* var. *turrachense* Mucher.

*Diagnostic characters*: bracteoles linear, in the middle of the pedicel; tepals outside glandular pilose; nectaries glabrous or pilose; filaments ± densely pubescent.

Iconography: Mucher (1990).

e) subsp. *paniculatum* (Arcang.) Mucher var. *laxiflorum* (Rchb.) Mucher, Phyton (Horn) 33 (1): 60. 1993

Type: lectotype, see Mucher (1993a) for details.

Synonyms: *A. cernuum* Rchb. non Wulfen [var.] *a laxiflorum* Rchb., *A. paniculatum* subsp. *paniculatum* var. *paniculatum* (nom. inval).

*Diagnostic characters*: bracteoles linear, in the middle of the pedicel; tepals outside glandular pilose; nectaries and filaments glabrous.

Iconography: Mucher (1993a).

f) subsp. *rhaeticum* Starm., Fritschiana 7: 2. 1996

Type citation: "Schweiz, Graubünden, Oberhalbstein S Tiefencastel, Abhang zum rechten Ufer des Adont N Präsanz (Personz), 1360–1375 m alt., GF 9423/2; Alnus incana–Prunus padus-Wald; 14.08.1995; leg./det. W. Starmühler (GZU)" (Starmühler 1996d).

Type: holotype, GZU 000212973. Isotypes: LE, M, NY, PE, TI, W, Z, Herb. STARMÜHLER.

Synonyms: none.

*Diagnostic characters*: tepals outside, pedicels and nectaries glabrous.

Iconography: Starmühler (1996d).

g) subsp. *valesiacum* (Gáyer) Mucher, Phyton (Horn) 33(1): 64. 1993

Type citation: "Mauvoisin, vallee de Bagnes [Suisse, Valais] (BP, Götz 1967)" (Mucher 1993a).

Type: holotype, BP. Synonyms: *A. valesiacum* Gáyer, *A. variegatum* L. subsp. *valesiacum* (Gáyer) Greuter & Burdet.

*Diagnostic characters*: bracteoles lanceolate to spathulate, situated at the pedicel’s top; pedicels above the bracteoles densely glandular pilose, below the bracteoles – sparsely pilose or glabrous; tepals outside glandular pilose; carpels 5, densely pilose; nectaries and filaments glabrous.
The taxonomic circumscription of *Aconitum* subgenus *Aconitum* (Ranunculaceae) in Europe

Iconography: Götz (1967), Mucher (1993a).

h) nothosubsp. *gandogeri* Mucher (A. *degenii* subsp. *paniculatum* × *A. degenii* subsp. *valesiacum*) – see hybrids of *A. degenii*.

d) *Aconitum xgayeri* Starm., Stapfia 45: 41. 1996

Type citation: “Tanssilvania, Rodna – Borberek [= Valea Vinului], Nr. 135419; 28.8.1897; L. Walz (CL)” (Starmüller, 1996a).

Type citation: “An schattigen Stellen in der Voralpenregion auf dem Gebirge Craciunel bei Alt Rodna, 1.8.1882, leg. Porcius – WU-Kerner” (Mitka 2003).

Synonyms: none.

Hybrid origin: *A. degenii* × *A. lasiocarpum*.

Diagnostic characters: hood rounded-conic or conic, petals outside pilose, carpels pilose, spur of nectaries reaching the top of the hood, pedicels above bracteoles densely glandular pilose, below bracteoles sparsely pilose, bracteoles linear to lanceolate.

e) *Aconitum xhebegynum* DC. (A. *degenii* × *A. variegatum*) – see nothosubsp. *Toxigata*.

f) *Aconitum xmielichhoferi* Rchb. (A. *degenii* × *A. tauricum*) – see nsect. *Acomarum*.

g) *Aconitum xpielosiusculum* (Ser.) Gáyer, Magyar Bot. Lap 10: 200. 1911

Type citation: “Neotype: Patura-ge de Lavaraz, Alpes de Bex, 26.9.1879, (laccard (ZT))” (Starmüller 1996a).

Type citation: “Suisse, Vaud, Pays d’Enhaut, Vallée de Gerig cent. – Wald mit Alnus incana, Marriage etc.; 14.08.1995; leg./det. Maillefer noz, LaMontagnette, alt. 1445 m, cs. 579/143; 17.8.1952; leg. A. Schur.” (Gáyer 1911).

Synonyms: none.

Hybrid origin: *A. degenii* × *A. pilipes*.

Diagnostic characters: hood rounded-conic, bracteoles lanceolate to spatulate, tepals outside pilose, carpels pilose, pedicels glandular pilose and eglandular pubescent.

**Aconitum lasiocarpum** Rchb., Uebers. Aconitum: 55. 1819

Type citation: “in Hungar Comit. Marmarosh. Sadler!”.

Type citation: “in Hungar Comit. Marmarosh. Sadler!”.

Type citation: “in Hungar Comit. Marmarosh. Sadler!” (Mitka 2003).

Synonyms: *A. cammarum* L. var. *beskidene* Zapał., *A. dasycarpum* Schur.

Distribution: Western and Eastern Carpathians, Podilya (Ukraine).

Diagnostic characters: inflorescence axis and tepals outside glandular pilose, hood conical; pedicels glandular pilose (subsp. *lasiocarpum*) or below bracteoles glabrous or sparsely eglandular pilose and curved and crisped eglandular pubescent (subsp. *kotulae*); bracteoles linear or lanceolate, rarely spathulate, (2.5–) 3–6 (–12) mm; carpels glandular pilose.

Iconography: Reichenbach (1827: t. 9); Mitka (2003: 175); Novikoff and Mitka (2011: 44).

Literature: Gáyer (1911); Starmüller (1993, 1996a); Joachimiak et al. (1999); Mitka and Starmüller (2000); Mitka (2003).
Lower taxa:

a) **subsp. lasiocarpum**

*Diagnostic characters*: pedicels entirely glandular pilose.

b) **subsp. kotulae** (Pawl.) Starm. & Mitka, Acta Soc. Bot. Polon. 69 (2): 150, 2000

*Type citation*: "Hab. in Transylvaniae alpibus. Baumgarten!"

*Type*: holotype, GZU 000206194. Isotypes: GJO, GZU 000206195, KL, KRA, W, WU 0034381, Herb. MUCHER.

*Synonyms*: none.

*Hybrids*: Aconitum ×gayeri Starm. (A. degenii × A. lasiocarpum) – see A. degenii.

b) **Aconitum lasiocarpum × A. toxicum** – hood rounded-conic, bracteoles linear-ovate with reticulate venation, pedicels glandular pilose, carpels pilose.

c) **Aconitum ×pawlowskii** Mitka & Starm. (A. lasiocarpum × A. variegatum) – see nothosect. *Toxigata*.

**Aconitum pilipes** (Rchb.) Gáyer, Magyar Bot. Lap. 10: 200. 1911

*Basionym*: A. cammarum L. var. pilipes Rchb., Fl. Germ. Exurbs. 738, 1832.

*Type citation*: "Salvesental bei Imst".

*Type*: neotype, WU-Kerner.

*Distribution*: Western and Eastern Alps.

*Diagnostic characters*: hood conical, outside glandular pilose; pedicels curved and s-formed glandular pilose and eglandular pubescent; bracteoles spatulate 3–6 mm, situated just below the flower; filaments pilose; carpels 5, entirely pubescent.

*Iconography*: Starmühler (1996b: 171).

Literature: Starmühler (1996b, 2001).

Hybrids:

a) **Aconitum ×austriacum** Mucher, Carinthia II 183/103(2): 524. 1993

*Type citation*: "Österreich, Salzburg, Hohe Tauern, Habachtal, Weg von der Moar-Alm zum Noitroi-Steig, Hochstaudenflur, 1540 m, 30. 8. 1991, leg. W. Mucher, GZU" (Mucher 1993b).

*Type*: holotype, GZU 000206194. Isotypes: GJO, GZU 000206195, KL, KRA, W, WU 0034381, Herb. MUCHER.

*Synonyms*: none.

*Hybrid origin*: A. pilipes × A. variegatum.

*Diagnostic characters*: carpels sparsely pubescent or pubescent at the suture.

b) **Aconitum ×pilosiusculum** (Ser.) Gáyer (A. degenii × A. pilipes) – see A. degenii.

c) **Aconitum napellus × A. pilipes** – see nothosect. *Acomarum*

d) **Aconitum pilipes × A. tauricum** – see nothosect. *Acomarum*

**Aconitum toxicum** Rchb., Uebers. Aconitum: 43. 1819

*Type citation*: "Hab. in Transylvaniae alpibus. Baumgarten!".

*Type*: lectotype, "Transsylv., in graminosis alpestris, [1]827, leg. Baumgarten!" (as A. toxicum Rchb.), W (Mucher 1993).

*Synonyms*: A. bosniacum Beck, A. diabolicum Gáyer, A. neomontanum auct. non Koelle, A. schurii Beck., A. schurii fo. reteyatense Gáyer, A. toxicum Rchb. bosniacum (Beck) Hayek, A. toxicum Rchb. fo. diabolicum (Gáyer) Grinț, fo. beskidense Zapał.

*Distribution*: Transilvania, Eastern Carpathians (Ceahlau Mts), Southern Carpathians, Balkans.

*Diagnostic characters*: pedicels glandular pilose (subsp. toxicum), glandular/eglandular pubescent (subsp. crisplum and nothosubsp. nyaradyanum), sparsely straight glandular pilose (nothosubsp. ungarianum), or glabrous (subsp. bucegiense); hood outside glandular pilose (subsp. toxicum), glandular/eglandular pubescent (subsp. crisplum and nothosubsp. nyaradyanum), or glabrous (subsp. bucegiense and nothosubsp. ungarianum); filaments in the upper part, pilose; hood rounded-conic or conical; carpels glabrous; bracteoles ovate, sometimes divided, with reticulate venation.

*Iconography*: Reichenbach (1827: t. 37).

*Literature*: Mucher (1993a, 1993b); Mitka (2000); Starmühler (2000).
The taxonomic circumscription of Aconitum subgenus Aconitum (Ranunculaceae) in Europe

Lower taxa:

a) subsp. toxicum

*Diagnostic characters:* pedicels and tepals outside with straight glandular trichomes.

b) subsp. crispulum (Nyár.) Mucher, Phyton (Horn) 33(1): 70. 1993

Type citation: “Transsilvania, distr. Brasov, ad rivum Gr. Weidenbach sub mibus Bucegi prope pagum Rasnov, alt. cca. 720 m s.m., 12.8.1929, leg. E.I. Nyárády (SIB-Nyárády)” (Mucher 1993a).

Typus: lectotype, SIB-Nyárády. Paratype, SIB-Nyárády.

*Synonyms:* A. toxicum Rchb. var. crispulum Nyárády in Borza.

*Diagnostic characters:* pedicels and tepals outside with curved glandular trichomes.

*Iconography:* Mucher (1993a).

c) subsp. bucegiense (Nyár.) Mucher, Phyton (Horn) 33(1): 68. 1993

Type citation: “Transsilvania, distr. Brasov, ad pedem montium Bucegi, prope Valea Toplitei, versus pagum Rasnov, in quercetis, una cum typo, alt. cca 700 m s.m., Nr. 201109, 22.9.1940, leg. P. Cretzoiu, det. E.I. Nyárády (CL)” (Mucher 1993a).

Typus: holotype, CL. Isotypes, CL, SIB.

*Synonyms:* A. toxicum Rchb. var. bucegiense Nyár.

*Diagnostic characters:* pedicels glabrous.

*Iconography:* Mucher (1993a).

d) nothosubsp. nyaradyanum Mucher – see hybrids of A. toxicum.

e) nothosubsp. ungarianum Starm. – see hybrids of A. toxicum.

Hybrids:

a) *Aconitum ×dragulescuann* Mucher, Phyton (Horn) 33(1): 72. 1993 nothosubsp. *dragulescuann*

Type citation: “Transsilvania, in praeruptis et graminosis ripium calc. Mt. Hagimásul Mare, supra rivum Nagyág, alt. 1500–1740 m s.m., distr. Ciuc; 19.8.1948; J.E. Nyárády (SIB-Nyárády)” (Mucher 1993).

Typus: holotype, SIB-Nyárády.

*Synonyms:* none.

*Hybrid origin:* A. degenii subsp. degenii × A. toxicum subsp. toxicum.

*Diagnostic characters:* pedicels, bracteoles and tepals outside with straight glandular trichomes only.

b) *Aconitum ×dragulescuann* Mucher nothosubsp. *grintescuanum* Starm., Siebenbürg. Arch. 36: 16. 2000

Type citation: “Rumänien, Siebenbürgen (Transsilvania, Erdély), Süd-Karpaten (Carpattii Meridionalii, Déli Kárpátok), Retezat-Gebirge (Muntii Retezatului, Retyezát-havasok) S Hotzing (Hateg, Hátszeg), Nationalpark Retezat, am Weg von der Gura Zlata-Hütte zum Retezat, am Bach Dobrun, 1470 m”

Typus: holotype, GZU 000232748.

*Synonyms:* none.

*Hybrid origin:* A. degenii subsp. degenii × A toxicum subsp. crispulum.

*Diagnostic characters:* pedicels, bracteoles and tepals outside with curved and straight glandular trichomes.

c) *Aconitum lasiocarpum × A. toxicum* – bracteoles spathulate or linear-ovate with reticulate venation, hood slightly conical or round-conic, carpels pilose.

d) *Aconitum toxicum* Rchb. nothosubsp. *nyaradyanum* Mucher, Phyton (Horn) 33(1): 71. 1993

Type citation: “Transsilvania, distr. Brasov, ad rivum Gr. Weidenbach sub mibus Bucegi prope pagum Rasnov, alt. cca. 720 m s.m., Nr. 195107, 12.8.1929, leg. E.I. Nyárády (CL)” (Mucher 1993a).

Typus: holotype, CL 195107.

*Synonyms:* none.

*Hybrid origin:* A. toxicum subsp. crispulum × A toxicum subsp. toxicum.

*Diagnostic characters:* pedicels and tepals outside glabrous or almost glabrous; pedicels sparsely glandular pilose, mainly above the bracteoles.
Józef Mitka, Andriy Novikov, Walter K. Rottensteiner

2c. – Nothoser. **Toxigata** Starm. (ser. **Variegata** × ser. **Toxica**)

Type species: *A. × hebegynum* DC., designated here.

**Diagnostic characters**: indumentum glandular and eglandular pubescent.

*Aconitum × austriacum* Mucher, Carinthia II 183/103(2): 524. 1993

Type citation: "Österreich, Salzburg, Hohe Tauern, Habachtal, Weg von der Moar-Alm zum Noitroi-Steig, Hochstaudenflur, 1540 m, 30. 8. 1991, leg. W. Mucher" (Mucher, 1993b).

Typus: holotype, GZU 000206194. Isotypes, GZU 000206195, WU 0034381, GJO, KL, KRA, W, Herb. MUCHER.

Synonyms: none.

Hybrid origin: *A. pilipes* × *A. variegatum*.

**Diagnostic characters**: Pedicels sparsely crisped to s-formed glandular pilose, mainly above the bracteoles; tepals outside glabrous; hood higher than broad; nectar-ies claw upright; nectaries spur curved backward, not reaching the top of the hood; carpels (3) 5, mostly +/- densely pilose.

Iconography: Mucher (1993b).

Literature: Starmühler (1996a).

*Aconitum × bartokianum* Starm., Siebenbürg. Arch. 36: 10. 2000

Type citation: "Aconita rarissima selecta (1999), Rumänien, Transilvania (Siebenburgen, Erdély), Süd Karpaten, Munţii Retezatului [...]; 14.08.1992; leg. W. Mucher et U. Starmühler (GZU)". (Starmühler 2000).

Typus: holotype, GZU 000225135. Isotypes, CL, GJO, Herb. STARMÜHLER, TNS.

Synonyms: none.

Hybrid origin: *A. toxicum* subsp. *crispulum* × *A. variegatum* subsp. *nasutum*.

**Diagnostic characters**: pedicel and tepals outside straight glandular pilose; carpels glabrous.

Iconography: Starmühler (2000: 11).

Literature: Starmühler (2000).

*a) nothosubsp. bartokianum*

Hybrid origin: *A. toxicum* subsp. *toxicum* × *A. variegatum* subsp. *nasutum*.

**Diagnostic characters**: pedicel and tepals outside straight glandular pilose; carpels glabrous.

*b) nothosubsp. rapaicsianum* Starm., Siebenbürg. Arch. 36: 14. 2000

Type citation: "Aconita rarissima selecta (1999), Rumänien, Transilvania (Siebenburgen, Erdély), Süd Karpaten, Munţii Retezatului (Retezat-Gebirge, Retyezát-havasok), Nationalpark Retezat, S-Hang des Retezat, 1980 m alt.; Hochstaudenflur mit *Achillea distans*, *Adenostyles alliarias*, *Angelica sylvestris*, *Carduus personata*, *Deschampsia cespitosa*, *Rumex alpinus*, *Senecio cacaliaster* etc.; 14.08.1992; leg. W. Mucher et U. Starmühler (GZU)" (Starmühler 2000).

Typus: holotype, GZU 000225136. Isotypes, CL, GJO, Herb. STARMÜHLER, TNS.

Synonyms: none.

Hybrid origin: *A. toxicum* subsp. *crispulum* × *A. variegatum* subsp. *nasutum*.

**Diagnostic characters**: pedicel and tepals outside curved glandular pilose; carpels glabrous.

Iconography: Starmühler (2000: 11).

*c) nothosubsp. sooanum* Starm., Siebenbürg. Arch. 36: 15. 2000

Type citation: "Hungaria media, Alpes Biharienses, ad balnea "Biharfüred"; 13.07.1914; leg. L.T. Haisz (CL-Soó)" (Starmühler 2000).

Typus: holotype, CL-Soó.

Synonyms: none.

Hybrid origin: *A. toxicum* subsp. *toxicum* × *A. variegatum* subsp. *variegatum*.

**Diagnostic characters**: pedicel and tepals outside straight glandular pilose; carpels pilose along the suture.

Iconography: Starmühler (2000: 11).

**Aconitum × hebegynum** DC., Regn. Veg. Syst. Nat.: 376. 1817, pro spec.

Type citation: "Hab. in dumetis Alpium Vallesiae, Austriae (Jacq.) et in Carpathorum convallibus (Wahlenb.).".

Typus: neotype, "(Schweiz) cultivé, provenant d’un pied vivant récolté à la Gemmi – G-DC" (Starmühler 1997b).

Synonyms: none.

Hybrid origin: *A. degenii* × *A. variegatum*.

**Diagnostic characters**: pedicel and tepals outside straight glandular pilose; carpels pilose along the suture.

Iconography: Starmühler (2000: 11).

**Lower taxa/hybrids:**
The taxonomic circumscription of *Aconitum* subgenus *Aconitum* (Ranunculaceae) in Europe

*Diagnostic characters:* Hood about as high as broad or slightly higher; nectary claw curved; nectary spur backward bent always reaching the top of the hood; bracteoles linear-lanceolate, rarely spathulate 4–6 (–8) mm long, mostly gl Randall al glandile pilose. Pedicels and tepals outside sparsely glandular pilose; carpels 3–5 glabrous or sparsely glandular pubescent.

Iconography: Mucher (1993b: 519–527).

Literature: Gáyer (1906).

*Type citation:* "(Tatra Mts.) Tatry, pod Raptawickimi Turniami (dol. Kościeliska) od poln., ok. 1300 m, piargi wapienne, 3.9.1932, leg. B. Pawłowski".

Typus: holotype, KRAM-Pawłowski 320221.

Synonyms: none.

Hybrid origin: *A. lasiocarpum* × *A. variegatum*.

Distribution: West Carpathians.

*Diagnostic characters:* Hood conical; nectary claw curved; nectary spur backward bent not reaching the top of the hood; bracteoles linear-lanceolate, lanceolate, glabrous or ciliate 2.5–6 (–12) mm long. Pedicels above bracteoles straight glandular pilose, below bracteoles sparsely straight glandular pilose or appressed curved pubescent; carpels 3–5 on the suture pilose.

Iconography: Mitka and Starmühler (2000: 151); Mitka (2003: 173).

Literature: Mitka and Starmühler (2000); Mitka (2003).

*Aconitum × tuschteticum* (N.Busch) N.Busch, Opred. Rast. Kryma i Kavkaza 30. 1919

Basionym: *A. caucasicum* N.Busch subsp. *pubiceps* (Rupr.) N.Busch var. *tuschteticum* N.Busch, Tr. Jur’jev. Bot. Sada 1: 3, 1900.

Type citation: "Dzhvari-Vozeli. 13.VII. [18]76. Radde" (LE).

Typus: holotype, LE (?).

Synonyms: *A. caucasicum* N.Busch subsp. *pubiceps* (Rupr.) N. Busch var. *tuschteticum* N.Busch, *A. nasutum* Rchb. subsp. *tuschteticum* (N.Busch) A.N.Luferov, *A. pubiceps* Rupr. var. *tuschteticum* (N.Busch) Grossh.

Hybrid origin: *A. degeni* × *A. vitosanum*.

Distribution: Caucasus, Slovenia.

*Diagnostic characters:* plant 50–100 cm high; inflorescence axis, pedicels and tepals outside glabrous and eglandular pubescent.

Iconography: none.

Literature: Luferov (2000); Starmühler (1996c).

3. – Nothosect. *Acomarum* Starm. (= nothosect. *Acopellus* Starm.)

*Type species:* *A. × cammarum* L. em. Fries, designated here.

*Diagnosis*

Carpels totally or partially sterile.

*Description*

Leaves divided into 3 or 5 lobes and dissected to the base; hoods hemispherical or conical, 1.2–2.0 (–2.5) times higher than wider; claws of the nectaries erect or slightly bent, reaching or not the top of the hood; spurs of nectaries backward bent or semi-spiral coiled; carpels 3 or 5; seeds with membraneous 4–6 lamellae and with one conspicuously winged edge; inflorescence ramose or rarely dense ramified; root elongated.

*Aconitum × acuminatum* Rchb., Uebers. Aconitum 46. 1819

Type citation: "Hab. in monte Baldo Heineken! Hb. Mertens".

Typus: not designated.

Synonym: *A. lobelianum* Host. in Gáyer fo. *brachytrichum* Gáyer.

Hybrid origin: *A. degenii* × *A. napellus*.

Distribution: Alps.

*Diagnostic characters:* hood glabrous, hemispherical; pedicels glabrous or eglandular pubescent, pedicels above bracteoles glandular pilose and below eglandular pubescent, carpels 3, glabrous or overall pubescent.

Iconography: Reichenbach (1827: t. 68).

Literature: Starmühler (2001).

*Aconitum × acutum* Rchb., Uebers. Acon. 21. 1819

Type citation: "Hab. in valle Kalstahl Tyrol. Sieber! in Alp. Seethal supra Judenburg v. Vest!".

Typus: not designated.

Synonym: *A. × zahlbruckneri* Gáyer.

Hybrid origin: *A. tauricum* × *A. variegatum*.

Distribution: Eastern and Southeastern Alps.

*Diagnostic characters:* hood glabrous, hemispherical; pedicels glabrous or eglandular pubescent; filaments glabrous or sparsely pilose, stalks of nectaries glabrous or slightly pubescent; carpels mostly glabrous.

Iconography: Reichenbach (1821: Tab. 12, 2 pro species).

Literature: Starmühler (2001).
Aconitum ×berdaui Zapał., Rozpr. Wydz. Mat.-Przyr. Akad. Umiej., Dział B. Nauki Biol. 48: 88. 1908a, pro hybr. [reprinted in Zapałowicz, 1908b].

Type citation: "In regione subalpina Tatrorum: in valle Kościeliska et àltero loco non indicato (Berdau), Podspady ad Jaworzynka". Typus: lectotype, "Doł. Kościeliska, ?08.1855, leg. Berdau, det. Zapałowicz (16.02.1908), KRAM 133482!" (Wacławska-Ćwiertnia and Mitka 2016).

Synonyms: A. lengyeli Gáyer, A. odotandrum Wissjul.

Hybrid origin: A. firmum × A. variegatum.

Distribution: Europe: Sudetes, Transilvania and the Balkans.

Diagnostic characters: inflorescence axis, pedicels and tepals outside pilose (nothosubsp. walasii) or glabrous (nothosubsp. berdaui); hoods conical; filaments glabrous or sparsely pilose, spur of the nectaries semi-spiral coiled; carpels pilose on the suture.

Iconography: Mitka (2003: 173); Novikoff and Mitka (2011: 44).

Literature: Wissjulina (1939); Starmühler and Mitka (2001); Mitka (2003), Novikoff and Mitka (2011), Wacławska-Ćwiertnia and Mitka (2016).

Lower taxa/hybrids:

a) nothosubsp. berdaui

Hybrid origin: A. firmum subsp. firmum × A. variegatum subsp. variegatum.

Diagnostic characters: inflorescence axis, pedicels and tepals outside glabrous.

Iconography: (Mitka 2003: 173, fig. 6D).

b) nothosubsp. walasii (Mitka) Mitka, The genus Aconitum in Poland and adjacent countries: 56. 2003

Type citation: "Poland, Western Carpathians, Pogórze Spisko-Gubałowskie Foothills), Podhale, Wzn. Gubałowskie, Roztoki, żwirowiska nad Czarnym Dunajcem, 22.8.1957, leg. E. Pancer" (Mitka 2003).

Typus: holotype, KRA 003852. Synonyms: A. ×lengyeli Gáyer nothosubsp. walasii Mitka. Hybrid origin: A. firmum subsp. moravicum × A. variegatum subsp. variegatum.

Diagnostic characters: inflorescence axis, pedicels and tepals outside pilose.

Iconography: Mitka (2003: 176, fig. 9E).

Aconitum ×cammarum L. em. Fries, Sp. Pl. 1 (ed. 2): 751. 1762 em. Nov. Flor. Suec. (ed. 2): 171. 1828

Type citation: "Austria, Styria". Typos: not designated. Conflict of original material has been revealed (The Linnaean Plant Name Typification Project, 2006).

Synonyms: A. intermedium DC., A. stoerkianum Rchb. Hybrid origin: A. sect. A. (A. napellus ?) × A. variegatum. Distribution: Europe (garden plant, sometimes naturalized).

Diagnostic characters: hood glabrous; tepals deep blue (fo. cammarum) or with white strips (fo. bicolor); pedicels above bracteoles sparsely curved pubescent, below bracteoles glabrescent; carpels glabrous; filaments pilose.

Iconography: Reichenbach (1827: t. 71, A. stoerkianum); Mitka (2003: 173, fig. 6F), Novikoff and Mitka (2011: 44).

Literature: Mitka (2003).

Lower taxa:

a) var. cammarum fo. cammarum

Diagnostic characters: tepals with monotonic, usually deep blue, color.

b) var. cammarum fo. bicolor (Schult) DC., Syst. Nat. [Candolle] 1: 372. 1817

Type citation: none. Typos: not designated. Synonyms: none.

Diagnostic characters: tepals variegate, with white and blue stripes.

Aconitum ×exaltatum Bernh. ex Rchb., Ill. Spec. Acon.: Tab. LXXII. 1827

Type citation: "In montium Sudetorum Aupagrund, Funk!". Typos: specimens: not designated, probably BM 000613639. Synonyms: A. exaltatum var. hamatum Rchb. [= A. hamatum (Rchb.) Gáyer], A. speciosum Otto ex Rchb. Hybrid origin: A. plicatum × A. variegatum. Distribution: Sudetes, Bohemian Massif, Bavarian Alps.

Diagnostic characters: inflorescence axis and hoods outside glabrous; hoods rounded-conic or slightly elongated; pedicels glabrous or eglandular curved and crisped pubescent, stamens pilose, spur of nectaries backward bent or capitate; carpels mostly entirely sterile.

Iconography: Mitka (2003: 177, fig. 10F). Literature: Mitka (2003).

Aconitum ×mielichhoferi Rchb., Uebers. Acon.: 29. 1819

Type citation: "Hab. in Alp. Carinth. Salisb. (in quodam certi harum regionum loco) Mielichhofer!".
The taxonomic circumscription of *Aconitum* subgenus *Aconitum* (Ranunculaceae) in Europe

Typus: not designated.

**Synonym:** *A. xronnigeri* Gáyer.

**Hybrid origin:** *A. degeni* × *A. tauricum.*

**Distribution:** Eastern and Southeastern Alps.

**Diagnostic characters:** pedicels at least above the bracteoles densely glandular pilose; bracteoles filiform to spathulate; tepals outside sparsely to densely glandular pilose; hood about as broad as high; nectaries always pilose, their stalks distinctly bent, their spur capitate, always reaching the top of the hood; carpels 3, glabrous to densely hairy.

**Literature:** Starmühler (2001).

*Aconitum ×schneebergense* Gáyer, Magyar Bot. Lapok 8: 189. 1909

**Type citation:** "Hab. in Schneeberg Austriae Inf. (Portenschlag – W, duo exempla: unum cum nota: *A. neomontanum*, Schneeberg, alterum: Austria Inf.)".

**Typus:** not designated.

**Synonyms:** *A. ×algoviense* Gáyer, *A. laxum* Gáyer, *A. ×virgatum* Rchb. ex Gáyer.

**Hybrid origin:** *A. napellus* × *A. variegatum.*

**Distribution:** Alps.

**Diagnostic characters:** pedicels above the bracteoles ± densely crisped eglandular pubescent, below the bracteoles ± glabrescent; tepals outside glabrous; hood about as high as broad; nectaries mostly glabrous, hardly curved, with a capitate to hooked spur, always reaching the top of the hood; filaments always hairy; carpels 2–3, glabrous or pilose on the dorsal or ventral side.

**Literature:** Starmühler (2001).

**Hybrid formulae:**

*Aconitum napellus* × *A. pilipes* – hood rounded, pedicels above bracteoles glandular pubescent and below bracteoles eglandular pubescent; spur of nectaries backward bent or capitate, carpels glabrous or entirely pubescent, sterile.

*Aconitum pilipes* × *A. tauricum* – hood rounded; pedicels glandular pubescent, spur of nectaries capitates; carpels glabrous or slightly pubescent.

*Aconitum superbum* × *A. variegatum* – more studies are required.

*Aconitum superbum* × *A. vitosanum* – more studies are required.

---

4. – Sect. *Angustifolium* (Seitz) Rottensteiner, **stat. nov.**

**Basionym:** *A. subsect. Angustifolium* Seitz, Feddes Repert. 80 (1): 60. 1969

**Type species:** *A. angustifolium* Bernh. ex Rchb.

**Diagnosis characters:** seeds tricorn, pyramidal, membranous 6–8 lamellae, root napiform.

**Description:** stem up to 60 cm, glabrous; leaves with 5–7 lobes, narrowly dissected; leaf segments linear to lanceolate, up to 4 (–6) mm wide; inflorescence compact, pyramidal or slightly ramified; pedicels firm, with tri-lobed or entire linear bracteoles; flowers violet; hood from crescent-shape to hemispherical, glabrous or sparsely pubescent; nectaries hardly bent with ± capitate spurs, always reaching the top of the hood; filaments glabrous; carpels 2–3, glabrous or pilose on the dorsal or ventral side.

**Aconitum angustifolium** Bernh. ex Rchb., Mon. Aconit.: 95, t. 15, fig. 2. 1821

**Type citation:** "In Styriae valle Wochinensi: Bernhardt! (ibid.) circa lacum, in altitude circiter 2000 pendum: de Vest! In Sibiria: Pallas!".

**Typus:** iconotype: Reichenbach (1820): Monogr. Aconit.: 24 (Seitz 1969).

**Synonyms:** *A. albicans* Host, *A. napellus* subsp. *angustifolium* (Bernh. ex Rchb.) Gáyer, *A. tenuifolium* Host.

**Distribution:** Julian Alps and Prealps in Italy and Slovenia.

**Diagnostic characters:** uppermost leaf segment 1–3 (–4) mm wide; flowers light blue to whitish; hood often ± triangular, about as high as broad; inflorescence axis, pedicels and tepals outside glabrous (fo. *angustifolium*) or ± pubescent (fo. *carniolicum*); nectaries hardly bent, their spur ± capitate, always reaching the top of the hood; filaments glabrous; carpels 2–3, glabrous or pilose on the dorsal or ventral side.

**Iconography:** Reichenbach (1821: t. 15, fig. 2).

**Literature:** Gáyer (1909); Seitz (1969); Nikolić (1994); Martinčič (1999); Aeschimann et al. (2004).

**Hybrids:** unknown.

**Lower taxa:**

a) fo. *angustifolium*

**Diagnostic characters:** inflorescence axis, pedicels and tepals outside glabrous.

b) fo. *carniolicum* Gáyer, Magyar. Bot. Lap. 8: 184. 1909
Type citation: "Krain, Küstenland, Steiermark. Auf der Zhaun u. Krushza (Fleischmann – W); Stiria, Auen a. d. Mur (Maly – W. loco ergo incerto)" (Gáyer 1909).

Type: not designated.

Synonyms: none.

Diagnostic characters: inflorescence axis, pedicels and tepals outside ± pubescent.

5. – Sect. Euchylodea Rchb.

Type species: A. kusnezoffii Rchb.

Diagnostic characters: nectary lobes inflated; spurs thick, long and hamate curved or short saccate; stipes slightly incurved or nearly erect.

Description: root obconical or elongated, 2–5 cm; stem up to 200–300 cm long, usually intensively branched on the level of inflorescence; cauline leaves with 5 lobes with narrow lanceolate segments; pedicel densely pubescent; bracteoles acute ovate; tepals lilac-blue, outside pubescent; hood hemispherical to slightly elongated; carpels 5, mostly glabrous.

5A. – Ser. Japonica (Nakai) Kadota

Type species: A. japonicum Thunb.

Diagnostic characters: leaf blades pentagonal to roundish pentagonal, sometimes roundish reniform; lateral lobes shallowly to medially 2-parted or sometimes deeply incised.

Aconitum carmichaelii Debeaux, Actes Soc. linn. Bordeaux 33: 87. 1879

Type citation: "La region montagneuse du Tché-foû, près de Bamboû Temple (très-probablement la Pagode neuve) ou il a été découvert par le Dr. Carmichael en 1875".

Type: not designated.

Synonyms: A. bodinieri H. Lév. & Vaniot, A. chinense Paxton, A. fischeri auct., A. lushanense Migo, A. wilsonii Stapf ex Veitch.

Distribution: China, Vietnam; neophyte in Europe: Scotland, France, Germany, Austria.

Diagnostic characters: Root obconical, 2–4 cm long, 1–1.6 cm broad; stem rigid, upright, 200–300 cm; cauline leaves pentagonal, ± pubescent on the lower surface; inflorescence with many side inflorescences; pedicel densely pubescent; bracteoles acute ovate; tepals lilac-blue, outside pubescent; hood about as high as broad; nectaries glabrous, with an upright claw and a recurved spur; filaments dentate, glabrous; carpels 5, mostly glabrous.

Iconography: Wang et al. (2003).

Literature: Li and Kadota (2001); Lin et al. (2017).

Hybrids: unknown.

ACKNOWLEDGMENTS

The work has been supported by a KBN/NCN grant N303 814440 given to JM and founds of the Institute of Botany of the Jagiellonian University in Kraków.

REFERENCES

Aeschimann D, Lauber K, Moser DM, Theurillat JP. 2004. Flora alpina. Vol. 1. Bern, Stuttgart, Wien.

Bauhin C. 1671. Pinax theatris botanici. Basileae: Impensis Ioannis Regis.

Boroń P, Wróblewska A, Binkiewicz B, Mitka J. 2020. Phylogeny of Aconitum subgenus Aconitum in Europe. Acta Soc Bot Pol. 89: Article 8933. https://doi.org/10.5586/asbp.8933

Bosch M, Simon J, López-Pujol J, Blanché C. 2016. DCDB: an updated online database of chromosome numbers of tribe Delphinieae (Ranunculaceae). Flora Mediterranea. 26: 191–201. http://dx.doi.org/10.7320/FlMedit26.191

Cappelletti EM., Poldini L. 1984. Seed morphology in some European aconites (Aconitum, Ranunculaceae). Plant Syst Evol. 145: 193–201. https://doi.org/10.1007/BF00983948

Clapham AR, Tutin TE, Warburg EF. 1957. Flora of the British Isles, Illustrations 1. Cambridge.

Clusius C. 1601. Rariovrn plantarvm historia. Quae accesserint, proxima pagina docebit. Vol. 2. Antverpiae: Ex officina Plantiniana Apud Ioannem Moretum.

Fritsch K. 1895. Beiträge zur Flora der Balkanhalbinsel, mit besonderer Berücksichtigung von Serbien, Dritter Theil. Verh Zool-Bot Ges Wien. 45: 367–382.

Gáyer G. 1906. Die toxicoiden Aconitum-Arten in Ungarn. Magyar Bot Lap. 5: 122–137.

Gáyer G. 1909. Vorarbeiten zu einer Monographie der europäischen Aconitum-Arten. Magyar Bot Lap. 9: 114–206.

Gáyer G. 1911. De Aconitis quibusdam alpinis. Magyar Bot Lap. 10: 194–196.

Gáyer G. 1912. Aconitum In: Hegi G, ed. Illustrierte Flora von Mittel-Europa. Mit besonderer Berücksichtigung von Deutschland, Oesterreich und der Schweiz. Zum Gebrauche in den Schulen und zum Selbstunterricht. Band III. Dicotyledones (I. Teil). München: J.F. Lehmann Verlag; p. 492–507.
The taxonomic circumscription of Aconitum subgenus Aconitum (Ranunculaceae) in Europe

Göttz E. 1967. Die Aconitum variegatum-Gruppe und ihre Bastarde in Europa. Feddes Repert. 76 (1–2): 1–62. https://doi.org/10.1007/fred.19670760102

Hayek A. 1917. Zur Kenntniss der Flora des Berges Žlep bei Ipek. Ann Naturhist Museums Wien. 31: 65–76. www.jstor.org/stable/41768192

Hong Y, Luo Y, Gao Q, Ren C, Yuan Q, Yang Q-E. 2017. Hayek A.

Jabbour F, De Craene LR, Nadot S, Damerval C. 2009. Establishment of zygomorphy on an ontogenic spiral and evolution of perianth in the tribe Delphinieae (Ranunculaceae). Caryologia. 62: 198–203. https://doi.org/10.1080/00087114.2004.10589685

Ilńicki T, Mitka J. 2009. Chromosome numbers in Aconitum sect. Aconitum (Ranunculaceae) from the Carpathians. Caryologia. 64: 446–452. https://doi.org/10.1080/00087114.2011.10589812

Ilńicki T, Mitka J. 2011. Chromosome numbers in Aconitum sect. Cammarum (Ranunculaceae) from the Carpathians. Caryologia. 64: 464–452. https://doi.org/10.1080/00087114.2011.10589812

Jabbour F, Renner SR. 2011a. Consolida and Aconitella are an annual clade of Delphinium (Ranunculaceae) that diversified in the Mediterranean basin and the Irano-Turanian region. Taxon. 60: 1029–1040. https://doi.org/10.1002/TAX.604007

Jabbour F, Renner SR. 2011b. A phylogeny of Delphinieae (Ranunculaceae) shows that Aconitum is nested within Delphinium and that the Late Miocene transitions to long life cycles in the Himalayas and Southwest China coincide with bursts in diversification. Mol Phylogenet Evol. 62: 928–942. https://doi.org/10.1016/j.ympev.2011.12.005

Jabbour F, Cossard G, Le Guilloux M, Sannier J, Nadot S, Damerval C. 2014. Specific duplication and dorsoventrally asymmetric expression patterns of Cycloidea-like genes in zygomorphic species of Ranunculaceae. Plos One. 9(4): e95727. https://doi.org/10.1371/journal.pone.0095727

Jacquin NJ. 1776. Florae Austriacae, sive plantarum selectarum in Austriae archiducatu sponte crescentium, icones, ad vivum coloratae, et descriptionibus, ac synonymismis illustratae. Vol. 4. Viennae Austriae: Typis Leopoldi Joannis Kaliwoda, Aulae imperialis typographi.

Jeanmonod D, Gamisans J. 2007. Flora Corsica. Aix-en-Provence: Edisud.

Joachimiak A, Ilńicki T, Mitka J. 1999. Karyological studies on Aconitum lasiocarpum (Rchb.) Gáyer (Ranunculaceae). Acta Biol Cracov, Ser Bot. 41: 205–211.

Kadota Y. 1981. A taxonomic study of Aconitum (Ranunculaceae) of the Akaishi Mountain Range in Central Japan. Bull Nat Sci Mus B (Tokyo). 7: 91–112.

Kadota Y. 1987. A revision of Aconitum subgenus Aconitum (Ranunculaceae) in East Asia. Utsunomiya: Sanwa Shoyaku Company, Ltd.

Keener CS, Reveal JL, Dutton E, Ziman S. 1999. A list of suprageneric names in Ranunculaceae (Magnoiliophyta). Taxon. 48: 497–506. https://doi.org/10.2307/1224562

Kirschner J, Kirschnerova L, Štěpánek J. 2007. Generally accepted plant names based on material from the Czech Republic and published in 1753–1820. Preslia. 79: 323–365.

Kita Y, Ito M. 2000. Nuclear ribosomal ITS sequences and phylogeny of East Asian Aconitum subg. Aconitum (Ranunculaceae), with special reference to extensive polymorphism in individual plants. Plant Syst Evol. 225: 1–13. https://doi.org/10.1007/BF00985455

Kita Y, Ueda K, Kadota Y. 1995. Molecular phylogeny and evolution of the Asian Aconitum subg. Aconitum (Ranunculaceae). J Plant Res. 108: 429–442.

Li LQ, Kadota Y. 2001. Aconitum L. In: Zhyengi W, Raven PH, Deyuan H, eds. Flora of China. Vol. 6. Caryophyllaceae through Lardizabalaceae. Beijing: Science Press, St. Louis: Missouri Botanical Garden; pp. 149–222. Available online from http://www.efloras.org/flore-taxonomy.aspx?flora_id=2&taxon_id=100300

Lin Q, Yang ZR, Lin Y. 2017. Type specimens in China national herbarium (PE), Volume 8, Angiospermae (5). Henan Science and Technology Press.

Luferov AN. 2000. Konspekt kavkavzskih vidov Aconitum (Ranunculaceae). Bot Zhur. 85: 87–96. (in Russian).

Luo Y, Zhang FM, Young Q. 2005. Phylogeny of Aconitum subgenus Aconitum (Ranunculaceae) inferred from ITS sequences. Plant Syst Evol. 252: 11–25. https://doi.org/10.1007/s00606-004-0257-5

Martinčič A. 1999. Mala flora Slovenije. Ed. 3. Ljubljana.

Mattoli PA. 1563. New Kreüterbuch: mit den allerschönsten und artlichsten Figuren aller Gewechss, dergleichen vormals in keiner Sprach nie an Tag kommen. Gedruckt zu Prag: Durch Georg Melantrich von Auentin, auff sein und Vincenti Valgriss Buchdruckers zu Venedig uncosten.

Molero J, Puig A. 1990. Seed morphology of Iberian species of the genus Aconitum. Collect Bot (Barcelona). 19: 111–127. https://doi.org/10.3989/COLECT-BOT.1990.V19.120

Mitka J. 2000. Systematyka Aconitum subg. Aconitum w Karpatach Wschodnich [Systematics of Aconitum subg. Aconitum in the Eastern Carpathians]. Roczn Bieszczadzkie. 9: 79–116. (in Polish).
Mitka J. 2002. Phenetic and geographic pattern of *Aconitum* sect. *Napellus* (Ranunculaceae) in the Eastern Carpathians – a numerical approach. Acta Soc Bot Pol 71: 35–48. https://doi.org/10.5586/aspb.2002.005

Mitka J. 2003. The genus *Aconitum* in Poland and adjacent countries – a phenetic-geographic study. Kraków: Institute of Botany, Jagiellonian University.

Mitka J, Boroń P, Sutkowska A. 2013. Holocene history of *Aconitum* in the Polish Western Carpathians and adjacent regions: long-distance migration or cryptic refugia. Mod Phytothemorphol. 3: 9–18. https://doi.org/10.5281/ZENODO.161587

Mitka J, Binkiewicz B, Stachurska-Swakoń A, Novikov A, Rottensteiner W. 2017. A synopsis of the genus *Aconitum* subg. *Aconitum* in Europe. Studia Univ Babeş-Bolyai, Sp Iiss: 166–167.

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. https://doi.org/10.5586/aspb.2015.012

Mitka J, Starmühler W. 2000. Phenetic variability of *Aconitum lasiocarpum* (Rchb.) Gáyer (Ranunculaceae): extension of taxonomic and geographic borders. Acta Soc Bot Pol 69: 145–155. https://doi.org/10.5586/asbp.2000.020

Mitka J, Sutkowska A, Ilnicki T, Joachimiak A. 2007. Reticulate evolution of high-alpine *Aconitum* (Ranunculaceae) in the Eastern Sudetes and Western Carpathians (Central Europe). Acta Biol Cracov Ser Aco-1970. *Aconitum paniciatum* subsp. *paniciatum* var. *turrachense* var. nova (Ranunculaceae). Phyton (Horn). 30 (1): 83–88.

Mucher W. 1991. *Aconitum variegatum* ssp. *variegatum* var. *stiriacum* var. nova (Ranunculaceae). Verh Zool-Bot Ges Österreich. 129: 143–151.

Mucher W. 1993a. Systematics and chorology of *Aconitum* ser. *Toxicum* in Europe. Phyton (Austria). 33: 51–76.

Mucher W. 1993b. Die Gattung *Aconitum* in Kärnten. Carinthia II. 183/103 (2): 519–527.

Müller K. 2005. SeqState-primer design and sequence statistics for phylogenetic data sets. Appl Bioinformatics. 4: 65–69. https://doi.org/10.1016/j.abb.2005.04.010-00008

Nikolić T. 1994. Flora Croatica. Index Florae Croaticae 1. Zagreb: Croatian Natural History Museum.

Novikoff A, Mitka J. 2011. Taxonomy and ecology of the genus *Aconitum* in the Ukrainian Carpathians. Wulfenia. 18: 37–61.

Novikoff A, Mitka J. 2015. Anatomy of stem-node-leaf continuum in *Aconitum* (Ranunculaceae) in the Eastern Carpathians. Nordic J Bot. 33: 633–640. https://doi.org/10.1111/njb.010093

Penev I, Simeonovski M. 1970. *Aconitum* L. In: Jordanov D, Kožuharov S, eds. Flora Reipublicae Popularis Bulgariae, Vol. 4. Serdicae; pp. 54–61.

Reichenbach HGL. 1819. Uebersicht der Gattung *Aconitum*. Regensburg.

Reichenbach HGL. 1820–1821. Monographia generis *Aconiti*. Lipsiae.

Reichenbach HGL. 1823–1840. *Icones florae germanicae et helveticae*. Lipsiae.

Ross-Craig S. 1948. Drawings of British Plants. London.

Rottensteiner WK. 2018. *Aconitum* subsect. *Burnatii* subsectio nova. Botanica Serbica. 42 (suppl. 1): 40.

Rouy G. 1884. Diagnoses d’especes nouvelles pour la flore de la péninsule Ibérique. Le Naturaliste. Journal des échanges et des nouvelles 6: 405–406.

Seitz W. 1969. Die Taxonomie der *Aconitum napellus*-Gruppe in Europa. Feddes Repert. 80: 1–76. https://doi.org/10.1002/fedr.19690800102

Seitz W. 1970. Nachtrag zur Nomenklatur der *Aconitum napellus*-Gruppe in Europa. Taxon. 19: 904–905. https://doi.org/10.2307/1218306

Seitz W, Zinsmeister HD, Abicht M. 1972. Beitrag zur Systematik der Gattung *Aconitum* in Europa. Bot Jahrb Syst. 92: 490–507.

Simon J, Bosch M, Molero J, Blanche C. 2001. A cnspect of chromosome numbers in tribe *Delphinieae* (Ranunculaceae). Available online from https://www.researchgate.net/publication/313862132_A_con-spect_of_chromosome_numbers_in_tribe_Delphinieae_Ranunculaceae
Zieliński R. 1982b. An electrophoretic and cytological study to the Qinghai-Tibetan Plateau. Taxon. 62: 713–722. https://doi.org/10.12705/624.10

Wang W, Fu D, Li LQ, Bartholomew B, Brach AR, Dutton BE, Gilbert MG, Kadota Y, Robinson OR, Tamura M, Warnock MJ, Zhu G, Ziman SN. 2003. Ranunculaceae. In: Wu ZY, Zhu G, eds. Flora of China illustar tions. Vol 6. Caryophyllaceae through Lardizabal- aceae. Beijing: Science Press and St. Louis: Missouri Botanical Garden Press.

Wissjulina E. 1939. Novyj vid roda Aconitum (Tourn.) L. flory USSR. Zhurn Inst Botan AN URSR. 21–22: 253–254. (in Ukrainian).

Wojciechowska B, Makulec J. 1969. Seed morphology and anatomy of some Aconitum species. Monographiae Botanicae. 29: 137–163.

Yang QE. 1996. A karyotype study of 15 species in the tribe Delphinieae (Ranunculaceae) from China. Acta Phytotaxonomica Sinica. 34 (1): 39–47.

Yu M, Yang YX, Shu XY, Huang J, Hou DB. 2016. Aconitum carmichaelii Debeaux, cultivated as a medicinal plant in western China. Genet Resour Crop Evol. 63: 919–924. https://doi.org/10.1007/s10722-016-0398-8

Zapałowicz H. 1908a. Krytyczny Przegląd Roślinności Galicji (części: XII, XIII) [A critical review of the flora of Galicia (parts: XII, XIII)]. Rozprawy Wydziału Matematyczno-Przyrodniczego Akademii Umiejętności. Dział B. Nauki Biologiczne. 48 (ser. III, t. 8): 41–90, 187–256.

Zapałowicz H. 1908b. Conspicue florae Galicie criticae. Vol. 2. Cracoviae.

Zając M, Zając A. 2009. The geographical elements of native flora of Poland. Kraków: Jagiellonian University.

Zhao D, Shi Y, Zhu X, Liu L, Ji P, Long C, Shen Y, Kennelly EJ. 2017. Identification of potential biomarkers from Aconitum carmichaelii, a traditional Chinese medicine, using a metabolomic approach. Planta Medica. 84(06/07): 434–441. https://doi.org/10.1055/s-0043-121708

Zieliński R. 1982a. An electrophoretic and cytological study of hybridization between Aconitum napellus subsp. skerisorae (2n = 32) and A. variegatum (2n = 16). I. Electrophoretic evidence. Acta Soc Bot Pol. 51: 453–464.

Zieliński R. 1982b. An electrophoretic and cytological study of hybridization between Aconitum napellus subsp. skerisorae (2n = 32) and A. variegatum (2n = 16). II. Cytological evidence. Acta Soc Bot Pol. 51: 465–471.

Ziman SM, Schiyan NM, Bulakh OV. 2015. Types of the taxa of genus Aconitum (Ranunculaceae) described from Ukraine. Ukr Bot Zhurn. 72 (4): 325–333 (in Ukrainian). https://doi.org/10.15407/ukrbotj72.04.325

APPENDIX

CHECKLIST OF ACONITUM SUBG. ACONITUM IN EUROPE

A. ×acuminatum Rchb. [A. degenii × A. napellus]
A. ×cutatum Rchb. [A. tauricum × A. variegatum]
A. adriaticum Gäyer = A. superbum Fritsch
A. albicans Host = A. angustifolium Bernh. ex Rchb.
A. ×algoviense Gäyer = A. ×schneeburgense Gäyer [A. napellus × A. variegatum]
A. amoenum Rchb. = A. plicatum Köhler ex Rchb.
A. anglicum Stapf
A. angustifolium Bernh. ex Rchb.

fo. angustifolium
fo. carniolicum Gäyer
A. ×aquilonare A.Kern. ex Gäyer [A. variegatum × A. vitosanum]
A. ×austriacum Starm. [A. pilipes × A. variegatum]
A. autumnale Clus. ex Rchb. = A. napellus L.
A. adriaticum Gäyer = A. superbum Fritsch
A. ×bartokianum Starm. [A. toxicum × A. variegatum]

nothosubsp. bartokianum Starm. [A. toxicum subsp. toxicum × A. variegatum subsp. nasutum]
nothosubsp. rapaicsianum Starm. [A. toxicum subsp. crispulum × A. variegatum subsp. nasutum]
nothosubsp. sooanum Starm. [A. toxicum subsp. toxicum × A. variegatum subsp. variegatum]
A. ×bavarcicum Starm. [A. napellus × A. plicatum]

nothosubsp. bavarcicum [A. napellus subsp. napellus × A. plicatum]
nothosubsp. lusenense Starm. [A. napellus subsp. lobelii × A. plicatum]
A. ×berdaui Zap. [A. firmum × A. variegatum]
nothosubsp. berdaui [A. firmum subsp. firmum × A. variegatum subsp. variegatum]
nothosubsp. walasii (Mitka) Mitka [A. firmum subsp. moravicum × A. variegatum subsp. variegatum]
A. bernhardianum Rchb., p.p. = A. napellus L.
A. bernhardianum Rchb., p.p. = A. plicatum Köhler ex Rchb.
A. beskidense (Zap.) Gäyer = A. lasiocarpum Rchb. subsp. kotulae (Pawł.) Starm. & Mitka
A. bodinieri H.Lév. & Vaniot = A. carmichaelii Debeaux
A. bosnicum Beck = A. toxicum Rchb.
A. bucovenense Zapal.
The taxonomic circumscription of *Aconitum* subgenus *Aconitum* (Ranunculaceae) in Europe

41

...
subsp. grosserratum (Gáyer) Grinţ.

fo. beskidense Zapal. = A. lasiocarpum Rchb.
subsp. kotulae (Pawl.) Starm. & Mitka

A. hamatum (Rchb.) Gáyer = A. ×exaltatum Bernh. ex Rchb. [A. plicatum × A. variegatum]

A. hayekianum Gáyer = A. tauricum Wulfen in Koelle

A. ×hebegynum DC. [A. degenii × A. variegatum]

A. ×hebegynum Auct. Fl. Carpathorum, non DC. = A. degenii Gáyer subsp. degenii var. intermedium (Zapal.) Mitka

A. hebegynum Auct., p.p. = A. lasiocarpum Rchb. subsp. kotulae (Pawl.) Starm. & Mitka

A. hians Rchb. = A. plicatum Köhler ex Rchb.
A. intermedium DC. = A. ×cammarum L. em. Fries [A. napellus × A. variegatum]

A. koelheii Rchb. = A. plicatum Köhler ex Rchb.
A. koelheanum Rchb., p.p. = A. tauricum Wulfen in Koelle

var. firmum (Rchb.) Rchb. = A. firmum Rchb.
A. laetum Rchb. = A. plicatum Köhler ex Rchb.

A. lasiocarpum (Rchb.) Gáyer subsp. kotulae (Pawl.) Starm. & Mitka

A. lasiocarpum A. Gáyer × A. toxicum Rchb.
A. latemarense Degen & Gáyer = A. tauricum Wulfen subsp. latemarense (Degen & Gayer) Starm. in W.Maurer

A. laxum Gáyer = A. ×schneebergerense Gáyer [A. napellus × A. variegatum]
A. laxum Rchb. = A. napellus L.

A. ×lengyelii Gáyer = A. ×berdai Zapal. [A. firmum × A. variegatum]

nothosubsp. walassii Mitka. = A. ×berdai Zapal. nothosubsp. walassii (Mitka) Mitka [A. firmum subsp. moravicum × A. variegatum]

A. linnaeanum Gáyer = A. napellus L.
A. lobelianum Host., non Rchb., p.p. = A. napellus L. subsp. lobelii Mucher

fo. brachytrichum Gáyer. = A. ×acuminatum Rchb. [A. degenii × A. napellus]

A. lobelianum Rchb. = A. napellus L.
A. lobelianum (Rchb.) Host. in Gáyer, p.p. = A. napellus L. subsp. lobelii Mucher

fo. brachytrichum Gáyer. = A. ×acuminatum Rchb. [A. degenii × A. napellus]

A. lobelianum Rouy-Fouc. = A. corsicum Gáyer
A. lushanense Migo = A. carmichaelii Debeaux

A. maninense (Skalicky) Mitka

A. ×mariae Rottensteiner, Mitka & Novikov [A. firmum s.str. × A. maninense]

nothosubsp. mariae [A. firmum subsp. firmum × A. maninense]

nothosubsp. paxii (Starm.) Mitka, comb. nov. [A. firmum subsp. moravicum × A. maninense]

A. meyeri Rchb. = A. napellus L.
A. ×mielichhoferi Rchb. [A. degenii × A. tauricum]
A. molle Rchb. = A. degenii Gáyer

A. multifidum Koch ex Rchb. = A. plicatum Köhler ex Rchb. A. multifidum Auct. Fl. Carpathorum, non Koch =

A. bucovinense Zapal.

A. ×nanum (Baumg.) Simonk. [A. bucovinense × A. firmum]

A. napellus L.

subsp. angustifolium (Bernh. ex Rchb.) Gáyer = A. angustifolium Bernh. ex Rchb.
subsp. burnatii (Gáyer) J.-M. Tison. = A. burnatii Gáyer

subsp. castellanum Molero and Blanché = A. castellanum (Molero & Blanché) Rottenst.
subsp. corsicum (Gáyer) W. Seitz = A. corsicum Gáyer

subsp. eustachyum (Rchb.) Gayer in Hegi = A. tauro-
ricum Wulfen subsp. tauricum var. eustachyum (Rchb.) Starm.
subsp. firmum (Rchb.) Gáyer, p.p. = A. firmum Rchb. subsp. firmum

var. carpaticum Maloch = A. firmum Rchb. subsp. moravicum Skalicky
subsp. formosum (Rchb.) Gáyer
subsp. hians (Rchb.) Gáyer = A. plicatum Köhler ex Rchb.

nothosubsp. hinterhuberi Starm. [A. napellus subsp. formosum × A. napellus subsp. napellus]

subsp. koelheanum (Rchb.) Mucher = A. tauricum

Wulfen in Koelle

subsp. lobelii Mucher

subsp. lusitanicum Rouy

subsp. napellus

var. babiogorense Zapal.

fo. babiogorense = A. firmum Rchb.
fo. subfissum Zapal. = A. firmum Rchb. subsp. carpaticum Zapal.

fo. carpaticum = A. firmum Rchb.

var. compactum Rapaics. = A. corsicum Gáyer

var. czarnohorense Zapal. = A. ×czarnohorense (Zapal.) Mitka [A. bucovinense × A. ×nanum]

fo. amoenum Zapal. = A. ×czarnohorense (Zapal.) Mitka [A. bucovinense × A. ×nanum]

fo. czarnohorense Zapal. = A. ×czarnohorense (Zapal.) Mitka [A. bucovinense × A. ×nanum]

fo. glabratum Zapal. = A. ×czarnohorense (Zapal.) Mitka [A. bucovinense × A. ×nanum]

fo. hoverlanum Zapal. = A. ×czarnohorense (Zapal.) Mitka [A. bucovinense × A. ×nanum]
The taxonomic circumscription of Aconitum subgenus Aconitum (Ranunculaceae) in Europe

fo. nanum Zapał., non Baumg. = A. ×czarnohorensense (Zapał.) Mitka [A. bucovinense × A. ×nanum]
fo. rodense Zapał. = A. ×czarnohorensense (Zapał.) Mitka [A. bucovinense × A. ×nanum]
fo. tenuisectum Zapał. = A. ×czarnohorensense (Zapał.) Mitka [A. bucovinense × A. ×nanum]
fo. turkulense Zapał. = A. ×czarnohorensense (Zapał.) Mitka [A. bucovinense × A. ×nanum]

Canada

fo. latisectum (Rchb.) Fiori = A. tauricum Wulfen subsp. tauricum (Rchb.) Starm.

var. firmum (Rchb.) Pawl. = A. firmum Rchb.

var. formosum (Rchb.) Koch. = A. napellus L. subsp. formosum (Rchb.) Gayer in Hegi

var. nanum Baumg. = A. ×nanum (Baumg.) Simonk. [A. bucovinense × A. firmum] subsp. nanus

var. koelleanum (Rchb.) Gürke in Richter-Gürke = A. tauricum Wulfen in Koelle

var. subtatrense Zapał.

fo. abnorme Zapał. = A. firmum Rchb.
fo. latisectum Zapał. = A. firmum Rchb.
fo. subtatrense Zapał. = A. firmum Rchb.

var. tatrense Zapał. = A. firmum Rchb.

var. tauricum (Wulfen) Sér. = A. tauricum Wulfen in Koelle

subsp. napellus sensu Seitz, 1969 = A. anglicum Stapf

notohsubsp. polatschekii Mucher ex Starm. [A. napellus subsp. formosum × A. napellus subsp. lobelii] notohsubsp. seitzi Mucher ex Starm. [A. napellus subsp. lobelii × A. napellus subsp. napellus]

subsp. skerisorae Seitz, non Gayer = A. firmum Rchb. subsp. skerisorae (Gayer) Starm.

subsp. superbum (Fritsch) W. Seitz = A. superbum Fritsch

subsp. tauricum (Wulfen) Gayer in Hegi = A. tauricum Wulfen in Koelle

A. napellus L. × A. pilipes (Rchb.) Gayer
A. nasutum Fischer ex Rchb., p.p. = A. variegatum L. subsp. nasutum (Fischer ex Rchb. em. Rupr.) Götz subsp. tuscheticum (N.Busch) A.N.Luferov = A. ×tuscheticum (N.Busch) N.Busch [A. degenii × A. vitosanum]

A. neomontanum Wulfen = A. napellus L.
A. neomontanum Auct., non Koelle = A. toxicum Rchb.
A. neubergense Clus. ex Rchb. = A. napellus L.

A. nevadense Uechtr. ex Gayer
A. occidentale Timb. Lagr. f. ex Gayer = A. nevadense

Uechtr. ex Gayer
A. odotandrnum Wissjul. = A. ×berdaui Zapał. [A. firmum × A. variegatum]

A. palmatifidum Rchb., p.p. = A. firmum Rchb.

fo. piliferum Gayer = Aconitum ×mariae Rottensteiner, Mitka & Novikov nothosubsp. paxii (Starm.) Mitka, comb. nov. [A. firmum subsp. moravicicum × A. maninense]
A. paniculatum Lam., p.p. (nom. inval.) = A. degenii Gayer subsp. degenii

subsp. lasiocarpum (Rchb.) Soó = A. lasiocarpum (Rchb.) Gayer subsp. paniculatum

var. paniculatum (nom. inval.) = A. degenii Gayer subsp. paniculatum (Arcang.) Mucher var. laxiflorum (Rchb.) Mucher

var. podolicum Zapał.

fo. latilobum Zapał. = A. lasiocarpum (Rchb.) Gayer subsp. kotulae (Pawl.) Starm. & Mitka

fo. latiusulum Zapał. = A. degenii var. intermedium (Zapał.) Mitka
var. prunense Zapał. = A. degenii var. intermedium (Zapał.) Mitka

var. turczanense Mucher = A. degenii Gayer subsp. paniculatum (Arcang.) Mucher var. turczanense (Mucher) Mucher

A. parviflorum Host. = A. tauricum Wulfen in Koelle

A. ×pawlskowiczii Mitka & Starm. [A. lasiocarpum × A. variegatum]

A. pilipes (Rchb.) Gayer subsp. pilipes (Rchb.) Gayer × A. tauricum Wulfen

A. ×pilosiusculum (Seringe) Gayer [A. degenii × A. pilipes]
A. plicatum Köhler ex Rchb.

subsp. plicatum

var. clusianum (Rchb.) Mitka & Starm. = A. clusianum Rchb.
subsp. sudeticum Mitka

A. podolicum (Zapał.) Voroshylov = A. lasiocarpum (Rchb.) Gayer subsp. kotulae (Pawl.) Starm. & Mitka
A. pubiceps Rupr.

var. tuscheticum (N.Busch) Grossh. = A. ×tuscheticum (N.Busch) N.Busch [A. degenii × A. vitosanum]
A. pyramidale Mill. ex Rchb. = A. napellus L.
A. ranunculifolium Rchb.

var. dolomiticum Evers, p.p. = A. tauricum Wulfen in Koelle nothosubsp. hayekianum
A. ×schneebergense
A. ×fissurae
A. firmum Rchb. subsp.
A. rigidum Rchb. = A. plicatum Köhler ex Rchb.
A. romanicum Woloszczak = A. firmum Rchb. subsp.
fissurae Nyár.
A. ×ronnigeri Gáyer = A. ×mielichhoferi Rchb. [A. tauricum subsp. latemarense × A. tauricum subsp. tauricum]
A. ×schneebergense Gáyer [A. napellus × A. variegatum]
A. schurii Beck. = A. toxicum Rchb.
fo. retzezatense Gáyer = A. toxicum Rchb.
A. skerisoraec Auct., non Gáyer = A. firmum Rchb.
A. skerisorae Gáyer = A. firmum Rchb. subsp. skerisorae (Gáyer) Starm.
A. speciosum Otto ex Rchb. = A. ×exaltatum Bernh. ex Rchb. [A. plicatum × A. variegatum]
A. sostaricianum Fritsch = A. superbum Fritsch
A. stoerkianum Rchb. = A. ×canmarum L. em. Fries [A. napellus × A. variegatum]
A. strictum Bernh. = A. napellus L.
A. superbum Fritsch
A. superbum Fritsch × A. variegatum L.
A. superbum Fritsch × A. vitosanum Gáyer
A. tatrae Borb. = A. firmum Rchb.
var. skerisorae Soó = A. firmum Rchb. subsp. skerisorae (Gáyer) Starm.
A. taurericum Rchb. = A. tauricum Wulfen in Koelle subsp. tauricum var. tauricum fo. taurericum (Rchb.) Gáyer
A. tauricum Auct. = A. firmum Rchb.
A. tauricum Wulfen in Koelle
nothosubsp. hayekianum Gáyer (Gáyer) Grinţ. in Savulescu [A. tauricum subsp. latemarense × A. tauricum subsp. tauricum]
subsp. latemarense (Degen and Gáyer) Starm.
subsp. nanum Auct. fl. Carpat. Orient., non (Bau.) Grinţ. = A. bucovicenense Zapal.
subsp. nanum (Bau.) Grinţ. = A. ×nanum (Bau.) Simonk. [A. bucovicenense × A. firmum] subsp. nanum (Bau.) Simonk. [A. bucovicenense × A. firmum]
subsp. taureticum (Rchb.) Grinţ. = A. tauricum Wulfen in Koelle subsp. tauricum var. tauricum fo. taurericum (Rchb.) Gáyer
subsp. tauricum
var. eustachyum (Rchb.) Starm.
var. latemarense (Degen & Gáyer) Mucher = A. tauricum Wulfen in Koelle subsp. subsp. latemarense (Degen & Gáyer) Starm. in W.Maurer
var. tauricum
fo. tauricum
fo. taurericum (Rchb.) Gáyer
A. tenuifolium Host. = A. angustifolium Bernh. ex Rchb.
A. ×teppneri Mucher ex Starm. [A. napellus × A. tauricum]
nothosubsp. goetzi Gáyer ex Starm. [A. napellus subsp. lobelii × A. tauricum subsp. tauricum]
nothosubsp. haderlappii Starm. [A. napellus subsp. lobelii × A. tauricum subsp. latemarense]
nothosubsp. kernerii Starm. [A. napellus subsp. napellus × A. tauricum subsp. latemarense]
nothosubsp. teppneri [A. napellus subsp. napellus × A. tauricum subsp. tauricum]
A. toxicum Rchb.
subsp. bucegiense (Nyár.) Mucher subsp. crispulum (Nyár.) Mucher
nothosubsp. nyaradayanum Mucher [A. toxicum subsp. crispulum × A. toxicum subsp. toxicum]
subsp. toxicum [var.] bosniacum (Beck) Hayek = A. toxicum Rchb.
var. bucegiense Nyár. = A. toxicum Rchb. subsp. bucegiense (Nyár.) Mucher
var. crispulum Nyárády in Borza = A. toxicum Rchb. subsp. crispulum (Nyár.) Mucher [var.] ß schurii Beck = A. toxicum Rchb.
var. toxicum
fo. diabolicum (Gáyer) Grinţ. = A. toxicum Rchb.
nothosubsp. ungaricum Starm. [A. toxicum subsp. bucegiense × A. toxicum subsp. toxicum]
A. trichocarpum Rchb. = A. tauricum Wulfen in Koelle
A. ×tuscheticum (N.Busch) N.Busch [A. degenii × A. vitosanum]
A. valesiacum Gáyer = A. degenii Gáyer subsp. valesiacum (Gáyer) Mucher
A. variegatum L.
subsp. kotulare Pawł. = A. lasiocarpum (Rchb.) Gáyer subsp. kotulare (Pawł.) Starm. & Mitka
subsp. nasutum (Fischer ex Rchb. em. Rupr.) Götz
nothosubsp. podobnikianum Mucher [A. variegatum subsp. nasutum × A. variegatum subsp. variegatum]
subsp. pyrenaicum Vivant & Delay = A. vivantii Rottensteiner.
subsp. valesiacum (Gáyer) Greuter & Burdet = A. degenii Gáyer subsp. valesiacum (Gáyer) Mucher
subsp. variegatum
var. carniolicum Starm.
var. diffusum (Rchb.) Penev & Simeon. = A. vitosanum Gáyer
var. stiriacum Mucher
The taxonomic circumscription of *Aconitum* subgenus *Aconitum* (Ranunculaceae) in Europe

var. *variegatum*

- fo. *aquilonare* (Gáyer) M.Niketić = *A.* ×*aquilonare* A.Kern. ex Gáyer [A. *variegatum* × A. *vitosanum*]
- fo. *kotulae* (Pawł.) Skalický = *A. lasiocarpum* (Rchb.) Gáyer subsp. *kotulae* (Pawł.) Starm. & Mitka

*A. ×virgatum* Rchb. ex Gáyer = *A. ×schneebergense* Gáyer [A. *napellus* × A. *variegatum*]

*A. vitosanum* Gáyer

*A. vivantii* Rottensteiner, nom. nov.

*A. vulgare* DC. = *A. napellus* L.

*A. wilsonii* Stapf ex Veitch. = *A. carmichaelii*Debeaux

*A. ×zahlbruckneri* Gáyer = *A. ×acutum* Rchb. [A. *tauricum* × A. *variegatum*]

*A. ×zapalowiczii* (Starm.) Mitka [A. *firmum* × A. ×*mariae* nothosubsp. *paxii*]