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

ADAM STEBEL

Department of Pharmaceutical Botany, School of Pharmacy with Division of Laboratory
Medicine, Medical University of Silesia in Katowice, Ostrogórska 30, 41–200 Sosnowiec,
Poland; e-mail: astebel@sum.edu.pl

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 Wacław ska (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 stramineum, Dicranella rufescens, Fissidens dubius var. dubius, Orthotrichum patens, Philonotis arnelii, P. caespitosa, Schistidium crassiptilum, 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 2013-1014. 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;
Stebel A. The Moss flora of Magura National Park

!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°28'50.3"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°26'08.9"E] Huta Krempska, towards E, bark of Acer pseudoplatanus, 619 m; [Gf21/81, 49°29'14.1"N/21°31'20.2"E] Huta Krempska, NE part, bark of Fagus sylvatica, 530 m; [Gf21/88, 49°28'31.8"N/21°27'56.4"E] Huta Polańska, near the Ożenna–Ciechania road, bark of Fagus sylvatica near the Pomiarka stream, 572 m; [Gf31/05, 49°27'25.9"N/21°33'45.7"E] Polany, Baranie stream valley, bark of Fagus sylvatica, 525 m; [Gf31/08, 49°29'15.0"N/21°35'51.5"E] Kolonia Olchowiec, SW part, bark of Fagus sylvatica, 502 m; [Gf31/10, 49°26'47.5"N/21°32'22.4"E] Ożenna, near the Ożenna–Ciechania road, bark of Fagus sylvatica, 632 m; [Gf31/14, 49°26'44.0"N/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, 373 m; [Gf31/28, 49°26'22.8"N/21°36'04.7"E] Mt Baranie, N slope, bark of Fagus sylvatica, 620 m.

!Anomodon longifolius (Schleich. ex Brid.) Hartm. – [Gf31/22, 49°26'26.7"N/21°30'43.2"E] Ciechania, grassy wayside, 554 m.

!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; [Gf31/29, 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.

[!] Brachydontium trichodes (F.Weber) 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 (Żarnowiec 2010).

[!] Brachythecium geheebii (Müll.Hal.) Keissl. – [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).

[!] Bryoerythrophyllum ferruginascens (Stirt.) Giacom. – [Gf21/13, 49°32'23.5"N/21°31'36.6"E] Mt Kamięń, NE slope, wet mineral soil, wayside slope and ditch, 501 m. Species known from scattered sites in the Beskid 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 Kiczera, stump near stream, 405 m; [Gf10/41, 49°36'06.7"N/21°21'48.0"E] Folusz, black tourist trail to ‘Diabli Kamięń’, 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–Halbowska 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°28'47.9"E] Krempna, near red tourist trail Mt Kolanin–Hałbowska pass, log in mixed forest, 525 m; [Gf20/65, 49°30'01.1"N/21°25'14.1"E] Mt Rostajne, NE slope, log in deciduous forest, 425 m; [Gf21/20, 49°28'44.1"N/21°27'48.4"E] Mt Kiczera Żydowiańska, W slope, bark of Pyrus sp. in thicket, 490 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).

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

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

**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. – [Gf10/31, 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 polycarpum** (Hedw.) Schimp. – [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.

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

**Eurhynchium angustirete** (Broth.) T.J.Kop. – [Gf10/41, 49°36'36.9"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. – [Gf20/85, 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.
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"] Mt Suchania, E slope, sandstone in beech forest, 538 m; [Gf21/72, 49°29'04.3"N/21°31'02.2"] Huta Krempska, E part, soil in mixed forest, 503 m; [Gf21/84, 49°28'23.0"N/21°32'49.7"] 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"] 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"] 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* (Brild.) Schimp. – [Gf10/41, 49°36'04.5"N/21°21'45.4"] 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"] Mt Rostajne, NE slope, bark of *Carpinus betulus*, 425 m; [Gf20/88, 49°28'50.3"N/21°27'56.4"] Mt Kiczera Żydowiańska, W slope, bark of *Fagus sylvatica* snag, 485 m; [Gf21/61, 49°29'48.8"N/21°30'14.8"] Mt Kotalnica, W slope, bark of *Acer pseudoplatanus*, 500 m; [Gf21/72, 49°29'05.9"N/21°30'57.6"] 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"] Mt Żydowska Góra, NW slope, bark of *Acer pseudoplatanus*, *c. spor.*, 640 m; [Gf31/02, 49°27'41.5"N/21°31'01.8"] Mt Żydowska Góra, S slope, bark of *Acer pseudoplatanus* near stream, 620 m; [Gf31/05, 49°27'29.7"N/21°33'50.0"] Polany, Baranie stream valley, bark of *Acer pseudoplatanus*, *c. spor.*, 504 m; [Gf31/10, 49°26'47.5"N/21°29'22.4"] Ozenna, near the Ozenna–Ciechania road, bark of *Fagus sylvatica*, 632 m; [Gf31/13, 49°26'45.4"N/21°31'57.1"] Huta Polańska, bark of *Fagus sylvatica* near the Pomiarka stream, 482 m; [Gf31/26, 49°26'30.2"N/21°33'53.5"] Huta Polańska, E of Mazgalica pass, bark of *Acer pseudoplatanus*, 740 m.

*Homalotheicum sericeum* (Hedw.) Schimp. – [Gf21/72, 49°29'16.5"N/21°31'20.2"] Huta Krempska, towards E, bark of *Acer pseudoplatanus*, 619 m; [Gf31/28, 49°26'14.2"N/21°35'56.9"] 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"] Folusz, valley of the stream running from Mt Kicirka, slope near stream, 410 m.

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

*Hyphnum cupressiforme* Hedw. var. *filiforme* Brid. – [Gf10/82, 49°34'00.7"N/21°23'02.3"] Mt Kornuty E of Mt Wątkowa, E slope, bark of *Fagus sylvatica*, 761 m; [Gf21/72,
Stebel A. The Moss flora of Magura National Park

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 Kamięń’, 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; [Gf1/84, 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 Kamięń’, 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 pallasii Bruch ex Brid. – [Gf10/41, 49°36′30.5″N/21°22′01.8″E] Folusz, black tourist trail to ‘Diabli Kamięń’, 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; [Gf31/22, 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 Kamięń’, 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; [Gf1/84, 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 Kamięń’, 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 pallasii Bruch ex Brid. – [Gf10/41, 49°36′30.5″N/21°22′01.8″E] Folusz, black tourist trail to ‘Diabli Kamięń’, 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; [Gf31/22, 49°26′43.1″N/21°28′51.9″E] Ożenna, near the Ożenna–Ciechania road, bark of Fagus sylvatica, 663 m.
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. – [Gf10/31, 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 Klopotnica 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; [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 Klopotnica 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 Klopotnica stream, 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 Żydomiańska, 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 Hedw. – [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 Żydomiańska, 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] Philonotis arnellii Husn. – [Gf31/13, 49°26′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. – [Gf31/13, 49°26′45.4″N/21°31′57.1″E] Huta Polańska, bark of Alnus incana near the Pomiarka stream, c. spor., 482 m.

Stebel A. The Moss flora of Magura National Park
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 Ślaski (Stebel 2006), Bieszczady Zachodnie (Stebel and Żarnowiec 2010) and Pogórze Orawsko-Jordanowskie (Stebel and Vončina 2014).

*Philonotis caespitosa* Jur. – [Gf10/54, 49°35'48.7"N/21°24'17.4"E] Huta Pielgrzyma, 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 Pielgrzyma, near the road to Folusz, sedge mire 470 m; [Gf21/13, 49°32'22.3"N/21°31'36.6"E] Mt Kamień, NE slope, moist soil on wayside slope and in ditch, 501 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.

*Pseudotaxiphyllum elegans* (Brid.) Z.Iwats. – [Gf10/40, 49°36'04.4"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 Klopotnica 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 Klopotnica stream, 407 m; [Gf10/54, 49°35'44.1"N/21°24'22.1"E] Huta Pielgrzyma, 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).


*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, concrete drainaghe 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 Halbrowska 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; [Gf31/05, N 49°27′42.0″ E 21°33′39.8″] Polany, Baranie stream valley, sandstones in beech forest, 480 m.

*Tortella inclinata* (R. Hedw.) Limpr. – [Gf10/83, 49°33′58.6″N/21°33′50.2″E] Mt Kornuty E of Mt Wątkowa, E slope, near the Świątkowa Wielka–Folusz road, mineral soil, wayside, 492 m; [Gf31/42, 49°25′09.2″N/21°31′07.0″E] Filipowska pass, slope near the Pomiarka stream, 654 m.

*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′23.5″N/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 investigation.

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*, *Serpolekea 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 Kamięń’ sandstone outcrop – place of occurrence of interesting epilithic moss flora (photo by A. Stebel, 11 May 2016).

Stebel A. The Moss flora of Magura National Park
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).
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Stebel A. The Moss flora of Magura National Park


