

MICROBRYUM DAVALLIANUM (BRYOPHYTA, POTTIACEAE) IN POLAND: DISTRIBUTION AND ECOLOGY

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Abstract. This paper presents the map of distribution of *Microbryum davallianum* (Sm.) R. H. Zander in Poland and the list of localities established upon revised herbarium materials. This is the first data on the presence of *Microbryum davallianum* var. *conicum* (Schwägr.) R. H. Zander and phytocoenoses of the *Pottietum davallianae* (Kühner 1971) Marst. 1981 association in Poland.

Key words: *Microbryum davallianum*, distribution, habitat, *Pottietum davallianae*, Poland

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INTRODUCTION

Microbryum davallianum (Sm.) R. H. Zander is one of the smallest mosses of the family *Pottiaceae*. In publications and herbarium materials from the 19th century and the first half of the 20th century this species was referred to as *Gymnostomum davallianum* Sm., *Pottia minutula* (Schwägr.) Fürnr. or *Pottia rufescens* Müll. Hal., and later also as *Pottia davalliana* (Sm.) C. Jens. Chamberlain (1978) recognized this taxon as *Pottia starkeana* (Hedw.) C. Müll. subsp. *minutula* (Schwägr.) Chamberlain.

According to Zander (1993), 13 species are included in the genus *Microbryum*. They are small, annual mosses with lanceolate or elliptical leaves and diversely developed capsules with or without peristome (sometimes peristome rudimentary). Identification of particular taxa relies upon features concerning the shape of capsule and, especially, peristome (its development or the lack of it), as well as the morphology of spores, especially their surface that can be smooth, papillose, spiculate or tuberculate (Zander 1999). In the sterile state, due to small size, these mosses are often neglected or impossible to identify. Some authors (e.g., Ros *et al.* 1996), recognize spore features

as the most important, putting less focus on the peristome that can be variably developed. Those researchers follow the concept of Chamberlain (1978) and place *Microbryum davallianum* in the *Pottia starkeana* (Hedw.) C. Müll. species complex. In this paper, the concept of Zander (1993) was applied, who has distinguished *Microbryum davallianum* in typical form and two varieties: *M. davallianum* var. *conicum* and *M. davallianum* var. *commutatum*.

The aim of this work was to revise the herbarium materials of *Microbryum davallianum* available in Poland, to make the map of its distribution, and to characterize the plant community with its domination. This task was possible because in 2008–2009, several profuse localities of *Microbryum davallianum* were found on the outskirts of Poznań.

MATERIAL AND METHODS

The list of localities of *Microbryum davallianum* in Poland was established solely upon revised materials from the following herbaria: KRAM-B, POZG-B, TRN, WA, and WRSL. The distribution map was presented in the

ATMOS square system (Ochyra & Szmajda 1981). The original material of *Pottietum davallianae* from Poznań consisted of seven phytosociological relevés made by using the classic Braun-Blanquet's (1951) method (see Dierschke 1994). The modified quantitative scale (2a, 2b, 2m) of Barkman *et al.* (1964) was implemented for the assessment of the species' cover. The constancy values and cover coefficients were computed according to the procedure proposed by Pawłowski (1966). The names of mosses are in accordance with the list of Ochyra *et al.* (2003), and nomenclature of plant communities follows Hübschmann (1986) and Brzeg and Wojterska (2001). Depiction of macroregions of Poland is in accordance with the monograph of Kondracki (1998).

RESULTS

DISTRIBUTION

Hill and Preston (1998) consider *Microbryum davallianum* as a submediterranean-subatlantic element, whereas, according to Düll (1984), the typical variety is a submediterranean taxon and *Microbryum davallianum* var. *conicum* shows suboceanic tendencies. In bryological literature concerning Poland, this species has been described as widespread or common, with over 70 localities. Unfortunately, only eleven of them have been documented by herbarium materials, including five samples collected by Marian Kuc. Bryofloristic research from the last 40 years lack information of this species.

Historical localities of *Microbryum davallianum* are dispersed all over the country. German records from the 19th century and the first half of the 20th century from Pomerania (Westpreussen) and north-eastern Poland (Ostpreussen) have been documented by Dietzow (1938), Winkelmann (1893), and Warnstorf (1896). In Wielkopolska and Ziemia Lubuska regions it has been recorded by Miller (1894, 1900, 1901, 1904), Bothe and Torka (1906), Matuszewski (1912), Torka (1904, 1927), and Koppe (1926, 1931); in Śląsk (Silesia) by Milde (1862) and Torka (1931); in Małopolska, Mazowsze and Podlasie regions by Krupa (1882), Kwieciński (1892), Stefanowicz-Owczarska (1937), and Eichler (1884). In the second half of the 20th century *Microbryum davallianum* has been found in Małopolska and Wyżyna Lubelska

regions (Bloch & Karczmarz 1973; Karczmarz 1960; Karczmarz & Kuc 1962; Kuc 1959a, b, 1962; Waclawska 1959, 1964).

The revision of the herbarium materials allowed ascertaining that the majority of the samples belong to the typical variety – *Microbryum davallianum* var. *davallianum*, whereas a sample from Kraków (Las Wolski Forest) represents *Microbryum davallianum* var. *conicum* (Schwägr.) R. H. Zander. It can be concluded by narrow-mouthed capsule, the presence of rudimentary peristome in some sporangia, and papillose spores (Fig. 1). Compared to the typical variety, leaves have shorter tips and less excurrent costae. This variety has not been recorded in Poland so far.

The map of distribution of *Microbryum davallianum* (Fig. 2) consists of 21 localities in 19 ATPOL squares. It seems that the species is currently very rare in Poland. It may be connected with the change in the use of arable lands, where intensely fertilized large-area cultivations predominate today.

LIST OF LOCALITIES

Microbryum davallianum var. *davallianum*

WZNIESIENIA SZCZECIŃSKIE. Grid square Ba 73 – Szczecin-Golecino, on clay, April 1880, *leg. J. Winkelmann* (POZG-B, 2 vouchers). WZGÓRZA BUKOWE. Ba 83 – Szczecin-Zdroje, clayey excavation, Oct. 1893, 1896, 1903 and Mai 1900, *leg. J. Winkelmann* (POZG-B, 4 vouchers); Ba 93 – Szczecin-Klucz, fallow, Aug. 1903, *leg. J. Winkelmann* (POZG-B, 2 vouchers). DOLINA DRWĘCY. Bd 77 – River Drwęca valley, near Gromoty, ditch bank, Sept. 1851, *leg. H. v. Klinggraeff* (TRN). RÓWNINA INOWROCLAWSKA. Cc 68 – Inowrocław, Oct. 1909, *leg. J. Winkelmann* (POZG-B). MIĘDZYRZECZE ŁOMŻYŃSKIE. Cf 20 – Kaczyny Stare, district Ostrołęka, field after rye cultivation, 20 Oct. 1966, *leg. D. Sobotka* (WA). RÓWNINA WRZESIŃSKA. Db 09 – Poznań-Goraszewo, stubble, 20 Sept. 2008, *leg. A. Rusińska* (POZG-B); Db 19 – Poznań-Krzesiny, fallow, 7 Oct. 2009, *leg. A. Rusińska & P. Górski* (POZG-B); Poznań, south from Splawie, field verge, 7 Oct. 2009, *leg. A. Rusińska & P. Górski* (POZG-B). DOLINA ŚRODKOWEJ WISŁY. De 26 – Warszawa, Trasa Łazienkowska road, near Rozdroże exit, slope, 28 Aug. 1979, *leg. A. Klimczak* (WA). OBNIŻENIE WĘGROWSKIE. Df 03 – Węgrów, bottom of gravel pit, 22 Sept. 1966, *leg.*



Fig. 1. *Microbryum davallianum* var. *conicum* (Schwägr.) R. H. Zander. a – habit, b – leaf and antheridia, c – spores, d – rudimentary peristome. All from KRAM-B 009637, leg. Z. Stańczak. Scale bars: a = 1.5 mm, b = 0.3 mm, c = 11 μ m, d = 22 μ m.

Z. Wójcik & D. Sobotka (WA). RÓWNINA WROCŁAWSKA. Eb 49 – Wrocław, s.d., leg. J. Milde (WRSL); Eb 58 – Smolec near Wrocław, clayey excavations, March 1859, leg. J. Milde (L. Rabenhorst, *Bryotheca europaea* Nr 163 WRSL). Eb 59 – Wrocław-Ołtaszyn, near road to Ślęza river, on cley, 26 Sept. 1865, leg. R. Uechtritz (WRSL). PŁASKOWYŻ ŚWIDNICKI. Ef 37 – Vicinity of Prawiednik (Prawiedniki) south from Lublin, molehill,

9 Sept. 1957, leg. M. Kuc (KRAM-B 023850). WYŻYNA SANDOMIERSKA. Ef 81 – Dobrocice, district Sandomierz, molehill, 18 Sept. 1955, leg. M. Kuc (KRAM-B 023852). WYNIOSŁOŚĆ GIEŁCZEWSKA. Eg 51 – Namule forest near Krasnystaw, field, 26 March 1955, leg. M. Kuc (KRAM-B 023851). NIZINA NADWIŚLAŃSKA. Fd 69 – Olsza near Kraków (currently Kraków), s.d., leg. J. Krupa (KRAM-B 010628). NIECKA POŁANIECKA.

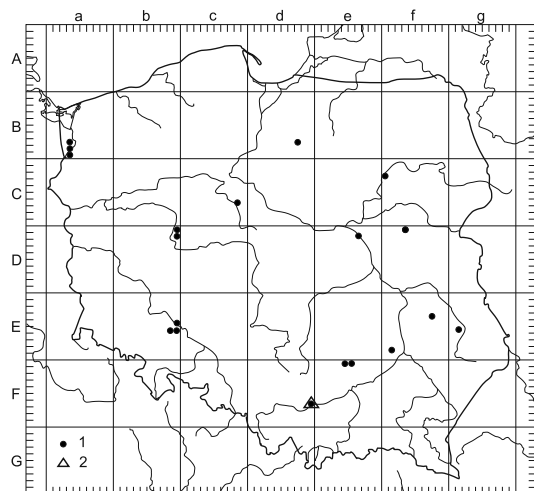


Fig. 2. Distribution of *Microbryum davallianum* (Sm.) R. H. Zander in Poland. 1 – *Microbryum davallianum* var. *davallianum*, 2 – *Microbryum davallianum* var. *conicum* (Schwägr.) R. H. Zander.

Fe 04 – Wola Żydowska, stubble, 9 Sept. 1956, *leg. M. Kuc* (KRAM-B 023849); Fe 05 – Vicinity of Jasień near Chmielnik, fresh exposure, 9 Sept. 1956, *leg. M. Kuc* (KRAM-B 023848).

Microbryum davallianum var. *conicum*

POMOST KRAKOWSKI. Grid square Fd 69 – Kraków, near Lasek Wolski, fallow, 24 April 1958, *leg. Z. Stańczak* (KRAM-B 009637).

ECOLOGY AND PHYTOSOCIOLOGY

Microbryum davallianum grows in open areas on clay and alluvial soils, on sides of paths, in pits and excavations, fields and stubbles, usually in moderately wet places. It is a basiphytic, ephemeral moss and an annual shuttle (Dierssen 2001). Sporangia are developed from late summer till winter (Zander 1999).

Phytocoenoses with predomination of *Microbryum davallianum* were found on the outskirts of Poznań, in places formerly protected as areas of special ecological value. These places assembled remains of valuable natural or semi-natural plant communities located in a big urban agglomeration. The mentioned areas of special ecological value

included areas with settlement, arable fields and meadows. The moss grew there in valleys of small streams Świątnica and Dworski Rów, on small, relatively wet clayey fields and grasslands. The documented patches with *M. davallianum* developed in the autumn on stubbles, fallow lands and shoulders of dirt roads, persisting there for several consecutive years. They functioned in habitat area of potential *Fraxino-Alnetum* W. Mat. 1952 forests, and in the annual cycle, they succeeded cultivations with weed communities of the order *Papaveretalia rhoeadis* Hüppe & Hofmeister 1990 ex Brzeg et M. Wojterska 2001. It is worth to note that in the studied area, a specific usage of arable land, i.e. traditional cultivation, is applied – after crop harvest, the fallow is left until late autumn or spring.

The floristic composition of phytocoenoses with predomination of *Microbryum davallianum* (Table 1) presents the association *Pottietum davallianae* (Kühner 1971) Marst. 1981. Identification of this association brings no doubt with comparison of materials gathered in Germany (see Hübschmann 1986). Apart from the presence and predomination of the characteristic species *Microbryum davallianum*, the phytocoenoses can be characterized by high participation of *Dicranella varia*, *Barbula convoluta*, *Funaria hygrometrica* and *Bryum argenteum*. The participation of vascular plants is low due to predomination of mosses in plant cover. This group is represented by annual (rarely perennial) segetal and ruderal plants (*Poa annua*, *Chenopodium album*, *Echinochloa crus-galli*, *Equisetum arvense*), and the terrophytes of wet and constantly destroyed habitats turning into communities of the class *Isoëto durieui-Juncetea bufonii*, i.e. *Cyperus fuscus*, *Juncus bufonius* or *Plantago intermedia*.

Little documentary material of *Pottietum davallianae* presented in this work does not allow extensive discussion on the diversity of this association in Poland. Apart from *Pottietum davallianae typicum* it is worth notice the possibility of the occurrence of phytocoenoses of the subsociation *P. d. dicranelletosum varia*, which can be supported by higher participation of *Dicranella varia* (comp. rel. 2–3, Table 1; Marstaller 2006).

Table 1. *Pottietum davallianae* (Kühner 1971) Marst. 1981.

| Successive number of relevé | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Constancy | Cover coefficient |
|--|------------------|------------------|------------------|------------------|-------|------------------|------------------|-----------|-------------------|
| Number of relevé in the field | 2 | 3 | 4 | 5 | 1 | 7 | 6 | | |
| Area of relevé [cm × cm] | 35×30 | 25×20 | 50×35 | 40×30 | 55×20 | 50×35 | – | | |
| Moss layer cover [%] | 80 | 95 | 80 | 70 | 80 | 85 | 75 | | |
| Herb layer cover [%] | 5 | 5 | 10 | 5 | 5 | 20 | 3 | | |
| Number of species | 12 | 10 | 12 | 14 | 17 | 12 | 9 | | |
| <i>Ch. Pottietum davallianae</i> | | | | | | | | | |
| <i>Microbryum davallianum</i> | 3.3 [^] | 3.3 [^] | 3.3 [^] | 3.3 [^] | 4.4 | 4.4 [^] | 4.3 [^] | V | 4821 |
| <i>Ch. Pacion cuspidatae</i> | | | | | | | | | |
| <i>Dicranella varia</i> | + | 3.3 [^] | 2.2 | + | 1.1 | . | . | IV | 871 |
| <i>Tortula acaulon</i> | 1.2 | +2 [^] | . | . | . | . | . | II | 79 |
| <i>Riccia cavernosa</i> | r | . | r | + | . | + | . | III | 17 |
| <i>Riccia sorocarpa</i> | . | . | . | . | . | + | + | II | 14 |
| <i>Ch. Barbuletea et Barbuletea unguiculatae</i> | | | | | | | | | |
| <i>Barbula convoluta</i> | + | 2.2 | + | + | 1.1 | 2.2 | + | V | 600 |
| <i>Funaria hygrometrica</i> | . | . | 1.2 | +2 | +2 | +2 | . | III | 93 |
| <i>Bryum klinggraeffii</i> | +2* | . | . | . | +2* | + | 1.1* | III | 93 |
| <i>Barbula unguiculata</i> | . | 1.1 | . | + | r | . | . | III | 80 |
| Others | | | | | | | | | |
| <i>Bryum argenteum</i> | 2.2 [^] | 1.1 | 3.3 | 3.3 | 1.2 | + | 1.1 | V | 1543 |
| <i>Leptobryum pyriforme</i> | 1.2 | 2.2 | 1.1 | + | . | . | + | IV | 407 |
| <i>Poa annua</i> | + | + | 1.2 | . | . | . | . | III | 86 |
| <i>Cyperus fuscus</i> | + | . | + | . | + | . | . | III | 21 |
| <i>Ceratodon purpureus</i> | . | . | +2 | + | + | . | . | III | 21 |
| <i>Bryum bicolor</i> | . | . | 1.1 | + | . | . | . | II | 79 |
| <i>Juncus articulatus</i> | . | . | . | + | + | 2.2 | + | III | 271 |
| <i>Juncus bufonius</i> | . | . | . | + | + | . | . | II | 14 |
| <i>Stachys palustris</i> | . | . | . | . | 1.1 | . | . | I | 71 |
| <i>Rorippa palustris</i> | . | . | . | . | + | + | . | II | 14 |
| <i>Equisetum arvense</i> | + | . | . | . | + | . | . | II | 14 |
| <i>Mentha arvensis</i> | . | + | . | . | + | . | . | II | 14 |

[^] – with sporophytes, * – with gemmae

SPORADIC SPECIES. *Centaurium erythraea* subsp. *erythraea* 4(+), *Chenopodium album* 4(+), *Conyza canadensis* 6(+), *Echinochloa crus-galli* 5(+), *Epilobium obscurum* 3(+2), *Juncus compressus* 5(+), *Marchantia polymorpha* 7(r), *Plantago intermedia* 1(+), *P. major* 6(+), *Stellaria media* 7(+), *Taraxacum officinale* 6(+).

All phytosociological relevés were made in Poznań, ATPOL square Db-19 (see LIST OF LOCALITIES)

Pottietum davallianae is a common association in Europe, even though its phytocoenoses are not well documented (see e.g., Hübschmann 1986; Bardat & Haugel 2002; Marstaller 2006; Sabovljević 2008; Preston *et al.* 2010).

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