

NEW RECORDS OF *BUXBAUMIA VIRIDIS* (*BUXBAUMIACEAE*,  
*BRYOPHYTA*) IN THE SUDETES

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**ABSTRACT.** *Buxbaumia viridis* is a rare, epixyloous moss species with boreal range of occurrence. It prefers native, coniferous, spruce-fir forests. Historically the species was recorded several in the Sudetes, but now only two locations are known in this mountain range. In 2017 five unknown *B. viridis* populations were found in Góry Sowie Landscape Park in the vicinity of Bielawa, in the Bardzkie Mountains near Bardo Śląskie, and in the Sudety Wałbrzyskie Landscape Park on the eastern slope of Waligóra.

**KEY WORDS:** *Buxbaumia viridis*, Sudety Wałbrzyskie Landscape Park, Góry Sowie Landscape Park, Bardzkie Mts., Sudety Mts.

## INTRODUCTION

The green shield moss *Buxbaumia viridis* is a especially noteworthy species, because of its unusual rarity and distant in time reports about its occurrence. The species has wide range of occurrence, however, it is strongly dispersed and rarely encountered in Poland and Europe. Due to these fact it was placed in Red data book of European bryophytes (SCHUMACKER & MARTINY 1995) as endangered (category V), and was placed in annex I of the Berne Convention (KONWENCJA... 1979), and in annex II of the Habitat Directive 92/43/EEC (DYREKTYWA... 1992). *Buxbaumia viridis* is protected by law in Poland (ROZPORZĄDZENIE... 2014). The species is also considered as “endangered” (category E) in the Polish part of the Carpathians and in Poland (ŻARNOWIEC et al. 2004).

*Buxbaumia viridis* is a terophyte which grows on logs of dead trees mainly on fir, spruce and beech, rarely on rich in humic substances soils (STEBEL 2004). The moss is most often noted in native forests (VONČINA & CHACHUŁA 2012). In Carpathian Mountains it is primarily associated with beech forests *Dentario glandulosae-Fagetum abietetosum*. In Pieniny mountains it is recorded in warm fir forests *Carici albae-Fagetum abietetosum* and beech forests *Carici albae-Fagetum typicum*. In the north of Poland it was

reported on *Luzulo pilosae-Fagetum* and *Stellario-Carpinetum* (STEBEL 2004, VONČINA 2012). In the Sudeten *B. viridis* was observed on *Luzulo nemorosae-Fagetum* (CYKOWSKA & VONČINA 2011). Because the protone-ma grows only on dead wood, *B. viridis* shows close link with forest plant communities. Young individuals rise at the turn of October and November, and in early spring. It is a dioecious plant, which spores ripen in spring (VONČINA 2012). The sporophytes are found individually or in small clusters, while minute gametophytes are hard to observe. Sporophyte grows up to 12 mm high. Seta reach approximately 7 mm length and has brown colour with noticeable papilla. The oval shape sporangium is green-yellow colour which become brown in later developmental stages. The peristome is composed of four triangular teeth layers (STEBEL 2004).

The main distribution center of this species in Poland is the south-eastern part of the country, where it has been described on many sites from different Carpathians parts (PHILIPPE & OCHYRA 2004, CYKOWSKA 2008, VONČINA 2008, CHACHUŁA & VONČINA 2010, CYKOWSKA & VONČINA 2011, VONČINA et al. 2011, KOZIK & VONČINA 2012, VONČINA & CHACHUŁA 2012, ZARZECKI 2012, FUDALI et al. 2015, KUCHARZYK & TOPOLSKA 2015). The moss was also observed both in the northern part of the country (HAJEK 2008, 2010,

2012, SZCZEPANIUK & KUCHARZYK 2016) and in the Sudetes (SMOCZYK & WIERZCHOLSKA 2008, CYKOWSKA & VONČINA 2011), where in XIX century was described as quite frequently occurring species (SZMAJDA et al. 1991, CYKOWSKA & VONČINA 2011). According to historical data, *B. viridis* was found on 20 sites in the Sudeten areas located in the Lower Silesian Voivodeship: Kaczawskie Mountains (LIMPRICHT 1890-1904), Miłek Mountain (WILCZYŃSKA 1974), Wałbrzyskie Mountains – Chełmiec and Mieroszów (MILDE 1869), Sowie Mountains – Walim (LIMPRICHT 1890-1904), Kudowa Zdrój, Zieleniec Valley, Duszniki Zdrój, Śnieżnik, Ślęza massif, Jelenia Góra, Rościszewice, Górzec (MILDE 1869), Łądek Zdrój (KERN 1914), Góry Białskie (BERDOWSKI 1979) and Opolskie Voivodeship: Brynica and Murów (SCHOEDEL 1878 unpubl.), Dębowiec, Głucholazy (TORKA 1931), Przysiecz Reserve (BERDOWSKI 1979). Currently it is reported on one new localization in the Kłodzko region (SMOCZYK & WIERZCHOLSKA 2008) and confirmed on the one described earlier (CYKOWSKA & VONČINA 2011).

New localities of *B. viridis* were found in the Sudetes in 2017. In the Sowie Mountains Landscape Park near Bielawa, Bardzkie Mountains near Bardo and in Sudety Wałbrzyskie Landscape Park on the eastern slope of the Waligóra.

## MATERIALS AND METHODS

Research were conducted in spring 2017 in Kamiennie Mountains, Sowie Mountains and Bardzkie Mountains which is part of the Middle Sudetes macro-region (KONDRACKI 2001). Locality was defined as moss cluster located in one stream at a distance not less than 200 meters from each other. The current localities of the species in the Middle Sudetes was expressed in ATMOS grid square system (OCHYRA & SZMAJDA 1981), additionally GPS coordinates were recorded (Garmin 62sc). Nomenclature was adapted after OCHYRA et al. (2003) and SZWEYKOWSKI (2006). The phytosociological classification was based on that developed by MATUSZKIEWICZ (2005).

## RESULTS

*Buxbaumia viridis* was found in five new localities in three separate mountain complexes. Positions were noted in commercially managed forests of *Luzulo luzuloidis-Fagetum* character dominated by *Fagus sylvatica* and *Picea abies* additionally *Acer pseudoplatanus* and in a lesser extent *Abies alba*.

ATMOS Eb-94: WS Poland, Middle Sudetes, Kamiennie Mountains, Sudety Wałbrzyskie Landscape Park 730 m a.s.l., 50.684°N, 16.298°E. Sixteen sporogones were observed on 90 centimeter *P. abies* log without bark, in a *Luzulo luzuloidis-Fagetum* community. Accompanying species: *Dicranum scoparium*, *Herzogiella seligeri*, *Plagiochila porelloides*, *Rhizomnium*

*punctatum* and *Sanionia uncinata*. Det. K. Torzewski, 5.04.2017.

ATMOS Eb-96: WS Poland, Middle Sudetes, Sowie Mountains, Góry Sowie Landscape Park. Position I: 760 m a.s.l., 50.646°N, 16.550°E. One sporogone was found on 100 cm *P. abies* log without bark, in a *Luzulo luzuloidis-Fagetum* community. Accompanying species: *Blepharostoma trichophyllum*, *Cephalozia bicuspidata*, *Herzogiella seligeri*, *Lophocolea heterophylla*, *Orthodicranum montanum*, *Rhizomnium punctatum*, *Sanionia uncinata*. Det. K. Torzewski, 20.04.2017. Position II 780 m a.s.l., 50.637°N, 16.557°E. Nineteen sporogones were observed on 140 cm *P. abies* log without bark, in a *Luzulo luzuloidis-Fagetum* community. Accompanying species: *Cephalozia bicuspidata*, *Marchantia polymorpha*, *Herzogiella seligeri*, *Orthodicranum montanum*, *Plagiochila porelloides*, *Rhizomnium punctatum*, *Tetraphis pellucida*. Det. K. Torzewski, 20.04.2017.

ATMOS Fb-16: WS Poland, Middle Sudetes, Bardzkie Mountains. Position I: 490 m. a.s.l., 50.527°N, 16.686°E. Two sporogones were observed on 140 cm *P. abies* log without bark, in a *Luzulo luzuloidis-Fagetum* community. Accompanying species: *Herzogiella seligeri*, *Orthodicranum montanum*, *Tetraphis pellucida*. Det. K. Torzewski, 22.04.2017. Position II: 450 m. a.s.l., 50.525°N, 16.686°E. Five sporogones were observed on 320 cm *Abies alba* log without bark, in a *Luzulo luzuloidis-Fagetum* community. Accompanying species: *Dicranum scoparium*, *Herzogiella seligeri*, *Orthodicranum montanum*. Det. K. Torzewski, 22.04.2017.

## DISCUSSION

Presented data shows five new localities of rare moss *Buxbaumia viridis* in Polish part of the Middle Sudetes. It allow us to characterize the typical places of occurrence of this species. *Buxbaumia viridis* is a characteristic native forests species (CIEŚLIŃSKI et al. 1996, STEBEL & ŻARNOWIEC 2014), which is confirmed by: 1. its occurrence in places with low human activity (Sudety Wałbrzyskie Landscape Park, Góry Sowie Landscape Park), 2. appropriate kind of wood as fir and spruce, 3. stage of its decay which is necessary for proper habitat conditions (VONČINA & CHACHUŁA 2012). There is no doubt that the occurrence of *B. viridis* is limited by the removing of wood from forests, which could reduce a suitable habitat conditions for the moss (VONČINA & CHACHUŁA 2012). Decrease of the species abundance in the Sudetes over the years can be caused by increased insolation and decreased humidity of habitats as a result of timber harvesting. Current localities of the species should be taken under strict protection for ensure proper living conditions of *B. viridis*. Taking into account historical data of the *B. viridis* occurrence in the Sudetes and the rest of the country, we can assume that Sudetes are one of the main centers of the species in Poland.

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