

DISTRIBUTION OF *DITRICHUM ZONATUM* (BRID.) KINDB. IN THE CZECH REPUBLIC, SLOVAKIA AND ADJACENT AREAS***Ditrichum zonatum* (Brid.) Kindb. v České republice na Slovensku a některých přilehlých oblastech**

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Abstract: The distribution of the species *Ditrichum zonatum* in the Czech Republic, Slovakia and adjacent areas is presented. Differences with *Ditrichum zonatum* var. *scabrifolium* Dix. are described.

Keywords: axillary hairs, Czech Republic, *Ditrichum zonatum*, *D. zonatum* var. *scabrifolium*, distribution, Slovakia

Introduction

The aim of this study is to describe the distribution and variability of *D. zonatum* in Central Europe, with a focus on the territory of the Czech Republic and Slovakia. In the Czech Republic the species is considered as endangered taxon (category EN – Kučera & Váňa 2005). In Slovakia the species is ranged under not sufficiently known taxa – DD (Kubinská & al. 2001).

The world distribution of *D. zonatum* was mapped by Schofield & Crum (1972). It can be considered as circumpolar species. Its distribution can be characterised as subarctic-subalpine in Europe. Besides Europe it is known from Japan, Alaska and the western part of North America (Duell 1984, Düll 1992b). Lewinsky (1986) mentions its occurrence also on the Faroe Islands. *D. zonatum* shows a disjunction between the Pacific coast of North America and Europe, so the locality on the Faroe Islands is an outpost of the European part of the distribution area in NW direction. In the 'Hepaticae et musci URSS exsiccati' collection Schljakov (1957) published *D. zonatum* from a locality on slopes on Mt. Vudjavrtschorr in the Chibiny Mts on the Kola Peninsula in NW Russia. The species is in northern Europe further known from Norway, Sweden, Finland and more to the south from Great Britain and Ireland (Duell 1984). Gaissler & Selldorf (1985) mention it more recently from Switzerland. *D. zonatum* has many localities in the Niedere Tauern Mts in Austrian Styria (Steiermark) which are part of the central crystalline Alps (Grims & al. 1999). Pedrotti (2001) mentions the species from Italy. In Spain *D. zonatum* grows in the Pyrenees (Casas 1991). Its occurrence on the French side of this mountain range has to be confirmed (Duell 1984).

The moss *Ditrichum zonatum* (Brid.) Kindb. grows on moist, slightly acidic rocks, mostly on N-faced parts of mountain tops and ridges, rarely on clayey soil, in places where snow remains for a long time, and in rock cavities in the subalpine to alpine zone. In the Alps it occurs up to an altitude of 2800 m above sea level (Grims & al. 1999, Dierßen 2001). The ecological requirements of *Ditrichum zonatum* were expressed by Düll (1992a) as values on the 9-point Ellenberg scale. It has high demands for light expressed by an Ellenberg indicator value of 8 and the species is cryophilous – its thermic demands are expressed by a value of 1. Its degree of continentality is 6, just as its moisture demand. The species requires a strongly acidic environment (value 1).

The name of *Ditrichum zonatum* is derived from the fact that annual increments of this moss form ± conspicuous layers of different shades (e.g. Dixon 1924, Nyholm 1954). Smith (2004) states that “*Well grown plants are easily recognized by the dense tufts, green above and reddish-brown below but the plants also occur, looking very different, as small cushions on exposed rocks*”. The Czech name for *Ditrichum zonatum* is 'útlavláska pásmovaná', which reflects these facts too. It is a dioecious moss whose sporophytes are unknown. This moss reproduces vegetatively by means of small bodies on its rhizoids, which are formed by a spirally twisted row of cells (Arts 1994).

Material and Methods

The results presented here are based on a study of herbarium specimens from the collections of BM, BRNM, BRNU, KRAM-B, OP, PR, PRC and from the private herbarium of Jan Kučera (herb. J.K.). Specimens collected by Zdeněk Pilous were deposited in his private herbarium, which was included into the collection of the National Museum in Prague (PR) after his death. The localities are arranged into districts according to the phytogeographical division of the Czech Republic (Skalický 1988) and in Slovakia according to the division by Futák (1980).

Results and Discussion

Distribution

Ditrichum zonatum was found at 15 localities in five mountain ranges (Fig. 1). The occurrence of *D. zonatum* var. *scabrifolium* Dix. is reported for the first time from the study area. *D. zonatum* is known to grow in the Sudeten Mts, the Giant Mts, the Hrubý Jeseník Mts and the German side of the Šumava (Bohemian Forest) mountain range to date. In the Giant Mts it was collected by B. Buryová near the 'Horní Úpský vodopád' waterfall at an elevation of 1230 m above sea level in 2002 (Kučera & al. 2004). On its highest mount Sněžka (Schneekoppe) it was collected by K.G. Limpricht in 1887, and nine years later, in 1896, by J. Velenovský. Its occurrence on Mt. Sněžka at an elevation of 1565 m was confirmed by J. Kučera in 1998. There are two historic localities known from the Giant Mts, Violík (Veilchensteine) at an elevation of 1470 m, where *D. zonatum* was collected by A. Schmidt in 1896, and Obří bouda (Riesenbaude), where this moss was found by E. Kalenský in 1899. There is a specimen from Mt. Šerák (Hochschar) from the Hrubý Jeseník Mts collected by J. Podpěra without date of collection deposited in the PRC herbarium. J. Kučera recently collected *D. zonatum* in the Velká Kotlina cirque (Novotný 2005).

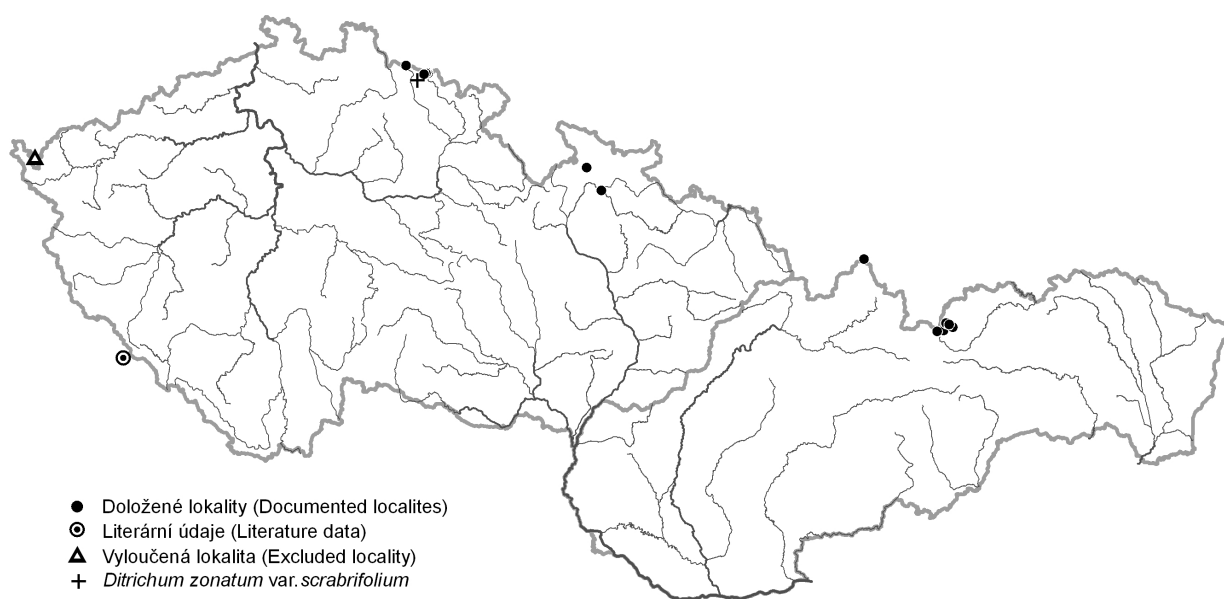


Fig. 1: Distribution of *D. zonatum*.

The species was also collected on the German side of Šumava range, close to Czech border. It was collected by L. Molendo and H. Paul on the top of Mt. Javor in 1920. Its record has been confirmed by other German bryologists, most recently by L. Meinunger and also W. Freiberg. The occurrence of *D. zonatum* is also mentioned from the spa town of Brambach from the German side of the Krušné hory Mts. According to Düll & Meinunger (1989) it has not been confirmed here. Müller (2004) mentions the species *D. lineare* and *D. zonatum* from this area. The latter has not been documented with a herbarium specimen and is not known in the Saxonian flora. This excluded locality is indicated in the map.

Revision of herbarium specimens has shown that the species occurs in the Western Beskid Mts and the High Tatra Mts (Novotný 1999) in Slovakia.

Variability

Two varieties are distinguished within the species *D. zonatum*: var. *zonatum* (Brid.) Podp. with smooth upper leaf cells and var. *scabrifolium* Dix. (Dixon 1902) with dense conical papillae occurring especially in the upper part and often down to the base of the leaves, mostly at both sides of the blade and on the ridge of the nerve. Podpěra (1954) calls this taxon f. *scabrifolium* Podp. I have observed differences in axillary hairs between both taxa. Preliminary observations have shown that var. *scabrifolium* has axillary hairs which are usually longer and occur more often in pairs. In the Czech Republic *D. zonatum* var. *scabrifolium* was found on the top of Mt. Sněžka by J. Kučera. This plant is depicted in Fig. 2. I suggest the Czech name 'útlavláska pásmovaná drsnolistá' for this taxon. Its distribution is given in Fig. 1. Author of this paper is currently conducting further biometrical studies on the variability of axillary hairs, including type material of var. *scabrifolium* Dix. loaned from the Natural History Museum (London).

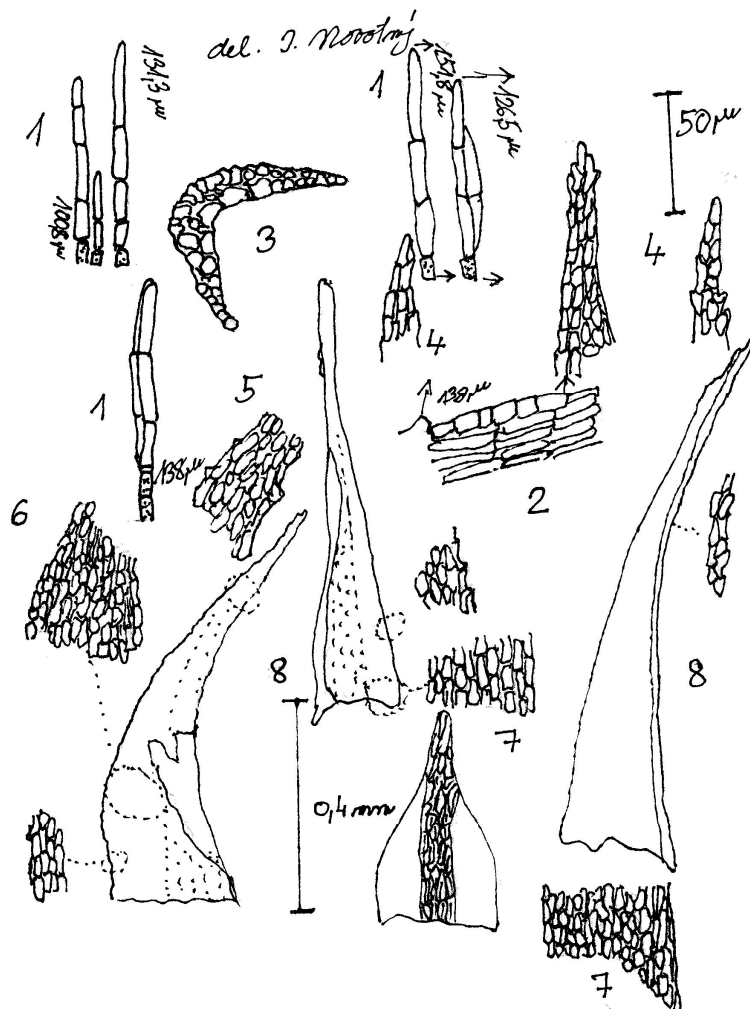


Fig. 2: *Ditrichum zonatum* var. *scabrifolium* [1 axillary hairs, 2 stem below the top with developing axillary hair, 3 transverse section of leaf, 4 leaf apex, 5 upper lamina cells, 6 mid-leaf cells, 7 basal cells, 8 leaf]

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Appendix

Giant Mts (Krkonoše)

Herbarium specimens

- Violík (N of source of the Elbe) (Veilchensteine), 1470 m, 11 Aug 1896, leg. A. Schmidt, PRC; *ibid.*, (Veilchstein bei der Schneegrubenbaude), rock crevices, Aug 1896, A. Schmidt, PRC. – Mt. Sněžka (Schneekoppe), rocks, 31 July 1887, leg. K.G. Limpricht, OP; *ibid.*, on sandy soil, abundant on Mt. Sněžka, Sep 1896, leg. J. Velenovský, PRC; along tourist trail at Obří bouda (Riesenbaude), Aug 1899, leg. E. Kalenský, PRC.

Literary sources

- Úpská jáma cirque: rocks ENE of the foot of 'Horní Úpský vodopád' waterfall, c. 110 m ENE of the fall's foot, middle part of a small ravine, SW exposed slope on the left side of the stream, E3550.97-N5623.15, 1230 m, humus layer over an almost vertical, moist NW face of granite rock, little shaded, 25 Sep 2002 leg. B. Buryová (3880),
- Úpská jáma cirque: N part of 'Studniční stěna' cirque face, 740 m NE of the summit of Mt. Studniční hora, E3550.45-N5622.62, c. 1410 m, fissure of E-facing granite rock, vertically, unshaded, on sandy soil, 22 Sep 2002 leg. J. Kučera (10354), herb J.K.; *ibid.*, E3550.44-N5622.615, c. 1420 m, fissure of E-facing granite rock, vertical, little shaded, 22 Sep 2002 leg. J. Kučera (10355), herb J.K., B. Buryová (3825); *ibid.*, 590 m, ENE of the top of Mt. Studniční hora, E3550.51-N5622.24, 1440 m, humus layer over NE-facing gneiss rock outcrop, 3 Oct 2001 leg. J. Kučera (8442), herb J.K. (Kučera & al. 2004).

Krušné hory Mts

- Excluded locality: village of Brambach (Düll & Meinunger 1989, Müller 2004)

Hrubý Jeseník Mts

Herbarium specimens

- Along the road to Mt. Šerák (Hochschar), s.d., leg. J. Podpěra, PRC. Recently the species was collected in Velká Kotlina cirque: 'Kunzova stráň' slope between the springs of the Moravice and the upper end of the 'Vitáskova rokle' ravine, 510 m S of the top of Mt. Vysoká hole, alt. 1360 m a.s.l., inclined face of phyllite rock outcrops on SE slope, S-1942, M33 zone: E=3660.21 km, N=5549.79 km, 14 July 2001, leg. J. Kučera (8876), herb. J.K.

Data from literature

- Bayerischer Wald Mts. Arbergipfel (leg. Molendo, Paul 1920: L. Meinunger! und noch W. Freiberg!) (Düll & Meinunger 1989).

High Tatra Mts

- Polský hřebeň ridge, s.d., leg. Z. Pilous, PR. – On granite rocks on W slopes of Mt. Prednia Bašta, 1900 m, 17 Aug 1947, leg. J. Müller, BRNU. – Below Teryho chata chalet, July 1954, leg. Z. Pilous, PR. – End of Javorová dolina valley, July 1956, leg. Z. Pilous, PR. – Mt. Vel'. Svišťovka, May 1957, leg. Z. Pilous, PR.

Western Beskid Mts

- Mt. Babí hora (Babia Góra), July 1906, leg. J. Podpěra, PRC. Mons Babia Góra. Ad terram argillosam ad cacuminem montis Sokolica, 1367 m s.m., 7 Oct 1963, leg. Teofil Wojterski (no.1735 Bryotheca Polonica Fasc. LXVIII), BRNM.

var. *scabrifolium* Dix.

Giant Mts (Krkonoše)

- Rocks S of the top of Mt. Sněžka, in fissure of S-facing rock, beneath an overhang, 1565 m, 25 Sep 1998, leg. J. Kučera, quadr. 5360c, herb. J.K., KRAM-B.