ANNALES HISTORICO-NATURALES MUSEI NATIONALIS HUNGARICI
Volume 103 Budapest, 2011 pp. 5–22

Distribution of Conringia austriaca (Brassicaceae) in Hungary and its phytogeographical significance in Central Europe

L. Somlyay

Department of Botany, Hungarian Natural History Museum,
H–1476 Budapest, Pf. 222, Hungary. E-mail: somlyay@bot.nhmus.hu

Abstract – All relevant literature and Hungarian herbarium records of *Conringia austriaca* have been gathered and revised in order to clarify the species' distribution in Hungary and adjacent territories. Erroneous records are elucidated and corrected. The frequency of alien occurrences of this species is generally exaggerated, and all such European records need confirmation. The phytogeographical significance of *C. austriaca* is emphasized, and proposed that in Central Europe this species should probably be considered a relic of an interglacial or interstadial stage of the Pleistocene. With one figure.

Key words – *Conringia austriaca*, Croatia, distribution, Hungary, phytogeography, relic species, Romania, Serbia, Slovakia.

INTRODUCTION

Conringia austriaca (Jacq.) Sweet, 1826 is an Armenian-Anatolian-Balkan-Pannonian floristic element (Meusel *et al.* 1965), representing the "Loranthus-type" of distribution pattern postulated by Jäger (1970). A smaller isolated range of this species is reported from Central Italy (Pignatti 1982).

In fact, west of the Carpathians the European records of this species are extremely sparse (Schulz 1923, Jalas *et al.* 1996). Apart from a few old and quite isolated records from the vicinity of Prague (Smejkal 1984, Feráková 1985), the westernmost European occurrences of *C. austriaca* are currently known in the vicinity of Wien, characterized by typical Pannonian flora (Neilreich 1866, Beck 1893, Niklfeld 1964). While in the Czech Republic *C. austriaca* is considered extinct today (Feráková 1999,

HOLUB 2000, HOLUB & PROCHÁZKA 2000), the Austrian populations are critically endangered (NIKLFELD & SCHRATT-EHRENDORFER 1999). The only known Slovak localities at Devín and Kamenica nad Hronom (FERÁKOVÁ 2002) represent links between the Austrian and Hungarian occurrences. In Slovakia *C. austriaca* is considered an endangered species (FERÁKOVÁ *et al.* 2001). In the territories of former Yugoslavia and Romania this species seems to be very rare as well (JALAS *et al.* 1996, OPREA 2005), whereas no record is known for Slovenia (MAYER 1952, TRPIN & VREŠ 1995). However, *C. austriaca* is not included in the red books of Croatia (NIKOLIC & TOPIC 2005), Serbia and Montenegro (STEVANOVIC 1999) and Romania (DIHORU & NEGREAN 2009).

Although the Central European distribution of *C. austriaca* presented on the map of JALAS *et al.* (1996) is much more precise as compared to that published by MEUSEL *et al.* (1965), according to ANČEV (2007) the species is not so widespread in Bulgaria as suggested by JALAS *et al.* (1996). It is worth mentioning that even in Turkey the species is presumably very rare (DONNER 1985).

The distribution of *C. austriaca* in Hungary is poorly known, and it has not received appropriate attention by Hungarian nature conservation so far (NÉMETH 1989, FARKAS 1999). Despite the recent suggestions by SOMLYAY (2006) and BARINA *et al.* (2007) this species is still not protected by law in Hungary.

The principal aims of this paper were (1) to clarify the distribution of *C. austriaca* in Hungary and adjacent territories, and (2) to evaluate the phytogeographical significance of the species in Central Europe.

MATERIAL AND METHODS

To collect Hungarian records of *C. austriaca*, data from all relevant literature and specimens of the following herbaria were checked: Hungarian Natural History Museum, Budapest (BP), Eötvös Loránd University, Budapest (BPU), Corvinus University, Budapest (CORV), Debrecen University, Debrecen (DE), Eszterházy Károly College, Eger (EGR), Mátra Museum, Gyöngyös (GYÖ), Pécs University, Pécs (JPU), Kazinczy Ferenc Museum, Sátoraljaújhely (KAZI), Savaria Museum, Szombathely (SAMU), Móra Ferenc Museum, Szeged (SZE), Szent István University, Gödöllő (SZIE). In case of herbaria without international symbols (see THIERS 2008) I have created provisional ones (CORV, GYÖ, KAZI, SZIE) for the purpose of this article. The herbarium of Bakony Natural History

Museum (Zirc) was also checked, but no relevant specimen could be found there. The *Conringia* collections in the herbarium of the University of Zagreb (ZAHO, Croatia) were investigated in 2008 and 2009.

All herbarium records of *C. austriaca* from Hungary are presented. In the enumeration the records are grouped geographically. Within each region the records are grouped according to administrative units and localities (s.loc. = without exact locality). However, some localities presented separately in the enumeration are (or may be) actually identical. Within each locality the records are separated by semicolons and arranged in chronological order, and contain the (1) relevant part of the label's text (occasionally), (2) name of the collector (s.coll. = collector unknown), (3) date of collecting (s.d. = without date), (4) taxon name used by the collector (occasionally, if the name is erroneously applied to the specimen in question), and (5) acronym(s) of the herbarium(-ria).

Some specimens (kept in BP, SZE) from the territories of Hungary and Serbia erroneously identified and subsequently published as *C. austriaca* are listed. Based on voucher specimens, relevant Hungarian literature records are evaluated (and corrected, if necessary). Some information on the distribution of the species in the neighbouring territories (Slovakia, Romania, Serbia, Croatia) is given. The phytogeographical significance of the species in Central Europe is evaluated.

RESULTS AND DISCUSSION

Notes on application of taxon names referable to *Conringia*

Conringia austriaca was described by NICOLAUS JOSEPH JACQUIN as *Brassica austriaca* (JACQUIN 1775). Although its protologue and the accompanying picture is quite useable for its separation from *B. orientalis* LINNAEUS, 1753 (also presented in JACQUIN 1775), their distinctive features remained for a long time obscure for botanists, which resulted in confused taxonomic treatment and inconsistent application of the specific epithet "*austriaca*". Unfortunately, when describing *B. austriaca*, Jacquin used plants raised from seeds of unknown origin, and ascribed a habitat ("crescit in asperis, inque arvis") to his new species (= *C. austriaca* (JACQ.) SWEET) that is rather characteristic of LINNÉ's *B. orientalis* (= *Conringia orientalis* (L.) DUMORT., 1827, syn.: *Erysimum perfoliatum* CRANTZ, 1769). In fact, in the 19th century these species were often mistaken, most probably even in cases when two taxon names (theoretically referring to two taxa) were published, such as in the works of SADLER (1818), MALY (1848), SCHUR (1853, 1866), REUSS (1853), FUSS (1866) and HAZSLINSZKY (1872) (see later).

The confusion is well demonstrated on the scheda of *C. orientalis* (L.) "Andrz." in the series *Flora Hungarica exsiccata* (Cent. VI. No. 562), where JACQUIN's *B. austriaca* is still (1916!) listed as a synonym. On the other hand, all the three specimens (collected in central

Moravia in 1927 and 1930) labelled as *Conringia austriaca* "Reichb." in the series *Flora Exsiccata Reipublicae Bohemicae Slovenicae* actually belong to *C. orientalis* (see SMEJKAL 1984).

Vouchers of *Conringia austriaca* from Hungary

Buda Mts

Budaörs: **Budaörsi-hegy** (PAPP, 5.V.1946, BP); – **Csíki-hegyek** (LENGYEL, VI.1913, BP).

Budapest: s.loc. (s.coll., s.d., sub *Conringia orientalis* PERS., BP; SADLER, s.d., sub *Erysimum austriacum* BAUMG., BP; ENTZ, VI.1866, sub *E. austriacum* BAUMG., BP; RICHTER L., VI.1876, sub *E. orientale* R.BR., BP; BORBÁS, VII.1889, sub *C. orientalis*, BP); – **Csillebérc** (PAPP, VI.1941, BP); – **Farkasrét** (LENGYEL, 13.V.1926, BP; MOESZ, 19.V.1930, BP); – **Farkas-völgy** ("Wolfsthal Budae", WINTERL, s.d., sub *E. perfoliatum* CRANTZ, BP; RICHTER L., s.d., sub *C. orientalis* R.BR., BP; GRUNDL, 1842, sub. *E. austriacum* BAUMG., SZE; JURÁNYI, VI.1861, sub *E. perfoliatum* CRANTZ, BP; ENTZ, V.1866, sub *E. austriacum* BAUMG., BP; BORBÁS, 14.V.1871, sub *E. austriacum* BAUMG., BP; RICHTER L., VI.1873, BP; SIMONKAI, 20.VI.1874, BP; SZÉPLIGETI, 20.VI.1874, sub *E. austriacum* BAUMG., BP; SZÉPLIGETI, 26.V.1878, BP; STEINITZ, 25.V.1880, sub *E. orientale* R.BR., BP; SZÉPLIGETI, 2.VI.1881, BP; FILARSZKY & SCHILBERSZKY, 13.V.1889, BP; s.coll., 23.V.1895, sub *C. orientalis*, BP; FILARSZKY & KÜMMERLE, 21.V.1906, BP; FILARSZKY, KÜMMERLE & JÁVORKA, 28.V.1906, BP; LENGYEL, VI.1909, BP; KOCSIS, 1.VI.1910, BP, DE; BOROS, 9.V.1919, BP; BOROS, 10.V.1923, BP; "in cultis", JÁVORKA, 7.V.1923, BP; SZABÓ, 10.V. 1923, SZIE; SOÓ, V.1923, BP, BPU, DE; ZSÁK, 5.V.1928, CORV; JÁVORKA, 9.V.1929, BP; JÁVORKA, 5.V. 1933, BP; VAJDA, 13.V.1933, BP; VAJDA, 19.V.1934, BP; VAJDA, 17.V.1936, BP; BOROS, 6.V.1945, BP; KÁRPÁTI Z., 30.V.1948, BP; HORÁNSZKY, 4.VI.1949, BP; SIROKI, 30.IV. 1951, DE; MOLDVAI, 9.V.1951, KAZI; SIROKI, 18.V.1951, DE, SZIE; MOLDVAI, 14.VI.1951, KAZI; SOMLYAY, 9.V.1999, BP; SOMLYAY, 19.VI.2004, BP); – **Irhás-árok** (KÁRPÁTI Z., 22.V.1948, BP); – **Kecske-hegy** ("in saxosis graminosis fruticosis mtis Kecskehegy (... 382)", ZSÁK, 8.V.1920, CORV; GYELNIK, 6.V.1923, BP; "Kecske-hegy (384 m), Kecske-sziklák", SOMLYAY, 25.V.2008, BP); – **Ördög-orom** (ZSÁK, 9.VI.1929, CORV; ZSÁK, 16.V.1930, CORV; SOMLYAY & BAUER, 23.V.2005, BP); – **Rupp-hegy** (WAGNER, VII.1916, BP; TRAUTMANN, 5.V.1918, BP; SCHILLER, 6.V.1918, BP; SCHILLER & TRAUTMANN, 9.V.1918, BP, DE, JPU, SZIE; ANDRASOVSZKY, 9.V.1918, BP; ZSÁK, 9.V. 1918, CORV, SZIE; DEGEN, 28.VII.1918, BP; BOROS, 28.VII.1918, BP; BOROS, 28.IV.1919, BP; DEGEN, 18.IV.1920, BP; LENGYEL, IV.1920, BP; SOÓ, V.1923, BPU; BARTHA, 20.V. 1929, BP; PAPP, 5.V.1946, BP; KÁRPÁTI Z., 22.V.1948, BP, CORV, DE; HEGEDÜS, 17.IV. 1981, BP; SOMLYAY & PIFKÓ, 5.VII.2001, BP; SOMLYAY, 19.IV.2004, BP); – **Sváb-hegy** (SZÉPLIGETI, 9.V.1873, BP; BORBÁS, VI.1887, sub *C. orientalis*, BP; BORBÁS, VI.1895, BP; "in declivibus supra Farkasrét", ZSÁK, 5.V.1927, CORV; JÁVORKA, 19.V.1936, BP; "a Farkasvölgy felé lejtő oldala"

[hillside facing Farkasvölgy], JÁVORKA, 7.V.1951, BP; PAPP, 27.V.1951, BP); – **Vadaskert** (?) (SIMONKAI, 14.V.1874, BP (very ambiguous locality).

Nagykovácsi: **Hosszú-erdő-hegy** (PAPP, 10.V.1944, BP); – **Remete-hegy** ("in valle ad Maria Einsiedel", LÁNG, s.d., BP; CZAKÓ, 26.VI.1887, DE; PERLAKY, 11.V.1893, BP; SZABÓ, 28.V.1908, SZIE; SZABÓ, V.1911, BP; ZSÁK, 12.VI.1920, CORV; PÉNZES, 23.V.1929, BP; JÁVORKA, 14.IV.1936, BP; BOROS, 10.V.1944, BP; PAPP, 10.V.1944, BP; BOROS, 6.VI.1944, BP; BÁNÓ, 1.V.1948, BP; SOMLYAY, 16.VI.2004, BP; SOMLYAY, 22.V.2008, BP).

Pilis Mts

Csobánka: **Kis-Kevély** (BOROS 23.V.1948, BP; SOMLYAY, 14.VI.2006, BP); – **Ziribár** (BARINA & PIFKÓ, 18.V.2002, BP; SOMLYAY, 11.VI.2006, BP).

Esztergom: **Strázsa-hegy** (BARINA, 7.VI.2001, BP; SOMLYAY, 27.V.2010, BP); – **Tábla-hegy** (BAUER, 3.V.1998, BP; BAUER, 15.V.2005, BP).

Kesztölc: **s.loc.** ("kőszirteken", s.coll., VI.1860, sub *E. austriacum* BAUMG., BP; "in saxosis", GRUNDL, V.1864, sub *E. austriacum* BAUMG., BP); – **Borostás-hegy** (BARINA, 12.VI.2002, BP); – **Kétágú-hegy** (HORÁNSZKY, 17.V.1955, BP); – **Klastrom-szirtek** ("in fruticetis montis supra Klastrompuszta", BOROS, 18.IX.1918, BP; SOMLYAY, 21.V.1999, BP; BAUER, 25.IV.2008, BP); – **Öreg-szirt** (SOMLYAY, 28.IV.2009, BP).

Pilisborosjenő: **Ezüst-hegy** (PAPP, 10.VI.1951, BP); – **Nagy-Kevély** (THAISZ, 21.V. 1890, BP; BOROS, 9.V.1929, BP; ZSÁK, 25.V.1932, CORV; BOROS, 23.IV.1944, BP; PAPP, 30.IV.1944, BP; PAPP, 18.V.1944, BP; KÁRPÁTI Z., 9.V.1948, BP, CORV; PÓCS, 21.V.1951, BP; PAPP, 10.VI.1951, BP, EGR; BARINA, PIFKÓ & SOMLYAY, 31.V.2002, BP; SOMLYAY, 15.VI.2010, BP).

Pilisszántó: **Hosszú-hegy** ("a barlang alatt" [under the cave], BARINA & PIFKÓ, 18.V.2002, BP; "Drenek", SOMLYAY, 11.VI.2006, BP); – **Pilis-hegy** (LENGYEL, VI.1911, BP; BARTHA, 26.VI.1932, BP; BARTHA, 17.VI.1933, BP; GOTTHÁRD, 17.VII.1974, GYÖ; GOTTHÁRD, 3.VI.1975, GYÖ; GOTTHÁRD, 20.V.1976, GYÖ; GOTTHÁRD, 2.VI.1978, GYÖ; BAUER, 25.IV.2008, BP; "Szent László kúpja", SOMLYAY, 7.V.2008, BP; SOMLYAY, 9.V.2010, BP).

Üröm: **Kő-hegy** (BŐHM, 26.V.2001, BP; SOMLYAY, 1.VII.2008, BP).

Mátra Mts

Gyöngyös: **Sár-hegy** ("Szálaserdő /szélén/", PAPP, 18.VI.1950, BP).

Bükk Mts

Eger: **Nagy-Eged** (VRABÉLYI, 17.V.1868, sub *E. austriacum* BAUMG., BP, EGR).

Erroneously identified specimens of *Conringia austriaca*

Hungary

Csór: **Iszka-hegy** (Bakony Mts) (Filarszky & Kümmerle, 20.V.1927, sub *C. austriaca* (Cr.), BP) = *Conringia orientalis* (L.) Dumort.

Szeged: **Újszeged** (a district of Szeged city) ("Hungaria centralis. Ujszeged. Vigh féle fürésztelep", Lányi, 25.IV.1915, sub *C. austriaca* Pers., SZE) = *Conringia orientalis* (L.) Dumort.

Serbia

Petrovaradin: **s.loc.** ("Ad turrim Pulveram supra Petrovar in arvo", s.coll., s.d., sub *Brassica austriaca*, BP: Herbarium Wolnyanum No. 84.) = *Conringia orientalis* (L.) Dumort.

Evaluation of Hungarian literature records

Conringia austriaca was first collected in Hungary (in the Buda Mts) by Joseph Jacob Winterl, the professor of chemistry and botany in the former Buda-Pest University. Winterl's successor at the university, Pál Kitaibel made large-scale travels throughout the Carpathian Basin, however, there is only one binomial combination ("*Brassica austriaca*") in his diaries (Gombocz 1945: 486), which might refer to *C. austriaca*. The voucher specimen is missing. However, based on the locality, habitat and list of accompanying species, Kitaibel's record obviously refers to another taxon. Sadler (1818) registered both "*B. austriaca*" and "*B. orientalis*", but ascribed identical habitat ("auf Aeckern") for both. Later Sadler (1826, 1840) considered them as a single species occurring in various habitats ("in pratis montanis", "inter segetes").

Neilreich (1859, 1861) made important steps in clarifying the confused nomenclature, and separated *E. orientale* R.Br. and *E. austriacum* Baumg. (= *C. orientalis* (L.) Dumort.) from *E. austriacum* DC. (= *C. austriaca* (Jacq.) Sweet). In his famous "Aufzählung" (Neilreich 1866) all Hungarian records of *C. austriaca* published till that time were enumerated, but all records from Reuss (1853) were questioned. However, a mysterious record ("Fönyed am Plattensee im Com. Somogy (Kit. Slav.)") from the vicinity of Lake Balaton was also reported by Neilreich (1866). Actually, such indication is missing from Kitaibel's original diary (*Iter Slavonicum* 1808, see Lőkös 2001) and the earlier excerpt from this diary (Kanitz 1863). Since Kitaibel visited the aforementioned region in mid-September, when it is hardly possible to find and identify the annual *C. austriaca*, furthermore, no actual specimen of this taxon is known so far from the region of the lake, this record is to be considered erroneous. However, it was accepted by Borbás (1900), Jávorka (1924) and Boros (1925). What is more, Borbás (1900), although himself did

not recognize the taxon in the region, strengthened the assumption that the species occurred at Lake Balaton by a reference to the manuscript of SZENCY, HUTTER and WIERZBICKI (only the copy by MÜLLER 1842 is known). However, author names and specific localities are missing in this list. Consequently, the name "*Brassica austriaca*" listed here and in another manuscript of WIERZBICKI ("Flora Keszthelyensis", see BODNÁR 1957) cannot automatically be taken as *C. austriaca*. It is not by chance that JÁVORKA & SOÓ (1951) and SOÓ (1968, 1980) considered *C. austriaca* as being "extinct" from the region under study. In fact, this species has probably never occurred there.

Correct records of *C. austriaca* from the Buda Mts were published by KERNER (1867), although these localities were assigned to the "Pilisgruppe". However, despite the great amount of specimens collected in the Buda Mts during the 19th and 20th centuries, only a few records appeared in print (KERNER 1867, BORBÁS 1879, RONNIGER 1929, PÉNZES 1942, HEGEDÜS 1994, SOMLYAY 2000, 2009).

For the Pilis Mts the species was first reported by FEICHTINGER (1865), cited by NEILREICH (1870), although with erroneous page number (284 instead of 277). Despite the fact that its published records from the Pilis Mts are very scarce (FEICHTINGER 1899, BOROS 1940, SOMLYAY 2000, BAUER 2001), *C. austriaca* occurs along the whole range of the mountains (SOMLYAY 2009).

This species was first collected in the Bükk Mts by MÁRTON VRABÉLYI, and his record was published with correct name by BORBÁS (1878), cited by JÁVORKA (1924), SOÓ (1937, 1968, 1980), JÁVORKA & SOÓ (1951), SIMON (2000) and VOJTKÓ (2001). Unfortunately, the presence of *C. austriaca* here has not been confirmed since its discovery. Two further records of *C. austriaca* reported by VOJTKÓ (2001) are erroneous, since the corresponding specimens of HULJÁK and BUDAI from Szilvásvárad (BP) represent *C. orientalis*.

LÁNYI (1916) published *C. austriaca* from the Great Hungarian Plain (Szeged city, south Hungary). This occurrence, considered as casual, was acceptedwithout criticism by all subsequent literature (JÁVORKA 1924, JÁVORKA & SOÓ 1951, SOÓ 1968, 1980, PRISZTER 1985: 188, JALAS *et al.* 1996, SIMON 2000). However, its voucher specimen in SZE belongs to *C. orientalis* (see above), consequently, this record is erroneous.

In 1927 NÁNDOR FILARSZKY and JENŐ BÉLA KÜMMERLE collected a specimen in the eastern Bakony Mts (on Mt. Iszka near Csór village, central Hungary), which was labelled as "*Conryngia austriaca* (CR.)" (BP) (see above). Although this record was not published in Hungarian literature, it appears on the distribution map of *C. austriaca* presented in JALAS *et al.* (1996), probably as a result of personal information. The specimen also represents *C. orientalis*.

Most probably erroneous record of *C. austriaca* from the vicinity of Sopron city (west Hungary) was published by JÁVORKA (1937) as well. This record perhaps originates from the misinterpretation of GOMBOCZ (1906: 100), who reported *E. perfoliatum* from the vicinity of Sopron (evidently based on a former *C. orientalis* record published by WALLNER 1903). The corresponding voucher is missing, moreover, not a single *C. austriaca* specimen is known so far from the Sopron Mts and its surroundings. This record was adopted by all subsequent literature, although SOÓ (1980) and SIMON (2000) questioned it. In KIRÁLY *et al.* (2004) *C. austriaca* is registered based on SOÓ (1968, 1980) and an unpublished personal

observation by ISTVÁN CSAPODY. The latter refers to a casual occurrence of *C. austriaca* in a beech forest, however, such habitat is unlikely for this species.

Interestingly, a correctly identified *C. austriaca* specimen (BP) collected by JÓZSEF PAPP in the Mátra Mts in 1950 has been so far ignored in Hungarian literature, consequently, this record is missing on the map of JALAS *et al.* (1996) as well.

Based on all available materials, the Hungarian distribution of *C. austriaca* (distinguishing correct and erroneously published records) is presented on Fig. 1.

Notes on distribution of *Conringia austriaca* in the neighbouring countries

Slovakia

The first literature record of *C. austriaca* in the Carpathian Basin comes from "Posonium" (today Bratislava in Slovakia), dating back to LUMNITZER (1791). Since LUMNITZER clearly distinguished and described *B. orientalis* and *B. austriaca* (although without author names), his record of the latter taxon ("In nemoribus unter dem Kindsgraben, frequens") is widely applied to *C. austriaca*.

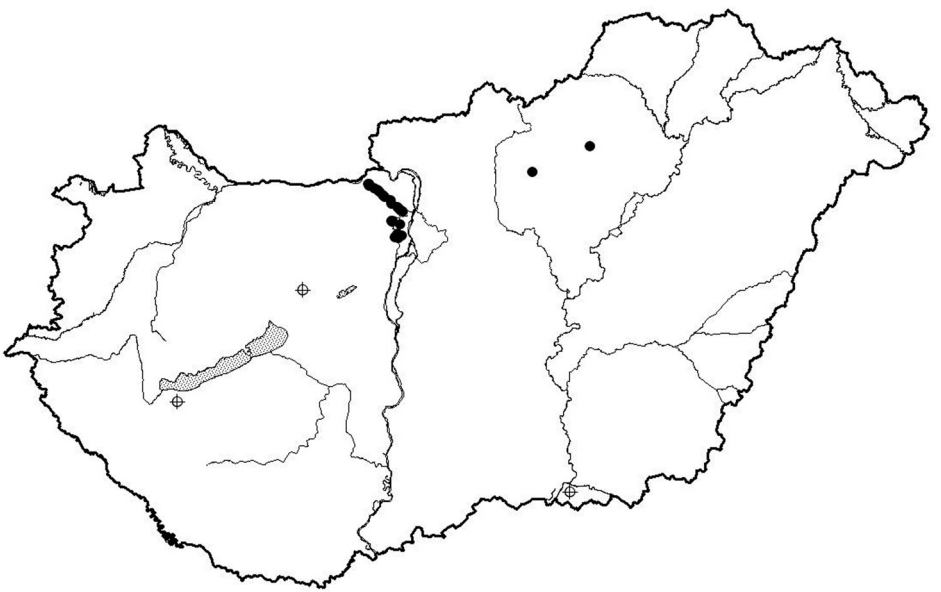

Fig.1. Distribution of *Conringia austriaca* in Hungary. Filled circles indicate records supported by voucher(s), crossed empty circles indicate erroneously published records in JALAS *et al.* (1996)

Unfortunately, the corresponding specimens in LUMNITZER's collections (stored at BP), two labelled as "*B. orientalis*" and one as "*B. austriaca*", contain mixed and partly alien material, and no localities are specified. Only one specimen contains a small vegetative piece of a *Conringia* taxon, which, however, cannot be identified. Furthermore, the specimen labelled as "*B. austriaca*" by LUMNITZER stored in KITAIBEL's herbarium (BP) actually belongs to *B. rapa* L. 1753, which suggests possible misapplication of the name in question (see JÁVORKA 1926).

The first unequivocally correct voucher of *C. austriaca* from the region was probably collected by JÓZSEF DORNER (1808–1873), although his specimen (BP) is not dated (the specified locality "Sandberg" refers to Devínska Kobyla at Devín). Anyway, all vouchers of this species from the territory of Slovakia stored in BP refer to the currently known two Slovak occurrences, i.e. Burda (Kovácspataki-hegyek) and Devínska Kobyla (dévényi Nagytető) (see FERÁKOVÁ 1985, 1999, 2002).

Transsylvania (Romania)

BAUMGARTEN (1816) published "*E. austriacum* Roth" from cultivated lands, enumerating *B. austriaca* JACQ. and *B. orientalis* L. as synonyms of that name.

SCHUR (1853, 1866) registered two species (under *Conringia*), without specified localities. First he united BAUMGARTEN's *E. austriacum* with *C. orientalis* (SCHUR 1853, see NEILREICH 1861), later, however, considered BAUMGARTEN's taxon as a synonym of *C. austriaca* (SCHUR 1866).

FUSS (1853) reported the fungus "*Uredo candida*" from "*C. austriaca*" from the vicinity of Gross-Scheuern (today Şura Mare). In his "Flora Transsilvaniae" FUSS (1866) registered both *C. orientalis* and *C. austriaca*, but the specified localities of the latter were identical to those mentioned by BAUMGARTEN (1816). Since only *C. orientalis* specimens (SIB) are to be found in the collection of FUSS (from Şura Mare and Slimnic villages, see DRĂGULESCU 2003), FUSS' literature records obviously refer to *C. orientalis*.

SIMONKAI (1887) registered only *C. orientalis* in the Transsylvanian flora, reaching the conclusion that all former records from BAUMGARTEN, SCHUR and FUSS refer to this species.

The first correct record of *C. austriaca* was published by NYÁRÁDY (1933) from the famous Cheia Turzii (Tordai-hasadék), and it remained for some decades as the only known Transsylvanian locality of the species (NYÁRÁDY 1939, 1955). However, in 1966 a new locality of *C. austriaca* was reported from Defileul Crisului Repede (Révi-szoros) (RAȚIU *et al.* 1966).

Unfortunately, in some recent surveys (DRĂGULESCU 2003, OPREA 2005) the old records from BAUMGARTEN and FUSS have been mistakenly applied to *C. austriaca* again.

Serbia

Although *C. austriaca* has been registered in the Serbian flora early on (PANČIĆ 1874) there is hardly any information on its current distribution in this country (see JALAS *et al.* 1996). JOVANOVIĆ-DUNJIĆ (1972) reported this species from Vojvodina (Vajdaság)

and Kosovo. The former locality presumably refers to the old record from Petrovaradin (Pétervárad) first published by SCHULZER *et al.* (1866) adopted by NEILREICH (1870), ZORKÓCZY (1896), JÁVORKA (1924) and MARKGRAF (1963). However, the voucher specimen of this record (stored in BP) represents *C. orientalis* (see above), hence this record is evidently erroneous.

Croatia

SCHLOSSER & VUKOTINOVIĆ (1857) registered both "*C. austriaca* PERS." and "*C. orientalis* PERS." in the Croatian flora, giving the local distribution of the first species as follows: "In satis ad Varasdinum et in campo Possavano". However, in the later version of their work (SCHLOSSER & VUKOTINOVIĆ 1869) the localities of *C. austriaca* were given as "In agris et satis campi Podravani et Possavani haud rara", whereas Varaždin, as a specified locality was mentioned at *C. orientalis*. Without even checking the collections of SCHLOSSER, it is evident, that this rare species could not be so widely distributed in Croatia, especially in cultivated lands along the rivers Sava ("campo Possavano") and Drava ("campo Podravano"). Nonetheless, Varaždin, as a correct record of "*E. austriacum* DC." (= *C. austriaca*) was cited by NEILREICH (1861), taken over by JÁVORKA (1924) and MARKGRAF (1963), recently marked (but questioned) on the distribution map of the species presented in JALAS *et al.* (1996). Even though the Croatian presence of this species remained ambiguous, it was included in the latest national checklist (PLAZIBAT 1997). Moreover, by reporting *C. austriaca* from Rudina village (Požega region), the occurrence of the species in Croatia was confirmed by TOMAŠEVIĆ (2006). Actually, the latter is the only *C. austriaca* record stored in *Flora Croatica Database* at the moment (NIKOLIĆ 2011).

As for the record of *C. austriaca* from Rudina, in 2008 the author had the possibility to check the voucher specimen collected by TOMAŠEVIĆ, and revised it as *Arabis glabra* (L.) BERNH., 1800. Consequently, no reliable Croatian record of *C. austriaca* is known at present.

When searching for Croatian vouchers of this species, two relevant specimens collected by SCHLOSSER was found in ZA. The first one (No. 385) was originally identified as "*Erysimum austriacum* BAUMG." by SCHLOSSER, with the locality information "In agris inter segetes in submontanis ad Križevac [= Križevci], Topliká [= Varaždinske Toplice] et alibi", revised by MIŠKO PLAZIBAT as *C. austriaca* (JACQ.) SWEET (confirmed here). The other one (without number) was identified as "*Conringia austriaca* PERS." by SCHLOSSER (= *C. austriaca* (JACQ.) SWEET, confirmed here), with the same locality information. Taking into consideration that these labels refer to several localities, and the labels of SCHLOSSER's *C. orientalis* specimens bear similar habitat and locality information ("campo Podravano", "Toplika"), it is probable, that the *C. austriaca* specimens in SCHLOSSER's collections had come from exchange material from abroad, and they were subsequently mixed with *C. orientalis*. This assumption is also strengthened by the obscurely given localities published in the aforementioned literature.

Phytogeographical remarks

In Hungarian literature it is widely accepted that the Hungarian Mountain Range accumulated many "continental" (i.e. oriental) and Sub-Mediterranean species during their north-westward migration in the Early Holocene (e.g. JÁVORKA 1925, ZÓLYOMI 1942, 1958), and only a few, formerly immigrated thermophilous taxa could survive the Last Glacial Maximum of the Pleistocene within the Carpathian Basin (SOÓ 1945, 1962).

However, ANDREÁNSZKY (1954) highlighted that actually many species that immigrated to Central and West Europe in the warm interglacial or interstadial phases of the Pleistocene could have survived the glacial stages in appropriate microhabitats. The mountains of the Carpathian Basin may have preserved relic taxa not only on elevated rocky peaks of the Carpathians (nunatak survival), but also in the collin region, e.g. in favourable microsites of the southern slopes of the Hungarian Mountain Range. As for such relics, beside the well-known examples (e.g. *Ferula sadleriana* LEDEB., 1844, *Linum dolomiticum* BORBÁS, 1897, *Seseli leucospermum* WALDST. & KIT., 1802), further, so far ignored taxa such as *Conringia autriaca*, *Crepis pannonica* (JACQ.) K. KOCH, 1851, *Lathyrus pallescens* (M. BIEB.) K. KOCH, 1841 and others should also be taken into account. It is worth mentioning that recently MAGYARI *et al.* (2010) presume similar refugial microsites for some steppe species even on the Great Hungarian Plain during the late glacial interstadial.

In his review of the relic plant species of the historical Hungary SOÓ (1933) did not enumerate *C. austriaca*, neither among the "Tertiary relics" (later "Preglacial relics"), nor the "xerothermic relics" of his postulated "Boreal steppe period" in the Early Holocene. Nevertheless, considering that *C. austriaca* is not a steppe species, and its dispersed Central European localities are almost exclusively restricted to dry, warm, rocky habitats of the collin regions, and no typical lowland occurrance of this species is detected, it is very probable that in Central Europe *C. austriaca* is a relic of a former interglacial or interstadial stage of the Pleistocene, in conformity with ANDREÁNSZKY's theory. According to this concept, the separated Italian range might represent a glacial refugial area of this species (see JÄGER 1970, HEWITT 2000).

The Central European localities of *C. austriaca* are not merely sporadic, but are characterized by surprisingly rich flora with a definite relic character. The most remarkable examples are those at Devínska Kobyla (dévényi Nagytető) in Slovakia (FERÁKOVÁ 1997), and the isolated Transsylvanian localities of the species at Cheia Turzii (Tordai-hasadék) and Defileul Crisului Repede (Révi-szoros), both being famous for their unique flora with clear Asian relations (NYÁRÁDY 1939, RAȚIU *et al.* 1966). These localities are far from the nearest Romanian occurrence of *C. austriaca* at the Lower Danube region (BORBÁS 1878, NYÁRÁDY 1955), a territory with unique flora as well. The latter is considered the "entrance" of the Lower Danube Corridor, the hypothesized route for many oriental species during their ancient north-westward migration.

The central parts of the Hungarian Mountain Range, especially the Buda and Pilis Mts, where almost all Hungarian populations of *C. austriaca* are located, are also characterized by extremely rich flora featuring many Sub-Mediterranean and continental floristic elements (KERNER 1857, BORBÁS 1879, ZÓLYOMI 1958, SOMLYAY 2009). It is worth mentioning that all the aforementioned relic species occur here within a relatively small territory.

Although casual occurrences of *C. austriaca* in secondary habitats are sometimes reported (e.g. SCHULZ 1923, JÁVORKA 1924, SOÓ 1968, PRISZTER 1985), the majority of these records are erroneous due to confusion with other taxa, especially *C. orientalis* (incorrect synonymy or wrong determination). Based on the results of the present study, virtually every record of *C. austriaca* from cultivated lands or ruderal habitats need confirmation. In Italy *C. austriaca* is said to occur in wastelands and cultivations ("Incolti, campi di cereali") (PIGNATTI 1982), however, the species' record for Sardegna was subsequently found to be an error for *Brassica napus* L. 1753 (ARRIGONI 1986). In Hungarian herbaria only a single specimen of *C. austriaca* was found to have undoubtedly been collected in cultivated land (JÁVORKA, 7/V/1923, BP). However, the locality in question (Farkas-völgy) is a valley in close proximity to the south-western slopes of Mt. Sváb (Sváb-hegy), where *C. austriaca* grows in its natural rocky habitat. In similar cases the casual establishment of this annual species is possible, however, such phenomena do not affect the regional phytogeographical significance of this taxon.

*

Acknowledgements – I am much obliged to the Hungarian curators and BOŽENA MITIĆ as well as MIŠKO PLAZIBAT (Zagreb) for the access to the collections under their care and help while working in herbaria mentioned in Material and methods. I am grateful to BOŽENA MITIĆ and NORBERT BAUER (Budapest) for taking part in the fieldwork, to KATARÍNA OLŠAVSKÁ (Bratislava), STANISLAV ŠPANIEL (Bratislava) and ANTUN ALEGRO (Zagreb) for their help with literature.

REFERENCES

ANČEV, M. 2007: Catalogue of the family Brassicaceae (Cruciferae) in the flora of Bulgaria. – *Phytologia Balcanica* **13**(2): 153–178.

ANDREÁNSZKY, G. 1954: *Ősnövénytan*. [*Paleobotany*.] – Akadémiai Kiadó, Budapest, 320 pp.

ARRIGONI, P. V. 1986: Conringia austriaca (Jacq.) Sweet. – In: GREUTER, W. & RAUS, TH. (eds): Med-Checklist Notulae, 12. *Willdenowia* **15**: 413–432.

BARINA, Z., CSIKY, J., FARKAS, S., JAKAB, G., KIRÁLY, G., LÁJER, K., MESTERHÁZY, A., MOLNÁR V, A., NAGY, J., NÉMETH, CS., PÁL, R., PIFKÓ, D., PINKE, GY., SCHMOTZER, A., SOMLYAY, L., SRAMKÓ, G., VIDÉKI, R. & VOJTKÓ, A. 2007: *Vörös Lista. A magyarországi edényes flóra veszélyeztetett fajai*. (*Red list of the vascular flora of Hungary*.) – Private edition, Sopron, 73 pp.

BAUER, N. 2001: Vascular flora of the hill Strázsa-hegy and its vicinity (Pilis Mts, Hungary). – *Studia botanica hungarica* **32**: 125–163.

BAUMGARTEN, J. CH. G. 1816: *Enumeratio stirpium in magno principatu Transsilvaniae praeprimis indigenarum in usum nostratum botanophilorum conscripta inque ordinem sexuali-naturalem concinnata 2.* – In Libraria Camesinae, Vindobonae, 392 pp.

BECK, G. 1893: Pflanzengeographische Verhältnisse. – In: BECK, G.: *Flora von Nieder- Österreich 2/2.* Carl Gerold's Sohn, Wien, pp. 15–71.

BODNÁR, B. 1957: Adatok Wierzbicki Péter keszthelyi működéséhez. [Data on the scientific activity of Péter Wierzbicki at Keszthely city.] – *Agrártörténeti Szemle* **1**(1–2): 57–67.

BORBÁS, V. 1878: Vizsgálatok a hazai Arabisek és egyéb Cruciferák körűl. [Contributions to the knowledge of the Hungarian Arabis species and other crucifers.] – *Mathematikai és Természettudományi Közlemények* **15**(6): 145–211.

BORBÁS, V. 1879: *Budapest- és környékének növényzete.* [*The flora of Budapest and its surroundings.*] – Magyar Királyi Egyetemi Könyvnyomda, Budapest, 172 pp.

BORBÁS, V. 1900: *A Balaton tavának és partmellékének növényföldrajza és edényes növényzete.* [*The vascular flora and phytogeography of Lake Balaton and its surroundings.*] *A Balaton tudományos tanulmányozásának eredményei 2/2/2.* [*Results of scientific researches in the region of Lake Balaton.*] – Hornyánszky, Budapest, 431 pp.

BOROS, Á. 1925: A drávabalparti sikság Flórájának alapvonásai, különös tekintettel a lápokra. (Grundzüge der Flora der linken Drauebene mit besonderer Berücksichtigung der Moore.) – *Magyar Botanikai Lapok* **23**(1–12)[1924]: 1–56.

BOROS, Á. 1940: A magyarföldi husáng (Ferula Sadleriana), hazánk bennszülött növénye és újabb termőhelye. [A new locality of our endemic plant species, Ferula sadleriana.] – *Természettudományi Közlöny Pótfüzet* **72**(4): 229–232.

DIHORU, G. & NEGREAN, G. 2009: *Cartea roşie a plantelor vasculare din România.* [*Red book of vascular plants of Romania.*] – Editura Academiei Române, Bucureşti, 630 pp.

DONNER, J. 1985: Verbreitungskarten zu P.H. Davis "Flora of Turkey, 1–8". – *Linzer Biologische Beiträge* **17**(1): 1–120.

DRĂGULESCU, C. 2003: *Cormoflora Judeţului Sibiu.* – Pelecanus, Braşov, 533 pp.

FARKAS, S. (ed.) 1999: *Magyarország védett növényei.* [*Protected plants of Hungary.*] – Mezőgazda Kiadó, Budapest, 416 pp.

FEICHTINGER, S. 1865: Közlemények Esztergom megye helyrajzából. [Contributions to the knowledge of topography of Esztergom County.] – In: *A magyar orvosok és természetvizsgálók X. nagygyűlésének tört. vázlata és munkálatai.* Emich Gusztáv, Pest, pp. 273–285.

FEICHTINGER, S. 1899: *Esztergom megye és környékének flórája.* [*The flora of Esztergom county and its surroundings.*] – Esztergom-vidéki Régészeti és Történelmi Társulat, Esztergom, 456 pp.

FERÁKOVÁ, V. 1985: Conringia austriaca – kriticky ohrozený druh flóry Slovenska. [Conringia austriaca – a critically threatened species of Slovak flora.] – *Zprávy Československé botanické společnosti* (*Praha*) **20**(3): 211–215.

FERÁKOVÁ, V. (ed.) 1997: *Flóra, geológia a paleontológia Devínskej Kobyly.* [*Flora, geology and paleontology of Devínska Kobyla.*] – APOP, Bratislava, 190 pp.

Feráková, V. 1999: Conringia austriaca (Jacq.) Sweet. – In: Ceřovský, j., Feráková, V., Holub, j., Maglocký, Š. & Procházka, F. (eds): *Červená Kniha ohrozených a vzácnych druhov rastlín a živočíchov SR a ČR 5, Vyššie rastliny*. [*Czech and Slovak Red Data Book of Threatened Plants and Animals 5, Vascular plants.*] Príroda, a. s., Bratislava, p. 105.

Feráková, V. 2002: Conringia Heist. ex Fabr. – In: Goliašová, K. & Šípošová, H. (eds): *Flóra Slovenska V/4.* [*Flora of Slovakia V/4.*] VEDA vydavatelstvo Slovenskej akadémie vied, Bratislava, pp. 672–680.

Feráková, V., Maglocký, Š. & Marhold, K. 2001: Červený zoznam papradorastov a semenných rastlín Slovenska (December 2001). (Red list of ferns and flowering plants of Slovakia (December 2001).) – *Ochrana Prírody* **20**(Suppl.): 44–77.

Fuss, M. 1853: Zur Kryptogamenflora Siebenbürgens. – *Verhandlungen und Mittheilungen des siebenbürgischen Vereins für Naturwissenschaften zu Hermannstadt* **4**: 109–112.

Fuss, M. 1866: *Flora Transsilvaniae excursoria*. – G. De Closius, Cibinii, 864 pp.

Gombocz, E. 1906: Sopronvármegye növényföldrajza és flórája. [The flora and phytogeography of Sopron county.] – *Mathematikai és Természettudományi Közlemények* **28**(4): 401–577.

Gombocz, E. 1945: *Diaria itinerum Pauli Kitaibelii 1–2*. – Verlag des Ungarischen Naturwissenschaftlichen Museums, Budapest, 1082 pp.

Hazslinszky, F. 1872: *Magyarhon edényes növényeinek füvészeti kézikönyve*. [*Handbook of the vascular flora of Hungary.*] – Athenaeum, Pest, 504 pp.

Hegedüs, Á. 1994: *Budapest jelenlegi virágos flórája*. [*The actual flora of Budapest.*] – Animula Kiadó, Budapest, 68 pp.

Hewitt, G. 2000: The genetic legacy of the Quaternary ice ages. – *Nature* **405**: 907–913.

Holub, J. 2000: Černá listina vymizelých taxonů květeny České republiky a Slovenské republiky. [The Black list of taxa disappeared from the floras of the Czech and Slovak Republics.] – *Preslia* **72**(2–4): 167–186.

Holub, J. & Procházka, F. 2000: Red List of vascular plants of the Czech Republic – 2000. – *Preslia* **72**(2–4): 187–230.

Jacquin, N. J. 1775: *Florae Austriacae sive plantarum selectarum in Austriae archiducatu sponte crescentium, icones, ad vivum coloratae, et descriptionibus, ac synonymis illustratae Vol. 3.* – Typis Leopoldi Joannis Kaliwoda, Viennae, 56 pp. + Tab. 201–300.

Jalas, J., Suominen, J. & Lampinen, R. (eds) 1996: *Atlas Florae Europaeae 11. Cruciferae* (*Ricotia to Raphanus*). – Helsinki University Printing House, Helsinki, 310 pp.

Jäger, E. J. 1970: Charakteristische Typen mediterran-mitteleuropäischer Pflanzenareale. – *Feddes Repertorium* **81**(1–5): 67–92.

Jávorka, S. 1924: *Magyar Flóra* (*Flora Hungarica*) *2*. – Studium, Budapest, pp. 401–800.

Jávorka, S. 1925: *Magyar Flóra* (*Flora Hungarica*) *3*. – Studium, Budapest, pp. 801–1307 + I–CII.

Jávorka, S. 1926: Kitaibel herbáriuma. (Herbarium Kitaibelianum 1.) – *Annales historico-naturales Musei nationalis hungarici* 24: 428–585.

Jávorka, S. 1937: *A magyar flóra kis határozója. 2. kiad.* [*Key to the Hungarian flora. 2nd edition.*] – Studium, Budapest, 346 pp.

JÁVORKA, S. & SOÓ, R. 1951: *A magyar növényvilág kézikönyve*. [*Handbook of Hungarian flora*.] – Akadémiai Kiadó, Budapest, 1120 pp.

JOVANOVIĆ-DUNJIĆ, R. 1972: Conringia Adans. – In: JOSIFOVIĆ, M. (ed.): *Flora SR Srbije 3*. [*Flora of Serbia 3*.] Srpska Akademija Nauka i Umetnosti, Beograd, pp. 376–378.

KANITZ, A. 1863: Reliquiae Kitaibelianae. – *Verhandlungen der kaiserlich-königlichen zoologisch-botanischen Gesellschaft in Wien* **13**: 57–118.

KERNER, A. 1857: Das Pilis-Vértes Gebirge, eine pflanzengeographische Skizze. – *Verhandlungen der kaiserlich-königlichen zoologisch-botanischen Gesellschaft in Wien* **7**: 257–278.

KERNER, A. 1867: Die Vegetations-Verhältnisse des mittleren und östlichen Ungarns und angrenzenden Siebenbürgens 4. – *Oesterreichische Botanische Zeitschrift* **17**(8): 250–260.

KIRÁLY, G., CSAPODY, I., SZMORAD, F. & TÍMÁR, G. 2004: A Soproni-hegység edényes flórájának enumerációja. [Enumeration of vascular plants of the Sopron Mts.] – In: KIRÁLY, G. (ed.): A Soproni-hegység edényes flórája. [The vascular flora of the Sopron Mts.] *Flora Pannonica* **2**(1): 91–474.

LÁNYI, B. 1916: Újabb adatok Csongrád vármegye flórájához. (Neuere Daten zur Flora des Komitates Csongrád.) – *Magyar Botanikai Lapok* **15**(6–12): 267–268.

LŐKÖS, L. (ed.) 2001: *Diaria itinerum Pauli Kitaibelii III. 1805–1817*. – Hungarian Natural History Museum, Budapest, 460 pp.

LUMNITZER, ST. 1791: *Flora Posoniensis exhibens plantas circa Posonium sponte crescentes secundum systema sexuale Linneanum digestas*. – Impensis Siegfried Lebrecht Crusii, Lipsiae, 557 pp.

MAGYARI, E. K., CHAPMAN, J. C., PASSMORE, D. G., ALLEN, J. R. M., HUNTLEY, J. P. & HUNTLEY, B. 2010: Holocene persistence of wooded steppe in the Great Hungarian Plain. – *Journal of Biogeography* **37**: 915–935.

MALY, J. C. 1848: *Enumeratio plantarum phanerogamicarum imperii Austriaci universi*. – Braumüller et Seidel, Vindobonae, 423 pp.

MARKGRAF, F. 1963: Conringia. – In: HEGI, G. [MARKGRAF, F. (ed.)]: *Illustrierte Flora von Mittel-Europa 4(1). Ed. 2.* Carl Hanser Verlag, München, pp. 424–426.

MAYER, E. 1952: *Seznam praprotnic in cvetnic slovenskega ozemlja.* (*Verzeichnis der Farn- und Blütenpflanzen des Slowenischen Gebietes*.) – Slovenska akademija znanosti in umetnosti, Ljubljana, 427 pp.

MEUSEL, H., JÄGER, E. J. & WEINERT, E. 1965: *Vergleichende Chorologie der Zentraleuropäischen Flora 1*. – VEB Gustav Fischer, Jena, 583 pp.

MÜLLER, B. 1842: *Elenchus plantarum in territorio Keszthelyensi a cl. cl. Szenczy, Hutter et Wierzbicki observatarum exmissis Cryptogamis*. – Manuscript, MTM Tudománytörténeti Gyűjtemény, Budapest, 12 pp.

NEILREICH, A. 1859: *Flora von Nieder-Oesterreich*. – Carl Gerold's Sohn, Wien, 1010 pp.

NEILREICH, A. 1861: *Nachträge zu Maly's Enumeratio plantarum phanerogamicarum imperii Austriaci universi*. – W. Braumüller, Wien, 348 pp.

NEILREICH, A. 1866: *Aufzählung der in Ungarn und Slavonien bisher beobachteten Gefässpflanzen nebst einer pflanzengeografischen Uebersicht*. – W. Braumüller, Wien, 389 pp.

Neilreich, A. 1870: *Aufzählung der in Ungarn und Slavonien bisher beobachteten Gefässpflanzen. Nachträge und Verbesserungen*. – W. Braumüller, Wien, 111 pp.

Németh, F. 1989: Száras növények. [Vascular plants.] – In: Rakonczay, Z. (ed.): *Vörös Könyv. A Magyarországon kipusztult és veszélyeztetett növény- és állatfajok*. [Red Data Book. Extinct and threatened plant and animal species in Hungary.] Akadémiai Kiadó, Budapest, pp. 265–321.

Niklfeld, H. 1964: Zur xerothermen Vegetation im Osten Niederösterreichs. – *Verhandlungen der Zoologisch-Botanischen Gesellschaft* **103–104**: 152–181.

Niklfeld, H. & Schratt-Ehrendorfer, L. 1999: Farn- und Blütenpflanzen. – In: Niklfeld, H. (ed.): *Rote Listen gefährdeter Pflanzen Österreichs*. Bundesministeriums für Umwelt, Jugend und Familie, Wien, pp. 33–152.

Nikolić, T. 2011: Flora Croatica Database, On-Line (http://hirc.botanic.hr/fcd). [Accessed 21 January 2011.]

Nikolić, T. & Topić, J. (eds) 2005: *Crvena knjiga vaskularne flore Hrvatske*. (*Red Book of Vascular Flora of Croatia.*) – Ministarstvo kulture, Državni zavod za zaštitu prirode, Zagreb, 693 pp.

Nyárády, E. I. 1933: Noutăţi din Cheia Turzii. (Novitäten aus der Turdaer-Schlucht.) – *Buletinul Grădinii Botanice şi al Muzeului Botanic dela Universitatea din Cluj* **13**(1–4): 57–59.

Nyárády, E. I. 1939: *Enumerarea plantelor vasculare din Cheia Turzii*. [*Enumeration of vascular plants of Cheia Turzii Gorge*.] – Monitorul Oficial şi Imprimeriile Statului Imprimeria Naţională, Bucureşti, 317 pp.

Nyárády, E. I. 1955: Cruciferae. – In: Săvulescu, T. (ed.): *Flora Republicii Populare Romîne 3*. [*Flora of Romania 3*.] Editura Academiei Republicii Populare Romîne, Bucureşti, pp. 102–501.

Oprea, A. 2005: *Lista critică a plantelor vasculare din România*. [*Revised checklist of vascular plants of Romania*.] – Universităţii "Alexandru Ioan Cuza", Iaşi, 668 pp.

Pančić, J. 1874: *Flora Kneževine Srbije ili vaskularne biljke, koje u Srbiji divlje rastu. Flora Principatus Serbiae*. [*Flora of principality of Serbia, or wild vascular plants that grow in Serbia.*] – Državna štamparija, Beograd, XXXIV + 798 pp.

Pénzes, A. 1942: *Budapest élővilága*. [*The flora and fauna of Budapest*.] – Királyi Magyar Természettudományi Társulat, Budapest, 236 pp.

Pignatti, S. (ed.) 1982: *Flora d'Italia 1*. – Edagricole, Bologna, 790 pp.

Plazibat, M. 1997: Brassicaceae. – In: Nikolić, T. (ed.): Index Florae Croaticae 2. *Natura Croatica* **6**(1) *Suppl.* 1: 21–39.

Priszter, Sz. 1985: *A magyar flóra és vegetáció rendszertani-növényföldrajzi kézikönyve 7*. (*Synopsis systematico-geobotanica florae vegetationisque Hungariae 7*.) – Akadémiai Kiadó, Budapest, 683 pp.

Raţiu, O., Gergely, I., Boşcaiu, N., Codoreanu, V., Bechet, M., Silaghi, G., Raţiu, F., Turcu, L., Lőrinczi, F., Péterfi, L. S., Micle, F., Pleşa, C. & Nicolau, M. 1966: Flora şi vegetaţia rezervaţiei naturale "Defileul Crişului Repede". (Die Flora und Vegetation des Naturschutzgebietes der Crişul Repede Talenge.) – *Contribuţii Botanice* **1**: 1–272.

Reuss, G. 1853: *Května Slovenska čili opis všech jevnosnubných na Slovensku divorostaucích a mnohých zahradních zrostlin podlé saustavy De Candolle-ovy*. [*The flora of Slovakia.*] – Tiskem Františka Lorbera, Banská Štiavnica, 496 pp.

Ronniger, K. 1929: Allgemein-Biologische Lehrexkursionen. II. 18.–21. Mai: Budapest und Umgebung. – *Verhandlungen der Zoologisch-Botanischen Gesellschaft* **79**: 68–70.

Sadler, J. 1818: *Verzeichniss der um Pesth und Ofen wildwachsenden phanerogamischen Gewächse mit Angabe ihrer Standorte und Blüthezeit*. – Konrad Adolf Hartleben, Pesth, 79 pp.

Sadler, J. 1826: *Flora comitatus Pestiensis Pars 2. Ed. 1*. – Matthiae Trattner de Petróza, Pestini, 398 pp.

Sadler, J. 1840: *Flora comitatus Pesthinensis in uno volumine comprehensa. Ed. 2*. – Kilian et Comp., Pesthini, 499 pp.

Schlosser, J. & Vukotinović, L. 1857: *Syllabus florae Croaticae*. – Dr. Ludovici Gaj., Zagrabiae, 192 pp.

Schlosser, J. & Vukotinović, L. 1869: *Flora Croatica*. – Fr. Župan, Zagrabiae, 1362 pp.

Schulz, O. E. 1923: Cruciferae – Brassiceae, Subtribus III. Cakilinae, IV. Zillinae, V. Vellinae, VI. Savignyinae, VII. Moricandiinae. – In: Engler, A.: *Das Pflanzenreich Regni vegetabilis conspectus 84 Heft.* (*IV. 105*). Wilhelm Engelmann, Leipzig, 100 pp.

Schulzer, S., Kanitz, A. & Knapp, J. A. 1866: Die bisher bekannten Pflanzen Slavoniens. – *Verhandlungen der kaiserlich-königlichen zoologisch-botanischen Gesellschaft in Wien* **16**: 3–172.

Schur, F. 1853: *Sertum Florae Transsilvaniae sive Enumeratio systematica omnium plantarum, quae in Transsilvania sponte crescunt et in usum hominum copiosius coluntur*. – Georg von Closius, Hermannstadt, 94 pp.

Schur, F. 1866: *Enumeratio plantarum Transsilvaniae*. – G. Braumüller, Vindobonae, 984 pp.

Simon, T. 2000: *A magyarországi edényes flóra határozója*. [*Key to the vascular flora of Hungary.*] – Tankönyvkiadó, Budapest, 976 pp.

Simonkai, L. 1887: *Erdély edényes flórájának helyesbitett foglalata.* (*Enumeratio florae Transsilvanicae vesculosae critica.*) – Királyi Magyar Természettudományi Társulat, Budapest [1886], 678 pp.

Smejkal, M. 1984: Conringia austriaca (Jacq.) Sweet, nezvěstný druh flóry ČSR. [Conringia austriaca (Jacq.) Sweet, eine verschollene Art der Flora der ČSR.] – *Zprávy Československé botanické společnosti* (*Praha*) **19**(1): 1–7.

Somlyay, L. 2000: Adatok a Dunazug-hegység, a Tornai-karszt és környéke flórájához. (Contributions to the flora of the Dunazug Mts, the Torna Karst and the adjacent areas.) *Kitaibelia* **5**(1): 47–52.

Somlyay, L. 2006: Keresztesvirágúak – Brassicaceae. – In: Ujhelyi, P. & Molnár V., A. (eds): *Élővilág enciklopédia, A Kárpát-medence gombái és növényei*. Kossuth Kiadó, Budapest, pp. 349–356.

Somlyay, L. 2009: A Budai-hegység florisztikai növényföldrajzának fő vonásai. (The main features of floristical phytogeography of the Buda Mts.) – *Kitaibelia* **14**(1): 35–68.

Soó, R. 1933: Analyse der Flora des historischen Ungarns. (Elemente, Endemismen, Relikte.) (A magyar flóra elemzése. (Flóraelemek, endemizmusok, reliktumok.)) – *Magyar Biológiai Kutató Intézet Munkái* **6**: 173–194.

Soó, R. 1937: *A Mátrahegység és környékének flórája.* (*Flora regionis montium Mátra.*) – Editio Instituti Botanici Universitatis Debreceniensis, Debrecen, 89 pp.

Soó, R. 1945: *Növényföldrajz.* [*Phytogeography.*] – Magyar Természettudományi Társulat, Budapest, 207 pp.

Soó, R. 1962: *Növényföldrajz.* [*Phytogeography.*] – Tankönyvkiadó, Budapest, 159 pp.

Soó, R. 1968: *A magyar flóra és vegetáció rendszertani-növényföldrajzi kézikönyve 3.* (*Synopsis systematico-geobotanica florae vegetationisque Hungariae 3.*) – Akadémiai Kiadó, Budapest, 506 pp.

Soó, R. 1980: *A magyar flóra és vegetáció rendszertani-növényföldrajzi kézikönyve 6.* (*Synopsis systematico-geobotanica florae vegetationisque Hungariae 6.*) – Akadémiai Kiadó, Budapest, 557 pp.

Stevanović, V. (ed.) 1999: *Crvena knjiga flore Srbije 1, Iščezli i krajnje ugroženi taksoni.* – Grafički centar Etiketa, Beograd, 566 pp.

Thiers, B. 2008 [continuously updated]: Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. http://sweetgum.nybg.org/ih/ [Accessed 17 February 2011.]

Tomašević, M. 2006: A new contribution to the flora of the Požega Valley and the surrounding mountains. – *Natura Croatica* **15**(1–2): 43–60.

Trpin, D. & Vreš, B. 1995: *Register flore Slovenije. Praprotnice in semenke.* [*Register of Slovenian flora. Gymnosperms and angiosperms.*] – ZRC SAZU, Ljubljana, 143 pp.

Vojtkó, A. (ed.) 2001: A *Bükk hegység flórája.* [*The flora of the Bükk Mts.*] – Sorbus 2001 Kiadó, Eger, 340 pp.

Wallner, I. 1903: Sopron környékén található virágos növények és edényes cryptogamok nemei és fajai. [Flowering plants and vascular cryptograms in the vicinity of Sopron city.] – *Soproni Magyar Királyi Állami Főreáliskola XXVIII. évi Értesítője 1902–1903*: 1–42.

Zólyomi, B. 1942: A középdunai flóraválasztó és a dolomitjelenség. (Die Mitteldonau-Florenscheide und das Dolomitphänomen.) – *Botanikai Közlemények* **39**(5): 209–231.

Zólyomi, B. 1958: Budapest és környékének természetes növénytakarója. [The vegetation of Budapest and its surroundings.] – In: Pécsi, M. (ed.): *Budapest természeti képe.* Akadémiai Kiadó, Budapest, pp. 509–642.

Zorkóczy, L. 1896: *Ujvidék- és környékének flórája.* [*The flora of Ujvidék and its surroundings.*] – Private edition, Ujvidék, 128 pp.