A neglected endemic of the Eastern Sudeten

Přehlížený endemit Východních Sudet

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An isolated population of Dianthus carthusianorum L. in the Velká kotlina glacial cirque, Hruby Jeseník Mts. (Eastern Sudeten, Czechoslovakia) is shown to represent an endemic taxon for which the name Dianthus carthusianorum L. subsp. sudeticus Kovanda is proposed. The subspecies is diploid, with 2n = 30. Its morphology, variation, distinguishing characters, ecology, geographical distribution and taxonomic relationships are discussed. The taxon appears to be most closely related to var. alpestris (Neill.) Hegi from the Eastern Alps from which it differs by its solitary, flexuous stems, scarious subtending bracts, few-flowered inflorescences and petal limb light rose, (11–)12–14(–15) mm long.

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INTRODUCTION

Dianthus carthusianorum L., even in its narrow circumscription excluding D. Pontederae Kerner, D. sanguineus Vis. and D. liburnicus Bartl. (see e. g. Tutin 1964, Meusel et Mühlberg 1971–1978) is a taxonomically complex species with an extensive range (from the Pyrenees to the Carpathians and from the Alps to southern Belgium and Denmark) and wide ecological plasticity, extending from the sea level to 2600 m in the Alps. Its excessive variability has led taxonomists to split it into a number of infraspecific taxa of every rank, often based on single morphological characters. Ascherson et Graebner (1921–1929) attempted to arrange these taxa into a hierarchical system, resulting in a maze of incongruous units.

The available evidence would suggest that this complex infraspecific differentiation took place almost exclusively at the diploid level, 2n = 30 (see e.g. Rohweder 1934). The tetraploid chromosome number (2n = 60) has so far been reported only for material of unknown origin (Anderson-Kottó et Gairdner 1931) and for plants from Val d’Entremont, Switzerland (Favarger 1946) and is explained in terms of endomitosis. Further cytogeographic and experimental studies are desirable.

It now seems certain that more or less distinct races of higher rank (that is distinguished by a combination of characters) occur mainly in the Alps and Carpathians. Those from the Balkan are now generally regarded as separate species. In the lowlands, the variation is much more continuous and differences between the various populations are difficult to recognize.

Revising the Central European material of Dianthus carthusianorum, great difficulty was encountered in identifying plants from Velká kotlina, Hruby
Jeseník Mts. (Eastern Sudeten) with anything currently recognized both within and without the species. A closer examination demonstrated that the population is taxonomically distinct both from subsp. *latifolius* (GRISEB. et SCHENK) HEGI with which it has been merged in the last fifty years and from all other members of the *Dianthus carthusianorum* species aggregate. A survey of the pertinent literature revealed that two attempts at taxonomic treatment had been made in the past, neither being effective from the viewpoint of nomenclature. The population was studied in the field in 1976–1978 and a number of plants are in cultivation in the experimental plot of the Botanical Institute of the ČSAV at Průhonice.

Morphology, variation, distinguishing characters, chromosome number, ecology, geographical distribution and taxonomic relationship of this Sudeten endemic are considered below.

**HISTORICAL**

The Velká kotlina population of *D. carthusianorum* has for long attracted the attention of botanists. Few have, however, undertaken to separate it as a taxon. Unlike other endemics and rare plants of the Eastern Sudeten, it was noticed relatively late. Early authors of Moravian and Silesian floras (see MATTUSCHKA 1776, KROCKER 1790, GÜNTHER, GRABOWSKI et WIMMER 1824, WIMMER et GRABOWSKI 1827, ROHRLER et MAYER 1835) do not list any *D. carthusianorum* from the Sudeten. WIMMER (1840) does report that the species extends „bis an das Hochgebirge” but the first record from Velká kotlina is found in GRABOWSKI (1843). FIEK (1881) emphasized that this was the only locality of *D. carthusianorum* in those mountains. OBRONNY (1886) was the first to observe that these plants belonged to a special variety but did not consider it necessary to name it. This was done by the Liegnitz (now Legnica, Poland) apothecary A. Callier in *Flora silesiaca exsiccata* in 1893. The name he used, f. *alpestris* CALLIER, is a homonym of the Eastern Alpine *D. carthusianorum* NEILREICH, of which the author was apparently unaware. On the herbarium label (no. 786, leg. CALLIER, HIRTE et SCHOLZ, 21. 8. 1893), the name is cited as „forma *alpestris* CALLIER in Bemerkungen zur Flora silesiaca exsiccata Editio 1893”. This is probably an error. The Bemerkungen were being published in Deutsche Botanische Monatsschrift and later in Allgemeine Botanische Zeitschrift but the publication was discontinued in 1895 and the last collection commented upon is no. 717 of the 1892 edition. HEGI (1911) seems to have adopted the citation from the herbarium label, while ASCHERSON et GRAEBNER (1921–1929) cite the name from a letter received from Callier. Callier’s classification is little known and the epithet has never been cited in literature, except by Hegi and Ascherson et Graebner.

SCHURE (1904) and LAUS (1908, 1910) report *D. carthusianorum* from Velká kotlina but do not recognize any infraspecific taxa; the latter did however mention the large flowers. In Hegi’s monographic study (1911) and Flora (1912), plants from Velká kotlina are included in subsp. *latifolius* (GRISEB. et SCHENK) HEGI, as are also in ASCHERSON et GRAEBNER’s Synopsis (1921–1929). The next to propose a taxonomic classification was PODPĚRA (1906) who supplied a short diagnosis (regarding the type of growth and colour of the epicalyx scales) but used no infraspecific name. In his subsequent Flora of Haná (Květena Hané, 1910), this situation is reversed: a new name, var. *sudeticus* PODP., is coined to accommodate plants from Velká kotlina which are casually mentioned but no diagnosis or reference to the previous work is provided. As a nomen nudum, var. *sudeticus* PODP. also appears in POLIVKA’s Excursion Flora (1912) but is completely missing in its second edition (DOMIN et PODPĚRA 1928). This is most surprising because here, in a footnote, a number of forms and varieties of *D. carthusianorum* are recognized. Plants from Velká kotlina are not mentioned at all, however. It can only be surmised that they are included in subsp. *latifolius* var. *alpestris* NEILR. Only one of the many infraspecific taxa described by Podpěra, var. *robustus* PODP., is recognized, and another, var. *hannensis* PODP., is included in subsp. *tenefolius* SCHUR. None of the subordinate taxa proposed by Podpěra only six years earlier (Podpěra 1922) were maintained by him in the Flora. Obviously, Podpěra became critical of the Aschersonian method which he had followed in his early studies of the Moravian flora (see also HENDRYCH 1978) and entirely renounced his elaborate subdivision of *D. carthusianorum* of 1922. This is also evident from the plentiful herbarium material gathered by him after 1928 in which even highly aberrant forms are consistently labelled *D. carthusianorum* L. and no infraspecific taxa are recognized. His students and friends seem to have been more con-
servative, however, having continued to use the epithet *sudeticus* in various ranks on both herbarium labels and in floristic reports. Examples include OTRUBA (1930) who describes "*Dianthus sudeticus*" beckoning the visitor to Velká kotlina and LAUS (1931) listing "*Dianthus carthusianorum* L. subsp. *sudeticus* PoDP." as occurring in the "ostsudetische Matte". Herbarium material from Velká kotlina was named *D. carthusianorum* var. *sudeticus* PoDP. (LAUS 1929 PRC, 1930 PRC, 1934 PRC; SMARDA 1947 BRNM; SOUČKOVÁ 1949 BRNM) or rarely *D. sudeticus* PoDP. (WEBER 1933 PRC). Unfortunately, the epithet was to remain a nomen nudum.

DOSTAL (1948-1950, 1954, 1958) took recourse to HEGI (1911, 1912) and ASCHERSON et GRAEBNER (1921-1929) in including plants from the Sudeten in his subsp. *montivagus* (DOMIN) DOST. So far the only author to query this classification has been JENÍK (1961) who suggested that the identity of these plants, with subsp. *montivagus* was uncertain.

MORPHOLOGY

Morphologically, the plants may be defined as follows: Stems solitary or laxly caespitose, somewhat flexuous, 15—25 (—30) cm long, with distinct nodes. Sheaths 5—9 mm long. Cauline leaves oblong-lanceolate, (1.5—) 1.8—2.6 (—3.2) mm wide. Involucral bracts scarious, stramineous to brown. Heads not conspicuously dense, 2—4 (—5)-flowered, sometimes reduced to a single flower. Epicalyx scales brownish, awned. Calyx 15—17 mm long, light brownish-red. Petal limb (11—)12—14 (—15) mm long, irregularly dentate in the upper part, light rose-coloured and hairy above, whitish and glabrous beneath. Claw longer than calyx.

The most conspicuous character is the light colour of the petal limb which may be likened to that of certain forms of *D. Lumnitzeri* WIESB. In *D. carthusianorum*, the colour is known to vary from rose to deep-purple red. No pale-flowered races have been reported, however, and albino forms are exceedingly rare. Mountain races, such as subsp. *latifolius* (GRISB. et SCHENK) HEGI, subsp. *atrorubens* (ALL.) PERS. and subsp. *vaginatus* (CHAIX) SCHINZ et KELLER invariably have darker petals than *D. carthusianorum* of the lowlands and pigmentation of floral parts in general is known to increase with altitude. It is most interesting therefore to find that in the Velká kotlina population the contrary is the case.

All the other characters are known to occur within *D. carthusianorum* but their combination and association with the above feature is quite unique and unmatched in any of the many races hitherto recognized, as will be demonstrated below. Unusual in the mountain habitat are the diffuse stems, referred to in the original diagnosis by Podpéra (1905). The corresponding Alpine races tend to be densely caespitose.

CHROMOSOME NUMBER

The Sudeten *Dianthus* proved diploid, with a chromosome complement of 2n = 30. The count was made from root-tips of young seedlings raised from seeds of plants transferred to the experimental plot in 1976 (three hours' pre-treatment with a saturated solution of hydroxyquinoline, followed by fixation in 1 : 3 glacial acetic alcohol and squashing in lacto-propionic orceine). The same number has been reported for subsp. *latifolius* (GRISB. et SCHENK) HEGI (MÁJOVSKÝ et al. 1970, 1974, HOLUB et al. 1972 and present author's unpublished results) and for subsp. *subalpinus* (REHMANN) KRÁLIK et MÁJOVSKÝ (MÁJOVSKÝ et al. 1974). The Moravian lowland *D. carthusianorum* is also diploid. To date, no counts are available for var. *alpestris* (NEILR.) HEGI.
VARIABILITY

The Velká kotlina population of *D. carthusianorum* is very homogeneous in terms of morphology. A certain amount of variation can be seen only in the length of stem, number of flowers per inflorescence and length of petal limb. However, the variation ranges are distinctly narrower than in any population of *D. carthusianorum* sampled hitherto by the present author (unpublished results). Plants with lax inflorescences were collected in 1909 (Laus BRNM) and 1949 (Součková BRNM) but were not observed in 1976–1978. This variant is not at all rare in *D. carthusianorum* and has been repeatedly described under various names from different parts of the range: var. *anisopodus* Ser., var. *proliferus* Lenticchia, var. *dissolatus* Oswald et Sagorski, var. *longipedunculatus* Gér. and var. *ramosus* Duffet. As in other *Dianthus* species, a tendency to gynodioecy is shown in the population and several individuals with only female flowers were found. Transitional situations are also present.

In cultivation, the stems became somewhat taller (20–30 cm) and the petal limbs shorter (10–13 mm). The other distinguishing characters, including the distinctive colour of the petal limb, proved constant.

It is of some significance that no hybrids are produced, even though two *Dianthus* species, *D. deltoides* L. and *D. superbus* subsp. *alpestris* Kablik ex Čelak., occur in the same locality and both are known to be able to hybridize with *D. carthusianorum*.

ECOLOGY AND GEOGRAPHICAL DISTRIBUTION

The glacial cirque is renowned as the richest locality of vascular plants in Czechoslovakia (about 350 species). Here, arctic-alpine, Alpine, Carpathian and boreal elements intermingle with plants of the Central European lowland. Many plant species are found thriving in unusual habitats and in startling phytocoenological relationships, some of them reaching the alti-

![Diagram](image)

Fig. 1. — Distribution of *Dianthus carthusianorum* L. in NW. Moravia: ▼ populations with predominating subsp. *carthusianorum* (some intergraded with *D. Pontederae* Körner), ▲ populations with predominating subsp. *latifolius* (Griseb. et Schenk) Hegi, ■ subsp. *sudeticus* Kovanda. Phytogeographical boundary of the Hrubý Jeseník Mts. shown by the thick line.

tudinal maxima or minima of their distribution in Czechoslovakia or even in Central Europe. A number of Sudeten endemics have been reported from Velká kotlina, including *Campanula Tatrae* BorB. subsp. *sudetica* (Hruby) Kovanda, *Plantago atrata* Hoppe subsp. *sudetica* (Pilger) Holub and several Hieraciums, and two more, *Campanula gelida* Kovanda and *Poa riphaea* (Aschers. et Graeb.) Frtsch, occur on Mt. Petrovy kamény in close proximity. The number of endemics is likely to increase when some critical species complexes have been subjected to detailed revision. The extraordinary habitat conditions, floristic riches and phytogeographical significance of the site have been commented on many times (see e.g. Jeník 1961, Jeník, Bureš et Burešová 1980).
Morphologically, the Sudeten taxon appears most closely allied to var. alpestris (NEILR.) HEGI from the Eastern Alps. It differs mainly in its solitary, flexuous stems (densely caespitose and straight in var. alpestris), heads 2—4(—5)-flowered (3—6-flowered in var. alpestris), scarios subtending bracts (mostly herbaceous in var. alpestris), petal limb up to 15 mm long and light rose (only 9—12 mm long and various shades of purple red in var. alpestris). Both taxa resemble each other in the length of stem, shape of inflorescence and colour of calyx.

The Carpathian and Eastern Alpine subsp. latifolius (GRISEB. et SCHENK) HEGI (syn.: D. monticagus DOMIN) is readily separated by its tall, straight stems up to 60—70 cm long, leaves 3—6 mm wide, sheaths 7—16 mm long, inflorescence many-flowered, dense, subtending bracts herbaceous and petal limb 8—13 mm long and purple-red to purple. Both the Sudeten taxon and subsp. latifolius have the diffuse growth in common. It is important to note that subsp. latifolius, though essentially montane and submontane in its distribution, extends far into lowland Silesia (north of the Eastern Sudeten) and Central Moravia (south of the Eastern Sudeten) where it intergrades on a large scale with D. carthusianorum subsp. carthusianorum. It is completely missing from the Hruby Jeseník Mts., however, (see Fig. 1) and no intermediates to var. sudeticus have been observed.

Another Carpathian taxon, subsp. subalpinus (REHMANN) KRÁLIK et MAJ-OVSKÁ, is characterized by straight stems, cauline leaves up to 4 mm wide, calyx 13—15 mm long and purple-red petal limb 8—13 mm long. Characters shared with the Sudeten population include low stems and few-flowered inflorescences.

The West Alpine subsp. vaginatus (CHAIX) SCHINZ et KELLER differs by its caespitose growth, straight stems, narrow cauline leaves (only 1—2 mm wide), many-flowered heads and deep purple petal limb 6—9 mm long. The other West Alpine taxon, subsp. atrorubens (ALL.) PERS., has stout stems up to 60 cm long, dense heads with subtending bracts placed at a distance from them, petal limb deep purple, very narrow and only 4—6 mm long.

**TAXONOMIC TREATMENT**

It follows from the above survey that the Sudeten population cannot very well be accommodated in any of the major segments of D. carthusianorum and should therefore be kept separate — an idea advanced by CALLIER in 1893 and PODPERA in 1910. Both these tentative taxonomic proposals were abortive, however, at least under the present provisions of the Code. The epithet alpestris used by Callier is associated with a different taxonomic type and is therefore not available. Because the epithet sudeticus, though never validly published, was used in herbarium and literature for over 40 years and refers beyond any doubt to the Velká kotlina population of D. carthusianorum, it is suggested that it be retained. To satisfy the Code, the following treatment is proposed:

*Dianthus carthusianorum* L. subsp. *sudeticus* Kovanda, subsp. nova

**Diagnosis:** Caulibus solitariis vel laxiusculae caespitosis, modice flexuosis, 15—25(—30) cm longis, nodis obvius interstinctis; vaginis 5—9 mm longis; foliis caulinis oblongo-lanceolatis, (l.5-)l.8—l.6(—3.2) mm longo, dilute brunneo-purpureo; limbo petalino fasciculis laxis, 2—4(—5) floribus formatis; squamis calycinis bruneis, aristatis; calyce 15—17 mm longo, dilute brunneo-purpureo, in parte media longe piloso, subtus albescente, glabro; unge calyce longiore.

**Holotypus:** „Kotlina na Jeseníku“, Podpěra 1906 BRNU.


**Etymology:** E nomine Montium Sudeticorum nominatus.

**Area geographica:** Endemice in valle glaciali Velká kotlina dicta Montium Hrubý Jeseník (Sudetorum pars orientalis) nascitur.

Subspecific rank, equivalent to that of the Alpine [subsp. vaginatus (Chaix) Schinz et Keller, subsp. atrorubens (All.) Pers.] and Carpathian races [subsp. latifolius (Griseb. et Schenk) Hego, subsp. subalpinus (Rehmann) Králik et Májovsky] is preferred, the population being morphologically well-defined and representing a distinct regional facies of the species. This concept of subspecies follows Babcock (1947) and is often used in modern taxonomy. Further study is required to ascertain whether var. alpestris should be recognized at the same rank; it seems highly likely that it should.

It is unclear from which source the Velká kotlina population has arisen. During any of the glacial eras, Alpine biotypes of D. carthusianorum could have colonized the Eastern Sudeten, as did a number of Alpine plants. Examples include Campanula barbata L., Gentiana punctata L., Cardamine resedifolia L., Campanula Scheuchzeri Vill., Poa glauca Vahl and perhaps also Plantago atrata Hoppe; the latter three species are known to have produced endemic races in the Eastern Sudeten (see Kovanda 1977, Jiřísek et Chrtík 1963, Holub et al. 1971). In the rock habitat in Velká kotlina, the evolutionary ancestors of subsp. sudeticus might well have survived both the severest glaciation and the warm interglacial periods. Whether they had been pre-differentiated or whether the present subsp. sudeticus is the result of convergent evolution, is a matter of guesswork. The singular colour of the petal limb may be due to a gene mutation in the early stages of differentiation.

While no intermediates between subsp. sudeticus and subsp. latifolius have been found, they can be traced between subsp. sudeticus and var. alpestris.
Plants occur in the Eastern Alps which on leaf shape, texture of subtending bracts and length of petal limb come close to subsp. *sudeticus* and, by contrast, some plants from Velká kotlina approximate to var. *alpestris*. A constant difference is the colour of the petal limb.

Another possibility would be that subsp. *sudeticus* developed from local Moravian populations of *D. carthusianorum* subsp. *carthusianorum* or subsp. *latifolius*. In view of the available evidence, this hypothesis appears less likely. The absence of any intermediates is perhaps not decisive: they could have been eliminated by natural selection (though one may wonder why the intermediates between subsp. *sudeticus* and var. *alpestris* have survived). It seems impossible, however, for subsp. *sudeticus* to have been derived from the Central Moravian lowland *D. carthusianorum* which is conspicuously small-flowered (with petal limb only 6–10 mm long), and approaches the more southern *D. Pontederae* Kerner. Except for the serpentine locality near Šumberk, it is absent from the foothills of the Eastern Sudeten (see Fig. 1). No intermediates to subsp. *sudeticus* are known, contrasting with the foothills of the Alps where *D. carthusianorum* is common and intergraded with var. *alpestris*.

As has been pointed out above, although the Carpathian subsp. *latifolius* is widespread and variable at lower altitudes in Moravia and Silesia, it has failed to colonize the Hrubý Jeseník Mountains. This is remarkable, because the subspecies is ecologically plastic and occurs in a variety of habitats. This peculiar geographical distribution alone makes it improbable for subsp. *latifolius* to have participated in the origin of subsp. *sudeticus*. Considering the morphological discontinuity (mainly in the morphology of the inflorescence and size of petal limb) it is also hard to think of subsp. *latifolius* as an evolutionary ancestor of subsp. *sudeticus*.

ACKNOWLEDGEMENTS

Thanks are due to Ministry of Culture, Prague, for their kind permission to carry out research in the Velká Kotlina State Nature Reserve, and to Hruby Jeseník Protected Landscape Area Authority, Malá Morávka, for providing facilities.

SOUHRN

sianorum, ne však mezi subsp. sudeticus a subsp. latifolius. Epitheton sudeticus bylo publikováno v hodnotě variety jako nomen nudum v Podpérově Květeně Haně roku 1910; v této práci je doplněno latinskou diagnosou a uvedeno tak v soulad s Mezinárodním kódem botanické nomenklatury.

REFERENCES


Received 28 April, 1979