

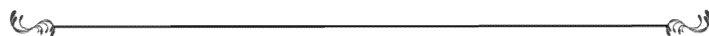
CONTRIBUTION TO THE BRYOFLORA OF THE ROŻNOWSKIE FOOTHILLS (WESTERN CARPATHIANS, POLAND)

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ABSTRACT: Distributional data for species of 1 hornwort, 17 species of liverworts and 82 species and 1 variety of mosses from the Rożnowskie Foothills, including 30 protected and 7 threatened species, is provided.

KEY WORDS: mosses, threatened species, protected species, distributional data, muscoflora.



Introduction

The Rożnowskie Foothills is a region lying in the Western Carpathians, covering about 800 square kilometres (Fig. 1). Its highest point, 583 m a.s.l. is the Mt Dąbrowska Góra. The landscape is typical for foothills (Fig. 2). Large parts of the area are occupied by arable fields and meadows. Patches of forest occur mainly on steep slopes and hill tops.



Fig. 1. Location of the Rożnowskie Foothills.

The bryoflora of the Rożnowskie Foothills within the borders proposed by Kondracki (1994) is poorly known. Bryological investigations in this area were first conducted in the mid-twentieth century (Szafran 1956; Kornaś and Medwecka-Kornaś 1956; Ochyra 1976; Ochyra et al. 2011; Szweykowski 1968; Stebel 1999, 2003a, b, c, 2004a, b, 2005, 2013; Blockeel et al. 2006.; Bednarek-Ochyra et al. 2011). This paper provides information about new locations of 1 species of hornwort, 17 species of liverworts, as well as 82 species and 1 variety of mosses. The overwhelming majority of them are new species to this area.

Materials and methods

Field investigations were carried out in the years 2011 and 2014. List of taxa are arranged alphabetically. The moss species names follow mainly Ochyra et al. (2003), whereas hornworts and liverworts after Klama (2006a). Species protected by law in Poland were taken after 'Regulation of the Minister of Environment' (2014) while threatened according to Klama (2006b) and Żarnowiec et al. (2004).

For each species the following information is provided: ATMOS grid square, GPS coordinates, locality, habitat, altitude and notes on the production of the sporophytes and gemmae.

List of species and localities

Key: ! - species partly protected in Poland, !! - species strictly protected in Poland; in the square brackets - species threatened in Poland with threat category.

Hornworts Anthocerotophyta

[E] *Anthoceros agrestis* Paton – [Fe 96, 49°47'55.4"N/20°48'17.9"E] Olszowa-Potoczówka, stubble field, *c. spor.*, 287 m; [Fe 96, 49°45'55.9"N/20°55'35.8"E] Pławna-Styrki, stubble field, *c. spor.*, 360 m; [Fe 97, 49°46'41.2"N/ 20°57'23.7"E] Kąsna Dolna, stubble field, *c. spor.*, 245 m.

Liverworts Marchantiophyta

! *Bazzania trilobata* (L.) S.Gray – [Fe95, 49°48'34.5"N/20°48'05.6"E] Olszowa-Podlesie, on ground in *Abies alba* forest, 290-300 m; [Fe96, 49°45'59.2"N/20°56'00.4"E] Pławna-Zagórze, on ground in *Abies alba* forest near trail to 'Diable Boisko' nature monument, 324 m; [Fe96, 49°45'51.5"N/20°55'56.2"E] Pławna, 'Diable

Boisko' nature monument, on ground in *Abies alba* forest, 335 m; [Fe96, 49°45'53.2"N/20°55'56.7"E] Siekierzyna-Wolackie, on ground in *Abies alba* forest, 347-373 m.

Blasia pusilla L. – [Fe95, 49°48'47.5"N/20°47'17.4"E] Borowa, N part, wet soil, wayside, 329 m.

Calypogeia azurea Stotler & Crotz – [Fe95, 49°48'34.5"N/20°48'05.6"E] Olszowa-Podlesie, on ground in *Abies alba* forest, 290-300 m.

Calypogeia integristipula Steph. – [Fe96, 49°45'30.7"; E 20°52'28.5"E] Siekierzyna-Wolackie, on ground in *Abies alba* forest, 373 m.

Cephalozia bicuspidata (L.) Dumort. – [Fe95, 49°49'29.4"N/20°43'56.8"E] Ruda Kameralna, N part, rotten wood in coniferous forest, 307 m.

Conocephalum conicum (L.) Dumort. – [Fe95, 49°48'45.1"N/20°47'31.3"E] Borowa, N part, wet wayside slope near stream, 301-310 m; [Fe95, 49°49'25.2"N/20°43'45.8"E] Ruda Kameralna, N part, bank of spring in *Abies alba* forest, 253 m.

![E] *Fossombronia wondraczekii* (Corda) Lindb. – [Fe 96, 49°47'55.4"N/20°48'17.9"E] Olszowa-Potoczówka, stubble field, 287 m; [Fe96, 49°48'39.8"N/20°49'16.5"E] 'Styr' nature reserve, bank of wet meadow, 430 m.

Jungermannia gracillima Sm. – [Fe95, 49°48'46.3"N/20°47'44.5"E] Borowa, N part, mineral soil, wayside landslide, 291 m.

Lepidozia reptans (L.) Dumort. – [Fe95, 49°48'34.5"N/20°48'05.6"E] Olszowa-Podlesie, on ground in *Abies alba* forest, 290-300 m; [Fe96, 49°45'33.8"N/20°52'22.0"E] Siekierzyna-Wolackie, on ground and rotten wood in *Abies alba* forest, 347 m.



Fig. 2. View on the Rożnówskie Foothills from Biała Woda village (photo by A. Stebel, 12 June 2012).

Lophocolea bidentata (L.) Dumort. – [Fe85, 49°52'03"N/20°46'26"E] Melsztyn, grassy slope near the castle, 222 m.

Lophocolea heterophylla (Schrad.) Dumort. – [Fe95, 49°49'29.4"N/20°43'56.8"E] Ruda Kameralna, N part, rotten wood in coniferous forest, 307 m; [Fe96, 49°45'33.8"N/20°52'22.0"E] Siekierczyna-Wolackie, rotten wood in *Abies alba* forest, 347 m.

Lophozia ventricosa (Dicks.) Dumort. – [Fe96, 49°45'51.5"N/20°55'56.2"E] Pławna, 'Diable Boisko' nature monument, sandstone outcrop, 335 m.

Marchantia polymorpha L. – [Fe87, 49°50'21"N/20°57'32"E] Gromnik, wayside in park near old church, *c. spor.*, 240 m; [Fe95, 49°48'46.4"N/20°47'57.6"E] Bieśnik, on ground in *Zea mays* cultivation near the Paleśniczanka stream, 246 m.

Plagiochila asplenioides (L.) Dumort. –

[Fe95, 49°48'47.8"N/20°47'53.9"E] Borowa, N part, wet wayside slope in *Abies alba* forest, 248-260 m; [Fe95, 49°48'34.5"N/20°48'05.6"E] Olszowa-Podlesie, on ground in *Abies alba* forest, 290-300 m; [Fe96, 49°45'56.4"N/20°56'00.6"E] Pławna-Zagórze, wayside in *Abies alba* forest near trail to 'Diable Boisko' nature monument, 322 m.

!![E] *Porella platyphylla* (L.) Pfeiff. – (Fig. 3) [Fe85, 49°52'03"N/20°46'26"E] Melsztyn, bark of *Robinia pseudoacacia* near the castle, 222 m.

Riccia glauca L. – [Fe95, 49°48'46.4"N/20°47'57.6"E] Bieśnik, on ground in *Zea mays* cultivation near the Paleśniczanka stream, 246 m.

Scapania nemorea (L.) Grolle – [Fe95, 49°48'34.5"N/20°48'05.6"E] Olszowa-Podlesie, sandstone in *Abies alba* forest, 290-300 m.



Fig. 3. *Porella platyphylla*, threatened liverwort in Poland (photo by A. Stebel).

Mosses Bryophyta

Anomodon attenuatus (Hedw.) Huebener – [Fe87, 49°50'21"N/20°57'32"E] Gromnik, bark of *Quercus robur* in park near old church, 240 m.

Amblystegium serpens (Hedw.) Schimp. – [Fe87, 49°50'21"N/20°57'32"E] Gromnik, bark of *Robinia pseudoacacia* in park, 240 m; [Fe97, 49°46'43"N/20°57'14"E] Kańska Dolna, park, concrete and bark of trees, *c. spor.*, 249 m.

Atrichum angustatum (Brid.) Bruch & Schimp. – [Fe96, 49°48'29.2"N/20°48'37.0"E] Olszowa-Podlesie, fallow ground, 384 m; [Fe96, 49°48'39.8"N/20°49'16.5"E] 'Styr' nature reserve, bank of wet meadow, 430 m.

Atrichum undulatum (Hedw.) P.Beauv. – [Fe 87, 49°50'21"N/20°57'32"E] Gromnik, grassy place in park, 240 m; [Fe 95, 49°48'47.8"N/20°47'53.9"E] Borowa, N part, wayside slope, *c. spor.*, 248 m; [Fe97, 49°46'43"N/20°57'14"E] Kańska Dolna, park, 249 m.

Brachytheciastrum velutinum (Hedw.) Ignatov & Huttunen – [Fe85, 49°52'03"N/20°46'26"E] Melsztyn, bark of wayside *Salix fragilis* near the castle, 222 m; [Fe87, 49°50'21"N/20°57'32"E] Gromnik, bark of *Robinia pseudoacacia* in park, 240 m; [Fe97, 49°46'43"N/20°57'14"E] Kańska Dolna, park, bark of trees, 249 m.

Brachythecium albicans (Hedw.) Schimp. – [Fe 85, 49°52'03"N/20°46'26"E] Melsztyn, wayside, 220 m; [Fe 96, 49°45'56.7"N/20°55'34.6"E] Pławna-Styrki, grassland, 360 m.

Brachythecium rivulare Schimp. – [Fe95, 49°49'25.2"N/20°43'45.8"E] Ruda Kameralna, N part, bank of spring in *Abies alba* forest, 253 m; [Fe97, 49°46'48.6"N/20°57'11.1"E] Kańska Dolna, sandstone in the Jastrzębianka stream, 246 m.

Brachythecium rutabulum (Hedw.) Schimp. – [Fe87, 49°50'21"N/20°57'32"E] Gromnik, wayside sandstone near old church, *c. spor.*, 240 m; [Fe97, 49°46'43"N/20°57'14"E] Kańska Dolna, park, on ground and bark of trees, 249 m.

Brachythecium salebrosum (F.Weber & D.Mohr) Schimp. – [Fe85, 49°52'03"N/20°46'26"E] Melsztyn, bark of wayside *Salix fragilis* near the castle, 222 m; [Fe96, 49°45'56.7"N/20°55'34.6"E] Pławna-Styrki, rotten wood, 360 m; [Fe97, 49°46'43"N/20°57'14"E] Kańska Dolna, park, bark of trees, 249 m.

Bryum argenteum Hedw. – [Fe85, 49°52'03"N/20°46'26"E] Melsztyn, wayside, 220 m; [Fe87, 49°50'21"N/20°57'32"E] Gromnik, wayside in park near old church, *c. spor.*, 240 m; [Fe96, 49°45'55.9"N/20°55'35.8"E] Pławna-Styrki, stubble field, 360 m; [Fe97, 49°46'43"N/20°57'14"E] Kańska Dolna, park, concrete and wayside, 249 m.

Calliergonella cuspidata (Hedw.) Loeske – [Fe87, 49°50'21"N/20°57'32"E] Gromnik, grassy place in park, 240 m; [Fe95, 49°48'47.8"N/20°47'53.9"E] Borowa, N part, wayside slope, 248 m; [Fe96, 49°47'57.2"N/20°48'15.9"E] Olszowa-Potoczówka, wet meadow, 281 m; [Fe97, 49°46'43"N/20°57'14"E] Kańska Dolna, park, wet grassy place, 249 m.

[I] *Campylopus flexuosus* (Hedw.) Brid. – [Fe96, 49°45'53.2"N/20°55'56.7"E and 49°45'51.5"N/20°55'56.2"E] Pławna, 'Diable Boisko' nature monument, on ground in *Abies alba* forest, 328-333 m and sandstone outcrop, 335 m; [Fe96, 49°45'37.1"N/20°52'18.5"E, 49°45'33.8"N/20°52'22.0"E and 49°45'30.7"N/20°52'28.5"E] Siekierzyna-Wolackie, on ground in *Abies alba* forest, 325, 347 and 373 m.



Fig. 4. *Campylopus introflexus*, invasive species in the moss flora of Poland (photo by A. Stebel).



Fig. 5. *Polytrichum commune*, rare moss at the Rożowskie Foothills (photo by A. Stebel).

Campylopus introflexus (Hedw.) Brid. – (Fig. 4) [Fe96, 49°45'56.4"N/20°56'00.6"E] Pławna-Zagórze, wayside in *Abies alba* forest near trail to 'Diable Boisko' nature monument, 322 m.

Ceratodon purpureus (Hedw.) Brid. – [Fe85, 49°52'03"N/20°46'26"E] Melsztyn, wayside, 220 m; [Fe87, 49°50'21"N/20°57'32"E] Gromnik, wayside in park near old church, *c. spor.*, 240 m; [Fe96, 49°45'56.7"N/20°55'34.6"E] Pławna-Styrki, grassland, 360 m; [Fe97, 49°46'43"N/20°57'14"E] Kańska Dolna, park, concrete and wayside, 249 m.

Climacium dendroides (Hedw.) F. Weber & D.Mohr – [Fe87, 49°50'21"N/20°57'32"E] Gromnik, grassy place in park, 240 m.

Dichodontium pellucidum (Hedw.) Schimp. – [Fe85, 49°52'00"N/20°46'43"E] Melsztyn, sandstone on bank of the Dunajec river, 214 m; [Fe97, 49°46'48.6"N/20°57'11.1"E] Kańska Dolna, sandstone on bank of the Jastrzębianka stream, 246 m.

Dicranella heteromalla (Hedw.) Schimp. – [Fe96, 49°45'51.5"N/20°55'56.2"E] Pławna, 'Diable Boisko' nature monument, sandstone outcrop, 335 m.

Dicranella staphyлина H.Whitehouse – [Fe96, 49°47'55.4"N/20°48'17.9"E] Olszowa-Potoczówka, stubble field, *c. gem.*, 287 m.

Dicranodontium denudatum (Brid.) E.Britton. – [Fe96, 49°45'51.5"N/20°55'56.2"E] Pławna, 'Diable Boisko' nature monument, sandstone outcrop, 335 m; [Fe96, 49°45'30.7"; E 20°52'28.5"E] Siekierzyna-Wolackie, on ground in *Abies alba* forest, 373 m.

Dicranum polysetum Sw. *ex anon.* – [Fe96, 49°45'59.2"N/20°56'00.4"E] Pławna-Zagórze, on ground in *Abies alba* forest near trail to 'Diable Boisko' nature monument, 322 m.

Dicranum scoparium Hedw. – [Fe95, 49°48'47.8"N/20°47'53.9"E] Borowa, N part, wayside slope, 248 m; [Fe95, 49°48'34.5"N/20°48'05.6"E] Olszowa-Podlesie, on ground in

Abies alba forest, 290-300 m; [Fe96, 49°45'53.2"N/20°55'56.7"E] Pławna, 'Diable Boisko' nature monument, on ground in *Abies alba* forest, 329 m; [Fe96, 49°45'30.7"N/20°52'28.5"E] Siekierzyna-Wolackie, on ground in *Abies alba* forest, 325-373 m.

Didymodon rigidulus Hedw. – [Fe97, 49°46'48.6"N/20°57'11.1"E] Kańska Dolna, concrete near the Jastrzębianka stream, 246 m.

[R] *Ephemerum serratum* (Hedw.) Hampe var. ***angustifolium*** (Bruch & Schimp.) Bruch & Schimp. – [Fe95, 49°48'46.4"N/20°47'57.6"E] Bieśnik, on ground in *Zea mays* cultivation near the Paleśniczanka stream, *c. spor.*, 246 m.

Eurhynchium angustirete (Broth.) T.J.Kop. – [Fe95, 49°48'47.8"N/20°47'53.9"E] Borowa, N part, wet wayside slope in *Abies alba* forest, 248-260 m; [Fe95, 49°48'34.5"N/20°48'05.6"E] Olszowa-Podlesie, on ground in *Abies alba* forest, 290-300 m; [Fe95, 49°49'20.7"N/20°43'58.3"E] Ruda Kameralna, N part, on ground in coniferous forest, 294 m; [Fe96, 49°46'03.5"N/20°56'02.4"E] Pławna-Zagórze, on ground in *Abies alba* forest near trail to 'Diable Boisko' nature monument, 347 m.

Fissidens taxifolius Hedw. – [Fe85, 49°52'03"N/20°46'26"E] Melsztyn, bank of ditch near the castle, 223 m.

Funaria hygrometrica Hedw. – [Fe97, 49°46'48.6"N/20°57'11.1"E] Kańska Dolna, near the Jastrzębianka stream, 246 m.

Heterocladium heteropterum (Brid.) Schimp. – [Fe96, 49°48'45.9"N/20°48'30.6"E] 'Styr' nature reserve, sandstone near small stream, 430 m.

Homalothecium sericeum (Hedw.) Schimp. – [Fe85, 49°52'03"N/20°46'26"E] Melsztyn, sandstone in thicket near the castle, 222 m.

Hygrohypnum luridum (Hedw.) Jenn. – [Fe97, 49°46'48.6"N/20°57'11.1"E] Kańska

Dolna, sandstone in the Jastrzębianka stream, 246 m.

!Hylocomium splendens (Hedw.) Schimp. – [Fe96, 49°45'37.1"N/20°52'18.5"E] Siekierczy-na-Wolackie, on ground in *Abies alba* forest, 325 m.

Hypnum cupressiforme Hedw. – [Fe87, 49°50'21"N/20°57'32"E] Gromnik, bark of *Robinia pseudoacacia* in park, 240 m; [Fe96, 49°45'53.2"N/20°55'56.7"E] Pławna, 'Diable Boisko' nature monument, on ground and sandstone in *Abies alba* forest, 329 m; [Fe96, 49°48'33.1"N/20°48'23.9"E] 'Styr' nature reserve, on ground in coniferous forest, 384 m; [Fe97, 49°46'43"N/20°57'14"E] Kąsna Dolna, park, bark of trees, 249 m.

Hypnum lindbergii Mitt. – [Fe87, 49°50'21"N/20°57'32"E] Gromnik, concrete near old church, 240 m; [Fe96, 49°48'39.8"N/20°49'16.5"E] 'Styr' nature reserve, bank of wet meadow, 430 m; [Fe97, 49°46'48.6"N/20°57'11.1"E] Kąsna Dolna, bank of the Jastrzębianka stream, 246 m.

Hypnum pallescens (Hedw.) P.Beauv. – [Fe95, 49°49'29.3"N/20°43'56.9"E] Ruda Kameralna, N part, bark of *Fagus sylvatica*, 308 m.

Kindbergia praelonga (Hedw.) Ochyra – [Fe95, 49°48'45.4"N/20°48'02.5"E] 'Styr' nature reserve, forest path, 263 m.

Leptobryum pyriforme (Hedw.) Wilson – [Fe96, 49°48'29.2"N/20°48'37.0"E] Olszowa-Podlesie, wayside, soil among *Rubus plicatus*, c. *gem.*, 384 m.

Leptodictyum riparium (Hedw.) Warnst. – [Fe85, 49°52'00"N/20°46'43"E] Melsztyn, bank of the Dunajec river, 214 m.

Leskea polycarpa Hedw. – [Fe85, 49°52'03"N/20°46'26"E] Melsztyn, bark of wayside *Fraxinus excelsior*, 220 m.

!Leucobryum glaucum (Hedw.) Ångstr. – [Fe95, 49°48'46.3"N/20°47'44.5"E] Borowa, N part, wayside slope, 291 m; [Fe95, 49°49'29.7"N/20°43'49.8"E] Ruda Kameralna,

N part, coniferous forest, 282 m; [Fe96, 49°46'01.3"N/20°56'01.5"E] Pławna-Zagórze, on ground in *Abies alba* forest near trail to 'Diable Boisko' nature monument, 330 m; [Fe96, 49°45'53.2"N/20°55'56.7"E] Pławna, 'Diable Boisko' nature monument, on ground in *Abies alba* forest, 329 m; [Fe96, 49°45'37.1"N/20°52'18.5"E] Siekierczy-na-Wolackie, on ground in *Abies alba* forest, 325-373 m; [Fe96, 49°48'33.1"N/20°48'23.9"E] 'Styr' nature reserve, on ground in coniferous forest, 384 m.

Mnium hornum Hedw. – [Fe95, 49°49'25.2"N/20°43'45.8"E] Ruda Kameralna, N part, bank of spring in *Abies alba* forest, 253 m; [Fe96, 49°47'59.1"N/20°48'12.7"E] Olszowa-Potoczówka, path in *Tilio-Carpinetum* forest, 301 m.

Orthodicranum montanum (Hedw.) Loeske – [Fe85, 49°52'03"N/20°46'26"E] Melsztyn, bark of wayside *Salix fragilis* near the castle, 222 m; [Fe87, 49°50'21"N/20°57'32"E] Gromnik, bark of *Tilia cordata* in park, 240 m; [Fe96, 49°45'53.2"N/20°55'56.7"E] Pławna, 'Diable Boisko' nature monument, on ground, sandstone and rotten wood in *Abies alba* forest, 329 m; [Fe96, 49°45'33.8"N/20°52'22.0"E] Siekierczy-na-Wolackie, on ground and rotten wood in *Abies alba* forest, 347 m.

Orthotrichum diaphanum Brid. – [Fe95, 49°48'46.4"N/20°47'57.6"E] Bieśnik, bark of *Acer pseudoplatanus* near the Paleśniczanka stream, c. *spor.*, 246 m.

Orthotrichum obtusifolium Brid. – [Fe85, 49°52'03"N/20°46'26"E] Melsztyn, bark of wayside *Fraxinus excelsior*, c. *gem.*, 220 m; [Fe95, 49°48'46.4"N/20°47'57.6"E] Bieśnik, bark of *Acer pseudoplatanus* near the Paleśniczanka stream, c. *gem.*, 246 m.

Orthotrichum pumilum Sw. ex anon. – [Fe85, 49°52'03"N/20°46'26"E] Melsztyn, bark of wayside *Fraxinus excelsior*, c. *spor.*, 220 m.

Orthotrichum speciosum Nees – [Fe95, 49°48'47.5"N/20°47'17.4"E] Borowa, N part, bark of *Salix caprea*, wayside, 329 m.

Oxyrrhynchium hians (Hedw.) Loeske – [Fe85, 49°52'03"N/20°46'26"E] Melsztyn, bank of ditch near the castle, 223 m; [Fe87, 49°50'21"N/20°57'32"E] Gromnik, slope near stream, 240 m; [Fe97, 49°46'43"N/20°57'14"E] Kańska Dolna, park, soil, 249 m.

! [V] *Philonotis arnellii* Husn. – [Fe96, 49°48'39.8"N/20°49'16.5"E] 'Styr' nature reserve, bank of wet path, among *Juncus tenuis*, 430 m.

Plagiothecium curvifolium Schlieph. ex Limpr. – [Fe95, 49°49'29.4"N/20°43'56.8"E] Ruda Kameralna, N part, wet place in coniferous forest, 307 m; [Fe96, 49°45'53.2"N/20°55'56.7"E] Pławna, 'Diable Boisko' nature monument, on ground in *Abies alba* forest, 329 m.

Plagiothecium cavifolium (Brid.) Z. Iwats. – [Fe87, 49°50'21"N/20°57'32"E] Gromnik, soil at base of *Tilia cordata* in park near old church, *c. spor.*, 240 m; [Fe95, 49°48'45.4"N/20°48'02.5"E] 'Styr' nature reserve, wayside slope, 263 m.

Plagiothecium nemorale (Mitt.) A. Jaeger – [Fe85, 49°52'03"N/20°46'26"E] Melsztyn, slope in thicket near the castle, 222 m.

Platygyrium repens (Brid.) Loeske – [Fe85, 49°52'03"N/20°46'26"E] Melsztyn, bark of *Robinia pseudoacacia* near the castle, 222 m; [Fe87, 49°50'21"N/20°57'32"E] Gromnik, bark of *Robinia pseudoacacia* in park, 240 m; [Fe96, 49°48'33.9"N/20°48'18.4"E] Olszowa-Podlesie, rotten log in thicket, 384 m; [Fe97, 49°46'43"N/20°57'14"E] Kańska Dolna, park, bark of trees, 249 m.

Platyhypnidium riparioides (Hedw.) Dixon – [Fe97, 49°46'48.6"N/20°57'11.1"E] Kańska Dolna, sandstone in the Jastrzębianka stream, 246 m.

! *Pleurozium schreberi* (Brid.) Mitt. – [Fe95, 49°48'47.8"N/20°47'53.9"E] Borowa, N part,

wayside slope, 248 m; [Fe95, 49°49'29.4"N/20°43'56.8"E] Ruda Kameralna, N part, wet place in coniferous forest, 307 m; [Fe96, 49°46'01.3"N/20°56'01.5"E] Pławna-Zagórze, on ground in *Abies alba* forest near trail to 'Diable Boisko' nature monument, 330 m; [Fe96, 49°45'37.1"N/20°52'18.5"E] Siekierczyna-Wolackie, on ground in *Abies alba* forest, 325-373 m.

Pogonatum aloides (Hedw.) P. Beauv. – [Fe95, 49°48'50.9"N/20°47'38.0"E] Borowa, N part, wayside in mixed forest, 274 m.

Pohlia nutans (Hedw.) Lindb. – [Fe95, 49°49'29.4"N/20°43'56.8"E] Ruda Kameralna, N part, wet place in coniferous forest, 307 m; [Fe96, 49°45'53.2"N/20°55'56.7"E] Pławna, 'Diable Boisko' nature monument, on ground in *Abies alba* forest, *c. spor.*, 329 m; [Fe96, 49°45'33.8"N/20°52'22.0"E] Siekierczyna-Wolackie, on ground in *Abies alba* forest, 347 m.

Pohlia wahlenbergii (F. Weber & D. Mohr) Andrews – [Fe96, 49°48'39.8"N/20°49'16.5"E] 'Styr' nature reserve, bank of wet path, among *Juncus tenuis*, 430 m.

Polytrichastrum formosum (Hedw.) G. L. Sm. – [Fe95, 49°49'29.4"N/20°43'56.8"E] Ruda Kameralna, N part, wet place in coniferous forest, 307 m; [Fe96, 49°45'56.4"N/20°56'00.6"E] Pławna-Zagórze, wayside in *Abies alba* forest near trail to 'Diable Boisko' nature monument, 322 m; [Fe96, 49°45'33.8"N/20°52'22.0"E] Siekierczyna-Wolackie, on ground in *Abies alba* forest, 347 m.

! *Polytrichum commune* Hedw. – (Fig. 5) [Fe96, 49°45'54.1"N/20°56'02.4"E] Pławna-Zagórze, bank of stream in *Abies alba* forest near trail to 'Diable Boisko' nature monument, 307 m.

Polytrichum juniperinum Hedw. – [Fe95, 49°48'46.3"N/20°47'44.5"E] Borowa, N part, mineral soil, wayside landslide, 291 m.

Polytrichum piliferum Hedw. – [Fe95, 49°48'46.3"N/20°47'44.5"E] Borowa, N part, mineral soil, wayside landslide, 291 m; [Fe96, 49°48'39.3"N/20°49'18.9"E] Olszowa-Podlesie, insolated wayside slope, 429 m.

Pseudoscleropodium purum (Hedw.) Broth. – [Fe95, 49°48'42.8"N/20°47'44.6"E] Borowa, N part, wayside slope, 307 m; [Fe95, 49°49'20.7"N/20°43'58.3"E] Ruda Kameralna, N part, on ground in coniferous forest, 294 m; [Fe96, 49°46'03.5"N/20°56'02.4"E] Pławna-Zagórze, on ground in *Abies alba* forest near trail to 'Diable Boisko' nature monument, 347 m; [Fe96, 49°48'33.1"N/20°48'23.9"E] 'Styr' nature reserve, on ground in coniferous forest, 384 m.

Pseudotaxiphyllum elegans (Brid.) Z.Iwats. – [Fe96, 49°47'59.1"N/20°48'12.7"E] Olszowa-Potoczówka, path in *Tilio-Carpinetum* forest, 301 m.

Pylaisia polyantha (Hedw.) Schimp. – [Fe85, 49°52'03"N/20°46'26"E] Melsztyn, bark of wayside *Salix fragilis* near the castle, 222 m.

Rhytidiadelphus squarrosus (Hedw.) Warnst. – [Fe87, 49°50'21"N/20°57'32"E] Gromnik, grassy place in park, 240 m; [Fe95, 49°48'47.8"N/20°47'53.9"E] Borowa, N part, wayside slope, 248 m; [Fe97, 49°46'43"N/20°57'14"E] Kańska Dolna, park, grassy places, 249 m.

Rosulabryum moravicum (Podp.) Ochyra & Stebel – [Fe87, 49°50'21"N/20°57'32"E] Gromnik, bark of *Robinia pseudoacacia* in park, 240 m.

Schistidium crassipilum H.H.Blom – [Fe87, 49°50'21"N/20°57'32"E] Gromnik, sandstone near old church, *c. spor.*, 240 m.

Sciuro-hypnum populeum (Hedw.) Schimp. – [Fe85, 49°52'03"N/20°46'26"E] Melsztyn, sandstone in thicket near the castle, 222 m.

Sphagnum angustifolium Russow & C.E.O.Jensen – [Fe95, 49°48'45.1"N/20°47'31.3"E] Borowa, N part, wet wayside slope near stream, 301-310 m.

Sphagnum capillifolium (Ehrh.) Hedw. – [Fe96, 49°45'33.8"N/20°52'22.0"E] Siekierzyna-Wolackie, on ground in *Abies alba* forest, 347 m.

Sphagnum compactum Lam. & DC. – [Fe95, 49°48'45.3"N/20°47'33.3"E] Borowa, N part, wet wayside slope in *Abies alba* forest, 296 m.

Sphagnum fimbriatum Wilson – [Fe95, 49°48'45.1"N/20°47'31.3"E] Borowa, N part, wet wayside slope near stream, 301-310 m.

Sphagnum girgensohnii Russow – [Fe95, 49°48'47.8"N/20°47'53.9"E] Borowa, N part, wet wayside slope in *Abies alba* forest, 248-260 m; [Fe95, 49°48'34.5"N/20°48'05.6"E] Olszowa-Podlesie, on ground in *Abies alba* forest, 290-300 m; [Fe95, 49°49'29.4"N/20°43'56.8"E] Ruda Kameralna, N part, wet place in coniferous forest, 307 m; [Fe96, 49°45'59.2"N/20°56'00.4"E] Pławna-Zagórze, on ground in *Abies alba* forest near trail to 'Diable Boisko' nature monument, 324 m; [Fe96, 49°45'33"N/20°52'22"E] Siekierzyna-Wolackie, on ground in *Abies alba* forest, 347-351 m.

Sphagnum palustre L. – [Fe95, 49°48'47.8"N/20°47'53.9"E] Borowa, N part, wet wayside slope in *Abies alba* forest, 248-260 m; [Fe96, 49°45'33.3"N/20°52'28.8"E] Siekierzyna-Wolackie, on ground in *Abies alba* forest, 351 m.

Sphagnum quinquefarium (Braithw.) Warnst. – [Fe95, 49°48'47.8"N/20°47'53.9"E and 49°48'45.1"N/20°47'31.3"E] Borowa, N part, wet wayside slope in *Abies alba* forest, 248-260 m and 301-310 m; [Fe96, 49°45'37.1"N/20°52'18.5"E and 49°45'30.7"N/20°52'28.5"E] Siekierzyna-Wolackie, on ground in *Abies alba* forest, 325 and 373 m.

Sphagnum russowii Warnst. – [Fe96, 49°45'37.1"N/20°52'18.5"E] Siekierzyna-Wolackie, on ground in *Abies alba* forest, 320-325 m.

!Sphagnum squarrosum Crome – [Fe96, 49°45'54.1"N/20°56'02.4"E] Pławna-Zagórze, bank of stream in *Abies alba* forest near trail to 'Diable Boisko' nature monument, 307 m.

![R]Syntrichia papillosa (Hedw.) Wilson – [Fe85, 49°52'03"N/20°46'26"E] Melsztyn, bark of wayside *Fraxinus excelsior*, 220 m.

Syntrichia ruralis (Hedw.) Web. & Mohr – [Fe96, 49°45'35.2"N/20°55'18.4"E] Bruśnik, wasteland, 408 m.

Tetraphis pellucida Hedw. – [Fe96, 49°45'33.8"N/20°52'22.0"E] Siekierzyna-Wolackie, on ground and rotten wood in *Abies alba* forest, 347 m.

!Thuidium assimile (Mitt.) A.Jaeger – [Fe96, 49°45'35.2"N/20°55'18.4"E] Pławna-Styrki, grassland, 360 m.

!Thuidium tamariscinum (Hedw.) Schimp. – [Fe95, 49°48'44.1"N/20°47'30.7"E] Borowa, N part, wet slope, 320 m; [Fe95, 49°49'29.4"N/20°43'56.8"E] Ruda Kameralna, N part, wet place in coniferous forest, 307 m; [Fe95, 49°48'49.8"N/20°48'18.0"E] 'Styr' nature reserve, wet place in coniferous forest, 319 m; [Fe96, 49°45'59.2"N/20°56'00.4"E] Pławna-Zagórze, on ground in *Abies alba* forest near trail to 'Diable Boisko' nature monument, 322 m.

Tortula muralis Hedw. var. *muralis* – [Fe97, 49°46'48.6"N/20°57'11.1"E] Kańska Dolna, concrete near the Jastrzębianka stream, *c. spor.*, 246 m.

Tortula muralis Hedw. var. *aestiva* Hedw. – [Fe85, 49°52'03"N/20°46'26"E] Melsztyn, sandstone in thicket near the castle, 222 m.

Tortula subulata Hedw. – [Fe87, 49°50'21"N/20°57'32"E] Gromnik, wayside slope near old church, *c. spor.*, 240 m.

Discussion on most important records

Among the discovered bryophytes, several are interesting from the chorological point of view. They are:

Campylopus flexuosus – moss which obviously appears in more and more localities, especially in the lower elevations of the Polish part of Carpathians (Stebel 2007, 2015).

Heterocladium heteropterum – mountain species, fairly frequent in Carpathians but extremely rare in the Carpathian Foothills belt, where it is only known from one locality in the Wiśnickie Foothills (Żmuda 1912; Bednarek-Ochyra et al. 1990) and one from Ciężkowickie Foothills (Armata 2006).

Philonotis arnellii – species with poorly known distribution in Poland. In the Polish part of Carpathians it is known from single localities (Lisowski and Kornaś 1966; Stebel 2006; Stebel and Żarnowiec 2010; Stebel and Vončina 2014)

Sphagnum angustifolium – moss scattered in the Polish part of Carpathians (Stebel 2006; Żarnowiec and Stebel 2014), not previously reported from the Carpathian Foothills belt.

Sphagnum fimbriatum – a lowland moss, in the Polish part of Carpathians known from single localities in the Western Beskidy Mts (Stebel 2006), Pieniny (Stebel et al. 2010) and Bieszczady Zachodnie range (Stebel and Koczur 2012)

Tortula muralis var. *aestiva* – a lowland moss with poorly known distribution in Poland, known from scattered localities, in the Polish part of Carpathians reported from the Pieniny (Szafran 1952).

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