

The rediscovery of the liverworts *Anastrophyllum donnianum* and *A. saxicola* in Central Europe (Slovakia, Tatra Mountains)

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Abstract – In 2006-2008, I found new localities of *Anastrophyllum donnianum* and *A. saxicola* in the Slovakian Tatras (Western Carpathians). These liverwort species had not been reported from Slovakia since 1888, and were classified as extinct. Both are found in this part of Europe in isolated localities in mountains, at the southern limit of their European distribution. *Anastrophyllum donnianum* is rare in Europe.

***Anastrophyllum donnianum* / *Anastrophyllum saxicola* / extinct species / the Tatra Mts / Western Carpathians**

INTRODUCTION

The genus *Anastrophyllum* belongs to the family Scapaniaceae (Heinrichs *et al.*, 2005; Crandall-Stotler *et al.*, 2009). This genus and the currently distinguished genus *Sphenobolus* (De Roo *et al.*, 2007) jointly include 10 species in Europe (Schumacker & Váňa, 2005; Long *et al.*, 2006). The majority of these are oceanic-montane or boreal-montane plants, and are most frequent in northern Europe. *Anastrophyllum donnianum* and *A. saxicola* are known from single localities in Central Europe. The latter is rather common in Nordic countries, but is rarer in southern Europe (Müller, 1906-1911; Damsholt, 2002), while *A. donnianum* is rare throughout the continent (Schumacker & Váňa, 2005).

In Europe, *A. donnianum* has been recorded on the Faroe Islands, in Norway, Britain, Poland, and Slovakia (Paton, 1999; Söderström *et al.*, 2002). The species was also reported from Germany (Harz Mts) and Austria (Alps), but the reliability of those records was doubtful (Müller, 1906-1911, 1951-1958). The southernmost populations of *A. donnianum* were found at two sites in the Slovakian and Polish Tatras. Both of them were located in the Western Tatras, about 2-3 km apart. The site in Slovakia, between the peaks of Ostrý Roháč and Volovec, was recorded by Krupa (1888). Since then, the species has not been reported from Slovakia (Duda & Váňa, 1982). In Poland, *A. donnianum* was found in 1958, on the western slopes of Jarząbczy Wierch (Szweykowski, 1960). The global range of *A. donnianum* also includes Canada, Alaska, Yunnan, and Tibet

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(Paton, 1999). It is abundant only in Sino-Himalaya, where it was found in West, Central and East Nepal, Sikkim, Bhutan, and Yunnan (Schill & Long, 2003).

The range of *A. saxicola* encompasses northern and central Europe, Greenland, North America, Siberia, China and Japan (Paton, 1999). In the British Isles it is very rare, being known from a few places in Scotland only (Paton, 1999). In central Germany, the Czech Republic, Slovakia and Poland, *A. saxicola* has been recorded in single localities. Most of these are in the Sudety Mts with a few in the Carpathians. In the Czech Republic, *A. saxicola* has been found in the surroundings of the city Česká Lípa, the Jizerské (Izerskie) Mts and Krkonoše (Karkonosze) Mts (Duda & Váňa, 1983). In the latter, its occurrence has not been confirmed recently either on the Czech (Kučera *et al.*, 2004) or on the Polish (Szweykowski, 2006) side of the border. In Poland, the liverwort has been recorded in the Sudety Mts (Karkonosze Mts: Nees, 1833; Limpricht, 1876; the Izerskie Mts: Limpricht, 1876) and the Carpathians (Tatras: Krupa, 1882). Almost all of the aforementioned localities were found in the 19th century. New data concern the Sudety Mts only (Stołowe Mts: Szweykowski, 1953). Slovakian localities of *A. saxicola* have been found in the Tatra Mts: three in the Western Tatras (Krupa, 1882; Szyszyłowicz, 1885) and one in the High Tatras (leg. V. Greschik 1887; Duda & Váňa, 1983). Similarly, in the Polish Tatras, the most recent observations were made in the 19th century (Krupa, 1882).

Anastrophyllum donnianum and *A. saxicola* have been classified as extinct in Slovakia (Kubinská *et al.*, 2001), and as rare in Poland (Klama, 2006). In the Czech Republic, where only *A. saxicola* is found, this liverwort is regarded as endangered (Kučera & Váňa, 2005).

RESULTS

New locality of Anastrophyllum donnianum

I found the new site of *A. donnianum* on 25 August 2008, near the southwestern margin of Vyšné Jamnícke Lake (Jamnicki Staw Wyżni), in the upper part of the Jamnícka Valley (Jamnícka Dolina / Dolina Jamnicka), at the altitude of 1835 m a.s.l. (Fig. 1). The site is located near the top of the ridge, between the peaks of Ostrý Roháč (Rohacz Ostry) and Volovec (Wołowiec), where the species was first found by Krupa (1888). The liverworts were growing on rock debris on slopes with a northeastern aspect, leading down to a lake. The local population was composed of a small, hand-sized patch, hidden in a cavity formed by rocks. The vegetation on the rocks surrounding the site was composed of hummocks of *Racomitrium lanuginosum* and initial (as well as mossy) forms of alpine grassland communities, *Oreochloa-Juncetum trifidi*. The patch of *A. donnianum* was mixed with *Bazzania tricrenata*, *Tritomaria quinquedentata*, *Polytrichum alpinum* and *Huperzia selago*. It is noteworthy that I found specimens of *A. donnianum* in only one place on rock debris around the lake.

In comparison with specimens of *A. donnianum* from Scotland, the specimens from the Tatras were markedly smaller, with shorter leaves (Fig. 2). A small amount of herbarium material from this site has been deposited in the herbarium of the Department of Botany (POZNB), University of Life Sciences, Poznań, Poland (no. 825).

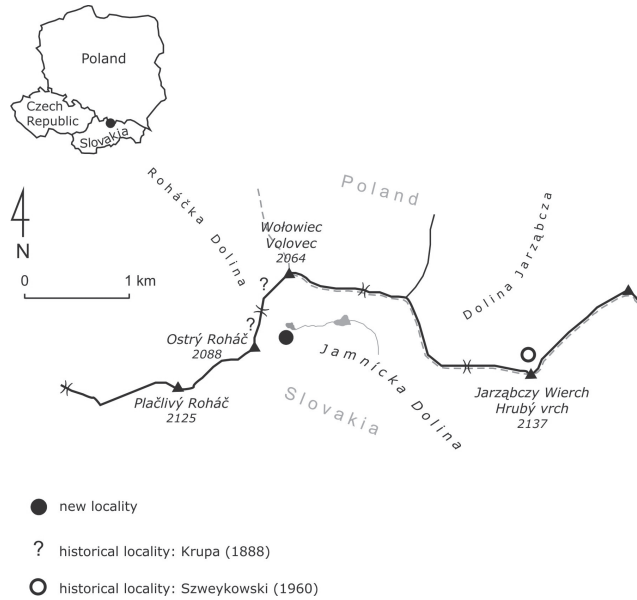


Fig. 1. Localities of *Anastrophyllum donnianum* in the Western Tatra Mts.

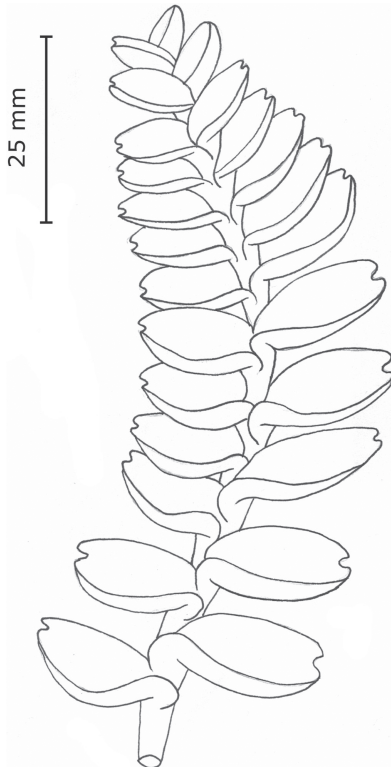


Fig. 2. *Anastrophyllum donnianum* from Tatra Mts in dorsal view (POZNB 825, leg. P. Górski, August 25, 2008).

List of historical sites of *A. donnianum* in the Tatra Mts

Western Tatras (Slovakian part)

1. On grassy slopes with northern exposure, between the peaks of Roháč (Rohacz) and Volovec (Wołowiec); no data on altitude were given (Krupa, 1888). I failed to find herbarium specimens from this site in the Polish herbaria.

Western Tatras (Polish part)

2. Jarząbcza Valley (Dolina Jarząbcza), on western slopes of Jarząbczy Wierch (Hrubý vrch), humus between granite rocks, 1700 m a.s.l. (Szweykowski, 1960, leg. J. Szweykowski 12 September 1958, herbarium specimen stored in POZW).

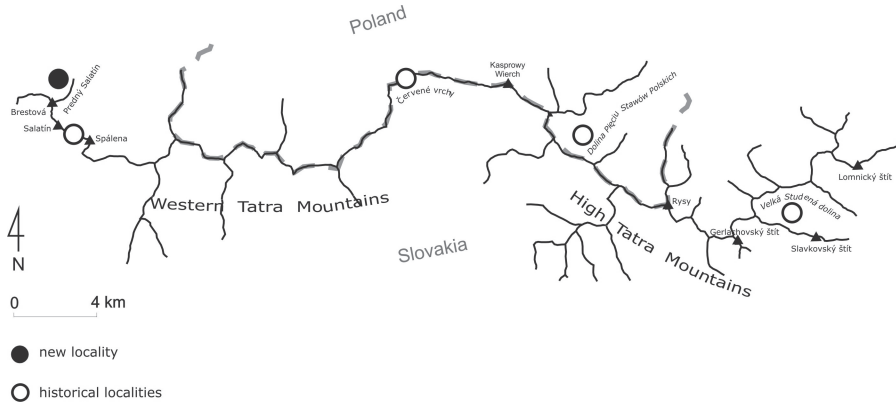


Fig. 3. Distribution of *Anastrophyllum saxicola* in the Tatra Mts.

New locality of Anastrophyllum saxicola

I found the new locality of *A. saxicola* on the northwestern slope of the wide ridge of Predný Salatín (Skrainy Salatyn), at the altitude of 1835 m a.s.l. (Fig. 3). The population of *A. saxicola* formed mossy carpets hanging between

small rock blocks among acidophilous grasslands growing on the slope. The vegetation on the rocks consisted of pillows of *Polytrichum alpinum*, *Racomitrium lanuginosum* and *Bazzania tricrenata*, and initial (and mossy) forms of alpine grasslands *Oreochloa-Juncetum trifidi* (e.g. *O.-J. t. racomitrietosum lanuginosi* or *O.-J. t. sphagnetosum*). The population of *A. saxicola* was small; it occupied an area of ca. 1 m² and was located far from the tourist route that passes along the ridge, and therefore tourism poses no direct threat. I only saw sterile plants at that site (Fig. 4).

I collected herbarium material on 23 July 2006 and deposited it in the herbarium of the Department of Botany (POZNB), University of Life Sciences, Poznań, Poland (no. 725).

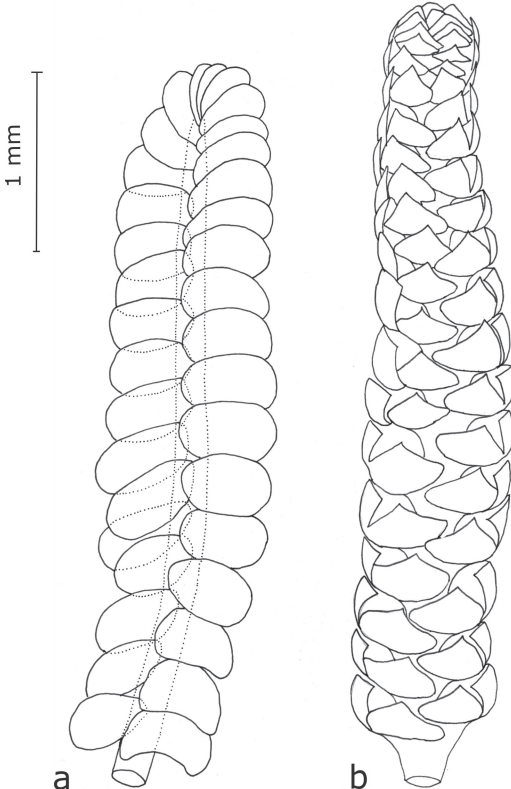


Fig. 4. Sterile specimens of *Anastrophyllum saxicola* in ventral (a) and dorsal (b) view from the Western Tatra Mts (POZNB 725, leg. P. Górski, July 23, 2006).

Historical localities of *Anastrophyllum saxicola* in the Tatra Mts

Western Tatras, Slovakian side

1. Mount Salatín (Salatyňski Wierch), 2050 m a.s.l. (Szyszyłowicz, 1885).
2. Between Mount Spálena (Spalona Kopa) and Mount Salatín (Salatyňski Wierch), 1671-2050 m a.s.l. (Szyszyłowicz, 1885).

Western Tatras, Slovakian-Polish border zone

3. Červené vrchy (Czerwone Wierchy), precise location not given, 2101 m a.s.l. (Krupa, 1882).

High Tatras, Slovakian side

4. Velká Studená Valley (Dolina Starolešna), leg. V. Greschik, 1887 (Duda & Váňa, 1983), herbarium specimen stored in Slovak National Museum in Bratislava (BRA).

High Tatras, Polish side

5. Valley of Five Polish Lakes (Dolina Pięciu Stawów Polskich / Dolina Piatich pol'ských plies), precise location not given, 1674-1889 m a.s.l. (Krupa, 1882).

Threats to *A. donnianum* and *A. saxicola* in the Tatras

The degree of threat to *A. donnianum* and *A. saxicola* in the Tatra Mts can be classified as very high. I searched for *A. donnianum* unsuccessfully at both historical sites. I penetrated the northeastern slopes falling from the peak of Ostrý Roháč (Rohacz Ostry). In terms of site fertility and topo-graphy, this site is the most similar to that described by Krupa (1888). I tried to find this species on three occasions (in 2005, 2006, and 2008) on the Polish side of the border, near Jarząbczy Wierch, where it was abundant in 1958 (Szweykowski, 1960). The population of *A. donnianum* on the new site in Jamnícka Valley was small, and limited to one place on rock debris near the lake. In 2008, I failed to confirm the existence of *A. saxicola* at the historical sites. This plant has not been recorded in the Tatras in the 20th century, despite floristic investigations (e.g. Szweykowski, 1960). The data show that *A. donnianum* and *A. saxicola* are some of the rarest species of liverworts in the Tatras, and given their distribution in Europe, they are peculiar elements of the Central European flora.

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