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Systematics and chorology of *Aconitum* sect. *Napellus* (Ranunculaceae) and its hybrids in the Northern Carpathians and Forest Carpathians

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ABSTRACT: The genus *Aconitum* is distributed in the Northern and Forest Carpathians with 7 species, including the infraspecific taxa and hybrids with 23 taxa. A new combination is *A. firmum* subsp. *maninense*. This subspecies is also stated in Poland for the first time. New taxa described here are *A. firmum* nsubsp. *paxii*, *A. firmum* subsp. *firmum* var. *portae-ferratae*, *A. firmum* nsubsp. *zapalowiczii*, *A.* ×*lengyelii* nsubsp. *walasii*. Following names are typified in this article: *A. bucovinense*, *A. firmum*, *A. firmum* subsp. *fissurae*, *A.* ×*lengyelii*, *A.* ×*nanum*. All taxa are described, their types are stated and a key for the determination is given.

KEYWORDS: *Aconitum*, Carpathians, Ranunculaceae, Systematics, Types

Introduction

In the genus *Aconitum* the differentiation of the Carpathians is quite exact: The only species, which can be found in the whole Carpathian mountain range (exept the Western Carpathians) is *A. moldavicum*, subsp. *moldavicum* in the whole range, subsp. *simonkaianum* in the Forest and Eastern Carpathians, subsp. *hostianum* only in the Southern Carpathians. *Aconitum lycoctonum* subsp.

lycoctonum can only be found in the Western and Northern Carpathians. *Aconitum lasiostomum* is a rare plant in the Eastern Carpathians, *A. lasianthum* is endemic in the Southern Carpathians. *Aconitum variegatum* subsp. *variegatum* grows in the Northern and rarely in the Forest Carpathians, subsp. *nasutum* in the Eastern and Southern Carpathians. *Aconitum degenii* grows in the Forest Carpathians, Eastern Carpathians and Southern Carpathians, *A. lasiocarpum* subsp. *kotulae* in the Northern, Forest and Eastern Carpathians (MITKA & STARMÜHLER 2000), subsp. *lasiocarpum* only in the Forest and Eastern Carpathians. *Aconitum toxicum* with its subsp. *toxicum* and subsp. *bucegiense* you find in the Eastern and Southern Carpathians, subsp. *crispulum* only in the Southern Carpathians. *Aconitum bucovinense* is endemic in the Forest, Eastern and Southern Carpathians. *A. firmum* subsp. *firmum* var. *firmum* grows mainly in the Northern Carpathians and is just rarely scattered distributed in the Forest and Eastern Carpathians, subsp. *fissurae* mainly in the Eastern and Southern Carpathians, just rarely in the southeastern end of the Forest Carpathians too, subsp. *moravicum* in the Northern Carpathians, subsp. *maninense* and var. *portae-ferratae* are endemic to the Northern Carpathians (MITKA & STARMÜHLER 2001).

The geographical borders of subdivisions of the Carpathians as it are used in this paper (fig. 1) are partly natural borders of the Carpathian mountain ranges, some borders are artificial (STARMÜHLER & STARMÜHLER 1995). So in the classical division there is no natural boundary between the Forest Carpathians and the Eastern Carpathians, which is based on geology, orography or plantgeography (PAX & WINKLER 1924). PAX (1908, 1919) states, that the best line of demarcation are the valleys of the river Tisa in Marmaros and the river Prut in Ukraine and the Jablunycja saddle as the watershed. The separation between Forest Carpathians and Northern Carpathians goes along the rivers Dunajec, Torysa and Hornád/Hernád. In the west the Carpathians are separated from the Sudetes along the rivers Oder, Bečva and Morava. The boundary between the Northern Carpathians and Western Carpathians (Malé Karpaty Mts. + Bílé/Biele Karpaty Mts.) goes along the rivers Bečva and Váh.

This boundary is just one of several proposals. ZEMANEK (1991) gives a good survey over the most important attempts to separate the Western Carpathians (including Northern and Forest Carpathians, as it is usally treated in current Polish and Slovakian literature) from the Eastern Carpathians, but he comes to the conclusion that the problem of demarcation of a boundary has not been solved definitely until now.

Material and methods

176 herbarium specimens of the investigated area from the herbaria in Austria (GZU, LI, W, WU), Czech Republic (PR, PRC), France (LY), Germany (M), Hungary (BP), Poland (KRA, KRAM, ZTS), Romania (CL, SIB), Slovakia (KO, SAV) and Switzerland (ZT) have been revised. In several excursions to the Polish part of the Tatra Mountains and the Bieszczady Mountains populations of different *Aconitum* taxa have been studied. In excursions to the adjacent Eastern

Carpathians (1996 and 1997) it was possible to investigate the same taxa, as it occur in the Forest Carpathians. Several plants from the Northern as well as from the Forest Carpathians are in culture and observation in the Botanical Garden of the Jagiellonian University at Kraków and in the private garden of the first author at Bruck/Mur for years and have been used for morphological, morphometric and karyological investigations, artificial hybridisations and for cytogenetical analysis of chromosomal C-Giemza bands (JOACHIMIAK & al. 1999) and with the use of RAPD method, based on PCR, for nuclear DNA (JOACHIMIAK & al., in prep.).

The **concept of infraspecific differentiation** is based mainly on SKALICKÝ (1982), who was the first to try to find general directions in the genus *Aconitum*. It had been necessary to render precise it and to complete it here and now to apply it clearly.

Thus in the genus *Aconitum* a **subspecies** is a variation of a whole population within a species. It is morphologically and ecologically well characterized. It has to have a conjunct area of its own or at least a central area, where it dominates as a subspecies. Besides, there may exist disjunct areas, which are rarely far from the center. It is not necessary to distinguish subspecies by the karyotype (SEITZ & al. 1972).

A **variety** in the genus *Aconitum* is, like a subspecies, defined as a variation of a whole population with an area of its own or at least a central area, but it may occur scattered in the whole area of the subspecies (in contradiction to the subspecies, which may not occur in the whole area of the species). The dimensions of the area are not important for the decision if it is subspecies or variety. The morphological division of a variety is usually based on less marks than that of a subspecies or there are characteristics used, which stand on a lower level of the hierarchy and/or less separating marks can be stated.

A **form** in the genus *Aconitum* is just a genotypic variation of an individuum and has no area of ist own. Because almost all modificative characteristics in the genus *Aconitum* have already been used for the description of forms, it is surely an important aim, to use just such characteristics, which are used for the description of subspecies and varieties too, always convincing that only hereditary characteristics are taken into consideration. Important is also a hierarchy of the importance of morphological characteristics. In the genus *Aconitum* the most important marks are mainly situated in the flower. On principle, morphological characteristics fall in the rank, as soon as the frame conditions are not fulfilled any more (e.g. area of its own or central area). Thus marks like pilose nectaries and filaments may be used for the separation of a variety, if a central area can be stablished. If this is not the case, then there is only a separation in the rank of a form possible (Compare the discussion in *A. firmum* var. *portae-ferratae* too!).

Infraspecific hybrids often occur in overlapping areas of its parents. They are always fully fertile and in most cases they include the whole morphological range of characteristics of both parents. In mixed populations you mostly do not find it as single plants, but as hybrid swarms. A nothovarietas, a hybrid between

two varieties, may occur scattered within the whole range of both parents. On the contrary, a nothosubspecies grows only or mainly (this means near the border) within the introgression area of its parents. The deeper in the territory of one subspecies and the more to the margin of the other subspecies, the nothosubspecies may become more frequent than that the parent, which grows here at the margin of its distribution. As it could be observed in the field, there exist then also populations without both parents or almost without one parent. This may be interpreted in two ways: either both parents have fully hybridized, or the hybrid is stronger and better adopted to the ecological conditions in this area and therefore it had better chances to survive. These populations could create, after isolation and changing of conditions, a new taxon. Thus, at least in the rank of a nothosubspecies, it seems to be convenient and logical to treat those hybrids in the genus *Aconitum* with a binominal nomenclature.

Survey over the systematics of the genus *Aconitum* LINNAEUS in the Northern Carpathians and Forest Carpathians

Aconitum subgen. Aconitum

sect. *Aconitum* subsect. *Aconitum*

ser. *Aconitum*: *A. variegatum* LINNAEUS subsp. *variegatum* var. *variegatum*

ser. *Toxicum* (REICHENBACH) MUCHER: *A. degenii* GÁYER subsp. *degenii* f. *degenii*, *A.* ×*gayeri* (*A. degenii* × *A. lasiocarpum*), *A. lasiocarpum* (REICHENBACH) GÁYER subsp. *kotulae* (PAWŁOWSKI) STARMÜHLER & MITKA, *A. lasiocarpum* (REICHENBACH) GÁYER subsp. *lasiocarpum*

nser. *Acotoxicum* MUCHER: *A.* ×*hebegynum* A.P.CANDOLLE (*A. degenii* × *A. variegatum*), *A.* ×*pawlowskii* MITKA & STARMÜHLER (*A. lasiocarpum* × *A. variegatum*)

sect. *Napellus* (WOLF) A.P.CANDOLLE subsect. *Napellus* (WOLF) RAPAICS:

A. bucovinense ZAPAŁOWICZ, *A. firmum* REICHENBACH subsp. *firmum* var. *firmum* et var. *portae-ferratae* STARMÜHLER & MITKA, subsp. *firmum* × subsp. *maninense*, subsp. *fissurae* NYÁRÁDY, subsp. *maninense* (SKALICKÝ) STARMÜHLER, subsp. *moravicum* SKALICKÝ, nsubsp. *paxii* STARMÜHLER (subsp. *maninense* × subsp. *moravicum*), nsubsp. *zapalowiczii* STARMÜHLER (subsp. *firmum* × nsubsp. *paxii*), *A.* ×*nanum* (BAUMGARTEN) SIMONKAI (*A. bucovinense* × *A. firmum*)

nsect. *Acopellus* MUCHER: *A.* ×*lengyelii* GÁYER nsubsp. *lengyelii* (*A. firmum* subsp. *firmum* × *A. variegatum* subsp. *variegatum*), *A.* ×*lengyelii* GÁYER nsubsp. *walasii* MITKA (*A. firmum* subsp. *moravicum* × *A. variegatum* subsp. *variegatum*)

***Aconitum* subgen. *Lycoctonum* (A.P.CANDOLLE) PETERMANN sect. *Lycoctonum* A.P.CANDOLLE ser. *Lycoctonia* TAMURA & LAUENER:**

A. lycoctonum LINNAEUS em. KOELLE subsp. *lycoctonum*, *A. moldavicum* HACQUET subsp. *moldavicum*, nsubsp. *porcii* STARMÜHLER (subsp. *moldavicum* × subsp. *simonkaianum*), subsp. *simonkaianum* (GÁYER) STARMÜHLER

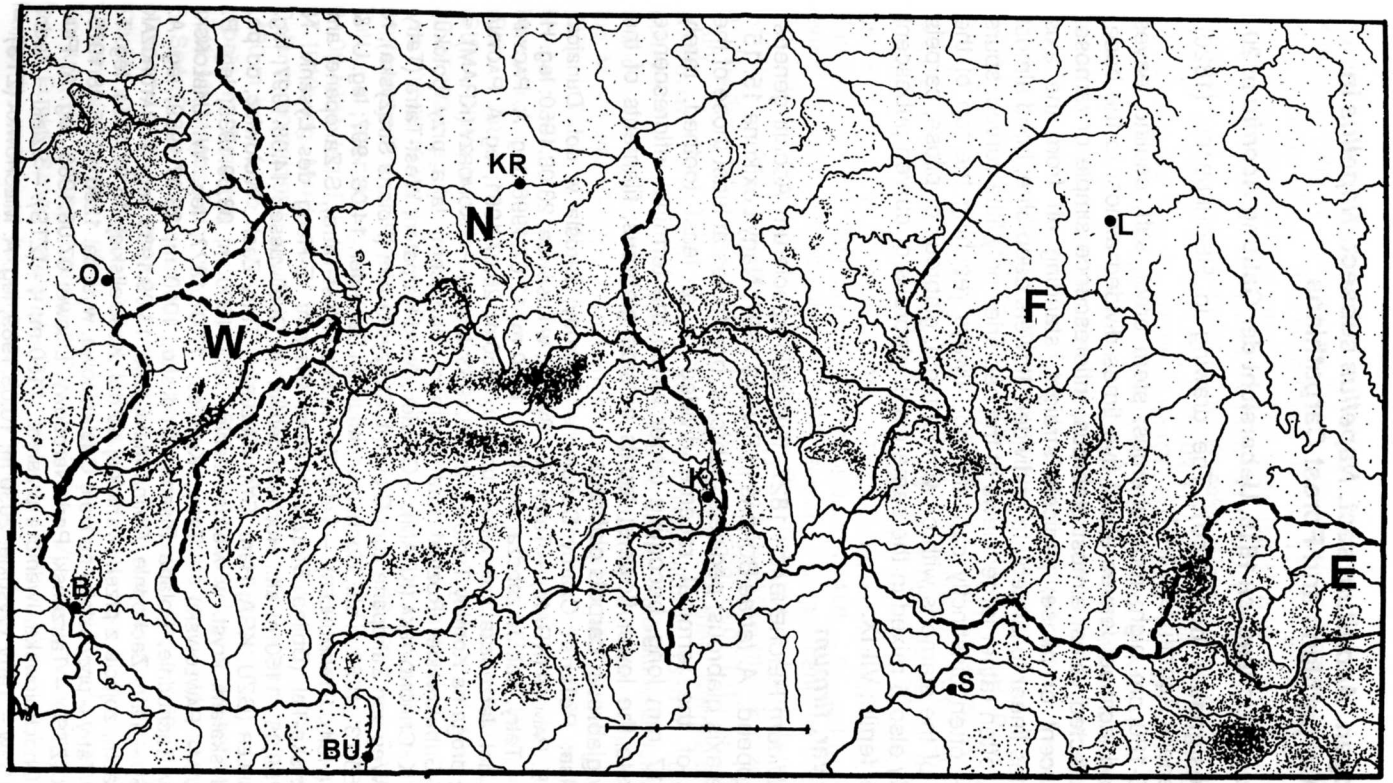

Fig. 1: The subdivisons of the Carpathians, as it are used in this paper: W = Western Carpathians; N = Northern Carpathians; F = Forest Carpathians; E = Eastern Carpathians; B = Bratislava; BU = Budapest; K = Košice; KR = Kraków; L = Ľvov; O = Olomouc; S = Satu-Mare; scale = 100 km

Aconitum subgen. *Aconitum* sect. *Napellus* subsect. *Napellus* in the Northern Carpathians and Forest Carpathians

Aconitum firmum REICHENBACH 1819, Uebersicht der Gattung *Aconitum*: 20

Lectotypus (designatus hoc loco): The drawing in REICHENBACH (1820), Monographia generis Aconiti: tab. 14/1.

Perennial; 20-180 cm high; root tuberous; stem erect, stiff; cauline leaves mostly with broad laciniae, leaves about five times divided almost to the base, mostly with connected veins, almost glabrous; inflorescence simple or ramose, glabrous, pubescent or pilose; pedicels straight, standing off from the axis upright; bracteoles linear to lanceolate or divided; flowers deep blue; hood almost as high as long, often rather large; claws of the nectaries only little curved, spurs of the nectaries often dinstinctly capitate, not always reaching the top of the hood; filaments of the stamens with or without teeth, glabrous or pilose; carpels (2-) 3 (-4), rarely also 5 mixed in the same plant, glabrous or curved pubescent on the backside, fertile; VII-IX.

subsp. *firmum* var. *firmum*

Syn.: *A. palmatifidum* REICHENBACH 1827, Illustratio specierum Aconiti generis: tab. 72, no 19 append., *A. tatrae* BORBÁS in PALLAS 1897, Nagy Lexikona 15: 15

Inflorescence axis glabrous; pedicels glabrous; bracteoles at least those of the lowest flowers of the terminal raceme divided or at least toothed, rarely undivided, 2.5-17 mm long, becoming larger within the terminal inflorescence from the upper to the lower flowers; tepals outside glabrous; filaments of the stamens mostly glabrous; carpels glabrous.

Specimina visa: Poland: Czarny Dunajec – Zagrody, zarośla w dol. Dunajca; 08.08.1955; leg. E. PANCER (KRAM). – Tatry, dol. Bystrej, w kosówce; 23.08.1960; leg. H. PIEKOŚ (KRAM). – Tatry, dol. Jarzębcza, źródlisko, 1550 m; 13.07.1996; leg. A. PACYNA (KRAM). – Tatry, dol. Jarzębcza, koło źródła potoku, 1550 m; 26.07.1961; leg. A. PACYNA (KRAM). – Tatry, droga na Kominy Tylkowe; 26.06.1953; leg. K. PODKOMORZY (KRAM). – Pogórze Spisko-Gubałowskie, Roztoki nad Czarnym Dunajcem, łąka przy potoku; 26.07.1960; leg. K. CHRONOWSKA (KRAM). – Galizien, Nord-Karpaten, West-Tatra (Tatry Zachodnie), am Weg von Zakopane zum Giewont, Strążyska-Alm (Polana Strążyska), N 49°15,76', E 19°55,73', 1050 m alt., Hochstaudenflur am Bachufer; 14.08.1997; leg. U. & W. STARMÜHLER (Herb. STARMÜHLER). – Tatry Zachodnie (West-Tatra), S Zakopane, am Weg vom Strążyska-Tal (Dolina Strążyska) zum Giewont, E-Hang des Łysanki, N 49°15,64', E 19°59,35', 1150 m alt.; Hochstaudenflur im Quellwasser; 14.08.1997; leg. U. & W. STARMÜHLER (GZU, KRA, Herb. STARMÜHLER). – Tatry Zach., Wołowiec, od pn. wsch. piarg pod skałami kryst. w wielkim żlebie, 1200-1300 m; 03.09.1935; leg. B. PAWŁOWSKI (KRAM- PAWŁOWSKI). – Tatry, Kuźnice; 17.07.18??; leg. W. JABŁOŃSKI (KRAM). – Tatry Zachodnie, Polana Pisana, Źrodlisko, 1010 m; 23.07.1989; leg. A. MIECHÓWKA (ZTS). – Tatry Zachodnie, Dolina Małej Łąki; 13.09.1985; leg. A. BATORCZAK (ZTS). – Tatry Zach., zejście z przeł. Iwanickiej do dol. Kościeliskiej; 15.07.1954; leg. T. TACIK (KRAM). – Tatry – przy szlaku na Hałę Gasienicową, wys. ca. 1290 m; 15.08.1975; leg. J. FLORCZYK (ZTS). – Tatrzański Park Narodowy, Liliowe; 07.08.1986; leg. A. FIUK (ZTS). – Dolina Chochołowska, Iwanicka przełęcz, 1150 m; -; - (ZTS). – Szlaki – Zadni Granat, Zmarzły Saw – Tatry Wysokie, 2030 m; 10.08.1989; leg. A. MIECHÓWKA (ZTS). –

Zakopane, Antałówka, ogród TSN XV-67; 17.07.1974; leg. J. FLORCZYK (ZTS). – Nord-Karpaten, Tatry Wysokie (Hohe Tatra), am Weg vom Morskie Oko (Großer Fischsee) zum Czarny Staw (Fischaug-See), N 49°11,72', E 20°04,84', 1400 m alt., Hochstaudenflur im Quellwasser; 13.08.1997; leg. U. & W. STARMÜHLER (CL, GJO, GZU, IBF, JACA, KL, LE, LG, LI, LJU, M, MEL, NY, OSC, PE, TBI, TK, TNS, W, WU, Z, Herb. STARMÜHLER). – Nord-Karpaten, Tatry Wysokie (Hohe Tatra), E-Ufer vom Morskie Oko (Großer Fischsee), N 49°11,90', E 20°04,41', 1390 m alt., Gebüschsaum am Seeufer; 13.08.1997; leg. U. & W. STARMÜHLER (CL, GJO, GZU, IBF, JACA, KL, KRA, LE, LG, LI, M, MEL, NY, OSC, PE, TBI, TK, TNS, W, WU, Z, Herb. STARMÜHLER). – Nord-Karpaten, Tatry Wysokie (Hohe Tatra), S-Ufer vom Morskie Oko (Großer Fischsee), N 49°11,64', E 20°04,12', 1395 m alt., Hochstaudenflur; 13.08.1997; leg. U. & W. STARMÜHLER (GZU, LE, LG, M, MEL, NY, PE, TBI, TNS, W, Z, Herb. STARMÜHLER). – Tatry, Liljowa, 1954 m, Tworzy małe skupienia w zagłębieniach terenu, na wapieniu, solo calcareo, aconiteta pava formans, Nr. 160110; 29.08.1929; leg. F. KRAWIEC & P. PAWŁOWSKI (CL). – Mt. Tatry, in saxosis graniticis ad lacum Morskie Oko; 23.07.1928; leg. R. SOÓ (CL). – Tatry, Dol. Kościeliska, żleb Babie Nogi, 1540 m, nad potokiem; 19.07.1961; leg. A. PACYNA (KRAM). – Babia Góra, zbocze Sokolicy, usypisko; 06.1964; leg. H. BŁASZCZYK (KRAM). – Babia Góra, Rybny Potok, 750 m; 20.08.1997; leg. B. RUSIN (KRA). – Babia Góra; 08.1876; leg. W. KULCZYŃSKI (KRAM). – Babia Góra, miejsce otwarte obok schroniska im. Zapałowicza; 17.07.1949; leg. K. KOSTRAKIEWICZ (KRAM). – Slovakia: Oberungarn, von einem Techniker mitgebracht; - ; - (WU-KERNER). – Carpat. cent., im Voelkergrund; 1847; leg. LANG (WU-KECK). – ...Trichtersee im Bez. Polane i. d. Carpath.; -; leg. LANG (WU-KECK). – Carpat., Feichtensee, M-0007110; - ; LÁNG (M). – In locis graminosis in subalp. m. Nagyrozsudec, com. Arva, c. 1400 m, Nr. 150658; 24.07.1913; leg. MARGITTAI (CL). – Tatry, Vysoké Tatry, N-Abhänge des Sattels zwischen Kežmarský štít u. Velká Svišťovka, 200 m W d. Steiges, steile Mylonitgeröllfluren, 1950 m; 10.09.1991; leg. M. MAGNES (GZU). – Tatry, Vysoké Tatry (Hohe Tatra), Malá Studená dolina von chata kpt. Nálepku zur Téryho chata, ca. 1950 m, Quellaustritte unter einer Felswand; 11.09.1991; leg. M. MAGNES (GZU). – Flora hungarica, ... in montibus ad Feketehegy, Nr. 233346; - ; - (BP). – Tatra, in valle Felkaertal, Poln. –Kamm, alt. 1900-2000 m; 16.08.1924; leg. NYÁRÁDY (SIB). – Folkaer Thal, Tatra; 03.08.1874; leg. JATIN (W). – Tatra, in valle Mengsdorf, circa lacum Popper See, alt. 1513 m, Granit; 28.07.1924; leg. E.I. NYÁRÁDY (SIB). – Tatra, circa lacum Popper Seen, alt. 1513 m, Granit; 28.07.1924; leg. NYÁRÁDY (SIB). – Tatra, in valle Mengsdorf supra lacum Frosch Seen, alt. 1900-2000 m, Granit; 29.07.1924; leg. NYÁRÁDY (SIB). – Tatra, in cacumine montis Greiner, alt. 1800-2148 m, calc.; 03.08.1924; leg. E.I. NYÁRÁDY (SIB). – Tatra Magna, in declivibus montis Durlsberg, supra lacos Weisse Seen, alt. cca. 1670 m, calc.; 03.08.1924; leg. E.I.NYÁRÁDY (SIB). – Tatra, in pascuis subalpinis „Weidau" sub monte Durlsberg, alt. cca. 1450 m; 04.08.1924; leg. E.I. NYÁRÁDY (SIB). – In subalp. m. Prassiva, com Liptó, Nr. 139745; 07.1912; leg. MARGITTAI (CL). – Liptoviae, Biela skala et Sivy vrch, alt. 1400-1800 m, Dolomit; 10.08.1924; leg. NYÁRÁDY (SIB). – Magas-Tatra, a Illinska völgy jobra, Muntegi 1400 m s.m., Liptó ..., Nr. 161998; 04.08.1916; leg. HULJÁK (CL). – In ... graminosis in subalp. m. Prassiva, com. Lipto, c. 1300 m; 07.1912; leg. A. MARGITTAI (SIB). – Com. Liptó, Mt. Magas Tátra, in dumetis ad lacum Csorbató et vallis Mlynica; 17.07.1928; leg. R. SOÓ (CL). – In locis lapidosis in alp. Prassivae, com Lipto, c. 1500 m; 07.1912; leg. A. MARGITTAI (SIB). – Hungaria, comitatus Liptó, Tatra magna, in valle Handeltal sub monte Kriváň, alt. cca. 1500 m, solo granitico; 20.08.1910; leg. E. NYÁRÁDY (SIB). – Tatra, Kriwan; 18.08.1859; - (WU). – Vysoke Tatry, Priehyba pod Kriváňom; 16.07.1968; leg. A. VOJTUŇ (KO). – Tatry, Lavínový Žľab; - ; - (KO). – Vys. Tatry, Velická dolina; 08.08.1962; leg. J. FUTÁK (SAV). – Belanské Tatry, Faixová; 22.08.1939; leg. K. PTAČOVSKÝ (SAV). – Hungaria, comitatus ad confines Liptó et Zólyom, Tatra Minor, in cacumine montis

Gyömbér (Djumbir), alt. cca. 1700 m, solo granitico; 03.08.1907; leg. E. NYÁRÁDY (SIB). – Ungarn, Liptau – Sohler Alpen, Voralpenbäche des Djumbir, Gneiss, 1600 m, M-0007109; 04.08.1870; leg. J. FREYN (M). – Magas-Tátra, a Popráditohoz vezetõ turista ut mentén a folyón át vezetõ hid körül, gránitsziklás televényes talajon, Nr. 161996; 31.08.1915; leg. HULJÁK (CL). – Ad lacum „Homulo" in valle Nagytarpatak, Magna Tátra, c. 1900 m, Nr 274834; 08.1922; leg. MARGITTAI (CL). – Hab in valle Nagytarpatak, Magna Tatra, c. 1600 m; 08.1922; leg. A. MARGITTAI (CL). – Flora Comit. Scepus, M. Tátra, ..., Nr. 13307; 16.07.1890; leg. A. RICHTER (CL). – Magas Tátra, ad „Vaskapu", Eisernes Tor, Nr. 13224; 14.08.1901; leg. A. RICHTER (CL). – detto Nr. 13225 (CL). – detto Nr. 21535 (CL). – detto Nr. 21542 (CL). – M. Tátra, Felkai völgy, „Ewige Regen", Nr. 161435; 18.08.1904; leg. GYÖRFFY (CL). – Tatra, in valle Furkota, at. 1500-1900 m, Granit; 23.08.1924; leg. E.I. NYÁRÁDY (SIB). – Hungaria comitatus Szepes, Tatra Magna, in valle Svišťovka dolina sub Lengyelnyereg, alt. cca. 1700 m, solo granito; 26.07.1908; leg. E. NYÁRÁDY (SIB). – Magas Tátra, Drechslerhäuschen, Nr. 161436; 12.08.1904; leg. GYÖRFFY (CL). – Hungaria, comitatus Szepes, montes Bélaenses, inter Faixblösse et Eisernes Tor sub monte Stirnberg, alt. cca. 1500 m; 21.07.1907; leg. E.G. NYÁRÁDY (SIB). – Hungaria, comitatus Szepes, Alpes Bélaenses, in declivibus montis Stirnberg prope „Vaskapu", alt. cca. 1600 m, solo calc.; 05.09.1911; leg. E.G. NYÁRÁDY (SIB). – Hungaria, comitatus Szepes, Alpes Bélaenses, in jugo montis Stirnberg apud portam ferream (Vaskapu) supra balneas Barlangliget, alt. cca. 1600 m, solo calcareo; 05.09.1911; leg. E.G. NYÁRÁDY (SIB). – Ungarn, Bélaer Kalkalpen, Stirnberg, Matten gegen den Gipfel, ca. 1750 m; 12.08.1909; leg. F. VIERHAPPER (WU). – Hungaria, comitatus Szepes, Tatra-Magna, in valle Nagytarpatakivölgy (Gr. Kohlbachtal) circa lacum Löffelkraut See, alt. cca. 1833 m, solo granitico; 05.08.1910; leg. E.I. NYÁRÁDY (SIB). – Großes Kohlbachtal in der Tatra, Ungarn; 07.1910; leg. J. NEVOLE (GZU). – Kohlbachtal auf der Südseite, Tatra, Ungarn; 07.1911; leg. J. NEVOLE (GZU). – Hungaria, comitatus Szepes, Tatra magna, in valle Nagytarpataki völgy, alt. cca. 1400 m, solo granitico; 16.08.1906; leg. E.G. NYÁRÁDY (SIB). – Slovakia septentrionalis, montes Tatry, distr. Poprad, vallis „Tristarská dolina", alt. 1300-1600 m s.m.; Nr. 128202; 20.08.1971; leg. M. VAŠÁK (LI). – Hungaria, comitatus Szepes, montes Bélaenses, in cacumine montis Bolandgerö = Törichter Seen supra Kopapass, alt. cca. 1900 m, solo calc.; 01.09.1907; leg. E.G. NYÁRÁDY (SIB). – Hungaria, comitatus Szepes, Montes Bélaenses, in valle Drechslerhäuschen sub monte Stirnberg, alt. cca. 1400-1500 m, solo calc.; 01.09.1907; leg. E.G. NYÁRÁDY (SIB). – Hungaria, comitatus Szepes, montes Bélaenses, in valle Kämpental sub Breitesfeld, supra pagum Zdjar, alt. cca. 1300 m, solo calc.; 18.07.1908; leg. E.G. NYÁRADY (SIB). – Tatra, Bélaer Alpen, in cacumine montis Hintere Fleischbank, alt. 2020 m, calc.; 03.08.1924; leg. NYÁRÁDY (SIB). –Tatra Magna, sub Karfunkelthurm ad Kesm. Grüner See, alt. cca. 1600 m, Granit; 02.08.1924; leg. E.I. NYÁRÁDY (SIB). – M. Tátra, Vaskapu, Nr. 161496; 11.08.1904; leg. GYÖRFFY (CL). – Magas Tátra, Vorderes Kupferschächtenthal, Nr. 161443; 22.08.1904; leg. GYÖRFFY (CL). – Magas-Tátra, a Mengusfalvi völgyélen a. N. Hinekotö, 1965 m, Nr. 161999; 31.07.1915; leg. HULJÁK (CL). – „Királyhegy", Hnileczi, ..., Nr. 13309; 18.07.1890; leg. A. RICHTER (CL). – Hab. in valle „Kleinkohlbach", M. Tatra, c. 1700 m; 28.07.1930; leg. A. MARGITTAI (CL). – Im Kleinkohlbachtale, Hohe Tatra, M-0007111; 28.07.1930; leg. A. MARGITTAI (M). – Tatra, in valle Kl. Kohlbachtal, alt. 1300-1800 m, Granit; 13.08.1924; leg. E.I. NYÁRÁDY (SIB). – Hab. ad lacum Beikás, Magna-Tatra, c. 1800 m; 11.08.1928; leg. A. MARGITTAI (CL). – Ad Köpataki tó Tátrae; Nr. 21540; 19.08.1902; leg. BORBÁS (CL). – Vas kapu Tatra, Nr. 13300; 15.07.1884; leg. A. RICHTER (CL). – Cott. Szepes, Mt. Magas Tátra in graminosis loco Blumengarten vallis Felkai völgy, ad rivum vallis Tarpatak; 8. –9.07.1928; - (CL). – Tatra, in valle Felkaertal, Blumengarten, alt. cca. 1800-1900 m, Granit; 16.08.1924; leg. NYÁDRÁDY (SIB). – Flora der Hohen Tatra,

Blumengarten im Felker Tal, 1821 m, M-0007112; 23.07.1931; leg. O. & E. BEHR (M). – Hungaria, comitatus Szepes, Tatra-Magna, in declivibus graminosis et saxosis sub lacum Békástavak (Frosch Seen) in valle Menguszfalvivölgy, alt. cca. 1800 m, solo granitico; 18.09.1910; leg. E.G. NYÁRÁDY (SIB). – Hungaria, comitatus Szepes, montes Bélaenses, in declivibus meridionalibus montis Muran, supra pagum Javorina, alt. cca. 1500 m; 20.07.1910; leg. E.G. NYÁRÁDY (SIB). – Hungaria, comitatus Szepes, Tatra Magna, sub lacum Késmárki Zöldtó, praeter rivum Weisswasser, alt. cca. 1300 m; 26.07.1905; leg. E.G. NYÁRÁDY (SIB). – Hungaria, comitatus Szepes, Tatra Magna, in valle Menguszfalvi völgy inter lacus Poprádító et Hincóitó, alt. cca. 1600-1700 m, solo granit.; 27.08.1905; leg. E.G. NYÁRÁDY (SIB). – Hohe Tatra, Aufstieg von Štrbské Pleso nach Popradské Pleso zum Rysy bei 2000 m, zwischen Silikatblöcken, M-0006240; 16.08.1973; leg. E. ALBERTSHOFER (M). – Flora der Karpaten, Kl. Tatra, Bachufer im Demenovathale, Kalk, ca. 1000 m, Nr. 60834; 08.08.1899; leg. F. PAX (BP). – Flora Hungarica, Comit. Hont. Pukanec, Bakabánya, Brezno, Stroma; 08.1898; leg. KUPČOK (ZT). – Flora Zoliensis, Brezno, in fruticosis „Stráná"; 26.07.1898; leg. S. KUPČOK (LI). – Subalp. monti Babiagora, comit. Árva, locus fere classicus; 1883; leg. L. SIMONKAI (BP). – Comit. Árva, in pineti infra locus „Rohačsi savak" – alpinum liptoviensium, ca. 1500 m; 22.08.1911; leg. A. JAVORKA (BP). – In rupestribus „Magos Fatra" loco „Bartya"; 08.1904; leg. L. SIMONKAI (BP). – Tatra, ad lacum Buckholz, 1950 m; 04.08.1931; leg. G. LENGYEL (BP). – Comit. Liptó, Tatra Inf. in valle Lucsky ad Demenyfalven; 25.07.1928; leg. G. LENGYEL (BP).

subsp. *firmum* var. *portae-ferratae* STARMÜHLER & MITKA varietas nova

Holotypus: [Slovakia, Belianske Tatry], Magas-Tátra, ad „Vaskapu" /Eisernes Thor/[Skalné vráta], Nr. 13223; 14.08.1901; leg. A. RICHTER (CL).- **Isotypus**: detto, Nr. 21536 (CL).

Both specimens have been determined by GÁYER 11.1909 as *Aconitum firmum* REICHENBACH and have been revised by MUCHER 02.1992 as *Aconitum napellus* LINNAEUS subsp. *firmum* (REICHENBACH) GÁYER.

Diagnosis: Axis inflorescentiae glabra; pedunculi glabri; bracteolae linearis, 1-2 (-3) mm, glabrae; tepala glabra; filamenta glabra vel sparse pilosa; carpella glabra vel tergo sparse pubescentes.

Etymology: This subspecies of *Aconitum firmum* is named after its locus classicus Vaskapu/Eisernes Tor (= iron gate) in the Belianske Tatry Mountains. Today this toponym is called Skalné vráta (= rocky gate), not to confound with another locality originally called Železné vráta/Eisernes Thor (= iron gate) in the Vysoké Tatry Mountains.

Inflorescence axis sparsely glabrous; pedicels glabrous; bracteoles linear, 1-2 (-3) mm long, glabrous; tepals outside glabrous; filaments of the stamens glabrous or sparsely pilose; carpels glabrous or sparsely pubescent on the backside.

Distribution: This new variety grows mainly in a small area in the Slovakian part of the Tatry Mountains, in the Malá Fatra Mountains and in addition it was also found in the Babia Gora Mountains in Poland (MITKA & STARMÜHLER 2001), where it grows in mixed populations with var. *firmum*.

Adnotation: *Aconitum firmum* var. *portae-ferratae* has probably a parallel evolution as *A. napellus* subsp. *formosum* in the Eastern Alps. The alpidic taxon

differs from subsp. *napellus* by extremely small bracteoles quite the same as *A. firmum* var. *portae-ferratae* differs from subsp. *firmum*. It seems to be the same at the southwestern border of *A. plicatum* as well as at its northeastern border. There may be an ancient genetic influence of *A. plicatum* in the Alps in *A. napellus* subsp. *formosum* and there may be the same genetic influence in the Carpathians in *A. firmum* var. *portae-ferratae*, which still has to be proved. Beside of this supposed geneflow influence by *A. plicatum* (= *A. callibotryon* RCHB.), which is endemic to the Bohemian Mass/Český Masív (including the Šumava and Sudeten Mts.) (SKALICKÝ 1990), it can be stated that *A. napellus* subsp. *formosum* is a genetic fixed taxon now, fully fertile and with a rather scattered area (often in competition with subsp. *lobelii* and subsp. *napellus*, but morphologically clearly separated from both of them) and distinctly distant from the area of *A. plicatum* (which does not occur in the Alps), so that there exist no more areas of introgression anymore. The same situation can be taken into consideration in *A. firmum* var. *portae-ferratae*, which seems to be a genetic fixed taxon now, fully fertile and with, as known to date, only with few localities in the Northern Carpathians (also often in competition with var. *firmum*) and distinctly distant from the area of *A. plicatum* (which does not occur in the Northern Carpathians), so that there exist no more areas of introgression anymore.

From the point of view of the hierarchy of morphological characteristics, bracteoles are one of the main marks (beside kind and density of pubescence) to distinguish the subspecies of *Aconitum firmum*. Because of the lack of more data (geographical area) this mark falls in the hierarchy so that this taxon has to be treated in the rank of a variety. For this reason the populations of var. *portae-ferratae* still have to be examined and the variability of the plants in pure populations has to be seen, as well as its area of distribution has to be documented better to discuss this taxon probably in the rank of a subspecies too.

Specimina visa: Slovakia: Tatra, Alpenkessel zwisch. Nový u. Havran; 09.07.1918; leg. K. RONNIGER (W). – Im Kleinkohlbachtale, Hohe Tatra, M-0007111; 28.07.1930; leg. A. MARGITTAI (M). – Hungaria, comitatus ad confin. Árva et Trencsén, montes Kriván Tatrae, in declivibus montis Rozsudec, alt. cca. 1300 m, solo dolomitico; 27.7.1907; leg. E. NYÁRÁDY (SIB). – Babia Góra, Rybny potok, 750 m; 20.08.1997; leg. D. RUSIN (KRA).

subsp. *firmum* × subsp. *maninense*

Inflorescence axis glabrous; pedicels sparsely 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 pubescent on the backside.

Aconitum firmum subsp. *firmum* is strictly characterized by totally glabrous inflorescences (axis, pedicels and outside of the tepals) in its whole area of distribution. Sparse glandular pubescence on the pedicel like in the plant of this until now only known specimen must be interpreted as a hybridogenous influence of subsp. *maninense*. To be sure and to know more about the

variability of that hybrid another specimens for examination or better living material would be necessary.

Specimina visa: Slovakia: Hungaria, comitatus Szepes, Montes Bélaenses, in valle Drechslerhäuschen sub monte Stirnberg, alt. cca. 1400-1500 m, solo calc.; 01.09.1907; leg. E.G. NYÁRÁDY (SIB).

subsp. *fissurae* NYÁRÁDY 1939, Enumerarea plantelor din Cheia Turzii: 132

Syn.: *A. romanicum* WOŁOSZCZAK 1903, Flora Polonicae exsiccatae no. 905. – *A. flerovii* STEINBERG 1937 in KOMAROV, Flora of the URSS 7: 730.

Lectotypus (designatus hoc loco): [Romania] Transsilvania, Cheia Turzii, Repezişul caprelor; Nr. 435214; 06.09.1936; leg. E.I. NYÁRÁDY (CL).

Inflorescence axis glabrous; pedicels glabrous; bracteoles linear to lanceolate, (3-) 4-6 mm long; tepals glabrous outside; filaments of the stamens mostly densely pilose; carpels glabrous.

This subspecies is quite common in the Eastern and Southern Carpathians as well as in the Bihor Mountains and in the Velebit Mountains. In the northwestern part of the Marmaros/Maramureş it frequently occurs near to the border of the Forest Carpathians (Bogdan, Mt. Čorna hora, Mt. Turkul, Mt. Pop Ivan, Gutin Tomnatyk Mt., Mt. Hoverla). In the adjacent region of the Forest Carpathians this taxon can be confirmed just from four localities until now.

Specimina visa: Ukraine: In valle Heršovec prope opp. Koločava; 07.1932; leg. A. LÁSKA (PRC).- In jugo Sikla prope opp. Sinovir; 07.1932; leg. A. LÁSKA (PRC).- Com. Marmaros, in alp. Szvidoviec, 1700 m; 04.07.1936; leg. A. MARGITTAI (CL).- Marmarosz, Mt. Dragobat, 1700 m; 25.07.1940; leg. ANDREÁNSZKY (BP).- Bliznica prope Jasina, 1700 m; 06.08.1928; leg. V. KRAJINA (PRC).- Dragobady; 17.08.1929; leg. M. DEYL (PRC).

subsp. *maninense* (SKALICKÝ) STARMÜHLER status novus

Basionym: *Aconitum firmum* REICHENBACH subsp. *moravicum* SKALICKÝ var. *maninense* SKALICKÝ 1985, Preslia 57: 136.

Holotypus: [Slovakia] Manínska soutěska – Súľov, Nr. 725; 01.08.1920; leg. K. DOMIN (PRC).

Inflorescence axis densely glandular pilose; pedicels densely glandular pilose; bracteoles linear to spathulate or divided, situated short before the tepals, (1.5-) 2.5-4 (-6) mm long; tepals outside densely glandular pilose; filaments of the stamens glabrous or pilose; carpels glabrous or pubescent.

Glandular pubescence is quite spread in European *Aconitum* subgen. *Aconitum*, more often and wider spread in sect. *Aconitum* than in sect. *Napellus*. Two species in sect. *Napellus* with exclusively straight glandular pubescence in the inflorescence are *A. burnatii* (Sierra Nevada, Alpes Maritimes) and *A. pentheri* (Balcan peninsula), which are comprehended in subsect. *Burnatii*. In subsect. *Napellus* glandular hair (curved or straight) is mostly just mixed with eglandular hair (*A. bucovinense*, *A. firmum*, *A. napellus*, *A. tauricum*). The existence of exclusively straight glandular pubescence in a taxon of subsect. *Napellus* is a very special characteristic and unique in *A. firmum* subsp. *maninense*. Since its first description by Skalický (1985) several new toponyms

have been found (and the grid will surely become narrower when specially searching for this taxon) and we can see a distinct central area now (fig. 3).

Adnotation: There occur plants in the Čornohora Mountains (Eastern Carpathians close to the border to the Forest Carpathians) which look very similar to *A. firmum* subsp. *maninense.* These plants are probably hybrids of *A. firmum* with *A. degenii* or *A.* ×*nanum* – they still have to be investigated to come to a final result. Karyological investigations will be necessary as in *A. firmum* subsp. *maninense* too.

Specimina visa: Poland: Galicia, ad pedem montis Tatrae Magnae, in valle Poduplaski, alt. cca. 1000 m, solo granitico; 27.07.1908; leg. E. NYÁRÁDY (SIB).– Galizien, Nord-Karpaten, Tatry Wysokie (Hohe Tatra), Dolina Rybiego Potoku (Fischbachtal) N vom Morskie Oko (Großer Fischsee), N 49°12,95', E 20°04,94', 1305 m alt., Hochstaudenfur; 13.08.1997; leg. U. & W. STARMÜHLER (Herb. STARMÜHLER, TNS). – Galizien, Nord-Karpaten, Tatry Wysokie (Hohe Tatra), S-Ufer vom Morskie Oko (Großer Fischsee), N 49°11,64', E 20°04,12', 1395 m alt.; Hochstaudenflur; 13.08.1997; leg. U. & W. STARMÜHLER (GZU, WU). – Tatry, źródliska potoku wpadającego do Suchej Wody (m. Capówka a Groniem), 940 m; 01.09.1965; leg. S. & B. PAWŁOWSKI (KRAM- PAWŁOWSKI). – Tatry, w pobliżu ujścia potoku z Capowskiego Lasu, E od Sichlańskiego p.; 04.09.1965; leg. S. & B. PAWŁOWSKI (KRAM-PAWŁOWSKI). – Tatry, nad p. (lewy dopływ Suchej Wody) E od Sichlańskiego Potoku, brzegi lasów i potoku 870-890 m; 01.09.1965; leg. S. & B. PAWŁOWSKI (KRAM-PAWŁOWSKI). – Tatry, Sichlański p., mokre miejsce 860 m; 23.08.1965; leg. S. & B. PAWŁOWSKI (KRAM-PAWŁOWSKI). – Slovakia: Manínska soutěska, Súľov, Nr. 725; 01.08.1920; leg. K. DOMIN (PRC), Holotypus. – Manín (SW od Súľovských vrchov), ok. 400 m; 27.07.1973; SKALICKÝ & SKALICKÁ (PRC). – Hungaria, comitatus Liptó, montes Tatrae Liptoviae, in saxis „Javor" in parte superiore vallis Tycha, alt. cca. 1500 m, solo calc.; 01.08.1907; leg. E. NYÁRÁDY (SIB). – Montes Liptovské Tatry, in alpinis mont. Osobitá, alt. c. 1580, solo calcareo; 07.1938; leg. M. DEYL (BP). – Montes Liptovské hole, mons Červené vrchy, in locis lapidosis calcareis rupium Javorové skalky, alt. 1450 m; 21.08.1930; leg. J. DOSTÁL (PRC). – Liptovské hole, Tichá Dolina; 08.1935; leg. P. SVOBODA (PR). – Tatra, in valle Kl. Kohlbachtal, Fünf Seen, alt. cca. 1900-2100 m; Granit; 13.08.1924; leg. E.I. NYÁRÁDY (SIB).

subsp. *moravicum* SKALICKÝ 1982, Preslia 54: 115

Syn.: *A. napellus* LINNAEUS em. SKALICKÝ subsp. *firmum* (REICHENBACH) GÁYER var. *carpaticum* MALOCH 1932, Sborn. Muz. Slov. Společn. 16: 124.

Holotypus: [Czech Republic] Beskydy, u cesty na západ. svahu Smrku, 1025 m, Nr. 322; 27.07.1943; leg. R. KURKA (PRC).

Inflorescence axis densely eglandular curved and crisped pubescent; pedicels densely eglandular curved and crisped pubescent; bracteoles at least those of the lowest flowers of the terminal raceme divided or at least toothed, rarely undivided, 2.5-5 (-10) mm long, becoming larger within the terminal inflorescence from the upper to the lower flowers; tepals outside densely eglandular curved and crisped pubescent; filaments of the stamens mostly pilose; carpels glabrous or curved pubescent on the backside.

Specimina visa: Poland: M. R. Rośliny Polskie, Beskid Zachodni, Babia góra, na Djablaku; 10.08.1911; leg. T. WILCZYŃSKI (GZU). – Bei der Czorna-Vythsula /Schwarzen Weichselquelle auf der Barania um 3500', Schlesische Carpathen, M-0007113; 07.1857; leg. UECHTRITZ (M). – Babia Góra, Rybny potok, 750 m; 20.08.1997; leg. D. RUSIN (KRA).

– Czech Republic: Beskydy, u cesty na západ. svahu Smrku, 1025 m, Nr. 322; 27.07.1943; leg. R. KURKA (PRC), holotypus. – Roháče, u Zverovky; 06.08.1968; leg. KOPECKÝ (PR). – Slovakia: Flora carpathica, Comitatus Trencsiniensis, im Thale Vrátna, M-0007876; 08.1878; leg. C. BRANCSIK (M). – Hungaria, comitatus Liptó, montes Tatrae Liptoviensae, in saxis „Javor" in parte superiore vallis Tycha, alt. cca. 1500 m, solo calc.; 01.08.1907; leg. E. NYÁRÁDY (SIB). – Flora Hungariae, in locis lapidosis calc. in subalp. m. Suchý (Krivein Tatra), c. 1300 m; 07.1912; leg. A. MARGITTAI (CL). – Malá Fatra, in lapidosis in declivi merid. montis Chleb, cca 1600 m, solo calcareo; 04.08.1950; leg. J. SOJÁK (PR).

nsubsp. *paxii* STARMÜHLER nothosubspecies nova (*A. firmum* subsp. *maninense* x subsp. *moravicum*)

Syn.: *A. palmatifidum* REICHENBACH fo. *piliferum* GÁYER 1913, in schedae

Holotypus: 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. & W. STARMÜHLER (GZU).

Diagnosis: Axis inflorescentiae glanduloso et eglanduloso curvate et crispule piloseque pubescens; pedunculi infra bracteolas eglanduloso curvate crispuleque pubescentes, supra bracteolas glanduloso et eglanduloso curvate et crispule piloseque pubescentes; bracteolae lanceolatae vel spathulatae, pubescentes, infra flos sitae; tepala externe glanduloso et eglanduloso curvate et crispule piloseque pubescentes; filamenta glabra vel pilosa; carpella glabra vel tergo pubescentes.

Eponymy: This new nothosubspecies is dedicated to Prof. Dr. Ferdinand Albin PAX (born 26.7.1858 at Königshof/Böhmen, died 1. 3. 1942 at Breslau/ Schlesien), German botanist and director of the Botanical Garden at Breslau (today Wrocław), the author of „Grundzüge der Pflanzenverbreitung in den Karpathen" (1898-1908).

Inflorescence axis glandular and eglandular curved and crisped pubescent and pilose; pedicels below the bracteoles mainly eglandular curved and crisped pubescent, above the bracteoles glandular and eglandular curved and crisped pubescent and pilose; bracteoles lanceolate to spathulate, situated in the upper half of the pedicel, pubescent and pilose; tepals outside glandular and eglandular curved and crisped pubescent and pilose; filaments of the stamens glabrous or sparsely pilose; carpels glabrous or pubescent on the backside.

Specimina visa: Poland: 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. & W. STARMÜHLER (GZU), holotypus. – Babia Góra, Rybny potok; 750 m; 20.8.1997; D. RUSIN (KRA). – [Beskid Żywiecki] Pilsko; 8.1878; H. ZAPAŁOWICZ (KRAM).- [*A. napellus* var. *babiogorense* fo. *vestitum* ZAPAŁ., rev. H. ZAPAŁOWICZ] Pilsko; ?; J. KRUPA (KRAM). – [*A. napellus* var. *carpaticum* ZAPAŁ. fo. *puberulum* ZAPAŁ.] Babia Góra, lasy pod Djablakiem, 1160 m; 24.7.1906; H. ZAPAŁOWICZ (KRAM) – Slowakia: Tátra – Kriván hegyseg, Kis – Kriván, Nr. 60325; 12.08.1889; - (BP). – Tátra – Kriván hegység, Rosnobe, Nr. 60323; 12.08.1889; leg. SZÉGLIGETI (BP). – Tatra – Kriván, Rozsutec, Nr. 60322; 12.08.1889; leg. SZÉPLIGETI (BP).

nsubsp. *zapalowiczii* STARMÜHLER nothosubspecies nova (*A. firmum* subsp. *firmum* × nsubsp. *paxii*)

Holotypus: 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. & W. STARMÜHLER (GZU).

Diagnosis: Axis inflorescentiae sparse glanduloso et eglanduloso curvate et crispule piloseque pubescens; pedunculi sparse glanduloso et eglanduloso curvate et crispule piloseque pubescentes; bracteolae linearis, lanceolatae vel spathulatae, sparse pubescentes, infra flos sitae; tepala glabra; filamenta glabra vel sparse pilosa; carpella glabra vel tergo sparse pubescentes.

Eponymy: This new nothosubspecies is dedicated to Hugo ZAPAŁOWICZ (1852-1917), Polish botanist and author of „Conspectus florae Galiciae criticae" (1908), where he describes several new *Aconitum* taxa.

Inflorescence axis sparsely glandular and eglandular curved and crisped pubescent and pilose; pedicels sparsely glandular and eglandular curved and crisped pubescent and pilose; bracteoles linear, lanceolate or spathulate, situated in the upper half of the pedicel, sparsely pubescent and pilose; tepals outside glabrous; filaments of the stamens glabrous or sparsely pilose; carpels glabrous or sparsely pubescent on the backside.

***Aconitum bucovinense* ZAPAŁOWICZ 1908, Conspectus Florae Galiciae Criticus 2: 230, pro hybr.**

Lectotypus (designatus hoc loco): Dr. A. REHMANN: Exsiccata Florae Galiciensis; *Aconitum*; Jakobeni na Bukowinie; leg. A. REHMANN (KRAM); no date; Nr. LXXVI/69 3532; KRAM 132396. This specimen was determined by ZAPAŁOWICZ himself as *A. napellus* × *A. paniculatum* [= *Aconitum bucovinense*] on 16.02.1908., and it is probably one of the specimens, which ZAPAŁOWICZ (1908) cites from this locus classicus only with „Jakobeny".

Perennial; 20-150 cm high; root tuberous; stem erect, stiff; caulinar leaves with lanceolate lacinias, its segments mostly narrower than in *A. firmum*, about five times divided almost to the base, mostly without connected veins, almost glabrous or sparsely curved pubescent; inflorescence simple or ramose, densely curved and crisped glandular and eglandular pubescent and glandular pilose; pedicels straight, standing off from the axis upright, densely curved and crisped glandular and eglandular pubescent and glandular pilose; bracteoles linear to obovate-lanceolate, (3-) 4-6 (-15) mm long, pubescent on both sides; flowers deep blue; tepals outside densely curved and crisped glandular and eglandular pubescent and glandular pilose; hood mostly distinctly longer than high; nectaries mostly pilose on the claws and lips, claws of the nectaries distinctly curved, spurs of the nectaries capitate, always reaching the top of the hood; filaments of the stamens with or without teeth, mostly densely pilose; carpels 3 (-4), glabrous or mostly curved and/or straight pubescent on the backside, fertile; (VI-) VII-VIII.

Adnotation: Hybrids of *Aconitum bucovinense* with *A. degenii* are morphologically very similar, but they are sterile. It surely occurs in the Forest Carpathians but there are still investigations necessary.

Specimina visa: Poland: Western Bieszczady, Halicz Mt., in rock crevices, 1250 m; 2.8.2000; leg. J. MITKA (KRA). – Połonina Caryńska, 1045 m, stok N, w lesie bukowym nad potokiem; 7.9.1995; J. MITKA (KRA). – Ukraine: Transcarpathia, district Uzhgorod, environs of Domanyutsi village, on the meadows, Nr. 197334; 17.06.1992; leg. V. KRICHFALUSHY (LI).- Flora Hungarica, Sovjetunió, Kárpátukrajna, Absinec; 20.07.1959; leg. I. FODOR (BP).- Floret Augusto in nostris alpibus, abunde in monte Foltie, Strimba etc.; - (SIB). – [Eastern Bieszczady] In subaline Pikuj (pertinet ad montes „Beszkidek") supra pagum Sebestyen-falva, Com. Bereg; 23.08.1907; leg. THAISZ (B).

***Aconitum ×nanum* (BAUMGARTEN) SIMONKAI 1887, Enum. Fl. Transsilv. Vesc. Crit.: 64, pro species** (*A. bucovinense* × *A. firmum*)

Lectotypus (designatus hoc loco): [Romania], in m. Arszuluj, Nr. 4745; [1812]; leg. [BAUMGARTEN] (CL-BAUMGARTEN).

BAUMGARTEN (1816) cites this taxon from „in mtb. Csibesz et Arszuluj". A specimen from the second locality was found in the Herbarium BAUMGARTEN at CL. In the following adnotation BAUMGARTEN also mentions, that he himself digged this plant in 1812 in Monte Arszuluj and transplanted it into the garden of Com. Joh. HALLER von Hallerstein in Fejéregyháza.

Perennial; 20-160 cm high; root tuberous; stem erect, stiff; caulinar leaves with lanceolate lacinias, about five times divided almost to the base, mostly without connected veins, almost glabrous or sparsely curved pubescent; inflorescence simple or ramose, glabrous or sparsely curved and crisped glandular and eglandular pubescent and glandular pilose; pedicels straight, standing off from the axis upright, sparsely curved and crisped glandular and eglandular pubescent and glandular pilose, often only above the bracteoles; bracteoles linear to lanceolate, (2-) 3-5 (-15) mm long, pilose at the margin, often pubescent on the upper side, sometimes also on the underside; flowers deep blue; tepals outside glabrous, sometimes the lateral petals with some single hair; hood mostly distinctly longer than high; nectaries mostly pilose on the claws and lips, claws of the nectaries distinctly curved, spurs of the nectaries capitate, always reaching the top of the hood; filaments of the stamens with or without teeth, mostly densely pilose; carpels (2-) 3 (-4), glabrous or curved and/or straight pubescent on the backside, fertile; (VI-) VII-VIII.

Adnotation: The typus specimen agrees with BAUMGARTEN's description „capsulis 3, glabris, nitidis". The description has to be amplified here, because *A. ×nanum* is a taxon of hybrid origin and has therefore more variability if not only the F1 hybrids but also backcrossings are included into this taxon.

This taxon, which is fully fertile, grows in mixed populations of *Aconitum bucovinense* and *A. firmum*, so that there is no doubt about its hybrid origin. As it could be observed in the Northern part of the Eastern Carpathians, it is also possible to find it in pure or almost pure populations in regions, where one of the parents becomes rare. This situation goes along with *A. variegatum* nsubsp. *podobnikianum*, the hybrid between subsp. *nasutum* and subsp. *variegatum*, in

Carniolia, or with *A. xtuscheticum*, the hybrid between *A. degenii* and *A. vitosanum*, which can be found in mixed populations of these taxa in the Caucasus, and which grows without at least one of its parents in Carniolia as a relict (STARMÜHLER 1996).

Specimina visa: Ukraine: In alp. Strimba pr. Kalocsa, Marmaros, c. 1200 m; 07.1924; leg. A. MARGITTAI (CL). – In vallis glacialis montis Negrovec [Piskonia] prope vicum Koločava, alt. c. 1650m, solo calcareo; 13.08.1936; leg. M. DEYL & A. LÁSKA (PR). – G. Świdowskie, Apszyniecka pod Todiaska; 28.07.1910; leg. H. ZAPAŁOWICZ (KRAM). – Comit. Marmaros, in alpe Dragobat supra page Körösmezö, in declivibus graminosis, c. 1700 m; 24.07.1939; leg. Z. KÁRPÁTI (BP). – In alp. Bliznica, Marmaros; 08.07.1939; leg. A. MARGITTAI (BP). – Hab. in alp. Bliznica, Marmaros, 1700 m; 08.07.1930; leg. A. MARGITTAI (BP). – Bliźnica; 23.07.1934; leg. ZLATNÍK (SAV). – In valle glacili sub cota 1735 prope montis Tatulska, solo calcareo; 07.1935; leg. M. DEYL (PR).

Aconitum subgen. *Aconitum* nsect. *Acopellus* in the Northern Carpathians and Forest Carpathians

A. bucovinense* × *A. degenii: still to investigate (To recognize this hybrid for sure there will be artificial hybridisations necessary before.).

A. degenii* × *A. firmum: still to investigate (Three plants have been found in the adjacent region Marmaros/Maramures (Herb. CL). Living Material for karyological investigations would still be necessary.).

***Aconitum* ×*lengyelii* GÁYER 1930, Magyar Botanikai Lapok 29: 46** (*A. firmum* × *A. variegatum*)

Lectotypus (designatus hoc loco): [Slovakia] Plantae exsiccatae regni Hungariae, Comit Szepes, in m. Hollókö pr. Sztraczena, Nr. 334968; 01.08.1901; leg. G. LENGYEL (BP).

GAYER (1930) mentions in his publication 3 specimens: Com. Szepes, Hollókö prope Sztracena (LENGYEL).- Com. Liptó, in valle Feketevág (LENGYEL).- Com. Zólyom, in valle Lomnista ad pag. Jecenye (LENGYEL). We have chosen the first one, which has been determined by himself in 1912.

The original description and the lectotype correspond with the hybrid between *A. firmum* subsp. *firmum* and *A. variegatum* subsp. *variegatum*.

nsubsp. *lengyelii* *(A. firmum* subsp. *firmum* × *A. variegatum* subsp. *variegatum)*

Perennial; 30-150 cm high; root tuberous; stem erect, stiff; caulinar leaves with broad lacinias, about mostly three times divided almost to the base, mostly connected veins, almost glabrous; inflorescence mostly ramose, glabrous; pedicels glabrous; bracteoles spathulate or little divided, 3-6 (-8) mm long, pilose at the margin; flowers deep blue; tepals glabrous outside; hood little higher than long; nectaries glabrous, claws of the nectaries little curved, spurs of the nectaries capitate or curved half backward, reaching the top of the hood or not; filaments of the stamens with or without teeth, glabrous; carpels 3-5, glabrous or pilose at the suture, sterile; VII-VIII.

Specimina visa: Poland: Dolina Kościeliska; 08.1855; leg. F. BERDAU (KRAM). – Galicia; 1895; A. REHMANN (LY). – Slovakia: Plantae exsiccatae regni Hungariae, Comit Szepes, in m. Hollókö pr. Sztraczena, Nr. 334968; 01.08.1901; leg. G. LENGYEL (BP), lectotypus. – Tatry Spiskie, Podspady nad Jaworzyną; 25.07.1878; leg. A. ROGALSKI (KRAM).

nsubsp. *walasii* MITKA nothosubspecies nova (*A. firmum* subsp. *moravicum* × *A. variegatum* subsp. *variegatum*)

Holotypus: [Poland, Carpathians], Podhale, Wzn. Gubałowskie, Roztoki żwirowiska nad Cz. Dunajcem; 22.08.1957; leg. E. PANCER (KRA 003852).

Diagnosis: Pedunculi curvate crispuleque pubescentes; galea externe glabra, distincte vel pauce elatior quam lata; nectarii calcar retroflexum vel totum revolutum; filamenta glabra vel pauce pilosa.

Eponymy: This new nothosubspecies is dedicated to Prof. Jan WALAS (1903-1991), Polish botanist, the author of classical works as „Wanderungen der Gebirgspflanzen längs der Tatraflüsse" and „Vegetation des Babia Góra-Gebietes in den Karpaten".

Perennial; root tuberous; stem erect; caulinar leaves with lanceolate lacinias, 3-5 times divided almost to the base, their segments 3-5 mm wide, almost glabrous or sparsely curved pubescent; inflorescence subsimple or ramose, glabrous or with scarce curved and crisped eglandular hair; bracteoles linear-lanceolate to obovate-lanceolate, spathulate or little divided 3-6 (-8) mm long, pilose at the margin, flowers deep blue; pedicels curved and crisped eglandular pubescent; hood glabrous outside, rarely with single curved hair, little higher than wide; claws of the nectaries little curved, spurs of the nectaries curved half backward or semispiral coiled, reaching the top of the hood or not; filaments of the stamens glabrous or sparsely pilose; carpels 3-5 glabrous or pilose on the suture, steril; VII-VIII.

Specimina visa: Poland: Podhale, Wzn. Gubałowskie, Roztoki, żwirowiska n. Czarnym Dunajcem, 22.08.1957; leg. E. PANCER (KRA). – [Beskid Żywieci] Pilsko, młaka pod „Hala Koroniecka" wys. 1220 m; no date; leg. G. MROŻEK (KRA). – [Beskid Śląski] dol. Wisły (ok. Baraniej Góry); 29.06.1914; leg. K. ROUPPERT (KRAM). – Śląsk, Bystrzyca; 07.1895; leg. B. KOTULA (KRAM).

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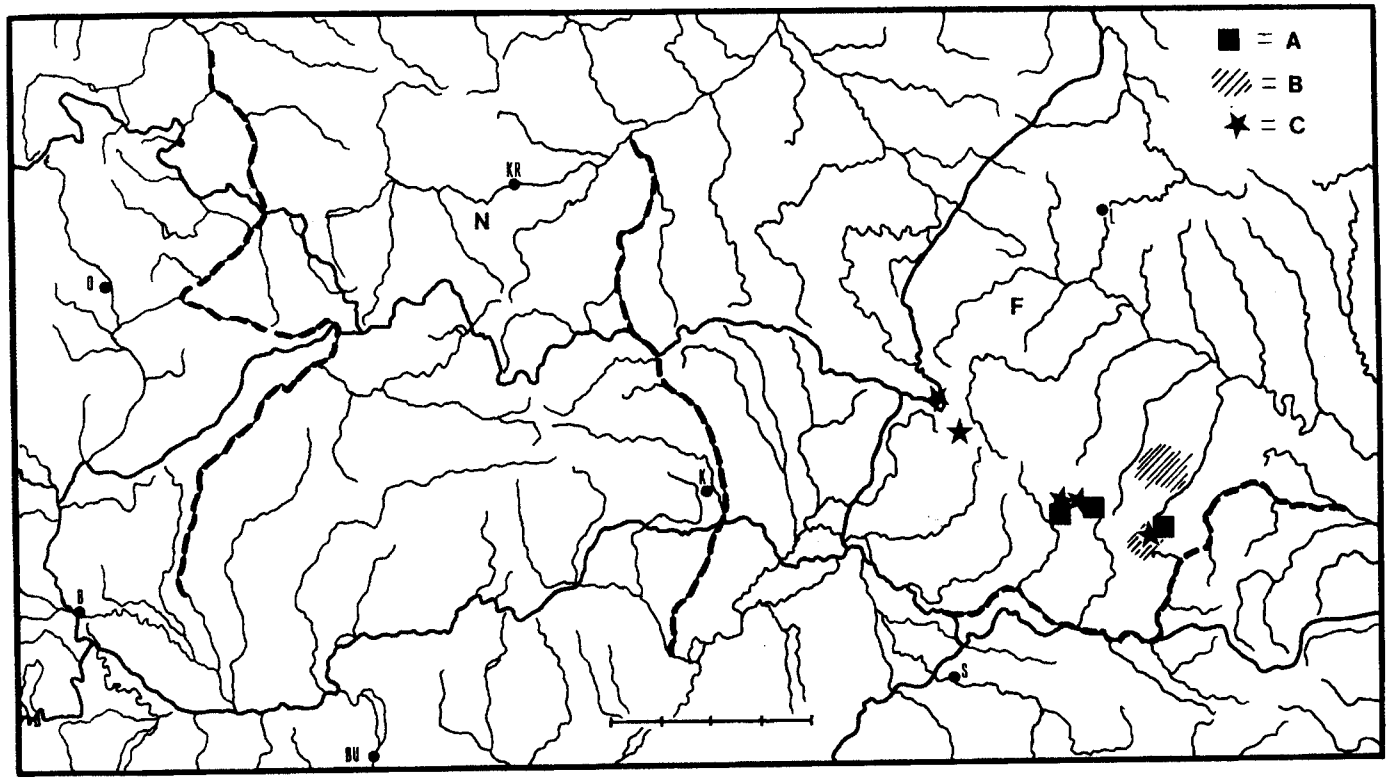

Fig. 2: Distribution of *Aconitum* sect. *Napellus* in the Northern Carpathians and Forest Carpathians: N = Northern Carpathians; F = Forest Carpathians; A = *A. bucovinense*; B = *A. firmum*; C = *A. ×nanum*; B = Bratislava; BU = Budapest; K = Košice; KR = Kraków; L = L'vov; O = Olomouc; S = Satu-Mare; scale = 100 km

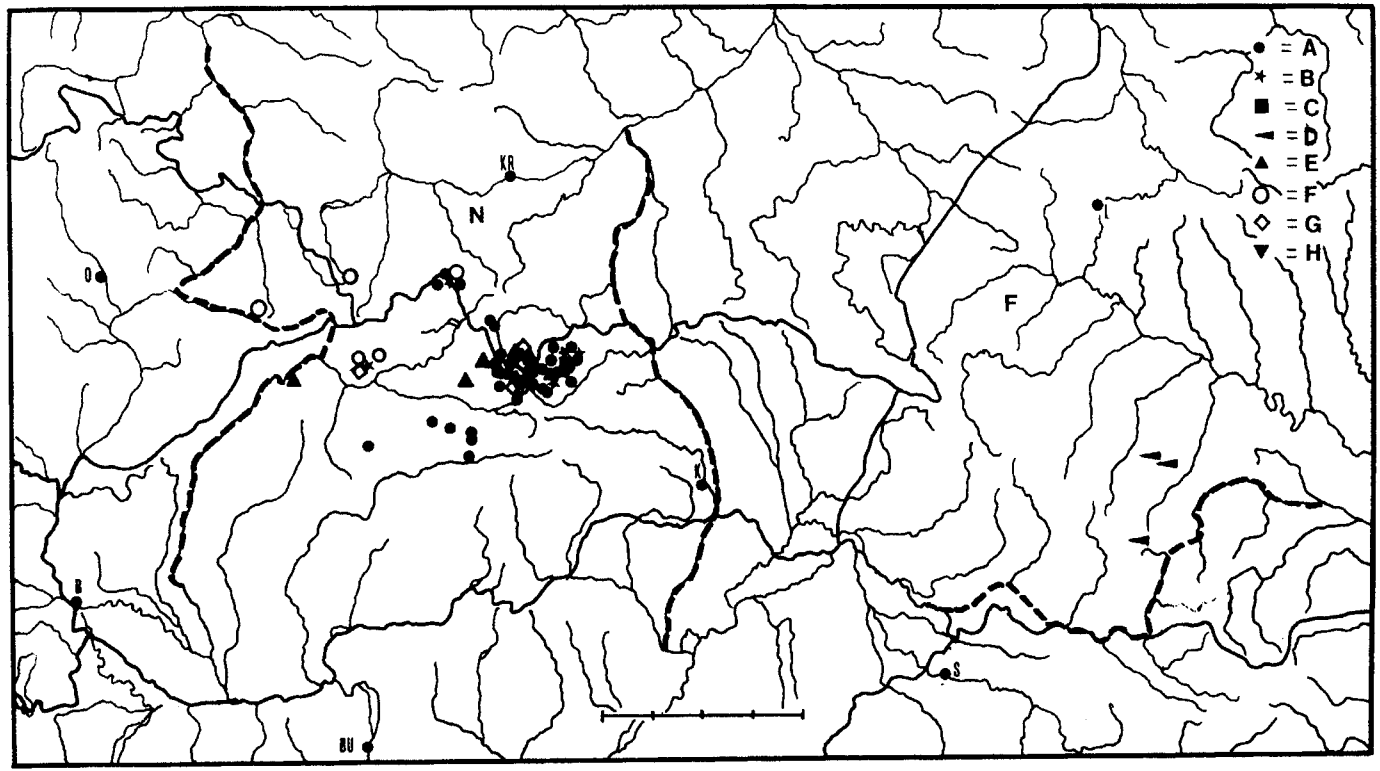

Fig. 3: Distribution of *Aconitum firmum* in the Northern Carpathians and Forest Carpathians: A = subsp. *firmum* var. *firmum*; B = subsp. *firmum* var. *portae-ferratae*; C = subsp. *firmum* × subsp. *maninense*; D = subsp. *fissurae*; E = subsp. *maninense*; F = subsp. *moravicum*; G = nsubsp. *paxii*; H = nsubsp. *zapalowiczii*; N = Northern Carpathians; F = Forest Carpathians; B = Bratislava; BU = Budapest; K = Košice; KR = Kraków; L = L'vov; O = Olomouc; S = Satu-Mare; scale = 100 km

Key for the genus *Aconitum* in the Northern Carpathians and Forest Carpathians

1 Hood 0.5-2.5 times as high as long, conical to hemisphaerical or obtuse, leaves with narrow segments or with broad segments (then divided to the base) 3

1* Hood cylindrical, about 2.5-3 times as high as long; nectary spurs spirally curved; leaves with very broad segments, not divided to the base 2

2 Flowers yellow ..... ***A. lycoctonum* subsp. *lycoctonum***

2* Flowers violet or dirty pink, rarely purple or liliac ..... ***A. moldavicum***

a Tepals outside curved pubescent ..... **subsp. *moldavicum***

a* Tepals outside straight pilose ..... **subsp. *simonkaianum***

a** Tepals outside curved pubescent and straight pilose ..... **nsubsp. *porcii***

3 Tepals pubescent and/or pilose outside 15

3* Tepals glabrous outside 4

4 Pedicels curved pubescent ..... ***A. lengyelii* nsubsp. *walasii***

4* Pedicels glabrous or of different pubescence 5

5 Pedicels glabrous 10

5* Pedicels pubescent and/or pilose 6

6 Pedicels curved and crisped eglandular and glandular pubescent and glandular pilose. 9

6* Pedicels at least above the bracteoles sparsely glandular pilose 7

7 Hood longer than high or as high as long; nectaries capitate ..... ***A. firmum* subsp. *firmum* × subsp. *maninense***

7* Hood higher than long; spurs of the nectaries half curved backward or semispirally curved 8

8 Carpels glabrous ..... ***A. ×hebegynum***

8* Carpels pilose on the suture ..... ***A. ×pawlowskii***

9 Filaments glabrous or sparsely pilose ..... ***A. firmum* nsubsp. *zapalowiczii***

9* Filaments mostly densely pilose ..... ***A. ×nanum***

10 Bracteoles at least of the lower flowers in the terminal inflorescence divided. 14

10* Bracteoles always undivided 11

11 Spurs of the nectaries capitate 12

11* Spurs of the nectaries curved backward ..... ***A. variegatum* subsp. *variegatum* var. *variegatum***

12 Bracteoles 1-2 (-3) mm long; filaments glabrous or sparsely pilose ..... ***A. firmum* subsp. *firmum* var. *portae-ferratae***

12* Bracteoles longer than 3 mm 13

13 Filaments mostly densely pilose; hood longer than high, or as high as long ... ***A. firmum* subsp. *fissurae***

13* Filaments glabrous; hood mostly little higher than long ..... ***A. ×lengyelii* nsubsp. *lengyelii***

14 Carpels fertile, glabrous or pubescent on the back; spurs of the nectaries little to distinctly capitate..... ***A. firmum* subsp. *firmum* var. *firmum***

14* Carpels sterile, glabrous or pubescent on the suture; spurs of the nectaries distinctly capitate or half curved backward... ***A. ×lengyelii* nsubsp. *lengyelii***

15 Bracteoles at least of the lower flowers in the terminal inflorescence divided; pedicels and tepals outside eglandular curved pubescent..... ..... ***A. firmum* subsp. *moravicum***

15* Bracteoles undivided; pubescence of the pedicels and tepals outside different **16**

16 Tepals outside only glandular pilose **18**

16* Tepals outside glandular and eglandular curved and crisped pubescent and pilose **17**

17 Hood almost as high as long; filaments glabrous or sparsely pilose .... ***A. firmum* nsubsp. *paxii***

17* Hood mostly dinstinctly longer than high; filaments mostly densely pilose .... ***A. bucovinense***

18 Hood distinctly higher than long; spurs of the nectaries not reaching the top of the hood **23**

18* Hood about as high as long or just little higher; spurs of the nectaries reaching the top of the hood **19**

19 Stem erect, stiff; root tuberous (long)..... ***A. firmum* subsp. *maninense***

19* Stem flexuous; root globose (round)..... **20**

20 Carpels glabrous **22**

20* Carpels pilose **21**

21 Tepals outside only sparsely glandular pilose..... ***A. ×hebegynum***

21* Tepals outside densely glandular pubescent..... ***A. ×gayeri***

22 Spurs of the nectaries capitate ..... ***A. degenii* subsp. *degenii* fo. *degenii***

22* Spurs of the nectaries bent backward or half curved backward .... ***A. ×hebegynum***

23 Carpels pilose only on the suture..... ***A. ×pawlowskii***

23* Carpels entirely pubescent..... **24**

24 Pedicels below and above the bracteoles glandular pilose..... ..... ***A. lasiocarpum* subsp. *lasiocarpum***

24* Pedicels glabrous or glandular pilose only above the bracteoles .... ***A. lasiocarpum* subsp. *kotulae***

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