Thaiszia - J. Bot., Košice, 12: 75-82, 2002
http://www.upjs.sk/bz/thaiszia/index.html

THAISZIA
JOURNAL OF
BOTANY

Observations on *Carlina biebersteinii*

MILOSLAV KOVANDA

Institute of Botany, Academy of Sciences of the Czech Republic, 252 43 Průhonice

KOVANDA M. (2002): Observations on *Carlina biebersteinii*. - Thaiszia - J. Bot. 12: 75-82. – ISSN 1210-0420.

ABSTRACT: The variation patterns in *Carlina biebersteinii* BERNH. ex HORNEM. are briefly outlined and a new subspecies, subsp. *sudetica*, is described, occurring as an isolated topodeme in a corrie in the Hrubý Jeseník Mts., Eastern Sudeten, and on the verge of extinction. Its morphology, relationships, ecology, geographical distribution and endagered status are discussed.

KEYWORDS: *Carlina biebersteinii*, Eastern Sudeten, morphology, relationships, ecology, geographical distribution, endangered status, taxonomy

Introduction

Carlina L. is a well-defined medium-sized genus closely resembling thistles in general appearance. A recent authoritative monograph (MEUSEL & KÄSTNER 1990, 1992) recognized 28 species distributed from Madeira and the Canary Islands across Europe and northern Africa to central Siberia and arranged in five subgenera: *Carlowizia* (MOENCH) LESSING, *Lyrolepis* (RECH. fil.) MEUSEL & KÄSTNER, *Mitina* (ADANS.) MEUSEL & KÄSTNER, *Heracantha* (DC.) MEUSEL & KÄSTNER and *Carlina*, each characterized by its life form, morphology, ecology and geographical distribution. Most of the species are clear-cut, presenting little difficulty in circumscription and taxonomic treatment. An exception is an array of taxa grouping around *C. vulgaris* sensu latiss. in the type subgenus, *Carlina*. MEUSEL & KÄSTNER (1992) attempted to throw some light upon the confusion by excluding all taxa with flat, entire and more or less finely spinous leaves from *C. vulgaris* and referring them to *C. biebersteinii*, known previously under the name of *C. longifolia* REICHENB. or *C. stricta* (ROUY) FRITSCH or as a subpecies of *C. vulgaris*. It is important to note that the venation of the cauline leaves (whether the lateral veins are parallel to the leaf margin or not) upon which much stress

was laid in previous accounts of the group (e. g. MEUSEL & WERNER 1962, WEBB 1976, MEUSEL & WERNER 1988) was completely abandoned as a distinguishing character. This was a major change in the taxonomy of the group. The contention that *C. biebersteinii* is "eine eigene, von *C. vulgaris* in der Regel gut unterscheidbare Art" (MEUSEL & KÄSTNER 1992) has a sound basis.

C. biebersteinii occurs in a variety of habitats from southern Finland, Denmark and central Europe to central Siberia and the Caucasus. Altitudinally it extends, in central Europe alone, from the lowlands to the krummholz region but is largely centered on the mountains. It is not surprising to find therefore that the species varies excessively over a wide range mainly in the shape of leaves and of involucral bracts and in the length and spacing of the spines on the leaf margin. A number of infraspecific taxa have been described which MEUSEL & KÄSTNER (1992) subsumed rather drastically into two subspecies, subsp. *biebersteinii* (temperate) and subsp. *brevibracteata* (ANDRAE) K. WERNER (submeridional).

When preparing an account of *Carlina*[1] for the Czech Flora, I was struck from the outset by the manifest dissimilarity of plants from the Hrubý Jeseník Mts., Eastern Sudeten, which did not fit into the variation pattern of either *C. vulgaris* or *C. biebersteinii,* and which differed markedly from anything occurring elsewhere in this country. A remote parallel could only be traced in the western Alps, and particularly in the Vosges, and to a much lesser degree in the Carpathians, but the scanty herbarium material available (BRNM, BRNU, OLM, PR, PRC) did not allow any definite conclusion to be drawn. A study of material from the herbaria K, LE and WU however demonstrated that the plants from the Hrubý Jeseník Mts. represent a separate, well defined taxon which cannot be equated with anything previously recognized. They are therefore considered distinct and are described as a new subspecies.

The Sudeten *Carlina biebersteinii*

Historical - The taxonomic status of the Sudeten *C. biebersteinii* has been uncertain since it was discovered in the mid-19th century. Unlike other rare or endemic plants of the Eastern Sudeten, it was noticed rather late perhaps due to the fact that botanical exploration of this mountain range came somewhat later than that of the Western Sudeten. Early authors of the Silesian and Moravian floras list only *C. acaulis* L. from the Hrubý Jeseník Mts. (see MATTUSCHKA 1770, KROCKER 1790, GÜNTHER, GRABOWSKI & WIMMER 1824, WIMMER & GRABOWSKI 1829, ROHRER & MAYER 1835, WIMMER 1840). The first author to report "the other *Carlina*" from the Hrubý Jeseník Mts. (Velká kotlina corrie) was GRABOWSKI (1843): "*C. vulgaris* β *longifolia*. B. entfernt-ungleich-gezähnt, dornig, die untern in den Blstiel verschmälert, Zähne meis[t] vorwärts gerichtet; St. 1-2kopfig; DeckB. länger als das Köpfchen. *C. longifolia* Rchb." He was followed by FIEK

[1] The account had to be submitted in 2000 to await publication in 2004 and contains, of necessity, only incomplete results of my study. The matter was therefore pursued further and most of the research underlying the present study, both in the field and in the herbaria, was carried out in my private capacity.

(1881) who supplied further morphological characters (shape and indumentum of leaves) and another locality, the Malá kotlina corrie. This treatment was adopted, at varietal or subspecific level, by most subsequent authors (e. g. OBORNY 1885, SCHUBE 1908), but the first and only author to notice that the leaves of the Hrubý Jeseník plants were flat, with only fine spines, was FORMÁNEK (1887). He unfortunately did not draw the obvious conclusion of removing the race from within *C. vulgaris*. LAUS (1908) in turn was the first to treat these plants at specific level, as *C. longifolia*, as also did DOMIN & PODPĚRA (1928). HENDRYCH (1986) and DOSTÁL (1989) preferred the epithet *stricta* when treating these plants as a subspecies of *C. vulgaris*. No attempt at a taxonomic separation has ever been made, however.

The oldest herbarium record that could be found in public herbaria in this country is as late as 1883 (see below) but earlier collections may be deposited in Wrocław, Poland (formerly Breslau, Prussian Silesia) because floristic research of the Eastern Sudeten was started by Silesian botanists whose natural centre was Breslau.

Morphological characters - The following are salient: growth stout, stems up to 6.5 mm thick and 55 cm tall, leaves herbaceous, flat, entire, irregularly finely spinulose, with short spinules (maximum 0.8 mm in length) alternating with solitary longer spinules (maximum 2.4 mm in length), heads 1-2(-3), up to 42 mm (without involucre) or up to 92 mm in diameter (including involucre), bracts patent, outermost lanceolate, acute, irregularly spinous, green, up to 52 mm long and 9 mm wide, the innermost narrowly linear-lanceolate, without spines, 16-19 mm long, straw-coloured to light brown, brownish-violet beneath, araneous at base.

These characters are retained in cultivation except that the heads become somewhat more numerous (up to 6 per stem). The plants proved biennial, only one (out of twenty) producing flowers and fruits only in the third year after which it died.

Chromosome number - *C. biebersteinii* is diploid, with 2n = 20, as are all the other species of subg. *Carlina* (see MEUSEL & KÄSTNER 1992). The same number was counted in the Sudeten plants. Polyploidy has so far not been recorded in the genus *Carlina*.

Relationships - With its herbaceous, flat, entire leaves, the Sudeten *Carlina* clearly belongs with *C. biebersteinii*, but the fine, short spinules, long outer involucral bracts and abnormally large heads make it aberrant within this and all other species of subg. *Carlina*. As indicated above, the only affinity can be seen on herbarium material from the western Alps and the Vosges, as far as the size of the heads is concerned, but they never approach or even attain the dimensions met with in the Sudeten. It was probably these plants that ROUY (1908) had in mind when describing his "forme" *C. stricta* from Alsace, Hohneck, Savoie, Hte Savoie, Puy-de-Dôme and Cantal, but the size of the heads is not mentioned at all in his original diagnosis, probably because they did not seem to him particularly large. In other characters separating the Sudeten *Carlina*, such as the size of spinules and involucral bracts, these plants tally with the type of *C.*

biebersteinii. Even considering the wide variation of the species, the Sudeten population appears well-defined and clear-cut.

Ecology and geographical distribution - The new subspecies is known from only two sites, Velká kotlina and Malá kotlina corries, on the S.E. side of the main ridge of the Hrubý Jeseník Mts., Eastern Sudeten, where it occurs on wet acid rocks (graphitic phyllite). Even though a number of other suitable sites are available in these mountains, a systematic search of them has failed to detect new occurrences. In the Malá kotlina corrie it occurs on a rocky slope (alt. 1,275 m, inclination 45°, south-eastern aspect, moderately wet soil, cover 45 per cent, shallow soil horizon, area of the relevé 2.5 × 2.0 m, relevé by V. KAVALCOVÁ) associated by *Molinia coerulea* 2, *Allium sibiricum* 2, *Galium boreale* 2-3, *Anthoxanthum odoratum* 1, *Calluna vulgaris* 1, *Hypochoeris uniflora* r, *Carex flava* r, *Carex pallescens* r, *Alchemilla glabra* r, *Arabis sudetica* r, *Traunsteinera globosa* r, *Thesium alpinum* r, *Digitalis grandiflora* r, *Vaccinium myrtillus* r, *Viola reichenbachiana* r, *Calathiana verna* r, *Pimpinella saxifraga* +, *Hieracium murorum* +; in close proximity *Nardus stricta* r, *Avenella flexuosa* r, *Saxifraga paniculata* r, *Festuca supina* +, *Helianthemum grandiflorum* subsp. *grandiflorum* +. All individuals in the *Carlina* population grow close enough together to form a single interbreeding unit.

From the Velká kotlina corrie it was reported as rare, occurring at 1320 m in an association *Bupleuro-Calamagrostietum arundinaceae* JENÍK 1961 (see JENÍK, BUREŠ & BUREŠOVÁ 1983), but it has not been seen there in recent years (confirmed by Mgr. V. KAVALCOVÁ of the Jeseníky Protected Area Authority).

The occurrence in wet habitats is perhaps unique in the whole distribution area of *C. biebersteinii*, the species being generally a plant of dry, open habitats. This particular characteristic has so far passed unnoticed. The altitude also is unusual, in this country at least, all other sites of the species on record lying in the lowlands or hilly country, remote from the mountains.

Pending further studies in the mountainous regions of Europe, subsp. *sudetica* is to be considered an endemic of the Eastern Sudeten.

It is probably no accident that both the corries are renowned for their floristic richness (Velká kotlina alone is the home of no less than some 350 species of vascular plants (JENÍK, BUREŠ & BUREŠOVÁ 1983), the largest number in any comparable site in the Czech Republics. Arctic-Alpine, Alpine, Carpathian and boreal elements come into contact here with plants of the central European lowlands, occurring often in unusual habitats and in surprising phytocoenological relationships (see JENÍK 1961). Velká kotlina corrie can boast several Sudeten endemics, including *Campanula rotundifolia* L. subsp. *sudetica* (HRUBY) SOÓ, *Plantago atrata* HOPPE subsp. *sudetica* (PILGER) HOLUB and *Dianthus carthusianorum* L. subsp. *sudeticus* KOVANDA. A number of plant species produce luxuriant forms here and *Carlina biebersteinii* subsp. *sudetica* with its stout growth and extremely large heads is an example of this.

It should be noted that *C. biebersteinii* is fairly rare in this country, occurring scattered in Bohemia (mostly known only from old herbarium records) and in

Fig. 1. *Carlina biebersteinii* BERNH. ex HORNEM. subsp. *sudetica* subsp. nova (orig. A. SKOUMALOVÁ)

several extant localities in the southern half of Moravia. In 1876 it was recorded at Velké Losiny, northern Moravia, but has never been seen there since.

Endangered status - This is a critically endangered taxon even though there is no imminent external threat. What is menacing is the rareness of the taxon. In the Malá kotlina corrie only 10 flowering individuals could be found in 2000 and 18 (+ 20 rosettes) in 200l. The number obviously varies from year to year, which is normal with a biennial, but the population remains too small to ensure survival. Considerable annual differences were also noted by BUREŠ (1996). The site lies remote from tourist paths but the small number of specimens makes the population extremely vulnerable to any fluctuation in habitat conditions. A great many viable achenes are produced but competition in the site is obviously too strong to allow any noticeable spread. Planting out of young rosettes has been surprisingly successful and will be continued, to strengthen the population. It is feared that the topodeme in the Velká kotlina corrie has become extinct in the past twenty years. BUREŠ (1996) says explicitly that the Malá kotlina corrie is the only extant site for the Sudeten "*C. vulgaris"*.

Taxonomic treatment - It should be clear from what has been said above that the Sudeten *Carlina* deserves taxonomic recognition. The rank of subspecies appears appropriate:

***Carlina biebersteinii* BERNH. ex HORNEM. subsp. *sudetica* subsp. nova**

Diagnosis: Stirps robusta; foliis herbaceis, planis, integris, irregulariter spinulosis; spinulis brevibus (maxime 0.8 mm longis) cum spinulis longioribus solitariis (maxime 2.4 mm attingentibus) alternantibus; capitulis 1 - 2 (-3), 32 - 42 mm (sine involucro) vel usque 92 mm (cum involucro) in diametro; involucri phyllis patentibus, externis lanceolatis, acutis, irregulariter spinosis, viridibus, usque 52 mm longis et 9 mm latis, internis lineari-lanceolatis, sine spinis, stramineis usque pallide brunneis, ad basin araneosis, subtus violaceo-brunneis, 16 - 19 mm longis; achaenis cylindricis, adpresse pilosis, c. 4 mm longis; pappo plumoso, stramineo, patente, 7.5 - 9 mm longo. A typo *C. biebersteinii* praecipue spinulis foliorum brevissimis, cum spinulis longioribus solitariis alternantibus, capitulis permagnis nec non involucri phyllis externis longioribus abhorret.

Holotypus: "Montes Hrubý Jeseník: in locis saxosis in convalle glaciali Malá kotlina, leg. M. Kovanda 20. 7. 2000." In Herbario Universitatis Masarykianae Brunnensis (BRNU) asservatur.

Specimina examinata: Velká kotlina ("Grosser Kessel"), Freyn 1883 BRNM, PRC, Schierl 1885 BRNM, Bachmann 1898 WU, Schustler 1929 PR, Jílek 1948 BRNM, Deyl 1949 PR; Malá kotlina ("Kleiner Kessel"), Leneček 1935 PRC, Součková 1949 BRNM.
Etymologia: E nomine Montium Sudeticorum nominata.
Area geographica: Endemice in Montibus Hrubý Jeseník ("Hochgesenke", Sudetorum pars orientalis) nascitur.

Acknowledgements

My sincere thanks go to Jeseníky Protected Landscape Area Authority, Bukovice and Malá Morávka, for providing facilities and for their kind permission to carry out research in a rigorous nature reserve and to collect seed. Keepers of the herbaria BRNM, BRNU, K, LE, OLM, PR, PRC and WU should be thanked for making the herbarium study possible.

References

BUREŠ L. (1996): Studie populací ohrožených druhů rostlin v CHKO Jeseníky. – Příroda 6: 7-38.

DOMIN K. & PODPĚRA J. (1928): Klíč k úplné květeně Republiky Československé. – Olomouc.

DOSTÁL J. (1989): Nová květena ČSSR. – Praha.

FIEK E. (1881): Flora von Schlesien preussischen und österreichischen Antheils. – Breslau.

FORMÁNEK E. (1887): Květena Moravy a rakouského Slezska I. – Brno.

GRABOWSKI H. (1843): Flora von Ober-Schlesien und dem Gesenke. – Breslau.

GÜNTHER K. Ch., GRABOWSKI H. & WIMMER F. (1824): Enumeratio stirpium phanerogamarum quae in Silesia proveniunt. – Vratislaviae.

HENDRYCH R. (1986): Polozapomenuté a nové nálezy z květeny ČSR. – Zpr. Čs. Bot. Společn. 21: 45-55.

JENÍK J., BUREŠ L. & BUREŠOVÁ Z. (1983): Revised flora of Velká Kotlina cirque, the Sudeten Mountains I. – Preslia 55: 25-61.

JENÍK J. (1961): Alpinská vegetace Krkonoš, Králického Sněžníku a Hrubého Jeseníku. – Praha.

KROCKER A. I. (1790): Flora Silesiaca 2. – Vratislaviae.

LAUS H. (1908): Schulflora der Sudetenländer. – Brünn.

MATTUSCHKA H. G. (1770): Flora Silesiaca 2. – Leipzig.

MEUSEL H. & KÄSTNER A. (1990): Lebensgeschichte der Gold- und Silberdisteln I. – Österr. Akad. Wiss., Kl. Math.-Nat., Denkschriften 127: 1-294.

MEUSEL H. & KÄSTNER A. (1992): Lebensgeschichte der Gold- und Silberdisteln II. – Österr. Akad. Wiss., Kl. Math.- Nat., Denkschriften 128: 1-658.

MEUSEL H. & WERNER K. (1962): Über die Gliederung von *Carlina acaulis* L. und *Carlina vulgaris* L. – Wiss. Z. Martin-Luther-Univ. Halle Wittenberg 11: 279-262.

MEUSEL H. & WERNER K. (1988): *Carlina* L. – Eberwurz. – In: ROTHMALER W., SCHUBERT R. & VENT W.: Exkursionsflora für die Gebiete der DDR und der BRD 4: 554-555. - Berlin.

OBORNY A. (1885): Flora von Mähren und österr. Schlesien 4. – Verh. Naturforsch. Ver. Brünn 23: 637-888.

ROHRER R. & MAYER A. (1835): Vorarbeiten zu einer Flora des mährischen Gouvernements ... – Brünn.

ROUY G. (1908): Flore de France 8. – Asnières & Paris.

SCHUBE T. (1904): Flora von Schlesien preussischen und österreichischen Anteils. – Breslau.

WEBB D. A. (1976): *Carlina* L. – In: TUTIN T. G. & al. [eds.]: Flora Europaea 4: 208-211. – Cambridge, London, New York & Melbourne.

WIMMER F. (1840): Flora von Schlesien preussischen und österreichischen Anteils. – Breslau, Ratibor & Ples.
WIMMER F. & GRABOWSKI H. (1829): Flora Silesiae 2. – Vratislaviae.

Received: 11 February 2002
Revised: 20 March 2002
Accepted: 26 March 2002