**TETRAPLODON ANGUSTATUS** (BRYOPSIDA, SPLACHNACEAE)
IN THE POLISH TATRA MTS

BEATA CYKOWSKA-MARZENCKA

**Abstract.** The paper gives six new records of the rare coprophilous altimontane moss species *Tetraplodon angustatus* (Hedw.) Bruch & Schimp. from the Polish Tatra Mts in the Western Carpathians. The ecology and current distribution of the species in the Tatras are described.

**Key words:** mosses, *Tetraplodon angustatus*, distribution, ecology, Tatra National Park, Tatra Mts, Carpathians, Poland

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**INTRODUCTION**

*Tetraplodon angustatus* (Hedw.) Bruch & Schimp. is a rare altimontane coprophilous moss (Fig. 1), one of six *Tetraplodon* species in Europe (Hill et al. 2006) and one of two species of the genus in Poland (Ochyra et al. 2003; Stebel et al. 2004; Cykowska 2005). Recently it was discovered at six localities in the Polish part of the Tatras in the Western Carpathians.

*Tetraplodon angustatus* is a boreal-montane species with an almost continuous circumpolar range in the Holarctic. The northern limit of the species corresponds to the north treeline, with a few localities farther north (Szmajda et al. 1991). It occurs in Europe, Asia and North America; the global distribution of *T. angustatus* was discussed in detail and mapped by Szmajda et al. (1991).

In Europe, *Tetraplodon angustatus* occurs in Fennoscandia, extending eastwards through the Kola Peninsula to the Ural Mountains; in the British Isles it was reported from the mountains of Scotland and North Wales. In continental Europe the species occurs mainly in the subalpine and alpine belts of the Alps and Carpathians, and in old mountains of the Variscan orogeny such as the Sudetes, Góry Świętokrzyskie Mts, and Rhôn in Germany (Szmajda et al. 1991).

In Poland, *Tetraplodon angustatus* is a rare component of the montane moss flora, previously recorded only from the Sudetes (Limprecht 1867, 1930; Milde 1869; Berdowski 1974), and Góry

![Fig. 1. *Tetraplodon angustatus* (Hedw.) Bruch & Schimp. at Pyszniańska Przełęcz pass in the West Tatra Mts, 9 June 2007.](image-url)
Świętokrzyskie Mts (Kobendza 1939; Szmajda et al. 1991), and from the Western Carpathians (Stebel et al. 2004) where it was reported from seven localities in the Tatra Mts (Szajda et al. 1991), three localities in the Kotlina Orawsko-Nowotarska basin (Staszkiewicz 1958; Lisowski 1961; Stebel et al. 2004) and one on the Baba Góra massif (Limpricht 1873, 1876; Stebel 2000).

Here I provide six new records of Tetraplodon angustatus in the Tatra Mts, present the current distribution of the species in the Tatra, and discuss its ecology. The herbarium material is deposited in the Bryological Herbarium of the W. Szafer Institute of Botany, Polish Academy of Sciences in Kraków (KRAM).

**ECOLOGY**

*Tetraplodon angustatus* is a coprophilous and nitrophilous moss growing on decaying animal carcasses, animal droppings, bird pellets, decaying wood, and nitrogen-rich soil or humus (Cameron & Wyatt 1986; Dierssen 2001). It occurs on well-insolated, moderately wet to moderately dry sites with moderately acid to neutral soils having pH 5.7–7.0 (–7.5). It prefers natural sites under weak or no anthropopression, and tolerates cold insolated, moderately wet to moderately dry sites (Diersen 2001). In Europe *T. angustatus* is an indicator species in coprophilous communities belonging to the alliance Splachnion lutei Hadač & Klika in Klika & Hadač ex v. Hübschm. 1957, order Splachnetalia lutei Hadač & Klika in Klika & Hadač ex v. Hübschm. 1957 and class Funarietea hygrometricae v. Hübschm. 1957 (Diersen 2001). It is an entomophilous species which produces abundant sporophytes and spores dispersed by dipterans (Cameron & Wyatt 1986). All the new collections in the Polish Tatra Mts reported here had mature sporophytes. They were found mainly on animal droppings; only one specimen was found on soil (probably nitrogen-rich), and one specimen was found growing on a *Sphagnum-Polytrichum* hummock (Cykowska 2011; Cykowska-Marzencka 2013). All specimens occurred at open, well-insolated and moderately wet sites above the upper forest limit at 1630–1960 m a.s.l.

**DISTRIBUTION IN TATRA NATIONAL PARK**

In Tatra National Park, *Tetraplodon angustatus* was previously known from seven localities (Chalubiński 1886; Krupa 1888; Lisowski 1959, 1965; Szajda et al. 1991). It was first reported more than a hundred years ago from three localities in the West Tatra Mts: the Dolina Chocholowska valley below Wołowiec, Mt. Starorobociański, and the Kasprowa Dolina valley (Chalubiński 1886). Later Lisowski (1965) reported it from the edge of Siwy Wierch peak and from the adjacent Przełęcz Palenica pass, but these two places are in the Slovak part of the West Tatra. The highest locality reported for *T. angustatus* in the West Tatras, 2000 m a.s.l., is the northern slope of Mt. Starorobociański Wierch (Lisowski 1965). During recent research it was found 40 meters lower (1960 m a.s.l.) on the western slope of Mt. Kamienista. Currently *T. angustatus* is known from 13 sites in the Polish part of Tatra National Park (Fig. 2).

**NEW LOCALITIES. SOUTHERN POLAND, WESTERN CARPATHIANS, HIGH TATRA MTS:** Mt. Opalony Wierch, above Usypisty Piarg scree, alt. 1750 m, 49°12′41″N/21°03′32″E, N slope, on animal dropping on soil and granite scree, c. spor., ATOMS grid square Ge–60, 15 July 2005, leg. B. Cykowska 3420 (KRAM); West Tatra Mts: Mt. Smreczyński Wierch, on north traverse of the mountain, alt. 1940 m, 49°12′20″N/19°52′46″E, alpine belt, N aspect, on animal dropping, c. spor., ATOMS grid square Gd–69, 9 June 2007, leg. B. Cykowska 8703 (KRAM); W slope of Mt. Kamienista, alt. 1960 m, 49°11′47″N/19°51′54″E, alpine belt, W aspect, on animal dropping, c. spor., ATOMS grid square Gd–69, 9 June 2007, leg. B. Cykowska 8701 (KRAM); NW slope of Mt. Kamienista, alt. 1940 m, 49°11′51″N/20°02′02″E, alpine belt, on *Sphagnum-Polytrichum* hummock, c. spor., ATOMS grid square Gd–69, 9 June 2007, leg. B. Cykowska 8701 (KRAM); NW slope of Mt. Kamienista, alt. 1940 m, 49°11′51″N/19°51′25″E, subalpine belt, N aspect, on animal dropping with *Tetraplodon mnioides*, c. spor., ATOMS grid square Gd–69, 9 June 2007, leg. B. Cykowska 8699 (KRAM); Mt. Grzes, alt. 1630 m, 49°14′11″N/19°46′04″E, E slope, on wet soil with *Festuca supina*, c. spor., ATOMS grid square Gd–58, 31 Aug. 2005, leg. B. Cykowska 5047 (KRAM).

**ADDITIONAL SPECIMENS EXAMINED. SOUTHERN POLAND, WESTERN CARPATHIANS, HIGH TATRA MTS:** Mt.
Opalony Wierch, N slope, c. spor., ATMOS grid square Ge–60, 7 June 1956, leg. S. Lisowski 93182 (KRAM);
West Tatra Mts: Kasprowa Dolina valley, upper forest belt, on granite boulder, ATMOS grid square Ge–50, 16 Sept. 1882, leg. T. Chałubiński (KRAM); Dolina Pańszczyca valley, cirque below Mt. Buczynowe Turnie, alt. 1930 m, ATMOS grid square Ge–50, 16 Sept. 1957, leg. S. Lisowski 93183 (KRAM); Mt. Mały Giewont between Mała Dolina valley and Przełęcz Bacug pass, alt. 1500 m, S exposition, on calcareous rocks, ATMOS grid square Gd–59, 15 July 1986, leg. J. Wójcicki s.n. (KRAM); Chochołowska Dolina valley, in upper part below Mt. Wołowiec, ATMOS grid square Gd–68, 14 July 1877, leg. T. Chałubiński s.n. (KRAM).

**DISCUSSION**

*Tetraplodon angustatus* is a rare component of the Polish moss flora. Most of its stations have been known since the 19th century. In the Góry Świętokrzyskie Mts and the Polish Carpathians it was recorded also in the second half of the 20th century and recently (Stebel 2000; Stebel et al. 2004; Stebel et al. 2013). The discovery of the new localities reported here suggests that it may be more common in the Tatra Mts, and future field work should yield additional localities (cf. Szmajda et al. 1991). In the Polish Carpathians, especially in the Tatras, *T. angustatus* seems not to be threatened. Only in the Sudetes all the records of the species except one date from the 19th century. Its scarce occurrence in the Sudetes indicates that *T. angustatus* needs special attention, preferably inclusion on the local Red List of mosses as rare (R) (Żarnowiec et al. 2004).

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