**Achillea pannonica in the Czech Republic, with taxonomic remarks**

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*Achillea pannonica* Scheele is an octoploid species of the *A. millefolium* group. Based on herbarium and field studies, a taxonomic and phytogeographic account of this taxon is provided in the Central European part of its range. The synonymy of *A. pannonica* includes *A. seidlii* J. Presl & C. Presl, *A. millefolium* var. *lanata* W. D. J. Koch, and *Achillea millefolium* f. *contracta* Schltdl. *Achillea pannonica* is a clearly delimited species: no variation deserving taxonomic recognition was observed in Central European plants. Morphological differences between *A. setacea* Waldst. et Kit. and *A. pannonica* are summarised in a table. *Achillea pannonica* is classified as a subtemperate to submeridional subcontinental European species or as a Pontic element with overlaps to the Balkans and westernmost Anatolia. Its range in the Czech Republic is divided into two parts including northern and central Bohemia, and southern and central Moravia, all warm to moderately warm and dry to moderately dry regions. Two distribution maps based on more than 1280 specimens revised are presented. The distribution pattern of *A. pannonica* in the Czech Republic which coincides well with the distribution of thermophilous oak woods of the order Quercetalia pubescenti-petraeae can be compared to that of *Anagallis foemina*, *Cerasus fruticosa*, *Dictamnus albus*, and *Lavatera thuringiaca*. It is probably a relict of the more continuous range which may have developed in the early Holocene. *Achillea pannonica* is a heliophilous to heliosciophilous species of dry grasslands, fringe communities, thermophilous oak forests, and some thermophilous (sub)ruderal communities. It grows on several types of rock and often prefers calcareous substrata such as limestone and loess. At several sites, it was observed to occur together with other yarrows. Hybridization with *A. millefolium* s. str. sometimes occur, and the new nothospecies, *A. × incognita*, is formally described; however, its reliable recognition requires chromosome counts.

**Keywords**: Compositae, yarrows, Achillea seidlii, Achillea × incognita, nomenclature, phytogeography, phytosociology, Central Europe

**Introduction**

*Achillea pannonica* Scheele is an octoploid (2n = 72) member of the *A. millefolium* group. At the species level, it was described in 1844 by the German Lutheran minister and botanist A. H. G. Scheele (1808–1864), but the species had been known long before under the improperly used name *A. lanata* Spreng. The species status and Scheele’s name was not generally accepted before 1883, when *A. pannonica* was issued in the exsiccate collection “Flora exsiccata austro-hungarica”, accompanied by detailed comments on the label (A. Heimerl in Kerner 1884: 117–118). Since then, the epithet “pannonica” has been used, and the species has been included in most Central European floras. It was probably Presl & Presl (1819; see below) who first recognised the distinctiveness of *A. pannonica* in what is now the Czech Republic. Under the name *A. millefolium* var. *lanata*, the species was issued after 1830 in
I. F. Tausch’s exsiccate series “Herbarium florae bohemae”. The first Moravian flora including *A. pannonica* (called *A. lanata* Spreng.) is that by Rohrer & Mayer (1835); the corresponding herbarium specimen collected by R. Rohrer was found in PRC.

The evolutionary position of *A. pannonica* as a high polyploid member of the *A. millefolium* group was postulated by Ehrendorfer (1953, 1959). Since then, *A. pannonica* has generally been recognised as a separate species of the *A. millefolium* group. In addition to high polyploidy, the specific status of *A. pannonica* is supported by morphological characters, ecological requirements, and a remarkable distribution pattern.

Biste (1978) made chromosome counts and studied morphology and proazulene content in particular members of the *A. millefolium* group, including *A. pannonica*, in the former eastern Germany. Later, she published an account of localities of this species, accompanied by a distribution map (Beurton 1985). Chromosome counts, taxonomic and phytogeographic studies of yarrows including *A. pannonica* were done in Poland, Ukraine, and Bulgaria, sometimes taking plants from other parts of the species range into consideration (Dąbrowska 1982, Sytnik 1984, Kuzmanov et al. 1989). Polish localities of *A. pannonica* were summarised, and a distribution map of *A. pannonica* in Poland was produced by Dąbrowska (1997). Based on multivariate methods, a detailed systematic study of Central European yarrows was published by Saukel & Länger (1992). A review of chromosome counts published up to the present can be found in Danihelka & Rotreklova (2001), together with recent chromosome counts on plants from the Czech Republic and Slovakia. In the former Czechoslovakia, the taxonomy and distribution of the *A. millefolium* group was studied by Spudilová (1957).

**Materials and methods**

The distribution map of the species is based on examination of specimens from the following public herbaria in the Czech Republic, Slovakia, and Austria (abbreviations follow Holmgren et al. 1990): BRA, BRNL, BRNM, BRNU, CB, CHOM, FMM, GM, HR, LIM, LIT, MJ, MMI, MP, NJM, OL, OLM, OP, PL, PR, PRC, ROZ, SAV, W, WU, ZMT, the herbarium of the Příbram District Museum (“herb. Příbram”), as well as from the private herbaria of J. Brabec (Prague), J. Hadinec (Prague), I. Jongepierová (Veselí nad Moravou), Z. Kaplan (Prague), R. Řepka (Brno), O. Šída (Prague), V. Žila (Strakonice), and that of the author’s (private collections indicated by the abbreviation “herb.” following the year and, if necessary, completed by the keeper’s initials). A total of 1280 specimens of *A. pannonica* from the Czech Republic were revised. Texts from herbarium labels (see Appendix 1) were abridged and latinized (Quitt & Kucharscy 1992). Obsolete and German toponyms were usually replaced by recent ones. Quantitative characters were measured on 50 herbarium specimens from the author’s collections. Names of phytogeographic division units follow Skalický (1988). The map of mean annual temperature was taken from Vesecký et al. (1958).

The occurrence of *A. pannonica* in different vegetation types was studied using 412 relevés extracted from the Czech national vegetation database (Chytry 1997) which in October 1999 contained more than 22,000 published and unpublished relevés. For the relevés published, the original classification was considered. The names of syntaxa follow Moravec et al. (1995). Within a database containing 15,898 relevés of grasslands, among them 388 relevés with *A. pannonica*, interspecific associations were evaluated using the
Results and discussion

*Achillea pannonica* Scheele in *Linnaea* 18: 471, 1844.

Ind. loc.: "[Hungary:] In Pannonia prope Pesthimum [Budapest]!". Typus ignotus.
- *Achillea millefolium* "forme" [subsp.] *setacea* γ [var.] *pannonica* (Scheele) Rouy Fl. Fr. 8: 249, 1903.
- *Achillea seidlii* J. Presl et C. Presl Fl. Čech. 173, 1819. ["Seidlii"]
- *Achillea millefolium* c. [var.] *villosa* Schur Enum. Pl. Transsilv.: 328, 1866, nomen illeg. superfl. 1 [cf. Art. 52.1, Greuter et al. 2000; the name is interpreted according to the original description.]
- *Achillea millefolium* c. [var.] *villosa* Schur Enum. Pl. Transsilv.: 328, 1866, nomen illeg. superfl. 1 [cf. Art. 52.1, Greuter et al. 2000; the name is interpreted according to the original description.]
- *Achillea millefolium* c. [var.] *villosa* Schur Enum. Pl. Transsilv.: 328, 1866, nomen illeg. superfl. 1 [cf. Art. 52.1, Greuter et al. 2000; the name is interpreted according to the original description.]

Ind. loc.: "Transsilvania, Banatus. In declivibus graminosis lapidosis apricos ad cheia Turzii, A. Richter ... inter Turdum et pagum Sind, Nyárády ...; Ciumbrud, A. Richter ...; Bággau (jud. Alba), Borza ...". Typus ignoratus.
- *Achillea millefolium* c. [var.] *villosa* Schur Enum. Pl. Transsilv.: 328, 1866, nomen illeg. superfl. 1 [cf. Art. 52.1, Greuter et al. 2000; the name is interpreted according to the original description.]


1 The name "A. Millefolium d. [var.] orientalis" Ledebo. fl. Ross. 2, 532", cited in the synonymy (together with another reference to DeCandolle 1838: 26) and being responsible for the illegitimate status, is a mistake to be corrected and should read "occidentalis" (cf. Ledebour 1843–1846: 532).
Description, delimitation, and variation

Description: Perennial, densely villous, often greyish green plants with a creeping, 1–15 (–30) cm long rhizome bearing sterile leaf rosettes and flowering shoots. Stems erect or shortly ascending, unbranched or seldom branched in their upper part, round or, when dry, striate or slightly ribbed, (9–) 20–75 (–100) cm tall, (1.6–) 2.0–3.4 (–4.8) mm thick below, with (11–) 15–25 (–28) nodes, yellowish green or olive-green, usually lighter than leaves, but often coloured reddish or brownish. Leaves alternate, rosette leaves shortly petiolate, lower cauline leaves very shortly petiolate or sessile, both mostly cuneate at the base; middle and upper cauline leaves sessile, auriculate, 2–3 times pinnatisect, later in the season often with leaf tufts in axils; primary segments usually ovate in outline, (2–) 6–13 mm long and 1.5–4.0 (–9.0) mm wide, their ultimate segments ovate to narrowly ovate in outline, with cartilaginous margin near the top, apiculate; rachis 1.0–2.0 (–2.5) mm wide; rosette and lower stem leaves narrowly oblanceolate (widest above the middle) or elliptic, their segments two-dimensionally arranged (leaves thus plane), rosette leaves 5–44 cm long and (3.9–) 9.0–29.0 mm wide, lower cauline leaves (3.5–) 5.0–19.0 (–35.0) cm long and (3.5–) 5–13 (–21) mm wide, middle and upper cauline leaves narrowly elliptic or narrowly lanceolate, the middle ones 2.6–10 (–15) cm long and 3–9 (–17) mm wide, the upper ones 1.2–3.3 (–4.5) cm long and 1.5–5 (–9) mm wide. Capitula arranged in usually dense, 1.8–6.8 (–10.3) cm long and (1.5–) 2.1–6.6 (–9.0) cm wide corymbs; involucre narrowly ovoid, sometimes cylindrical or ovoid, its base rounded in outline, (3.5–) 3.8–4.7 (–5.2) mm long and (2.1–) 2.2–3.2 (–3.3) mm wide when flowering, involucral bracts ovate or narrowly ovate, green, sometimes with yellowish brown to brown margin, densely hairy, sometimes glabrate in fruit. Ligules white, (4–) 5 (–6), three-lobate, (1.0–) 1.1–1.7 (–2.1) mm long and (0.9–) 1.4–2.4 (–2.6) mm wide when dry. Achenes oblanceolate in outline, compressed, narrowly winged, (1.5–) 1.7–2.3 mm long, brown, with pale margin. Flowering from late May to September. Octoploid.

For the recognition of *A. pannonica* (Fig. 3) the following observations may be useful. The plants exhibit a distinctive appearance, forming long rhizomes with solitarily standing sterile rosettes consisting of very long (up to 50 cm, sometimes as much as two-thirds of the plant height) and wide (exceptionally, up to 5 cm), erect, rigid appearing leaves with regularly arranged segments. This particularly applies to plants growing in favourable conditions in deep soils in field or vineyard margins, etc. On the other hand, in extreme conditions small plants with short and narrow rosette leaves are encountered. The ligules of *A. pannonica* are always white; I have not observed pink ligules in the field or in dried specimens. The indumentum covering all the aboveground parts of the plant is very dense,
especially in young plants. Later in summer, it often persists in nodes below the insertions of leaves, and usually turns rusty-coloured in old herbarium specimens.

The differences between *A. pannonica* and *A. setacea*, a species with which the former is most frequently confused, are summarised in Table 1. *Achillea setacea* normally flowers about two weeks earlier than *A. pannonica*. *Achillea collina* Rchb., another species *A. pannonica* is confused with, can be distinguished by a looser indumentum, consisting of shorter hairs, of all its aboveground parts, by absence of large leaf rosettes with long creeping rhizomes, by smaller capitula arranged in narrower corymbs, and by its later flowering time, usually starting in mid-June. *Achillea millefolium* s. str. is also less hairy than *A. pannonica*, has larger, sometimes pink or purplish, often longer and wider ligules and lacks the rigid large rosette leaves typical of *A. pannonica*. The final leaf segments of its middle cauline leaves are usually lanceolate, narrower and longer than in *A. pannonica*.

When *A. millefolium* s. str. and *A. pannonica* occur together, identification problems can arise. Some poorly developed plants can be identified only when considered as a part of population samples. Some of these “intermediates” may be hybrids (see below), but most of them are only habitat modifications due to high phenotypic plasticity of both taxa. Beurton (1985: 123–124) mentioned similar recognition problems. Trying to distinguish *A. collina* and *A. pannonica*, analogous difficulties may arise (cf. Saukel & Länger 1992: 70; Dąbrowska 1982: 199); in my opinion, they are caused by the high ecological plasticity of both and by the unusual genetic variability of *A. collina* rather than by the taxonomic intricacy of *A. pannonica*.

Table 1. – Comparison of morphologic characteres and flowering time of *Achillea pannonica* and *A. setacea*.

<table>
<thead>
<tr>
<th>Character</th>
<th><em>A. pannonica</em></th>
<th><em>A. setacea</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rhizome length (cm)</td>
<td>1–15 (–30)</td>
<td>1–6 (–8)</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>(9–) 20–75 (–100)</td>
<td>(6–) 12–50 (–53)</td>
</tr>
<tr>
<td>Length of rosette leaves (cm)</td>
<td>5–44</td>
<td>3–13</td>
</tr>
<tr>
<td>Width of rosette leaves (mm)</td>
<td>(3.9–) 9.0–29.0</td>
<td>2.9–6.5 (–11.0)</td>
</tr>
<tr>
<td>Form of rosette and lower cauline leaves</td>
<td>segments two-dimensionally arranged (leaves thus plane)</td>
<td>segments three-dimensionally arranged (leaves thus terate)</td>
</tr>
<tr>
<td>Length of lower cauline leaves (cm)</td>
<td>(3.5–) 5.0–19.0 (–35.0)</td>
<td>(2.0–) 3.0–11.5</td>
</tr>
<tr>
<td>Width of lower cauline leaves (mm)</td>
<td>(3.5–) 5.0–13.0 (–21.0)</td>
<td>(2–)3–6 (–11)</td>
</tr>
<tr>
<td>Width of ultimate segments of middle cauline leaves (mm)</td>
<td>0.4–1.0 (–1.2)</td>
<td>0.2–0.3 (–0.4)</td>
</tr>
<tr>
<td>Width of the main inflorescence (cm)</td>
<td>(1.5–) 2.1–6.6 (–9.0)</td>
<td>(0.7–) 1.5–5.6 (–6.1)</td>
</tr>
<tr>
<td>Length of involucre (mm)</td>
<td>(3.5–) 3.8–4.7 (–5.2)</td>
<td>(2.9–) 3.0–4.0 (–4.1)</td>
</tr>
<tr>
<td>Width of involucre (mm)</td>
<td>(2.1–) 2.2–3.2 (–3.3)</td>
<td>(1.4–) 1.5–2.7 (–2.8)</td>
</tr>
<tr>
<td>Length of dry ligules (mm)</td>
<td>(1.0–) 1.1–1.7 (–2.1)</td>
<td>(0.6–) 0.8–1.7 (–1.9)</td>
</tr>
<tr>
<td>Width of dry ligules (mm)</td>
<td>(0.9–) 1.4–2.4 (–2.6)</td>
<td>(1.0–) 1.1–2.0 (–2.5)</td>
</tr>
<tr>
<td>Length of fruits (mm)</td>
<td>(1.5–) 1.7–2.3</td>
<td>1.1–1.4</td>
</tr>
<tr>
<td>Flowering time</td>
<td>late May to September, about two weeks later than the latter</td>
<td>early May to early July, rarely again in August</td>
</tr>
</tbody>
</table>
The specimens of *A. pannonica* revised varied highly in appearance, particularly in size, branching, and the density of indumentum. This variation, in my opinion, does not deserve formal taxonomic recognition. It is caused by the high phenotypic plasticity of the species in different environments. Branching is often induced by insects or mechanical damage of growth meristems. Plants growing in deep soils, mainly in subruderal habitats and on loess, are often robust. They have long and broad leaves, and large capitula. Plants flowering in August and September are often branched above, have loose corymbs, and are less hairy.

Prodan (1931) described two infraspecific taxa: *A. pannonica* f. *virescens* Prodan (in Bul. Acad. Stud. Agron. Cluj, Memorii, 2: 39, 1931) and *A. pannonica* var. *strictiformis* (see above). The former should differ from the nominate form in its green-grey indumentum, while the latter should include plants with thick stems (up to 10 mm), with long (30–35 cm) and broad (3–4 cm) ground leaves, 3–10 cm wide corymbs and 5–6 mm long capitula. I have not seen the type specimens yet, but judging from the original descriptions, these taxa are likely not to be of real importance. This almost certainly is true of *A. pannonica* f. *ramosa* Nyárády (in Bul. Ști. Acad. Republ. Pop. Rom., sect. biol., agron., geol. et geogr., 3: 35, 1951; diagn. orig.: “Caulis fere ex omnibus axillis foliorum ramosus.”) and *A. pannonica* f. *laxa* DClbrowska (in Acta Univ. Wratislav. - Pr. Bot. no. 24: 190, 1982); these should differ from the typical *A. pannonica* in the branching of the stem from its base or from the middle in the former and above in the latter. *Achillea pannonica* f. *subsetacea* Nyárády (in Bul. Ști. Acad. Republ. Pop. Rom., sect. biol., agron., geol. et geogr., 3: 35, 1951; diagn. orig.: “Planta ± intermedia inter parentes [A. pannonica and A. setacea]” should comprise narrow-leaved plants with densely arranged leaf segments. Resembling *A. setacea* in overall appearance, the shape of ultimate leaf segments and characters of the capitula should correspond to those of *A. pannonica*. As regards their putative hybridogenous origin, its confirmation would have required chromosome counts at least.

Klokov & Krytskaja (in Sytnik 1984: 235) mentioned a “form” with pink and purplish (sic!) ligules occurring in sandy hills along the right bank of the Dnipro River in the Ukraine; in my opinion, however, *A. pannonica* always has only white ligules. In spite of the identification difficulties described above and the high phenotypic plasticity, *A. pannonica* seems to be a morphologically well delimited species with no infraspecific variation deserving taxonomic recognition as part of (putative) variation described in literature can be explained by identification errors.

**Nomenclatural notes and taxonomic history**

The species was recognised as a separate taxon in the beginning of the nineteenth century independently in Hungary, Bohemia, and Germany. It was probably J. Sadler (Sadler 1818) who became aware of the distinctiveness of *A. pannonica* in the environs of Budapest (as the species is probably very common there) and coined the name *A. lanata* Spreng. for it. This is obvious both from literature and from several specimens from that time stored in some public herbaria. It should be stressed that Hungarian botanists clearly distinguished between *A. tanacetifolia* All. (= *A. distans* Waldst. et Kit.), also quite common at some sites near Budapest, and *A. lanata*, which both are listed in species accounts from that time (e.g. Sadler 1818, 1826). This assumption is also supported by the text of the label of an *A. pannonica* specimen collected at the outskirts of Budapest of that time:
"Achillea lanata" Spreng. ... Legi ad Schöne Schäfferin Budae [Szép juhászné, Ságvári liget, Budapest] inter tanacetifoliam... ([A. F. Láng] sine anno WU)". Actually, the use of the name A. lanata was a mistake; probably the first person to become aware of the misinterpretation was W. D. J. Koch (Koch 1837; cf. A. Heimerl in Kerner 1884). He found that the name A. lanata was based on plants of the A. distans group (p. 373), and proposed a new name at variety level (A. millefolium var. lanata) which was soon widely accepted.

Achillea seidlii was described by J. S. Presl and K. B. Presl from Prague’s environs. The original description (Presl & Presl 1819; Fig. 1) does not make the interpretation of Presls’ taxon easy. As type localities, the villages of Podbaba and Šárka, today both Prague’s northwestern suburbs, are given. Their recent yarrow flora comprises A. nobilis L., A. pannonica, and A. setacea as well as tetraploid populations so far referred to as “other tetraploids” (Danihelka & Rotreklová 2001). With A. nobilis and A. setacea well known to the Presls and both included in “Flora čechica” (Presl & Presl 1819), the choice had to be restricted to A. pannonica and tetraploid yarrows (incl. A. collina). An extensive search in PRC (the herbarium of K. B. Presl was purchased by the German university in Prague after his death and is now incorporated in PRC) resulted in one herbarium sheet. The sheet (Fig. 2) bears two plants identified as A. seidlii collected in the Šárka valley (“Scharka”) near Prague, and the corresponding label (Fig. 1), probably written by K. B. Presl (J. Hadinec, in verb.), refers directly to “Flora čechica” (“fl. čech. no”). Unfortunately, no collector is indicated; neither was the corresponding number (1267) added. In fact, this supports the authenticity of the specimens as collected before the publication of the book. Two fragmentary plants on the sheet, lacking lower parts of the stem and supplemented by separate (ground?) leaves, were probably collected in late summer. The better preserved specimen with an inflorescence branched above could not be identified with certainty (etiam F. Ehrendorfer, in verb., et J. Saukel, in verb.): it might be either a tetraploid plant or the hexaploid A. millefolium s. str. which is, however, recently absent from or very rare in the type localities. The second fragment was partially eaten by insects, but its general appearance, leaf dissection, and indumentum, mainly below the nodes, make its identification as A. pannonica possible. This specimen is selected here as lectotype of the name A. seidlii. In spite of later disarrangement of the Achillea collections in PRC, the presence of two


Fig. 1. – The original description of Achillea seidlii J. Presl et C. Presl (Presl & Presl 1819: 173) and the label of the lectotype from PRC; cf. Fig. 2.
species on one sheet seems not to have originated from improper handling because both stems had been cut the same way when collected.

The use of the name *A. seidlii* changed much through time. This is evident both from herbarium specimens and from literature. Plants collected between 1820 and 1850 in Bohemia and identified as *A. seidlii*, now preserved in PR, PRC, W, and WU, represent *A. millefolium*, *A. pannonica*, *A. pratensis* Saukel et Länger, and *A. styriaca* Saukel et al., ined. The opinions of different botanists also varied. Reichenbach (1830–1833) placed *A. seidlii* behind *A. millefolium* and marked it with an asterisk as a species that “can be regarded as a subspecies or a variety by others”. He also added “*A. silvatica* Beck. [= Becker]” and *A. scabra* Host (= *A. asplenifolia*) as its synonyms; the latter was later removed from the synonymy of *A. seidlii* in “addenda et corrigenda” (p. 851). Koch (1837) considered *A. seidlii* a synonym of *A. millefolium* var. *alpestris* Wimm. et Grab. or, in a narrower sense, of *A. dentifera* Lam. (= *A. distans* Waldst. et Kit.). Rouy (1903) and Fiori (1903–1904) included *A. seidlii* into *A. millefolium* var. *sudetica*, with the latter ranking it a form. After that time, the name disappeared from European botanical literature. Index Kewensis now includes *A. seidlii* as a synonym of *A. millefolium*.

In Bohemian botanical writing *A. seidlii* was treated as a separate species by Kosteletzky (1824) and Opiz (1852). Ignaz F. Tausch, producing the exsiccate series “Herbarium florae bohemicae”, regarded *A. seidlii* as a synonym of *A. millefolium* var. *lanata* (= *A. pannonica*; cf. Ott 1851). Čelakovský (1871) shared his opinion. Typifying *A. seidlii*, I followed the opinions of I. F. Tausch and L. Čelakovský, and my choice is in accordance with the locality given in the protologue. A rejection procedure in terms of the Code is now necessary to prevent the replacement of the name *A. pannonica* (published 1844) by the name *A. seidlii* (published 1819).

In the herbaria W and WU (cf. also Beurton 1985: 120), specimens from an unknown German exsiccate series were seen with a printed label stating “Achillea millefolium α. collina Fl. Dr. / Merseburg W. Gerhard”). The exsiccate must have been issued in 1820 or earlier as this year is indicated in a handwritten note on the label of the specimen stored in WU (originating from the herbarium of A. F. Láng 2 which was later purchased by K. Keck 3 and is still kept separately in WU). A search in German floras dating from that time was unsuccessful (W. Gutermann and U. Braun, both in litt.); and the name had probably never been validly published. The name *A. millefolium* f. *contracta* based on *A. pannonica* was proposed by D. F. L. Schlechtendal in “Flora beroliniensis” (Schlechtendal 1823: 445). Compared to other floras from that time, the description is quite detailed and in some respect fitting: “In forma β [= contracta] caulis strictus simplex lanuginosus, folia convoluta erecta, superiora fere cauli adpressa, prasertin ad basin lanuginosa, corymbus terminalis non amplus. Habitu alieno haec forma discedit at nullo vero charactere.” The identity of Schlechtendal’s taxon was discussed by Schulz (1902) who, following the example of Ascherson (1864), identified it with *A. millefolium* var. *lanata* Koch, which he believed to be the correct name for *A. pannonica*. An authentic specimen from Schlechtendal’s herbarium now stored in HAL was proposed as the lectotype of the name.

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2 Adolf Franz Láng (1793–1863) was a pharmacist in the Slovak towns of Nitra and Bratislava.
3 Karl Keck (1825–1894) was a bookshop keeper in Vienna and later a private researcher in the castles of Friedegg near Schwetberg and Aistersheim.
Fig. 2. – Lectotype of *Achillea seidlif* J. Presl et C. Presl (PRC no. 963). The plant proposed here as the lectotype is indicated with an arrow.
Fig. 3. – *Achillea pannonica* Scheele; Moravia, distr. Břeclav, Mikulov: Svatý kopeček Hill above the eastern part of the town, 310 m a. s. l., leg. J. Danihelka, 13 June 1994, herb. J. D.
I was unable to typify the name *A. pannonica* because Scheele’s herbarium specimens were not available to me. Searches in the herbaria BREM, GOET, and REG, made on my request, revealed no type material. Dąbrowska (1982: 197) was also unsuccessful.

**Notes on distribution of *A. pannonica* in the Czech Republic**

The distribution range of *A. pannonica* within the Czech Republic consists of two areas (Figs. 4, 5). The species is confined to regions of thermophilous flora (Thermoboehemicum and Pannonicum according to Skalický 1988) with overlaps to adjacent regions of mesophilous flora (see Appendix 1; for localities of populations in which chromosome counts were done see Danihelka & Rotreklová 2001). Tight relations exist between the distribution pattern observed and the mean annual temperature (Fig. 6): most of the localities are concentrated in regions with a mean annual temperature higher than 8 °C, and no
native occurrence was observed in regions with a mean annual temperature lower than 7 °C. Compared with A. setacea, A. pannonica is less xerophilous: it is also present in regions with an annual precipitation of 550–600 mm and more, while the former prefers regions with a mean annual rainfall lower than 550 mm, and the isohyet of 600 mm is only exceptionally exceeded (Danihelka 2001). The absence of A. pannonica in the warm part of eastern Bohemia and in the part of Silesia adjacent to northern Moravia can be explained by their relatively humid climate along with a lack of suitable habitats. Regardless of their general distributions, Anagallis foemina, Cerasus fruticosa, Dictamnus albus, and Lavatera thuringiaca exhibit very similar distribution patterns within the Czech Republic (cf. Slavík 1986, 1990, 1997). The distribution of A. pannonica also coincides with the distribution pattern of thermophilous oak woods of the order Quercetalia pubescenti-petraeae (Neuhauslová et al. 1998: 169). Achillea pannonica can be included into the thermophilous phytochorotype Buglossoides arvensis-Ranunculus illyricus with a marginal position towards the less thermophilous phytochorotype Bothriochloa ischaemum-Scabiosa ochroleuca (Slavík 1988).

The Bohemian localities of A. pannonica are concentrated along the Bilina River, the Ohře River, in the eastern part of the Doupov Hills (Doupovské hory), in the Bohemian
Low Mountains (České středohoří), along the lower Vltava River, in the Bohemian Karst (Český kras), and along the Labe River eastwards to the western piedmonts of the Iron Hills (Železné hory). The species is absent from floodplains but it grows usually on slopes of river valleys (often with rock outcrops) and on hillsides of adjacent areas. If suitable habitats, such as open rocky places, are present, *A. pannonica* penetrates along deep narrow river valleys into moderately warm regions. Examples of this phenomenon are localities near the town of Křivokláš (valley of the Berounka River), near the villages of Nalžovické Podhájí and Cholín (valley of the Vltava River; here together with *Orobanche arenaria*; cf. Holub & Zázvorka 1999), near the town of Týnec nad Labem (the Labe River valley), and near the town of Mladá Boleslav (valley of the Jizera River). Also an outlying locality near the town of Bělá pod Bezdězem (northwest of the town of Mladá Boleslav) is quite remarkable. In this region, however, several thermophilous species occur, or at least did so, among them *A. setacea* (cf. Danihelka 2001).

The Moravian localities of *A. pannonica* form a triangle between the towns of Znojmo, Hodonín, and Olomouc. In southwestern Moravia, the species makes its way in western and northwestern directions through the narrow valleys of the Dyje River (a chain of sites between the towns of Znojmo and Vranov nad Dyji), through the valleys of the Jihlava and Rokytná Rivers (sites west of the town of Ivančice), and through the valley of the Svratka...
River (Květnice Hill above the town of Tišnov; together with Inula oculus-christi, Stipa capillata, and Teucrium botrys; V. Grulich, in verb.). The northernmost localities in Moravia are situated between the village of Laškov and the town of Náměšť na Hané in its central part. Other remarkable outlying occurrences were registered between the villages of Želátovice and Tučín east of the town of Přerov (on travertine), on the top of Bradlo Hill in the Chříby Mts near the town of Koryčany (together with Cornus mas and Iris variegata; V. Pluhar, in verb.), and in the southern part of the White Carpathian Mts (Bílé Karpaty) east of the town of Strážnice. The absence of A. pannonica from the central part of the Morava River Valley (Hornomoravský úval; cf. Skalický 1988) is caused by lack of suitable habitats.

In the two outlying Bohemian localities the species must be considered adventive. This is certainly the case near the village of Rojice (near the town of Blatná in southern Bohemia); this explanation is supported by the fact that A. pannonica was collected there together with A. crithmifolia Waldst. et Kit. (M. Deyl 1971 PR). Also the occurrence at the village of Hradičany (near the town of Mimoň in northern Bohemia; Č. Ondráček 1992 CHOM) is probably non-indigenous. Nor do records from the Ore Mts (Krušné hory) (Přísečnice: Vohradníková 1969 CHOM; Mückenberg [Komáří hůrka] im böhm. Erzgebirge: J. Wiesbour sine anno PR) as well as from the towns of Liberec (Reichenberg: Langer sine anno PR) and Hrádek nad Nisou (Grottau, MzL. [an G. Menzel?] sine anno PR) represent natural occurrences. With ecological conditions not complying with the requirements of the species, these records could be explained as label confusions rather than as adventive occurrences. In the last case, however, the nearest locality in Germany is situated in the vicinity of the town of Görlitz only about 40 km north (Beurton 1985: 122).

**General distribution and phytogeographic comments**

*Achillea pannonica* grows in Germany (Bavaria, central and eastern part of the country), Poland, Czech Republic, Slovakia, eastern Austria, Hungary, Romania, Ukraine, Croatia, Serbia, Bulgaria, Macedonia, Albania, northern Greece, and Turkey (western Anatolia). The southeastern boundary of the distribution range remains to be determined. Its occurrence in northern Slovenia, Moldavia, and southeastern Russia is reported in literature, but I have not yet seen any herbarium specimens from these countries. For a general distribution map, see Meusel & Jäger (1992: 479). From a phytogeographic point of view, *A. pannonica* is classified as a subtemperate to submeridional subcontinental European species or as Pontic element with overlaps to the Balkans and westernmost Anatolia. The general distribution range of *A. pannonica* is similar to those of Ficaria calthifolia, Linum flavum, Pulsatilla pratensis, Rapistrum perenne, and Potentilla arenaria (the last going further eastwards; cf. Meusel et al. 1965; Meusel et al. 1978; Meusel & Jäger 1992). Regardless of some minor or major differences caused by particular substratum preferences (cf. Slavík 1986, 1990, 1997), regional distribution patterns of the listed species in the Czech Republic are similar to that of *A. pannonica*.

The northern Bohemian localities of *A. pannonica* are connected with those in central Germany by a chain of sites in the Labe River valley. Another group of localities is concentrated in eastern Brandenburg (Beurton 1985). The species is further scattered throughout Poland; for the list of localities see Dąbrowska (1997). The distribution pattern described makes it possible to explain the presence of *A. pannonica* in Bohemia as a result of
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eyearly postglacial migration along the northern side of the Carpathians. The southern Moravian localities represent the northwesternmost part of the Pannonian distribution range of the species, as *A. pannonica* occurs also in eastern Austria and southern Slovakia.

The recent distribution of *A. pannonica* in the Czech Republic seems to be a relict of a former more continuous distribution. The species might have spread during the early Holocene (Boreal and Praeboreal). The species decline, caused by continuous spread of woodland in the Atlantic, was then stopped as a result of human impacts in the Neolithic Age including deforestation. This explains the occurrence of *A. pannonica* at remote sites which do not represent extrazonal islands of primary non-forest vegetation (in contrast to rock outcrops on the slopes of river valleys). These sites are often old fortified settlements, e.g. the summit of Chlum Hill near the town of Mladá Boleslav, slopes below the earlier castle of Cimburk near the town of Kutná Hora, and slopes called “Na Šancích” near the village of Přístoupim near the town of Český Brod.

The distinct distribution range with relict traits supports the species status of *A. pannonica* and the assumption that *A. pannonica* represents, despite the octoploid chromosome number, an old polyploid taxon within the *A. millefolium* group. Its evolutionary origin, however, remains unknown.

**Ecological requirements and phytosociological affinity**

*Achillea pannonica* is a heliophilous to heliosciophilous species; unlike *A. setacea*, it can survive in sterile form when shaded by surrounding vegetation. I observed the species growing on many types of eruptive (basalt, diabase, phonolite), metamorphic (amphibolite), and sedimentary (limestone) rock; and only very acidic rocks are avoided. It is very frequent on calcareous substrata such as limestone and loess.

In the Czech Republic, *A. pannonica* is mainly confined to dry grasslands of the alliances *Alysso-Festucion pallentis*, *Helianthemo cani-Festucion pallentis*, *Seslerio-Festucion pallentis*, *Festucion valesiaca*, *Bromion erecti*, and *Koelerio-Phleion phleoidis* as well as to the fringe communities of the alliance *Geranion sanguinei*. It grows also in open spaces within thermophilous oak forests of the alliance *Quercion pubescenti-petraeae*, and in shrub communities of the alliances *Berberidion* and *Prunion spinosae*. Sometimes it is even encountered in ruderal and subruderal vegetation of the alliances *Convulvulo-Agropyrrion*, *Daucio-Melilotion*, and *Onopordion acanthii*.

Within a group of 388 relevés containing *A. pannonica*, fifteen species with the strongest relation to this species were selected. The significance of the relation is extraordinary high in all cases. They are (u-value in parentheses; cf. Brueelheide 1995): *Thymus glabrescens* (50.5), *Agropyron intermedium* agg. (46.1), *Chamaecytisus austriacus* (43.2), *Inula ensifolia* (43.1), *Viola ambigua* (43.1), *Aster linosyris* (42), *Onobrychis arenaria* (39.8), *Chamaecytisus ratisbonensis* (38.9), *Astragalus onobrychis* (38.6), *Jurinea mollis* (37.4), *Astragalus austriacus* (37.4), *Dorycnium pentaphyllum* agg. (37.4), *Thalictrum minus* (36.5), *Peucedanum cervaria* 35.9, and *Aster amellus* (34.9). Their phytosociological affinity corresponds to the situation described above; the species marked with asterisk are confined to dry grasslands of the order *Festucetalia valesiaca*, others to those of the class *Festuco-Brometea* (*Aster amellus, Dorycnium pentaphyllum* agg., *Onobrychis arenaria, Thymus glabrescens*), to fringe communities of the alliance *Geranion sanguinei* (*Peucedanum cervaria*), to thermophilous oak forests of the alliance
Quercion pubescenti-petraeae (Thalictrum minus), and to thermophilous shrub communities of the alliance Prunon spinosae (Chamaecytisus austriacus).

Sympatric occurrence and hybridization with other yarrows

Sometimes two or more members of the A. *millefolium* group occur together at one locality. Apart from A. *setacea* documented by a herbarium specimen (cf. Danihelka 2001), I have observed sympatric occurrence of A. *asplenifolia*, A. *collina*, A. *pannonica* in the Hvoranské louky nature reserve near the village of Čejč in southern Moravia. Achillea *collina*, A. *setacea*, and A. *pannonica* grow together on Šibeníčník Hill near the town of Mikulov and at sandy places near the Bzenec-přívoz railway station, both in southern Moravia. The same combination of taxa was encountered on a grassy slope with rock outcrops near the village of Otvovice in central Bohemia. The species mentioned are all morphologically and phenologically distinct and can be recognised without major problems. I observed neither intermediate plants of putative hybridogenous origin, nor other phenomena suggesting an extensive gene flow amongst particular taxa which had been mentioned by Saukel & Länger (1992: 71). The only spontaneous hybrids I was able to detect were heptaploid plants of the combination A. *millefolium* × A. *pannonica* (Danihelka & Rotreklova 2001). They were originally all sampled as A. *pannonica* and recognised as hybrids only by means of chromosome counts (all had 2n = 63). They approach A. *pannonica* in appearance, and only minor differences in indumentum and growth habit could be recognised. These hybrids were found in three localities, and they seem to be occasionally produced where both parents grow together. With the nothospecies having no binomial yet, it is formally described in Appendix 2. The occurrence of hybrids between A. *millefolium* and A. *pannonica* was, for instance, reported by Biste (1978); for other references see Danihelka & Rotreklova (2001).

Beurton (1985) reported sympatric occurrence of two and more yarrows in the southern piedmonts of the Kyffhäuser Mts near the town of Bad Frankenhausen, Germany: A. *pannonica* and A. *setacea* were encountered at one site; A. *millefolium* s. str., A. *pannonica*, and A. *setacea* at another one. She found that A. *pannonica* rarely grows together with A. *collina* because the latter prefers man-made habitats in central Germany.

Acknowledgements

I am indebted to M. Chytrý, V. Grulich, M. Kočí, and V. Řehořek (all Brno), to Z. Kaplan and J. Štěpánek (both Prague), and to W. Gutermann (Vienna) for their help including consultations on vegetation science, phytogeography, mapping software, nomenclature, early exsiccate collections, and history of botany. The identity of some herbarium specimens was consulted with F. Ehrendorfer and J. Saukel (both Vienna). I would also like to thank the owners of private herbaria and the people in charge of public herbarium collections mentioned above; among them U. Braun (Halle), M. Dvořáková (Brno), J. Hadinec (Praha), D. Kováts (Budapest), Č. Ondráček (Chomutov), B. Skočdopolová (Praha), and W. Till (Vienna) in particular provided me extraordinary support. Jan W. Jongepier (Veselí nad Moravou) and Jeffrey A. Vanderziel (Brno) kindly improved the language. This research was partly supported by the grant MSM no. 143100010 and the grant no. 206/98/1545 from the Grant Agency of the Czech Republic.
Srovnání


Řebříček panonský (obr. 3) je vytrvalá, hustě dlouze chlupatá, často šedozelená bylina, s plazivým, 1–15 (–30) cm dlouhým oddenkem, (9–) 20–75 (–100) cm vysoká, s obou, za sucha slabě žebrenatou, (1,6–) 2–3,4 (–4,8) mm silnou lodyhou. Listy přízemní lůžko jsou krátce řapíkaté, dolní lůžky listy krátce řapíkaté nebo přisedlé, střední a horní lůžky listy přisedlé, obvykle ouškatou bází objímavé, 2–3krát přenosečné, později v paždi se svačevky listů; listové úkrojky prvního řádu (2–) 6–13 mm dlouhé a 1,5–4,0 (–9,0) mm široké, s koncovými úkrojky vejčitémi až úzce vejčitémi, přibliž vrcholu s chrupavým lemem, hrotil; listové vřeteno 1,0–2,0 (–2,5) mm široké; přízemní a dolní lůžky listy úzce obklopené nebo eliptické, s úkrojky víceméně dvourozměrně uspořádanými, listy přízemní lůžko 5–44 cm dlouhé a (3,9–) 9–29,0 mm široké, dolní lůžky listy (3,5–) 5,0–19,0 (–35,0) cm dlouhé a (3,5–) 5,0–13,0 (–21,0) mm široké, střední a horní lůžky listy úzce eliptické nebo úzce kopinaté, prostřední lůžky listy 2,6–10,0 (–15,0) cm dlouhé a 3–9 (–17) mm široké, horní lůžky listy 1,2–3,3 (–4,5) cm dlouhé a 1,5–5,0 (–9,0) mm široké. Chocholíčnaté laty většinou husté, 1,8–6,8 (–10,3) cm dlouhé a (1,5–) 2,1–6,6 (–9,0) mm široké; zákrovy většinou úzce vejcovitou, na bázi zaoblouknuté, za květu (3,5–) 3,8–4,7 (–5,2) mm dlouhé a (2,1–) 2,2–3,2 (–3,3) mm široké, zákrovy čtyřlístné vejcovitě nebo úzce vejčité, zelené, někdy se žlutohnědým až hnedým okrajem, hustě chlupaté, za plodu někdy olysalé. Jazykovité květy bílé, za sucha někdy smetanově bílé, v suchém stavu (1,0–) 1,1–1,7 (–2,1) cm dlouhé a (0,9–) 1,4–2,4 (–6,6) mm široké. Nažky v obrysu obklopené smetanově bílé, úzce křídlaté, (1,5–) 1,7–2,3 cm dlouhé, hnedé, světle lemované. Kvetje až od konce květova do září.


<table>
<thead>
<tr>
<th>Znak</th>
<th><em>A. pannonica</em></th>
<th><em>A. setacea</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>délka oddenku (cm)</td>
<td>1–15 (–30)</td>
<td>1–6 (–8)</td>
</tr>
<tr>
<td>výška (cm)</td>
<td>(9–) 20–75 (–100)</td>
<td>(6–) 12–50 (–53)</td>
</tr>
<tr>
<td>délka listů přízemní růžice (cm)</td>
<td>5–44</td>
<td>3–13</td>
</tr>
<tr>
<td>šířka listů přízemní růžice (mm)</td>
<td>(3,9–) 9,0–29,0</td>
<td>2,9–6,5 (–11,0)</td>
</tr>
<tr>
<td>tvar listů přízemní růžice a dolních lodyžních listů</td>
<td>úkrojky uspořádané dvourozměrně (listy proto téměř ploché)</td>
<td>úkrojky uspořádané trojrozměrně (listy proto na průřezu oblé)</td>
</tr>
<tr>
<td>délka dolních lodyžních listů (cm)</td>
<td>(3,5–) 5,0–19,0 (–35,0)</td>
<td>(2,0–) 3,0–11,5 (–15,0)</td>
</tr>
</tbody>
</table>
šířka dolních lodyžních listů (mm)  (3,5-) 5,0-13,0 (-21,0) (2-) 3-6 (-11)
šířka koncových úkrojů středních lodyžních listů (mm)  0,4-1,0 (-1,2) 0,2-0,3 (-0,4)
šířka hlavního květenství (cm)  (1,5-) 2,1-6,6 (-9,0) (0,7-) 1,5-5,6 (-6,1)
délka zákruhu (mm)  (3,5-) 3,8-4,7 (-5,2) (2,9-) 3,0-4,0 (-4,1)
šířka zákruhu (mm)  (2,1-) 2,2-3,2 (-3,3) (1,4-) 1,5-2,7 (-2,8)
délka jazykovitých květů za sucha (mm)  (1,0-) 1,1-1,7 (-2,1) (0,6-) 0,8-1,7 (-1,9)
šířka jazykovitých květů za sucha (mm)  (0,9-) 1,4-2,4 (-2,6) (1,0-) 1,1-2,0 (-2,5)
délka plodů (mm)  (1,5-) 1,7-2,3 1,1-1,4
doba květu  od konce květu do září, asi o dva týdny později než A. setacea

Areál A. pannonica v českých zemích je tvořen dvěma arelami (obr. 4, 5). Druh je soustředěn do Českého a Moravského termofytika (Skalický 1988), přičemž na některých místech přesahuje i do sousedního mezofytika. Výčet revidovaných herbarových dokladů je v dodatku 1 (Appendix 1); přehled populací, u nichž byl zjištěn počet chromozomů, uvádí Danihelka & Rotreklová (2001b). Srovnání mapy rozšíření s mapou průměrných ročních teplot (Vesecký et al. 1958) ukazuje, že převážná většina lokalit se nachází v oblastech s roční průměrnou teplotou vzdachu vyšší než 8 °C. Na rozdíl od A. setacea proniká A. pannonica i do území o něco vlhkějších, tj. se srážkovým úhnnem 550-600 mm. Do teplé, avšak vlhké části východních Čech a Slezské nížiny s ročním úhnnem srážek kolem 650 mm už nezasahuje.


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Danihelka: *Achillea pannonica* in the Czech Republic


Appendix 2

Achillea ♂incognita Danihelka, nothospecies nova (= Achillea millefolium L. × A. pannonica Scheele)

Holotypus: Bohemia septentrionalis, Montes České středohoří, distr. Lovosice: ad marginem silvae secundum viam ad cacumen versus in declivi septentrionali collis Boreč ad pagum Boreč, alt. cca. 380 m n. m. (coll. J. Danihelka d. 13. VII. 1995); planta sub no. A95/196 in Horto botanico plantarum medicarum Universitatis Masisyrkianae brunensis culta; leg. J. Danihelka d. 27. VI. 1996; holotypus (no. 556127) cum isotypo (no. 556127b) in herbario BRNU asservatur.

Diagn osis: Plantae inter A. millefolium et A. pannonicam habitu plus minusve intermediae vel speciem alteram accedentes. A specie priori primo pilositate magis conspicua caulis (principue sub nodis), ramosor superiorum inflorescentiae, squamorumque involucri, atque ligulis semper albis differt. A specie altera (species octoploidea cum 72 chromosomatis) solum chromosomatum numero heptaplodo eo (2n = 63) certe distinguet potest.