

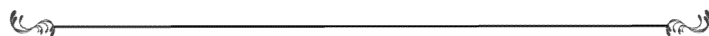
**CONTRIBUTION TO THE MOSS FLORA OF THE MAGURA NATIONAL PARK  
(WESTERN CARPATHIANS, POLAND)**

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**ABSTRACT:** The paper provides new distributional data for 15 species, 1 variety of mosses  
new to the Magura National Park, and 40 species rare in the area.

**KEY WORDS:** biodiversity, distributional data, threatened species, protected species, Beskid  
Niski range, muscoflora.



## Introduction

The Magura National Park is situated in the Beskid Niski range in the Western Carpathians and covers an area of 19438.9 ha (Fig. 1). A major part of the Park is forested, whereas the remaining part is occupied by non-forest vegetation, mainly meadows and pastures (Fig. 2). Especially valuable for occurrence of mosses are sandstone outcrops (Fig. 3). The highest elevation, 846 m above sea level, is Mt Wątkowa. The first information about moss flora from the area of the present Park was published by Waclawska (1957), Karczmarz (1987), Brylska (1991) and Ochyra et al. (1999). The data were summarized by Stebel and Ochyra (2000) in the paper entitled 'The moss flora of the Magura National Park in the Beskid Niski Range (Western Carpathians)'. Since then, several bryological papers have appeared which brought information about several species new to the Magura National Park, for example *Hookeria lucens*, *Lescuraea mutabilis*, *Niphotrichum elongatum*, *Orthodicranum tauricum* and *Orthotrichum stramineum*, as well as new data concerning the distribution of some rare mosses of this area (Stebel 2003, 2011; Bednarek-Ochyra et al. 2011; Ochyra et al. 2011; Stebel et al. 2011, 2014; Górski et al. 2015).



Fig. 1. Location of the Magura National Park.

The aim of this paper is to present new localities of 56 mosses, including 15 species and 1 variety new to the flora of the Magura National Park, i.e. *Anomodon rugelii*, *Brachythecium geheebii*, *Bryoerythrophyllum ferruginascens*, *Calliergon cordifolium*, *Campylopus flexuosus*, *Cynodontium strumiferum*, *Dicranella rufescens*, *Fissidens dubius* var. *dubius*, *Orthotrichum patens*, *Philonotis arnelii*, *P. caespitosa*, *Schistidium crassipilum*, *Sciuro-hypnum oedipodium*, *Serpoleskea subtilis*, *Tortella inclinata* and *Ulota crispa*, and 40 rare species in this area.

## Materials and methods

Field investigations were carried out in the years 2013-2014. The list of species is arranged alphabetically. Names of species follow Ochyra et al. (2003). Species protected by law in Poland were taken after 'Regulation of the Minister of Environment' (2014) whereas threatened according to Żarnowiec et al. (2004).

For every species, the following data is given: ATMOS square grid (basic square and small square comprising 1 square kilometre), names of sites, GPS coordinates, habitat, altitude and notes on the production of the sporophytes and gemmae. For new and very rare species, information about their distribution in the Polish part of the Carpathians is provided.

## List of species and localities

Key: \* - species new to the Magura National Park, ! - species partly protected in Poland; in the square brackets - species threatened in Poland with threat category.

**!Abietinella abietina** (Hedw.) M.Fleisch. – [Gf31/14, 49°26'51.2"N/ 21°32'36.5"E] Huta Polańska, grassy wayside slope, 495 m;

[Gf31/22, 49°26'26.7"N/21°30'43.2"E]  
Ciechania, grassy wayside, 554 m.

!**Anomodon attenuatus** (Hedw.) Huebener – [Gf10/82, 49°34'00.7"N/21°23'02.3"E] Mt Kornuty E of Mt Wątkowa, E slope, bark of *Fagus sylvatica*, 761 m; [Gf20/76, 49°29'14,6"N/21°26'08,9"E] Rostajne, E part, bark of *Fagus sylvatica*, 495 m; [Gf20/88, 49°28'503"N/21°27'56.4"E] Mt Kiczera Żydowiańska, W slope, bark of *Fagus sylvatica* snag, 485 m; [Gf21/72, 49°29'16.5"N/21°31'20.2"E] Huta Krempska, towards E, bark of *Acer pseudoplatanus*, 619 m; [Gf21/81, 49°28'31.8"N/ 21°30'20.1"E] Huta Krempska, las Huciska, NE slope of Mt Jaworzyna, bark of *Fagus sylvatica*, 625 m; [Gf31/05, 49°27'25.9"N/21°33'45.7"E] Polany, Baranie stream valley, bark of *Fagus sylvatica*, *c. spor.*, 514 m; [Gf31/08, 49°29'15.0"N/21°35'51.5"E], Kolonia Olchowiec, SW part, bark of *Fagus sylvatica*, 530 m; [Gf31/10, 49°26'47,5"N/21°29'22,4"E] Ożenna, near the Ożenna–Ciechania road, bark of *Fagus sylvatica*, 632 m; [Gf31/14, 49°26'44.0"/21°32'40.1"E] Huta Polańska, sandstone near path, 502 m; [Gf31/13, 49°26'50.4"N/21°32'05.8"E] Huta Polańska, sandstone near path in the Pomiarka stream valley, 485 m; [Gf31/22, 49°26'31,9"N/ 21°31'13,4"E] Ciechania, bark of *Fagus sylvatica* near the Pomiarka stream, 525 m; [Gf31/28, 49°26'22.8"N/21°36'04.7"E, Mt Baranie, N slope, bark of *Fagus sylvatica*, 620 m.

!**[I]Anomodon longifolius** (Schleich. *ex* Brid.) Hartm. – [Gf31/28, 49°26'14.2"N/21°35'56.9"E] Mt Baranie, N slope, bark of *Acer pseudoplatanus*, 730 m.

\*!**[V]Anomodon rugelii** (Müll.Hal.) Keissl. – [Gf10/70, 49°34'42.9"N/ 21°21'09.7"E] between Mt Kornuty and Wątkowa, N of green tourist trail, bark of old beech, 780 m; [Gf10/82, 49°34'00.7"N/21°23'02.3"E] Mt Kornuty E of Mt Wątkowa, E slope, bark of

*Fagus sylvatica*, 761 m. Primeval forest species, recently reported from the Beskidy Zachodnie Mts (Stebel 2006) and Bieszczady Zachodnie range (Żarnowiec 2010).

!**Anomodon viticulosus** (Hedw.) Hook. & Taylor – [Gf10/41, 49°36'32.4"N/21°22'03.4"E] Folusz, near black tourist trail from Folusz to Mt Barwinek, concrete wall near the Kłopotnica stream, 407 m; [Gf31/22, 49°26'31.9"N/21°31'13.4"E] Ciechania, bark of *Fagus sylvatica* near the Pomiarka stream, 525 m; [Gf31/28, 49°26'14.2"N/21°35'56.9"E], Mt Baranie, N slope, bark of *Acer pseudoplatanus*, 730 m.

!**[R]Brachydontium trichodes** (F.Weber) Milde – [Gf31/28, 49°26'30.5"N/21°36'16.2"E] Mt Baranie, wet sandstone in beech forest near yellow tourist trail, *c. spor.*, 620 m.

\*!**[V]Brachythecium geheebii** Milde – [Gf10/82, 49°34'00.7"N/21°23'02.3"E] Mt Kornuty E of Mt Wątkowa, E slope, bark of *Fagus sylvatica*, 761 m. Primeval forest species, recently reported from the Beskidy Zachodnie Mts (Stebel 2006) and Bieszczady Zachodnie range (Stebel and Żarnowiec 2010).

\*!**[R]Bryoerythrophyllum ferruginascens** (Stirt.) Giacom. – [Gf21/13, 49°32'23.5"N/21°31'36.6"E] Mt Kamień, NE slope, wet mineral soil, wayside slope and ditch, 501 m. Species known from scattered sites in the Beskidy Zachodnie Mts (Stebel 2006) and Pieniny Mts (Stebel et al. 2010).

**Callicladium haldanianum** (Grev.) H.A.Crum – [Gf10/31, 49°36'49.6"N /21°22'14.9"E], Folusz, valley of the stream running from Mt Kicirka, stump near stream, 405 m; [Gf10/41, 49°36'06.7"N/21°21'48.0"E] Folusz, black tourist trail to 'Diabli Kamień', log in beech forest, 442 m; [Gf10/82, 49°34'14.1"N/21°22'43.0"E], Mt Kornuty E of Mt Wątkowa, E slope, log in beech forest, 819 m; [Gf20/13, 49°32'34.3"N/21°24'06.7"E] Mt Osypisko, SE slope, bark of *Betula pendula* in mixed forest,

564 m and [49°32'30.3"N/ 21°23'48.7"E] log in mixed forest, 570 m; [Gf20/19, 49°32'14.6"N/21°28'47.9"E] Krempna, near red tourist trail Mt Kolanin–Hałbowska pass, log in mixed forest, 525 m; [Gf20/32, 49°31'10.3"N/21°23'07.5"E] between Wołowiec and Świątkowa Wielka, log in mixed forest, 595 m; [Gf20/42, 49°31'06.4"N/21°23'13.3"E] Wołowiec, E part, log in mixed forest, 592 m and [49°31'07.7"N/21°23'10.0"E] log in *Picea abies* forest, 600 m; [Gf20/65, 49°30'01.1"N/ 21°25'14.1"E] Mt Rostajne, NE slope, log in deciduous forest, 425 m; [Gf20/88, 49°28'44.1"N/21°27'48.4"E] Mt Kiczera Żydowiańska, W slope, bark of *Pyrus* sp. in thicket, 490 m; [Gf21/20, 49°31'49.8"N/ 21°29'32.1"E] W of Hałbowska pass, log, 545 m; [Gf21/45, 49°28'30.7"N/21°33'45.5"E] Mt Suchania, E slope, log in beech forest, 478 m; [Gf21/73, 49°29'06.1"N/21°32'15.6"E] Huta Krempska, E part, log in mixed forest, 473 m; [Gf21/84, 49°28'28.3"N/21°32'41.4"E] Polany Huta, log in *Picea abies* forest, 492 m; [Gf21/92, 49°28'13.9"N/21°30'35.1"E] Mt Żydowska Góra, NW slope, log in beech forest, 648 m; [Gf31/03, 49°27'34.9"N/ 21°21'55.7"E] Huta Polańska, near the Zimna Woda stream, bark of *Alnus incana*, 465 m; [Gf31/05, 49°27'29.7"N/ 21°33'50.0"E] Polany, Baranie stream valley, log in beech forest, 504 m; [Gf32/00, 49°27'26.9"N/ 21°37'45.5"E] Wilsznia, N part, log in beech forest, 527 m. Commonly with sporophytes. Species considered as threatened in Europe (Schumacker and Martiny 1995), in Poland fairly frequent in south-eastern part (Stebel 2013).

\**Calliargon cordifolium* (Hedw.) Kindb. – [Gf10/54, 49°35'44.1"N/21°24'22.1"E], Huta Pielgrzyska, near the road to Folusz, sedge mire 460 m. Lowland species, rare in the mountains.

\*!**[I]***Campylopus flexuosus* (Hedw.) Brid. – [Gf10/31, 49°36'49.7"N/21°22'21.9"E] Folusz, valley of the stream running from Mt Kicirka, humus in mixed forest near *Pinus sylvestris*, 410 m and [49°36'45.1"N/21°22'10,0"E] eroded mineral soil, wayside in beech forest, 430 m; [Gf10/41, 49°36'15.1"N/21°22'01.9"E] Folusz, black tourist trail to ‘Diabli Kamień’, sandstone near trail, 450 m and 49°36'07.9"N/21°22'04.7"E, Folusz, ‘Diabli Kamień’, shaded sandstone outcrops, 490–505 m. Species reported from Beskid Niski by Waclawska (1957). Recently many sites of this species has been found in the Western Carpathians by Stebel (2007, 2015).

\**Cynodontium strumiferum* (Hedw.) Lindb. – [Gf10/41, 49°36'07.9"N/21°22'04.7"E] Folusz, ‘Diabli Kamień’, sandstone, 510 m. Species known from many sites from almost whole parts of the Polish Carpathians.

*Cynodontium polycarpon* (Hedw.) Schimp. – [Gf10/41, 49°36'07.9"N/21°22'04.7"E] Folusz, ‘Diabli Kamień’, sandstone, 510 m.

\**Dicranella rufescens* (Dicks.) Schimp. – [Gf20/85, 49°28'36.9"N/21°25'36.8"E] Mt Feszówka, E slope, clayey slope near stream, 445 m. Species known from many sites mainly from the western part of the Polish Carpathians.

*Drepanocladus polycarpos* (Voit) Warnst. – [Gf20/88, 49°28'36.9"N/21°28'05,6"E] Mt Kiczera Żydowiańska, W slope, wet bottom of small excavation on meadow, 485 m.

!*Eurhynchium angustirete* (Broth.) T.J.Kop. – [Gf10/41, 49°36'30.3"N/21°22'03.8"E] Folusz, slope on the Kłopotniczan stream, 405 m and [49°36'04.5"N/21°21'45.4"] Folusz, black tourist trail to ‘Diabli Kamień’, slopes on stream and wayside, 440–445 m; [Gf20/19, 49°32'14.8"/21°28'51.3"], Krempna, near red tourist trail Mt Kolanin–Hałbowska pass, wet place in mixed forest, 500 m; [Gf20/76, 49°29'16,5"N/21°26'10,6"E] Rostajne, E part,

sandstone in beech forest, 500 m; [Gf21/13, 49°32'10.7"N/21°31'46.6"] Mt Kamień, NE slope, sandstone in beech forest, 485 m; [Gf21/45, 49°30'34.1"N/21°33'21.9"E], Mt Suchania, E slope, sandstone in beech forest, 538 m; [Gf21/72, 49°29'04.3"N/21°31'02.2"E] Huta Krempska, E part, soil in mixed forest, 503 m; [Gf21/84, 49°28'23.0"N/21°32'49.7"E] Polany Huta, on ground in *Picea abies* forest, 492 m; [Gf31/03, N 49°27'35.8" E 21°21'59.0"] Huta Polańska, wet place in mixed forest, 464 m.

***Fissidens bryoides*** Hedw. – [Gf21/84, 49°28'15.5"N/21°32'58.6"E] Polany Huta, wayside slope in mixed forest, 439 m.

\****Fissidens dubius*** P. Beauv. var. *dubius* – [Gf31/05, 49°27'42.0"N/21°33'39.8"E] , Polany, Baranie stream valley, between sandstone boulders in beech forest, 480 m. Moss known from the Park only from one locality, but as variety *F. dubius* var. *mucronatus* (Breidl. ex Limpr.) Karttunen, Hedenäs & Söderström (Brylska 1991).

***Heterocladium heteropterum*** (Brid.) Schimp. – [Gf10/41, 49°36'04.5"N /21°21'45.4"E] Folusz, black tourist trail to 'Diabli Kamień', sandstone in beech forest, 440 m.

***Homalia trichomanoides*** (Hedw.) Schimp. – [Gf20/65, 49°30'01.1"N/21°25'14.1"E] Mt Rostajne, NE slope, bark of *Carpinus betulus*, 425 m; [Gf20/88, 49°28'50.3"N/21°27'56.4"E] Mt Kiczera Żydowiańska, W slope, bark of *Fagus sylvatica* snag, 485 m; [Gf21/61, 49°29'48.8"N/21°30'14.8"E] Mt Kotalnica, W slope, bark of *Acer pseudoplatanus*, 500 m; [Gf21/72, 49°29'05.9"N/21°30'57.6"E] Huta Krempska, E part, bark of *Fagus sylvatica*, 498 m; [Gf21/91, 49°28'16.5"/21°30'17.5"] Mt Jaworzyna, NE slope, bark of *Acer pseudoplatanus*, 654 m; [Gf21/92, 49°28'13.4"N/21°30'35.9"E] Mt Żydowska Góra, NW slope, bark of *Acer pseudoplatanus*, c. *spor.*, 640 m; [Gf31/02, 49°27'41.5"N/

21°31'01.8"E] Mt Żydowska Góra, S slope, bark of *Acer pseudoplatanus* near stream, 620 m; [Gf31/05, 49°27'29.7"N/21°33'50.0"E] Polany, Baranie stream valley, bark of *Acer pseudoplatanus*, c. *spor.*, 504 m; [Gf31/10, 49°26'47.5"N/21°29'22.4"E], Ożenna, near the Ożenna–Ciechania road, bark of *Fagus sylvatica*, 632 m; [Gf31/13, 49°26'45.4"N/21°31'57.1"E] Huta Polańska, bark of *Fagus sylvatica* near the Pomiarka stream, 482 m; [Gf31/26, 49°26'30.2"N/21°33'53.5"E] Huta Polańska, E of Mazgalica pass, bark of *Acer pseudoplatanus*, 718 m; [Gf31/28, 49°26'12.2"N/21°35'57.3"E], Mt Baranie, bark of *Acer pseudoplatanus*, 740 m.

***Homalothecium sericeum*** (Hedw.) Schimp. – [Gf21/72, 49°29'16.5"N/21°31'20.2"E] Huta Krempska, towards E, bark of *Acer pseudoplatanus*, 619 m; [Gf31/28, 49°26'14.2"N/21°35'56.9"E] Mt Baranie, N slope, bark of *Acer pseudoplatanus*, 730 m.

***Hylocomiadelphus triquetrus*** (Hedw.) Ochyra & Stebel [= *Rhytidiadelphus triquetrus* (Hedw.) Warnst. – [Gf10/31, 49°36'50.2"N/21°22'25.6"E] Folusz, valley of the stream running from Mt Kiczka, slope near stream, 410 m.

***Hylocomium splendens*** (Hedw.) Schimp. – [Gf10/31, 49°36'50.2"N/21°22'25.6"E] Folusz, valley of the stream running from Mt Kiczka, slope near stream, 410 m; [Gf10/41, 49°36'22.9"N/21°22'05.2"E] Folusz, black tourist trail to 'Diabli Kamień', wayside slope, 420 m; [Gf20/13, 49°32'39.5"N/21°24'08.2"E] Mt Osypisko, SE slope, litter in mixed forest, 547 m; [Gf21/13, 49°32'10.5"N/21°31'46.1"E] Mt Kamień, NE slope, wayside, 495 m; [Gf31/14, 49°26'51.2"N/21°32'36.5"E] Huta Polańska, grassy wayside slope, 495 m.

***Hypnum cupressiforme*** Hedw. var. *filiforme* Brid. – [Gf10/82, 49°34'00.7"N/21°23'02.3"E] Mt Kornuty E of Mt Wątkowa, E slope, bark of *Fagus sylvatica*, 761 m; [Gf21/72,

49°29'13.1"N/21°31'16.0"E] Huta Krempska, E part, bark of *Fagus sylvatica*, 594 m; [Gf31/10, 49°26'47.1"N/21°29'28.6"E] Ożenna, near the Ożenna–Ciechania road, bark of *Fagus sylvatica*, 640 m; [Gf31/26, 49°26'30.2"N/21°33'53.5"E] Huta Polańska, E of Mazgalica pass, bark of *Acer pseudoplatanus*, 718 m; [Gf32/00, 49°27'18.5"N/21°37'23.2"E] Wilsznia, N part, bark of *Fagus sylvatica*, 555 m.

*Leskea polycarpa* Hedw. – [Gf21/74, 49°29'01.4"N/21°33'03.3"E] Huta Krempska, E part, bark of *Fagus sylvatica*, *c. spor.*, 490 m; [Gf31/20, 49°26'36.2"N/21°29'09.8"E] Ożenna, near the Ożenna–Ciechania road, bark of *Fagus sylvatica*, *c. spor.*, 670 m.

**!Leucobryum glaucum** (Hedw.) Ångstr. – [Gf10/31, N 49°36'50.5"N/21°22'27.1"E], Folusz, valley of the stream running from Mt Kicirka, slope near steam and bark of *Alnus incana*, 395-400 m; [Gf10/41, 49°36'22.9"N/21°22'05.2"E] Folusz, black tourist trail to 'Diabli Kamień', wayside slope, 420 m and [49°36'15.1"N/21°22'01.9"E], wet wayside sandstones, 450-505 m.

*Leucodon sciuroides* (Hedw.) Schwägr. – [Gf20/86, 49°28'39.0"N/21°25'41.4"E] Rostajne, bark of wayside *Salix fragilis* near the Świątkowa Wielka–Grab road, 442 m.

*Mnium marginatum* (Dicks.) P.Beauv. – [Gf10/31, 49°36'33"N/21°22'07"E] Folusz, wall near the Kłopotnica stream, 400 m; [Gf10/41, 49°36'04.5"N/21°21'45.4"E] Folusz, black tourist trail, bark of lower part of *Fagus sylvatica* trunk, 440 m.

**!Neckera complanata** (Hedw.) Huebener – [Gf20/63, 49°29'59.1"N/21°23'59.3"E] Nieznajowa, bark of *Fagus sylvatica*, 490-495 m; [Gf31/02, 49°27'41.5"N/21°31'01.8"E] Mt Żydowska Góra, S slope, bark of *Acer pseudoplatanus* near stream, 620 m.

*Orthodicranum tauricum* (Sapjegin) Smirnova – [Gf31/20, 49°26'43.1"N

/21°28'51.9"E] Ożenna, near the Ożenna–Ciechania road, bark of *Fagus sylvatica*, 663 m.

*Orthotrichum affine* Schrad. ex Brid. – [Gf10/41, 49°36'30.5"N/21°22'01.8"E] Folusz, black tourist trail to 'Diabli Kamień', bark of *Alnus incana* near the Kłopotnica stream, 405 m; [Gf31/22, 49°26'21.0"N/21°30'53.4"E] Ciechania, bark of *Salix fragilis*, wayside, 541 m.

*Orthotrichum diaphanum* Schrad. ex Brid. – [Gf10/31, 49°36'49"N/21°22'38"E] Folusz, bark of *Acer pseudoplatanus*, wayside, 395 m; [Gf21/84, 49°28'15.5"N/21°32'58.6"E] Polany Huta, bark of *Acer pseudoplatanus*, wayside, *c. spor.*, 439 m; [Gf30/27, 49°26'52.5"N/21°26'29.2"E] Mt Dylik, bark of wayside *Salix fragilis*, *c. spor.*, 526 m; [Gf31/26, 49°26'26.2"N/21°34'01.1"E] Huta Polańska, E of Mazgalica pass, bark of *Fagus sylvatica* near tourist trail in exposed place, *c. spor.*, 688 m.

*Orthotrichum obtusifolium* Brid. – [Gf10/41, 49°36'30.5"N/21°22'01.8"E] Folusz, black tourist trail to 'Diabli Kamień', bark of *Alnus incana* near the Kłopotnica stream, *c. gem.*, 405 m; [Gf31/26, 49°26'26.2"N/21°34'01.1"E] Huta Polańska, E of Mazgalica pass, bark of *Fagus sylvatica* near tourist trail in exposed place, *c. gem.*, 688 m.

*Orthotrichum pallens* Bruch ex Brid. – [Gf10/41, 49°36'30.5"N/21°22'01.8"E] Folusz, black tourist trail to 'Diabli Kamień', bark of *Alnus incana* near the Kłopotnica stream, *c. spor.*, 405 m; [Gf20/63, 49°29'59.1"N/21°23'59.3"E] Nieznajowa, bark of *Fagus sylvatica*, *c. spor.*, 490-495 m; [Gf21/73, 49°29'11.2"N/21°31'46.8"E] Huta Krempska, E part, bark of *Fagus sylvatica*, *c. spor.*, 591 m.

**\*[R]Orthotrichum patens** Bruch & Brid. – [Gf10/40, 49°36'03.2"N/21°21'34.3"E] Folusz, near black tourist trail to Mt Barwinek, bark of

*Salix caprea*, *c. spor.*, 441 m; [Gf20/63, 49°29'59.1"N/21°23'59.3"E] Nieznajowa, bark of *Fagus sylvatica*, 490-495 m; [Gf21/73, 49°29'12.3"N/21°31'07.4"E] Huta Krempska, E part, bark of *Fagus sylvatica*, 560 m; [Gf31/26, 49°26'30.4"N/21°33'50.4"E] Huta Polańska, E of Mazgalica pass, bark of *Fagus sylvatica*, *c. spor.*, 724 m. Number of its localities increases recently in many regions of the Polish Carpathians.

***Orthotrichum pumilum*** Sw. *ex anon.* – [Gf 10/31, 49°36'49"N/21°22'38"E] Folusz, bark of wayside *Acer pseudoplatanus*, *c. spor.*, 395 m and [49°36'50.0"N/21°22'17.7"E], Folusz, valley of the stream running from Mt Kicirka, bark of *Fraxinus excelsior* near stream, *c. spor.*, 395-410 m; [Gf10/40, 49°36'09.9"N/21°21'47.4"E] Folusz, black tourist trail to Mt Barwinek, bark of *Fagus sylvatica* near the Kłopotnica stream, *c. spor.*, 440 m.

***Orthotrichum speciosum*** Nees – [Gf10/31, 49°36'49"N/21°22'38"E] Folusz, bark of wayside *Fraxinus excelsior*, *c. spor.*, 400 m and [49°36'50.0"N/21°22'17.7"E] valley of the stream running from Mt Kicirka, bark of *Fraxinus excelsior* near stream, *c. spor.*, 395–410 m; [Gf 10/40, 49°36'09.9"N/21°21'47.4"E] Folusz, black tourist trail to Mt Barwinek, bark of *Fagus sylvatica* near the Kłopotnica stream, *c. spor.*, 440 m; [Gf10/41, 49°36'30.5"N/21°22'01.8"] Folusz, black tourist trail to 'Diabli Kamień', bark of *Alnus incana* near Kłopotnica steam, *c. spor.*, 405 m; [Gf20/85, 49°28'39.0"N/21°25'41.4"E] Rozstajne, bark of wayside *Salix fragilis* near the Świątkowa Wielka–Grab road, 442 m; [Gf20/88, 49°28'43.4"N/21°27'49.1"E] Mt Kiczera Żydowiańska, W slope, bark of *Acer pseudoplatanus*, *c. spor.*, 490 m; [Gf21/75, 49°29'05.8"N/21°33'11.6"E] Polany, W part, bark of *Alnus incana*, 489 m; [Gf21/81, 49°28'48.0"N/21°30'30.9"E] Huta Krempska,

las Huciska, NE slope of Mt Jaworzyna, bark of *Acer pseudoplatanus*, *c. spor.*, 548 m; [Gf21/84, 49°28'15.5"N/21°32'58.6"E] Polany Huta, bark of wayside *Acer pseudoplatanus*, *c. spor.*, 439 m; [Gf31/10, 49°26'44.1"N/21°29'31.5"E] Ożenna, near the Ożenna–Ciechania road, bark of *Salix caprea*, 646 m; [Gf31/22, 49°26'21.0"N/21°30'53.4"E]

Ciechania, bark of wayside *Salix fragilis*, 541 m; [Gf31/26, 49°26'26.2"N/21°34'01.1"E] Huta Polańska, E of Mazgalica pass, bark of *Fagus sylvatica* near tourist trail in exposed place, *c. spor.*, 688 m.

**[V]*Orthotrichum stramineum*** Brid. – [Gf10/31, 49°36'49"N/21°22'38"E] Folusz, bark of wayside *Fraxinus excelsior*, *c. spor.*, 400 m; [Gf20/42, 49°31'05.3"N/21°23'12.5"E] Wołowiec, E part, bark of *Fagus sylvatica*, *c. spor.*, 587 m; [Gf20/88, 49°28'43.4"N/21°27'49.1"E] Mt Kiczera Żydowiańska, W slope, bark of *Acer pseudoplatanus*, *c. spor.*, 490 m; [Gf21/84, 49°28'15.5"N/21°32'58.6"E] Polany Huta, bark of wayside *Acer pseudoplatanus*, *c. spor.*, 439 m; [Gf31/05, 49°27'31.8"N/21°33'44.2"E] Polany, Baranie stream valley, bark of *Fagus sylvatica*, *c. spor.*, 528 m; [Gf31/42, 49°25'16.9"N/21°31'14.1"E] Mt Filipowski Wierch, NW slope, bark of *Acer pseudoplatanus*, 696 m and [49°25'33.0"N/21°31'03.1"E], bark of *Fagus sylvatica*, *c. spor.*, 677 m.

**[V]*Orthotrichum striatum*** Hedw. – [Gf10/31, 49°36'45.0"N/21°22'10.0"E] Folusz, valley of the stream running from Mt Kicirka, bark of *Salix caprea*, *c. spor.*, 430 m; [Gf10/40, 49°36'03.2"N/21°21'34.3"E] Folusz, near black tourist trail to Mt Barwinek, bark of *Salix caprea*, *c. spor.*, 441 m; [Gf31/13, 49°26'45.4"N/21°31'57.1"E] Huta Polańska, bark of *Alnus incana* near the Pomiarka stream, *c. spor.*, 482 m.

**\*![V]*Philonotis arnellii*** Husn. – [Gf31/42, 49°25'26.4"N/21°31'02.9"E] Mt Filipowski

Wierch, NW slope, wet soil in depression in sedge mire, 673 m. Distribution of this species in the Carpathians is poorly known. It has been reported from Gorce (Lisowski and Kornaś 1966), Beskid Śląski (Stebel 2006), Bieszczady Zachodnie (Stebel and Żarnowiec 2010) and Pogórze Orawsko-Jordanowskie (Stebel and Vončina 2014).

\*!**[R]** *Philonotis caespitosa* Jur. – [Gf10/54, 49°35'48.7"N/21°24'17.4"E] Huta Pielgrzyska, near the road to Folusz, wet meadow, 455 m. Moss rare in the Carpathians, known from scattered localities.

!**Philonotis calcarea** (Bruch & Schimp.) Schimp. – [Gf10/54, 49°35'35.5"N/21°24'35.0"E] Huta Pielgrzyska, near the road to Folusz, sedge mire 470 m; [Gf21/13, 49°32'23.5"N/21°31'36.6"E] Mt Kamień, NE slope, moist soil on wayside slope and in ditch, 501 m.

**Pohlia wahlenbergii** (F.Weber & D.Mohr) A.L.Andrews – [Gf21/61, 49°29'29.2"N/21°29'53.3"E] Huta Krempska, Na Zarubi, wet mineral soil, wayside, 427 m.

!**Polytrichum commune** Hedw. – [Gf21/13, 49°32'14.0"N/21°31'46.3"E] Mt Kamień, NE slope, wayside ditch and slope, 505 m.

!**Pseudoscleropodium purum** (Hedw.) M.Fleisch. ex Broth. – [Gf20/13, 49°32'22.9"N/21°23'52.1"E] Mt Osypisko, SE slope, litter in mixed forest, 545 m and [49°32'33.4"N/21°23'48.9"E], Mt Osypisko, SE slope, litter in mixed forest, 583 m; [Gf21/84, 49°28'27.3"N/21°32'42.1"E] Polany Huta, litter in *Picea abies* forest, 485 m.

**Pseudotaxiphllum elegans** (Brid.) Z.Iwats. – [Gf10/40, 49°36'04"N/21°20'41"E] Folusz, black tourist trail to Mt Barwinek, soil on path, *c. gem.*, 550 m.

\***Schistidium crassipilum** H.H.Blom – [Gf10/40, 49°36'09.9"N/21°21'47.4"E] Folusz, black tourist trail to Mt Barwinek, concrete bridge on the Kłopotnica stream, *c. spor.*, 440

m; [Gf10/41, 49°36'32.4"N/21°22'03.4"E] Folusz, near black tourist trail from Folusz to Mt Barwinek, concrete wall near the Kłopotnica stream, 407 m; [Gf10/54, 49°35'44.1"N/21°24'22.1"E] Huta Pielgrzyska, near the road to Folusz, concrete parapet, *c. spor.*, 460–470 m; [Gf21/61, 49°29'31.2"N/21°30'28.6"E] Huta Krempska, concrete bridge, *c. spor.*, 420 m. Species common in the whole country (Ochyra et al. 2003).

\***Sciuro-hypnum oedipodium** (Mitt.) Ignatov & Huttunen – [Gf21/73, 49°29'12.3"N/21°31'07.4"E] Huta Krempska, E part, log in beech forest, 560 m. Moss fairly frequent in the Beskidy Zachodnie Mts (Stebel 2006).

\***[R]***Serpoleskea subtilis* (Hedw.) Loeske – [Gf20/63, 49°29'59.1"N/21°23'59.3"E] Nieznajowa, bark of *Fagus sylvatica*, *c. spor.*, 490–495 m; [Gf21/45, 49°30'28.6"N/21°33'34.4"E] Mt Suchania, E slope, bark of *Fagus sylvatica* near stream, *c. spor.*, 519 m; [Gf21/81, 49°28'45.6"N/21°30'30.6"E] Huta Krempska, las Huciska, NE slope of Mt Jaworzyna, bark of *Acer pseudoplatanus* in beech forest, *c. spor.*, 563 m; [Gf31/05, 49°27'31.8"N/21°33'44.2"E] Polany, Baranie stream valley, bark of *Fagus sylvatica* in beech forest, *c. spor.*, 528 m; [Gf32/00, 49°27'18.8"N/21°37'23.6"E] Wilsznia, N part, bark of *Fagus sylvatica*, 560 m. Primeval forest species, known from scattered localities in the Carpathians.

!**Sphagnum fallax** (H. Klinggr.) H. Klinggr. – [Gf10/40, 49°36'00.3"N/21°21'28.9"E] Folusz, near black tourist trail to Mt Barwinek, wayside drainage ditch, 442 m; [Gf21/13, 49°32'14,0"N/21°31'46,3"E] Mt Kamień, NE slope, wayside ditch and slope in thicket, 505 m.

!**Sphagnum palustre** L. – [Gf10/40, 49°36'00.3"N/21°21'28.9"E] Folusz, near black



tourist trail to Mt Barwinek, wayside drainage ditch, 442 m.

***Thuidium tamariscinum*** (Hedw.) Schimp. – [Gf10/41, 49°36'19.6"N/21°22'04.6"E] Folusz, black tourist trail to 'Diabli Kamień', wayside slope, 420 m and [49°36'09.0"N/21°21'49.2"E], wayside slope, 445 m; [Gf20/13, 49°32'19.6"N/21°23'58.4"E] Mt Osypisko, SE slope, litter in mixed forest, 526 m; [Gf21/13, 49°32'10.7"N/21°31'46.6"E] Mt Kamień, NE slope, sandstone in beech forest, 485 m; [Gf21/20, 49°31'49.8"N/21°29'32.1"E] W of Hałbowska pass, wet place in mixed forest, 545 m; [Gf21/72, 49°29'08.1"N/21°30'49.0"E] Huta Krempska, E part, bank of spring in beech forest, 478 m; [Gf21/84, 49°28'28.3"N/21°32'41.4"E] Polany Huta, litter in *Picea abies* forest, 492 m; [Gf31/42, 49°25'09.2"N/21°31'07.0"E] Filipowska pass, slope near the Pomiarka stream, 654 m.

\****Tortella inclinata*** (R. Hedw.) Limpr. – [Gf10/83, 49°33'58,6"N/21°23'50,2"E] Mt Kornuty E of Mt Wątkowa, E slope, near the Świątkowa Wielka–Folusz road, mineral soil, wayside, 620–645 m. In the Carpathians moss known from scattered localities, fairly frequently occurs on man-made habitats.

***Trichostomum tenuirostre*** (Hook. & Taylor) Lindb. – [Gf31/05, N 49°27'42.0" E 21°33'39.8"] Polany, Baranie stream valley, sandstones in beech forest, 480 m.

\*!**[V]***Ulota crispa* (Hedw.) Brid. – [Gf10/40, 49°36'03.2"N/21°21'34,3"E] Folusz, black tourist trail to the Mt Barwinek, bark of *Salix caprea*, *c. spor.*, 441 m; [Gf21/75, 49°29'05.8"N/21°33'11.6"E] Polany, W part, bark of *Alnus incana*, *c. spor.*, 489 m; [Gf21/84, 49°28'15.5"N/21°32'58.6"E] Polany Huta, bark of *Acer pseudoplatanus* near path, *c. spor.*, 439 m; [Gf31/13, 49°26'45.4"N/21°31'57.1"E] Huta Polańska, bark of *Alnus*

*incana* near the Pomiarka stream, *c. spor.*, 482 m; [Gf31/42, 49°25'16.9"N/ 21°31'14.1"E] Mt Filipowski Wierch, NW slope, bark of *Acer pseudoplatanus*, *c. spor.*, 696 m. Moss considered as primeval forest species, but recently the number of its localities increases rapidly in the whole country.

***Weissia controversa*** Hedw. – [Gf21/13, 49°32'23.5N/21°31'36.6"E] Mt Kamień, NE slope, wet mineral soil, wayside slope and ditch, *c. spor.*, 501 m; [Gf21/45, 49°30'28.9"N/21°33'34.4"E] Mt Suchania, E slope, mineral soil on meadow, 520 m.

### Discussion

Despite the fairly vast knowledge about the moss flora of the Magura National Park, 15 species and 1 variety of mosses new for this area were found during this investigations. Some of them are rare, epiphytic species confined to well-preserved old stands, so-called primeval forest species (Stebel and Żarnowiec 2014), for example *Anomodon rugelii*, *Brachythecium geheebii*, *Serpoleskea subtilis* and *Ulota crispa*. A few species, most probably, have just recently spread in Poland, i.e. *Campylopus flexuosus* (Stebel 2007), *Orthotrichum patens* and *Sciuro-hypnum oedipodium*. *Schistidium crassipilum*, another addition to the muscoflora of the Magura National Park, seems to be a common species in Poland (Ochyra et al. 2003) but it has not been distinguished from *S. apocarpum* s.l. The discovery of so many species indicates that the moss flora of the Magura National Park is still unknown and needs further investigation.

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Fig. 2. Magura National Park – view from Mt Suchania (photo by A. Stebel, 4 August 2014).



Fig. 3 ‘Diabli Kamień’ sandstone outcrop – place of occurrence of interesting epilithic moss flora (photo by A. Stebel, 11 May 2016).



Fig. 4. *Sphagnum fallax* – very rare bog species in the Magura National Park. (photo by A. Stebel).



Fig. 5 *Leucobryum glaucum* (bright turfs) and *Campylopus flexuosus* (dark turfs) on sandstone in the ‘Diabli Kamień’ sandstone outcrop (photo by A. Stebel, 11 May 2016).

## Bibliography

Bednarek-Ochyra H., Ochyra R., Stebel A. 2011. The genus *Niphotrichum* (Bryophyta, Grimmiaceae) in the Polish Carpathians. In: A. Stebel, R. Ochyra (eds), Chorological studies on Polish Carpathian bryophytes: 15–51. Sorus, Poznań.

Brylska B. 1991. *Fissidens cristatus* var. *mucronatus* (Musci, Fissidentaceae), zapomniany takson we florze mchów Polski. *Fragmenta Floristica et Geobotanica* 35(1-2): 239–244.

Górski P., Smoczyk M., Pawlikowski P., Vončina G., Stebel A., Paciorek T., Staniaszek-Kik M., Romański M., Wiaderny A., Gąbka M., Wierzcholska S. 2015. New distributional data on bryophytes of Poland, 2. *Steciana* 19(2): 55–65.

Karczmarz K. 1987. Flora mszaków Beskidu Niskiego. *Annales Universitatis Mariae Curie-Skłodowska – Sectio C* 62: 111–135.

Lisowski S., Kornaś J. 1966. Mchy Gorców. *Fragmenta Floristica et Geobotanica* 12(1): 41–111.

Ochyra R., Baryła J., Stebel A. 1999. New discoveries of *Cirriphyllum tommasinii* (Musci, Brachytheciaceae) and a revision of its Polish distribution. *Fragmenta Floristica et Geobotanica* 44(2): 522–525.

Ochyra R., Żarnowiec J., Bednarek-Ochyra H. 2003. *Census Catalogue of Polish Mosses*. Institute of Botany, Polish Academy of Sciences, Kraków, 372 pp.

Regulation of the Minister of the Environment (Poland) of 9 October 2014 on wild species of plants under protection. *Journal of Laws* (2014), item 1409.

Schumacker R., Martiny P. (with the collaboration of R. Düll, T. Hallingbäck, N. Hodgetts, C. Sérgio, N. Stewart, E. Urmi and J. Váňa) 1995. Threatened bryophytes in Europe including Macaronesia. In: *Red Data Book of European bryophytes*. Part 2: 29–193. The European Committee for Conservation of Bryophytes, Trondheim.

Stebel A. 2003. Musci macroregioni meridionali Poloniae exsiccati. Fasciculus XXXVII (No. 1101–1150). Medical University of Silesia in Katowice, Katowice, 12 pp.

Stebel A. 2006. The mosses of the Beskidy Zachodnie as a paradigm of biological and environmental changes in the flora of the Polish Western Carpathians. *Śląski Uniwersytet Medyczny w Katowicach and Wydawnictwo Sorus, Katowice–Poznań*, 347 pp.

Stebel A. 2007. Nowe dane do rozmieszczenia krzywoszczeci pogiętej *Campylopus flexuosus* (Hedw.) Brid. (Bryopsida) w Polsce. *Chrońmy Przyrodę Ojczystą* 63(2): 93–98.

Stebel A. 2011. Kilka nowych gatunków mchów z Magurskiego Parku Narodowego (Beskid Niski, Karpaty Zachodnie). *Roczniki Bieszczadzkie* 19: 141–147.

Stebel A. 2013. Distribution of *Callicladium haldanianum* (Bryophyta, Hypnaceae) in Poland. *Polish Botanical Journal* 58(2): 593–603.

Stebel A. 2015. Contribution to the bryoflora of the Wiśnickie Foothills (Western Carpathians, Poland). *Acta Musei Silesiae Scientiae Naturales* 64(3): 131–139.

Stebel A., Cykowska B. & Żarnowiec J. 2011. Current distribution of the European threatened moss *Dicranum viride* (Bryophyta,

- Dicranaceae) in the Polish Carpathians. In: A. Stebel, R. Ochyra (eds), *Chorologica studies on Polish Carpathians bryophytes*: 99–110. Sorus, Poznań.
- Stebel A., Rosadziński S., Wierzcholska S., Zubel R., Paciorek T. 2015. New distributional data for the moss *Dicranum viride* in Poland. *Herzogia* 28: 38–43.
- Stebel A., Ochyra R. 2000. Flora mchów Magurskiego Parku Narodowego w Beskidzie Niskim (Karpaty Zachodnie). *Fragmenta Floristica et Geobotanica Polonica* 7: 229–263.
- Stebel A., R. Ochyra, G. Vončina. 2010. Mosses of the Pieniny Range (Polish Western Carpathians). Sorus, Poznań, 114 pp.
- Stebel A., Vončina G. 2014. Bryophyte diversity in the flora of the Orawsko-Jordanowskie Foothills (Polish Western Carpathians). *Muzeum Tatrzańskie in Zakopane, Zakopane*, 127 pp.
- Stebel A., Żarnowiec J. 2010. Materiały do flory mchów Bieszczadów Zachodnich (Karpaty Wschodnie). *Roczniki Bieszczadzkie* 18: 134–156.
- Stebel A., Żarnowiec J. 2014. Gatunki puszczańskie we florze mchów Bieszczadzkiego Parku Narodowego (Karpaty Wschodnie). *Roczniki Bieszczadzkie* 22: 259–277.
- Wacławski Z. 1957. Mchy dorzecza górnego Wisłoku. *Fragmenta Floristica et Geobotanica* 3(1): 93–114.
- Żarnowiec J. 2010. Mchy doliny Terebowca (Bieszczady Zachodnie, Bieszczadzki Park Narodowy). *Roczniki Bieszczadzkie* 18: 157–166.
- Żarnowiec J., Stebel A., Ochyra R. 2004. Threatened moss species in the Polish Carpathians in the light of a new Red-list of mosses in Poland. In: A. Stebel, R. Ochyra (eds.), *Bryological studies in the Western Carpathians*: 9–28. Sorus, Poznań.