

Contribution to the bryoflora of the Ciężkowickie Foothills (Western Carpathians, Poland)

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Abstract: The paper provides information about new localities of 118 species, including 2 hornworts, 22 liverworts and 94 mosses collected at the Ciężkowickie Foothills. The most interesting are bryophytes protected and threatened in Poland, for example *Fossombronia wondraczekii*, *Nowellia curvifolia*, *Sphagnum compactum*, *Trichocolea tomentella* and *Weissia squarrosa*.

Key words: hornworts, liverworts, mosses, distributional data, threatened species, protected species, Ciężkowickie Foothills, Western Carpathians, Poland

Introduction

Ciężkowickie Foothills (Pogórze Ciężkowickie in Polish) is a region lies in the Western Carpathians (Fig. 1) and covers an area of 740 km² (Kondracki 1994). It is densely populated and meadows, pastures, arable fields and villages, with rather small patches of forests predominate in its landscape (Fig. 2, 3). The highest point is Mt. Liwocz (562 m a.s.l.). Ciężkowickie Foothills region is one of the poorest bryologically known area in the Polish part of the Carpathians and only several sites of bryophytes are known from here (Szafran 1956, Armata 2006, Cykowska 2006a,b).

The paper provides information about new localities of 118 species, including 2 hornworts, 22 liverworts and 94 mosses.

Materials and methods

Field investigations were carried out in the years 2011, 2014 and 2016. List of taxa are set alphabetically. The moss species names follow mainly Ochyra et al. (2003), whereas hornworts and liverworts according to Klama (2006a). Species protected by law in Poland were taken after 'Regulation of the Minister of Environment' (2014) whereas threatened after Klama (2006b) and Żarnowiec et al. (2004).

For each species the following information is given: ATMOS grid square (Ochyra & Szmajda 1981), GPS coordinates, locality, habitat and altitude.

List of species and localities

Abbreviations: ! – species partly protected in Poland, in the square brackets – species threatened in Poland with threat categories, *c. spor.* – with sporophytes, *c. gem.* – with gemmae.

HORNWORTS / ANTHOCEROTOPHYTA

[E]*Anthoceros agrestis* Paton – [Fe97, 49°47'50"N/21°00'05"E] Przedmieście Wielkie, stubble-field, *c. spor.*, 343 m; [Fe98, 49°49'35"N/21°09'49"E] Żurowa-Wielka Wieś, stubble-field, *c. spor.*, 305 m (Fig. 4).

Phaeoceros carolinianus (Michx.) Prosk. – [Fe98, 49°49'35"N/21°09'49"E] Żurowa-Wielka Wieś, stubble-field, *c. spor.*, 305 m.

LIVERWORTS / MARCHANTIOPHYTA

Aneura pinguis (L.) Dumort. – [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, ‘Księży Las’ forest, wet mineral soil in *Abies alba* forest, 340 m.

!***Bazzania trilobata*** (L.) Gray – [Fe97, 49°46'39"N/20°58'11"E] ‘Skamieniałe Miasto’ nature reserve, humus soil among *Vaccinium myrtillus* near sandstone outcrops, 302 m; [Fe97, 49°46'41"N/20°58'47"E] Ciężkowice, ‘Wodospad’ nature monument, on ground in *Abies alba* forest, 311 m; [Ge08, 49°43'05"N/21°05'35"E] Moszczenica, ‘Księży Las’ forest, forest floor in *Abies alba* forest, 344 m.

Blasia pusilla L. – [Fe87, 49°51'29"N/21°03'02"E] Lubaszowa, near road to the monastery, landslide, 255 m.

Calypogeia azurea Stotler & Crotz – [Fe88, 49°50'06"N/21°05'31"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, wet slope in *Abies alba* forest, c. spor., 368 m; [Ge08, 49°43'04"N/21°05'20"E] Moszczenica, ‘Księży Las’ forest, forest floor in *Abies alba* forest, 349 m.

Cephalozia bicuspidata (L.) Dumort. – [Fe88, 49°50'06"N/21°05'31"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, log in *Abies alba* forest, c. spor., 368 m; [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, ‘Księży Las’ forest, rotten wood of silver fir in *Abies alba* forest, 340 m.

Chiloscyphus polyanthos (L.) Corda – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, bank of stream, 255 m; [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, ‘Księży Las’ forest, wet mineral soil, seepage area in *Abies alba* forest, 340 m.

Conocephalum conicum (L.) Dumort. – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, bank of stream, 255 m; [Ge08, 49°43'04"N/21°05'20"E] Moszczenica, ‘Księży Las’ forest, mineral soil, stream bed in *Abies alba* forest, 349 m.

![E] ***Fossombronia wondraczekii*** (Corda) Lindb. – [Fe88, 49°50'42"N/21°08'50"E] Żurowa-Podlesie Drugie, stubble-field, c. spor., 469 m; [Fe97, 49°47'50"N/21°00'05"E] Przedmieście Wielkie, stubble-field, c. spor., 343 m; [Fe98, 49°49'35"N/21°09'49"E] Żurowa-Wielka Wieś, stubble-field, c. spor., 305 m.

Frullania dilatata (L.) Dumort. – [Ff90, 49°49'14"N/21°23'25"E] Brzyska, bark of *Acer platanoides* in old park near the castle, 241 m.

Jamesoniella autumnalis (DC.) Steph. – [Ge08, 49°43'01"N/21°05'26"E] Moszczenica, ‘Księży Las’ forest, bottom of trunk of silver fir in *Abies alba* forest, 346 m.

Lepidozia reptans (L.) Dumort. – [Ge08, 49°43'04"N/21°05'20"E] Moszczenica, ‘Księży Las’ forest, forest floor in *Abies alba* forest, 349 m.

Lophocolea bidentata (L.) Dumort. – [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, ‘Księży Las’ forest, forest floor in *Abies alba* forest, 340 m.

Lophocolea heterophylla (Schrad.) Dumort. – [Fe89, 49°51'16"N/21°16'28"E] Wisowa, 384 m; [Fe88, 49°50'05"N/21°05'33"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, log in *Abies alba* forest, 383 m; [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, ‘Księży Las’ forest, stump in *Abies alba* forest, 340 m.

Marchantia polymorpha L. subsp. ***polymorpha*** – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, bank of stream, 255 m.

Marchantia polymorpha L. subsp. ***ruderale*** Bischl. & Boisselier – [Fe88, 49°52'53"N/21°05'46"E] Bistuszowa, wayside, 231 m; [Fe88, 49°52'55"N/21°12'16"E] Kowalowa, waste place, 281 m.

![V] ***Nowellia curvifolia*** (Dicks.) Mitt. – [Ge08, 49°43'03"N/21°05'13"E] Moszczenica, ‘Księży Las’ forest, rotten wood in *Abies alba* forest, 365 m.

Pellia epiphylla (L.) Corda – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, bank of stream, 255 m; [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, ‘Księży Las’ forest, moist mineral soil in *Abies alba* forest, 340 m.

!*Plagiochila asplenoides* (L. emend. Taylor) Dumort. – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, wayside slope, 260 m; [Fe97, 49°46'41"N/20°58'45"E] Ciężkowice, ‘Wodospad’ nature monument, on ground in *Abies alba* forest, 300 m; [Fe88, 49°50'06"N/21°05'31"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, wet slope in *Abies alba* forest, 368 m; [Ge08, 49°43'04"N/21°05'20"E] Moszczenica, ‘Księży Las’ forest, forest floor in *Abies alba* forest, 349 m.

Plagiochila poreloides (Torrey ex Nees) Lindenb. – [Ge08, 49°43'04"N/21°05'20"E] Moszczenica, ‘Księży Las’ forest, stream bed in *Abies alba* forest, 349 m.

Riccardia palmata (Hedw.) Carruth. – [Ge08, 49°43'03"N/21°05'13"E] Moszczenica, ‘Księży Las’ forest, rotten wood of silver fir in *Abies alba* forest, 365 m.

Riccia glauca L. – [Fe97, 49°47'50"N/21°00'05"E] Przedmieście Wielkie, stubble-field, 343 m; [Fe98, 49°49'35"N/21°09'49"E] Żurowa-Wielka Wieś, stubble field, 305 m.

!*Trichocolea tomentella* (Ehrh.) Dumort. – [Ge08, 49°43'04"N/21°05'20"E] Moszczenica, ‘Księży Las’ forest, mineral soil, stream bed in *Abies alba* forest, 349 m.

MOSSES / BRYOPHYTA

Amblystegium serpens (Hedw.) Schimp. – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, wall, c. spor., 260 m; [Fe88, 49°52'53"N/21°05'46"E] Bistuszowa, wall, c. spor., 231 m; [Fe88, 49°52'55"N/21°12'16"E] Kowalowa, wall, c. spor., 281 m; [Fe97, 49°46'32"N/20°59'31"E] Ostrusza, abandoned quarry, stone, 266 m; [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, ‘Księży Las’ forest, rotten wood of silver fir in *Abies alba* forest, 340 m.

!*Anomodon attenuatus* (Hedw.) Huebener – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, stone wayside slope in deciduous forest near the road to the monastery, 260 m.

Atrichum undulatum (Hedw.) P.Beauv. – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, wayside, c. spor., 260 m; [Fe88, 49°52'55"N/21°12'16"E] Kowalowa, slope, 281 m; [Fe89, 49°51'16"N/21°16'28"E] Wisowa, mixed forest, c. spor., 384 m; [Fe88, 49°50'39"N/21°05'46"E] Jodłówka Tuchowska-Ratówka, near mountain hut, c. spor., 498 m; [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, ‘Księży Las’ forest, mineral soil in *Abies alba* forest, 340 m.

Barbula unguiculata Hedw. – [Ff90, 49°48'13"N/21°22'28"E] Brzyska-Strebikowa, gravelly soil, wayside, c. spor., 398 m.

Brachytheciastrum velutinum (Hedw.) Ignatov & Huttunen – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, bark of trees, c. spor., 260 m; [Fe89, 49°51'16"N/21°16'28"E] Wisowa, log, 384 m; [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, ‘Księży Las’ forest, mineral soil in *Abies alba* forest, 340 m.

Brachythecium albicans (Hedw.) Schimp. – [Fe97, 49°46'32"N/20°59'31"E] Ostrusza, abandoned quarry, mineral soil, 266 m.

Brachythecium rivulare Schimp. – [Fe88, 49°50'06"N/21°05'31"E] Jodłówka Tuchowska, between Ratówka and Kobyli Dział settlements, seepage in *Abies alba* forest, c. spor., 368 m; [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, ‘Księży Las’ forest, mineral soil, stream bed in *Abies alba* forest, 340 m.

Brachythecium rutabulum (Hedw.) Schimp. – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, wayside, 260 m; [Fe88, 49°52'53"N/21°05'46"E] Bistuszowa,

wayside, 231 m; [Fe89, 49°51'16"N/21°16'28"E] Wisowa, soil in thicket, *c. spor.*, 384 m; [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, 'Księży Las' forest, mineral soil in *Abies alba* forest, 340 m.

Brachythecium salebrosum (Hoffm. ex F.Weber & D.Mohr) Schimp. – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, wall, *c. spor.*, 260 m; [Fe88, 49°52'55"N/21°12'16"E] Kowalowa, wall, 281 m; [Fe89, 49°51'16"N/21°16'28"E] Wisowa, log in thicket, *c. spor.*, 384 m; [Fe97, 49°46'32"N/20°59'31"E] Ostrusza, abandoned quarry, mineral soil, 266 m; [Fe88, 49°50'05"N/21°05'33"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, stump in *Abies alba* forest, 383 m; [Ge08, 49°43'03"N/21°05'13"E] Moszczenica, 'Księży Las' forest, rotten wood in *Abies alba* forest, 365 m.

Bryum argenteum Hedw. – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, wall, 260 m; [Fe88, 49°52'53"N/21°05'46"E] Bistuszowa, wall, wayside, 231 m; [Fe88, 49°52'55"N/21°12'16"E] Kowalowa, wayside, *c.spor.*, 281 m; [Fe97, 49°46'32"N/20°59'31"E] Ostrusza, abandoned quarry, mineral soil, 266 m; [Fe98, 49°49'35"N/21°09'49"E] Żurowa-Wielka Wieś, stubble field, 305 m.

Bryum rubens Mitt. – [Ge08, 49°43'03"N/21°05'13"E] Moszczenica, 'Księży Las' forest, mineral soil, dry ditch on margin of *Abies alba* forest, *c.gem.*, 365 m.

Callicladium haldanianum (Grev.) H.A.Crum – [Fe88, 49°50'05"N/21°05'33"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, log in *Abies alba* forest, *c. spor.*, 383 m; [Ff90, 49°48'13"N/21°22'28"E] Brzyska-Strebikowa, stump in *Abies alba* forest, *c. spor.*, 398 m; [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, 'Księży Las' forest, rotten wood of silver fir in *Abies alba* forest, 340 m.

Calliergonella cuspidata (Hedw.) Loeske – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, ditch, 255 m; [Fe88, 49°52'53"N/21°05'46"E] Bistuszowa, ditch, 231 m; [Fe89, 49°51'16"N/21°16'28"E] Wisowa, wet place, 384 m; [Fe88, 49°50'36"N/21°05'55"E] Jodłówka Tuchowska-Ratówka, meadow near mountain hut, 492 m; [Fe88, 49°52'55"N/21°12'16"E] Kowalowa, wet meadow, 281 m; [Ge08, 49°43'03"N/21°05'13"E] Moszczenica, 'Księży Las' forest, moist mineral soil in *Abies alba* forest, 365 m.

Campylopus flexuosus (Hedw.) Brid. – [Fe97, 49°46'43"N/20°58'09"E] 'Skamieniałe Miasto' nature reserve, mineral soil in *Pinus sylvestris* forest, 320 m; [Fe98, 49°49'26"N/21°10'21"E] Żurowa, 'Borówka' sandstone outcrop, sandstone and path in *Pinus sylvestris* forest, 339 m; [Fe88, 49°50'39"N/21°05'41"E] Jodłówka Tuchowska-Ratówka, mineral soil near sandstone outcrop near mountain hut, 501 m.

Campylopus introflexus (Hedw.) Brid. – [Fe97, 49°46'32"N/20°59'31"E] Ostrusza, abandoned quarry, mineral soil and sandstone, 266 m; [Ff90, 49°48'13"N/21°22'28"E] Brzyska-Strebikowa, on ground in *Abies alba* forest, 398 m; [Ff90, 49°48'19"N/21°22'03"E] Brzyska-Zakościele Góry, wayside in *Pinus sylvestris* forest, 444 m.

Ceratodon purpureus (Hedw.) Brid. – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, wall, waste place, *c. spor.*, 260 m; [Ff90, 49°48'13"N/21°22'28"E] Brzyska-Strebikowa, wayside, *c. spor.*, 398 m; [Fe89, 49°51'16"N/21°16'28"E] Wisowa, waste place 384 m; [Fe97, 49°46'32"N/20°59'31"E] Ostrusza, abandoned quarry, mineral soil, 266 m; [Fe98, 49°49'35"N/21°09'49"E] Żurowa-Wielka Wieś, stubble-field, 305 m; [Ge08, 49°43'03"N/21°05'13"E] Moszczenica, 'Księży Las' forest, dry ditch on margin of *Abies alba* forest, 365 m.

Cirriphyllum piliferum (Hedw.) Grout – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, slope near stream, 255 m; [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, 'Księży Las' forest, mineral soil in *Abies alba* forest, 340 m.

- Climacium dendroides*** (Hedw.) F.Weber & D.Mohr – [Fe88, 49°52'55"N/21°12'16"E] Kowalowa, bank of meadow, wayside, 281 m.
- Cratoneuron filicinum*** (Hedw.) Spruce – [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, ‘Księży Las’ forest, sandstone in stream bed in *Abies alba* forest, 340 m.
- Dichodontium pellucidum*** (Hedw.) Schimp. – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, boulders in stream, 255 m; [Ge08, 49°43'04"N/21°05'20"E] Moszczenica, ‘Księży Las’ forest, sandstone, stream bed in *Abies alba* forest, 349 m.
- Dicranella heteromalla*** (Hedw.) Schimp. – [Fe89, 49°51'16"N/21°16'28"E] Wisowa, mixed forest, 384 m; [Fe88, 49°50'06"N/21°05'31"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, wet slope in *Abies alba* forest, c. spor., 368 m; [Ge08, 49°43'04"N/21°05'20"E] Moszczenica, ‘Księży Las’ forest, mineral soil in *Abies alba* forest, c.spor., 349 m.
- Dicranella rufescens*** (Dicks.) Schimp. – [Fe87, 49°51'29"N/21°03'02"E] Lubaszowa, near road to the monastery, landslide, c. spor., 255 m; [Fe88, 49°50'42"N/21°08'50"E] Żurowa-Podlesie Drugie, stubble field, 469 m.
- Dicranella varia*** (Hedw.) Schimp. – [Ff90, 49°48'13"N/21°22'28"E] Brzyska-Strebikowa, gravelly soil, wayside, c. spor., 398 m.
- Dicranodontium denudatum*** (Brid.) E.Britton – [Fe98, 49°49'26"N/21°10'25"E] Żurowa, ‘Borówka’ sandstone outcrop, sandstone, 359 m.
- Dicranum scoparium*** Hedw. – Humus soil, rotten wood, bark, sandstone. [Fe88, 49°50'49"N/21°08'07"E] Mt Pasia, south-eastern slope, 504 m; [Fe88, 49°50'40"N/21°08'51"E] Żurowa-Podlesie Drugie, 472 m; [Fe97, 49°46'41"N/20°57'55"E] Ciężkowice, ‘Skamieniałe Miasto’ nature reserve, 302 m; [Fe97, 49°46'41"N/20°58'47"E] Ciężkowice, ‘Wodospad’ nature monument, 311 m; [Fe89, 49°51'16"N/21°16'28"E] Wisowa, 384 m; [Fe97, 49°47'53"N/21°00'07"E] Przedmieście Wielkie, margin of coniferous forest, 332 m; [Fe98, 49°49'24"N/21°10'16"E] Żurowa, ‘Borówka’ sandstone outcrop, wayside in mixed forest, 332 m; [Fe88, 49°50'39"N/21°05'41"E] Jodłówka Tuchowska-Ratówka, near mountain hut, 501 m; [Ff90, 49°48'13"N/21°22'28"E] Brzyska-Strebikowa, *Abies alba* forest, 398 m; [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, ‘Księży Las’ forest, forest floor in *Abies alba* forest, 340 m.
- Didymodon rigidulus*** Hedw. – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, concrete, c. gem., 260 m; [Fe98, 49°49'36"N/21°11'38"E] Żurowa, Niwy settlement, on the concrete tile on the roof of barn, c. gem., 280 m.
- Dryptodon hartmanii*** (Schimp.) Limpr. – [Fe88, 49°50'51"N/21°08'01"E] Mt Pasia, ‘Ostry Kamień’ sandstone outcrop, sandstone, c. gem., 526 m.
- Eurhynchium angustirete*** (Broth.) T.J.Kop. – Soil in forests and thickets, rotten wood. [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, 260 m; [Fe97, 49°46'41"N/20°58'44"E] Ciężkowice, ‘Wodospad’ nature monument, *Abies alba* forest, 301 m; [Ff90, 49°48'13"N/21°22'28"E] Brzyska-Strebikowa, *Abies alba* forest, 398 m; [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, ‘Księży Las’ forest, *Abies alba* forest, 340 m.
- Fissidens bryoides*** Hedw. – [Ff90, 49°48'13"N/21°22'28"E] Brzyska-Strebikowa, wayside in mixed forest, c. spor., 398 m; [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, ‘Księży Las’ forest, mineral soil in *Abies alba* forest, c.spor., 340 m.
- Fissidens taxifolius*** Hedw. – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, slope near stream, 260 m; [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, ‘Księży Las’ forest, wet mineral soil in *Abies alba* forest, 340 m.
- Fissidens pusillus*** (Wilson) Milde – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, boulder in stream, c. spor., 260 m.
- Funaria hygrometrica*** Hedw. – [Fe88, 49°52'53"N/21°05'46"E] Bistuszowa, wayside, c. spor., 231 m.

Herzogiella seligeri (Brid.) Z.Iwats. – [Fe89, 49°51'16"N/21°16'28"E] Wisowa, rotten wood in mixed forest, 384 m; [Fe88, 49°50'05"N/21°05'33"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, stump in *Abies alba* forest, 383 m; [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, ‘Księży Las’ forest, rotten wood of silver fir in *Abies alba* forest, c.spor., 340 m.

Hygrohypnum luridum (Hedw.) Jenn. – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, boulders in stream and concrete, c. spor., 255–260 m; [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, ‘Księży Las’ forest, sandstone, the stream bed in *Abies alba* forest, c.spor., 340 m.

!Hylocomium splendens (Hedw.) Schimp. – [Fe98, 49°49'24"N/21°10'16"E] Żurowa, ‘Borówka’ sandstone outcrop, wayside in mixed forest, 332 m; [Fe88, 49°50'05"N/21°05'33"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, on ground in *Abies alba* forest, 383 m.

Hypnum cupressiforme Hedw. – Bark, soil and rotten wood. [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, 260 m; [Fe89, 49°51'16"N/21°16'28"E] Wisowa, 384 m; [Fe97, 49°46'32"N/20°59'31"E] Ostrusza, abandoned quarry, 266 m; [Fe88, 49°50'05"N/21°05'33"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, 368–383 m; [Ge08, 49°43'05"N/21°05'35"E] Moszczenica, ‘Księży Las’ forest, *Abies alba* forest, 344 m.

Hypnum lindbergii Mitt. – [Ff90, 49°48'13"N/21°22'28"E] Brzyska-Strebikowa, wayside, c. spor., 398 m; [Fe97, 49°46'32"N/20°59'31"E] Ostrusza, abandoned quarry, mineral soil, 266 m; [Ge08, 49°43'03"N/21°05'13"E] Moszczenica, ‘Księży Las’ forest, mineral soil in *Abies alba* forest, 365 m.

Hypnum pallescens (Hedw.) P.Beauv. – [Fe88, 49°50'49"N/21°08'07"E] Mt Pasia, south-eastern slope, *Fagus sylvatica* stump, c. spor., 504 m; [Fe97, 49°46'41"N/20°57'55"E] ‘Skamieniałe Miasto’ nature reserve, sandstone, c. spor., 302 m; [Fe88, 49°50'39"N/21°05'46"E] Jodłówka Tuchowska-Ratówka, bark of *Fagus sylvatica* in beech forest near mountain hut, c. spor., 498 m; [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, ‘Księży Las’ forest, bark of *Quercus robur* in *Abies alba* forest, 340 m.

Leskea polycarpa Hedw. – [Fe88, 49°50'49"N/21°08'07"E] Mt Pasia, south-eastern slope, bark of *Fagus sylvatica* near path, c. spor., 504 m; [Fe98, N 49°48'39"; E 21°08'29"] Olszyny, bark of wayside *Fraxinus excelsior*, c. spor., 290 m; [Ff90, 49°49'14"N/21°23'25"E] Brzyska, bark of *Fraxinus excelsior* in old park near the castle, 241 m.

Leskella nervosa (Brid.) Loeske – [Ff90, 49°49'14"N/21°23'25"E] Brzyska, bark of *Acer platanoides* in old park near the castle, 241 m.

Leucobryum glaucum (Hedw.) Ångstr. – [Fe97, 49°46'43"N/20°58'09"E] Ciężkowice, ‘Skamieniałe Miasto’ nature reserve, soil in *Pinus sylvestris* forest, 320 m; [Fe97, 49°46'41"N/20°58'47"E] Ciężkowice, ‘Wodospad’ nature monument, on ground in *Abies alba* forest, 297 m; [Fe98, 49°49'23"N/21°10'25"E] Żurowa, ‘Borówka’ sandstone outcrop, wayside in *Pinus sylvestris* forest, 349 m; [Fe88, 49°50'06"N/21°05'36"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, on ground in *Abies alba* forest, 389 m; [Ge08, 49°43'05"N/21°05'35"E] Moszczenica, ‘Księży Las’ forest, forest floor in *Abies alba* forest, 344 m.

Mnium hornum Hedw. – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, slope in thicket, 260 m; [Fe88, 49°50'48"N/21°08'19"E] Mt Pasia, south-eastern slope, on soil near path, 473 m; [Fe97, 49°46'41"N/20°57'55"E] ‘Skamieniałe Miasto’ nature reserve, sandstone, 302 m; [Fe97, 49°46'41"N/20°58'47"E] Ciężkowice, ‘Wodospad’ nature monument, on ground in *Abies alba* forest, 311 m; [Fe98, 49°49'26"N/21°10'25"E] Żurowa, ‘Borówka’ sandstone outcrop, sandstone, 359 m; [Fe88, 49°50'05"N/21°05'33"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, log in *Abies alba* forest, 383

m; [Ge08, 49°43'04"N/21°05'20"E] Moszczenica, 'Księży Las' forest, forest floor in *Abies alba* forest, 349 m.

Orthodicranum montanum (Hedw.) Loeske – [Fe89, 49°51'16"N/21°16'28"E] Wisowa, bark of deciduous trees, 384 m; [Fe97, 49°47'53"N/21°00'07"E] Przedmieście Wielkie, stump in coniferous forest, 332 m; [Fe88, 49°50'05"N/21°05'33"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, stump in *Abies alba* forest, 383 m; [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, 'Księży Las' forest, rotten wood of silver fir in *Abies alba* forest, 340 m.

Orthotrichum anomalum Hedw. – [Fe98, N 49°48'39"; E 21°08'29"] Olszyny, bark of wayside *Fraxinus excelsior*, c. spor., 290 m; [Ff90, 49°49'14"N/21°23'25"E] Brzyska, bark of *Fraxinus excelsior* in old park near the castle, c. spor., 241 m.

Orthotrichum affine Schrad. ex Brid. – [Ge08, 49°43'01"N/21°05'26"E] Moszczenica, 'Księży Las' forest, bark of *Fraxinus excelsior* in *Abies alba* forest, c.spor., 346 m.

Orthotrichum diaphanum Schrad. ex Brid. – [Fe88, 49°50'49"N/21°08'07"E] Mt Pasia, south-eastern slope, bark of *Fagus sylvatica* near path, c. spor., 504 m; [Fe98, N 49°48'39"; E 21°08'29"] Olszyny, bark of wayside *Fraxinus excelsior*, c. spor., 290 m.

[R]***Orthotrichum patens*** Bruch ex Brid. (Fig. 5) – [Fe88, 49°50'49"N/21°08'07"E] Mt Pasia, south-eastern slope, bark of *Fagus sylvatica* near path, c. spor., 504 m; [Ff90, 49°49'14"N/21°23'25"E] Brzyska, bark of *Acer platanoides* in old park near the castle, c. spor., 241 m.

Orthotrichum pumilum Sw. – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, concrete, c. spor., 255 m; [Ff90, 49°49'14"N/21°23'25"E] Brzyska, bark of *Fraxinus excelsior* in old park near the castle, c. spor., 241 m.

Orthotrichum speciosum Nees – [Ff90, 49°49'14"N/21°23'25"E] Brzyska, bark of *Fraxinus excelsior* in old park near the castle, c. spor., 241 m; [Fe88, 49°52'53"N/21°05'46"E] Bistuszowa, bark of *Tilia cordata*, c. spor., 234 m; [Ge08, 49°43'01"N/21°05'26"E] Moszczenica, 'Księży Las' forest, bark of *Fraxinus excelsior* in *Abies alba* forest, c.spor., 346 m.

[V]***Orthotrichum striatum*** Hedw. (Fig. 6) – [Ge08, 49°43'01"N/21°05'26"E] Moszczenica, 'Księży Las' forest, bark of *Fraxinus excelsior* in *Abies alba* forest, c.spor., 346 m.

Oxyrrhynchium hians (Hedw.) Loeske – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, mineral soil, 260 m; [Fe97, 49°46'32"N/20°59'31"E] Ostrusza, abandoned quarry, mineral soil, 266 m; [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, 'Księży Las' forest, mineral soil in *Abies alba* forest, 340 m.

Paraleucobryum longifolium (Ehrh. ex Hedw.) Loeske – [Fe88, 49°50'51"N/21°08'01"E] Mt Pasia, 'Ostry Kamień' sandstone outcrop, sandstone, 526 m; [Fe97, 49°46'39"N/20°57'55"E] 'Skamieniałe Miasto' nature reserve, sandstone, 302 m.

Plagiomnium affine (Blandow ex Funck) T.J.Kop. – On ground in forests and thickets. [Fe89, 49°51'16"N/21°16'28"E] Wisowa, 384 m; [Fe97, 49°47'53"N/21°00'07"E] Przedmieście Wielkie, margin of coniferous forest, 332 m; [Fe98, 49°49'24"N/21°10'16"E] Żurowa, 'Borówka' sandstone outcrop, wayside, 332 m; [Fe88, 49°50'06"N/21°05'31"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, *Abies alba* forest, c. spor., 368 m; [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, 'Księży Las' forest, *Abies alba* forest, 340 m.

Plagiomnium cuspidatum (Hedw.) T.J.Kop. – [Ge08, 49°43'04"N/21°05'20"E] Moszczenica, 'Księży Las' forest, forest floor in *Abies alba* forest, 349 m.

Plagiomnium undulatum (Hedw.) T.J.Kop. – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, bank of stream, 260 m; [Fe88, 49°52'53"N/21°05'46"E] Bistuszowa, ditch, 231 m; [Fe88, 49°50'06"N/21°05'31"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, springs in *Abies alba* forest, 368 m; [Ge08,

49°43'04"N/21°05'20"E] Moszczenica, 'Księży Las' forest, forest floor in *Abies alba* forest, 349 m.

Plagiothecium cavifolium (Brid.) Z.Iwats. – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, mineral soil in thicket, 260 m.

Plagiothecium curvifolium Schlieph. ex Limpr. – [Fe89, 49°51'16"N/21°16'28"E] Wisowa, 384 m; [Fe88, 49°50'06"N/21°05'31"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, on ground and rotten wood in *Abies alba* forest, c. spor., 368-383 m; [Ge08, 49°43'04"N/21°05'20"E] Moszczenica, 'Księży Las' forest, forest floor in *Abies alba* forest, 349 m.

Plagiothecium denticulatum (Hedw.) Schimp. – [Ge08, 49°43'05"N/21°05'35"E] Moszczenica, 'Księży Las' forest, forest floor in *Abies alba* forest, c.spor., 344 m.

Plagiothecium laetum Schimp. – [Ge08, 49°43'03"N/21°05'13"E] Moszczenica, 'Księży Las' forest, bark of *Quercus robur* in *Abies alba* forest, 365 m.

Plagiothecium nemorale (Mitt.) A.Jaeger – [Ge08, 49°43'04"N/21°05'20"E] Moszczenica, 'Księży Las' forest, forest floor in *Abies alba* forest, 349 m.

Pleurozium schreberi (Willd. ex Brid.) Mitt. – On ground in forests and thickets, grasslands. [Fe88, 49°50'40"N/21°08'51"E] Żurowa-Podlesie Drugie, 472 m; [Fe89, 49°51'16"N/21°16'28"E] Wisowa, 384 m; [Fe97, 49°46'39"N/20°58'11"E] 'Skamieniałe Miasto' nature reserve, 302 m; [Fe98, 49°49'24"N/21°10'16"E] Żurowa, 'Borówka' sandstone outcrop, wayside, 332 m; [Fe88, 49°50'06"N/21°05'31"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, *Abies alba* forest, 368 m; [Ff90, 49°48'13"N/21°22'28"E] Brzyska-Strebikowa, *Abies alba* forest, 398 m; [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, 'Księży Las' forest, forest floor in *Abies alba* forest, 340 m.

Polygonatum urnigerum (Hedw.) P.Beauv. – [Fe97, 49°46'32"N/20°59'31"E] Ostrusza, abandoned quarry, mineral soil, 266 m.

Pohlia campotrichela (Renauld & Cardot) Broth. – [Fe88, 49°50'42"N/21°08'50"E] Żurowa-Podlesie Drugie, stubble field, c. gem., 469 m.

Pohlia nutans (Hedw.) Lindb. – On ground in forests and thickets. [Fe89, 49°51'16"N/21°16'28"E] Wisowa, 384 m; [Fe98, 49°49'24"N/21°10'16"E] Żurowa, 'Borówka' sandstone outcrop, mixed forest, 332 m; [Fe88, 49°50'05"N/21°05'33"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, *Abies alba* forest, 383 m; [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, 'Księży Las' forest, *Abies alba* forest, 340 m.

Pohlia wahlenbergii (F.Weber & D.Mohr) A.L.Andrews – [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, 'Księży Las' forest, mineral soil in *Abies alba* forest, 340 m.

Polytrichastrum formosum (Hedw.) G.L.Sm. – On ground in forests and thickets. [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, 260 m; [Fe89, 49°51'16"N/21°16'28"E] Wisowa, 384 m; [Fe97, 49°46'39"N/20°58'11"E] 'Skamieniałe Miasto' nature reserve, 302 m; [Fe88, 49°50'06"N/21°05'31"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, *Abies alba* forest, c. spor., 368 m; [Ge08, 49°43'05"N/21°05'35"E] Moszczenica, 'Księży Las' forest, *Abies alba* forest, c.spor., 344 m.

Polytrichum piliferum Hedw. – [Fe97, 49°46'32"N/20°59'31"E] Ostrusza, abandoned quarry, mineral soil, 266 m.

Pseudoscleropodium purum (Hedw.) M.Fleisch. ex Broth. – On ground in forests and thickets, grasslands. [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, 260 m; [Fe88, 49°52'55"N/21°12'16"E] Kowalowa, 281 m; [Fe97, 49°46'44"N/20°58'11"E] Ciężkowice, 'Skamieniałe Miasto' nature reserve, *Pinus sylvestris* forest, 318 m; [Fe97, 49°46'41"N/20°58'45"E] Ciężkowice, 'Wodospad' nature monument, *Abies alba* forest, 300

m; [Fe98, 49°49'24"N/21°10'16"E] Żurowa, 'Borówka' sandstone outcrop, mixed forest, 332 m; [Ff90, 49°48'13"N/21°22'28"E] Brzyska-Strebikowa, *Abies alba* forest, 398 m; [Ge08, 49°43'05"N/21°05'35"E] Moszczenica, 'Księży Las' forest, *Abies alba* forest, 344 m.

Pylaisia polyantha (Hedw.) Schimp. – [Ff90, 49°49'14"N/21°23'25"E] Brzyska, bark of *Fraxinus excelsior* in old park near the castle, 241 m; [Ge08, 49°43'01"N/21°05'26"E] Moszczenica, 'Księży Las' forest, bark of *Fraxinus excelsior* in *Abies alba* forest, c.spor., 346 m.

Rhizomnium punctatum (Hedw.) T.J.Kop. – [Fe88, 49°50'06"N/21°05'31"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, seepage in *Abies alba* forest, c. spor., 368 m; [Ge08, 49°43'09"N/21°05'24"E] Moszczenica, 'Księży Las' forest, rotten wood in *Abies alba* forest, 340 m.

!Rhytidadelphus squarrosus (Hedw.) Warnst. – Grasslands, meadows, waste places, on ground in forests and thickets. [Fe88, 49°52'53"N/21°05'46"E] Bistuszowa, 231 m; [Fe88, 49°52'55"N/21°12'16"E] Kowalowa, 281 m; [Fe88, 49°50'40"N/21°08'51"E] Żurowa-Podlesie Drugie, 472 m; [Fe89, 49°51'16"N/21°16'28"E] Wisowa, 384 m; [Fe97, 49°46'44"N/20°58'11"E] Ciężkowice, 'Skamieniałe Miasto' nature reserve, *Pinus sylvestris* forest, 318 m; [Fe97, 49°46'41"N/20°58'45"E] Ciężkowice, 'Wodospad' nature monument, *Abies alba* forest, 300 m; [Fe98, 49°49'24"N/21°10'16"E] Żurowa, 'Borówka' sandstone outcrop, mixed forest, 332 m; [Fe88, 49°50'36"N/21°05'55"E] Jodłówka Tuchowska-Ratówki, near mountain hut, 492 m; [Ge08, 49°43'03"N/21°05'13"E] Moszczenica, 'Księży Las' forest, *Abies alba* forest, 365 m.

Rhytidadelphus subpinnatus (Lindb.) T.J.Kop. – [Ge08, 49°43'04"N/21°05'20"E] Moszczenica, 'Księży Las' forest, moist mineral soil, stream bed in *Abies alba* forest, 349 m.

Rosulabryum moravicum (Podp.) Ochyra & Stebel – [Fe89, 49°51'16"N/21°16'28"E] Wisowa, bark of deciduous trees, c. gem., 384 m; [Ge08, 49°43'03"N/21°05'13"E] Moszczenica, 'Księży Las' forest, mineral soil in *Abies alba* forest, c.gem., 365 m.

Sanionia uncinata (Hedw.) Loeske – [Ge08, 49°43'03"N/21°05'13"E] Moszczenica, 'Księży Las' forest, rotten wood in *Abies alba* forest, 365 m.

Schistidium crassipilum H.H.Bлом – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, concrete, c. spor., 260 m; [Fe89, 49°51'17"N/21°16'29"E] Wisowa, old concrete, c. spor., 384 m.

Sciuro-hypnum oedipodium (Mitt.) Ignatov & Huttunen – [Fe98, 49°49'24"N/21°10'28"E] Żurowa, 'Borówka' sandstone outcrop, litter in young *Pinus sylvestris* forest, 344 m; [Fe88, 49°50'05"N/21°05'33"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, on ground in *Abies alba* forest, 383 m.

Sciuro-hypnum plumosum (Hedw.) Ignatov & Huttunen – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, boulders in stream, 255 m.

Sciuro-hypnum populeum (Hedw.) Ignatov & Huttunen – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, concrete bridge, 255 m.

Sphagnum compactum Lam. & DC. – [Fe88, 49°50'06"N/21°05'31"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, wet slope in *Abies alba* forest, 368 m.

Sphagnum fallax (H.Klinggr.) H.Klinggr. – [Fe97, 49°47'53"N/21°00'07"E] Przedmieście Wielkie, margin of coniferous forest, 332 m; [Ge08, 49°43'05"N/21°05'35"E] Moszczenica, 'Księży Las' forest, forest floor in *Abies alba* forest, 344 m.

Sphagnum girgensohnii Russow – [Fe97, 49°46'41"N/20°58'45"E] Ciężkowice, 'Wodospad' nature monument, on ground in *Abies alba* forest, 300 m; [Fe88, 49°50'05"N/21°05'33"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, on ground in *Abies alba* forest, 383 m; [Ge08, 49°43'05"N/21°05'35"E] Moszczenica, 'Księży Las' forest, forest floor in *Abies alba* forest, 344 m.

- !Sphagnum palustre** L. – [Fe97, 49°46'41"N/20°58'45"E] Cięzkowice, ‘Wodospad’ nature monument, on ground in *Abies alba* forest, 300 m; [Ge08, 49°43'05"N/21°05'35"E] Moszczenica, ‘Księży Las’ forest, forest floor in *Abies alba* forest, 344 m.
- !Sphagnum russowii** Warnst. – [Fe97, 49°46'41"N/20°58'47"E] Cięzkowice, ‘Wodospad’ nature monument, on ground in *Abies alba* forest, 297 m.
- !Sphagnum squarrosum** Crome – [Fe88, 49°50'06"N/21°05'31"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, wet slope in *Abies alba* forest, *c. spor.*, 368 m; [Ge08, 49°43'05"N/21°05'35"E] Moszczenica, ‘Księży Las’ forest, moist forest floor in *Abies alba* forest, 344 m.
- ![R]Syntrichia papillosa** (Wilson) Jur. – [Ff90, 49°49'14"N/21°23'25"E] Brzyska, bark of *Acer platanoides* and *Fraxinus excelsior* in old park near the castle, *c. gem.*, 241 m.
- Syntrichia ruralis** (Hedw.) F.Weber & D.Mohr – [Fe88, 49°50'37"N/21°05'50"E] Jodłówka Tuchowska-Ratówki, isolated mineral soil near mountain hut, 501 m; [Fe98, 49°49'36"N/21°11'38"E] Żurowa, Niwy settlement, on the concrete tile on the roof of barn, 280 m.
- ![R]Syntrichia virescens** (De Not.) Ochyra – [Fe98, N 49°48'39"; E 21°08'29"] Olszyny, bark of wayside *Fraxinus excelsior*, 290 m.
- Tetraphis pellucida** Hedw. – Rotten wood in forests, always with gemmae. [Fe89, 49°51'16"N/21°16'28"E] Wisowa, 384 m; [Fe97, 49°47'53"N/21°00'07"E] Przedmieście Wielkie, coniferous forest 332 m; [Fe88, 49°50'05"N/21°05'33"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, *Abies alba* forest, 383 m; [Ge08, 49°43'04"N/21°05'20"E] Moszczenica, ‘Księży Las’ forest, *Abies alba* forest, *c.spor.*, *c.gem.*, 349 m.
- Thuidium assimile** (Mitt.) A.Jaeger – [Ge08, 49°43'03"N/21°05'13"E] Moszczenica, ‘Księży Las’ forest, mineral soil at margin of *Abies alba* forest, 365 m.
- Thuidium tamariscinum** (Hedw.) Schimp. – On ground in *Abies alba* forest. [Fe97, 49°46'41"N/20°58'45"E] Cięzkowice, ‘Wodospad’ nature monument, 300 m; [Fe88, 49°50'06"N/21°05'31"E] Jodłówka Tuchowska, between Ratówki and Kobyli Dział settlements, 368 m; [Fe90, 49°48'13"N/21°22'28"E] Brzyska-Strebikowa, 398 m; [Ge08, 49°43'03"N/21°05'13"E] Moszczenica, ‘Księży Las’ forest, 365 m.
- Tortula modica** R.H.Zander – [Fe98, 49°49'35"N/21°09'49"E] Żurowa-Wielka Wieś, stubble-field, *c. spor.*, 305 m.
- Tortula muralis** Hedw. – [Fe87, 49°51'26"N/21°03'01"E] Lubaszowa, near road to the monastery, concrete, *c. spor.*, 260 m; [Fe88, 49°52'55"N/21°12'16"E] Kowalowa, concrete, *c. spor.*, 281 m.
- Tortula truncata** (Hedw.) Mitt. – [Fe97, 49°47'50"N/21°00'05"E] Przedmieście Wielkie, stubble-field, *c. spor.*, 343 m.
- [R]Weissia squarrosa** (Nees & Hornsch.) Müll.Hal. – [Ge08, 49°43'03"N/21°05'13"E] Moszczenica, Księży Las forest, dry ditch at the margin of *Abies alba* forest, associated with *Ceratodon purpureus*, *Bryum rubens*, *c.spor.*, 365 m.

Discussion on most important records

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

Phaeoceros carolinianus – hornwort obviously vanishing from the bryoflora of the Carpathians, mainly due to agriculture abandonment. Recently reported from scattered sites in the lower elevations of the following regions: the Gorce (Mierzeńska 1994), Beskid Wysoki (Klama 1996) and Beskid Mały and Kotlina Żywiecka (Stebel & Stebel 1998).

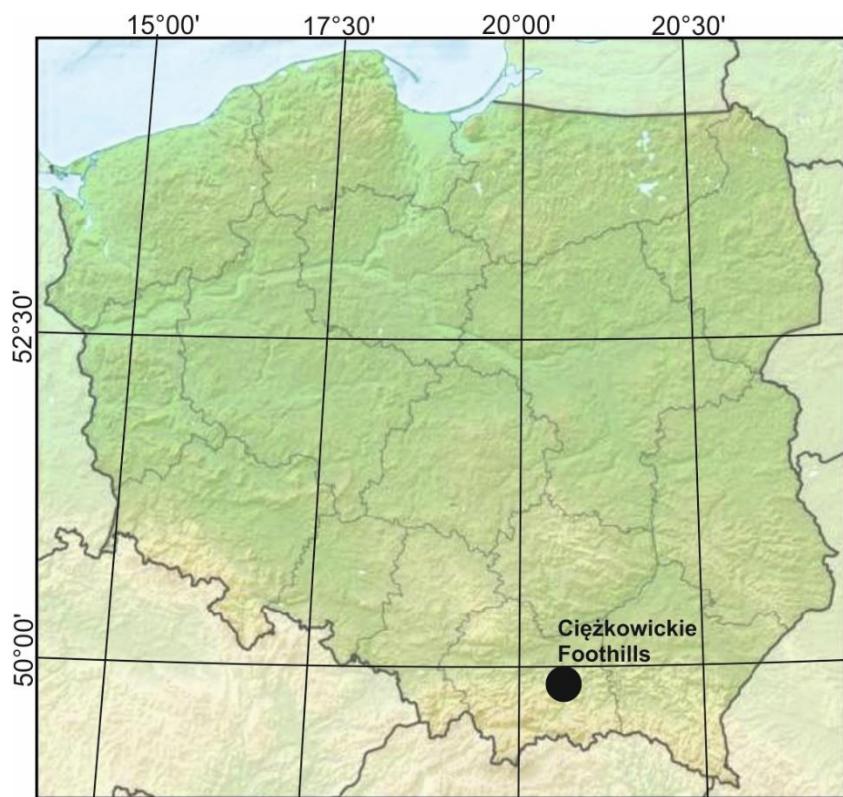


Fig 1: Location of the Ciężkowickie Foothills in Poland.



Fig 2: Typical landscape of the Ciężkowickie Foothills. Vicinity of Zadziele settlement near Łužna village (photo by G. Vončina, 9 June 2016).



Fig 3: 'Ostry Kamień' sandstone outcrop near Ryglice (photo by A. Stebel, 23 August 2014).



Fig 4: Stubble-field with abundant occurrence of hornworts near Źurowa-Wielka Wieś (photo by A. Stebel, 23 August 2014).



Fig 5: Epiphytic moss *Orthotrichum patens* (photo by V. Plášek).



Fig 6: Epiphytic moss *Orthotrichum striatum* (photo by V. Plášek).

Campylopus introflexus – invasive moss, known from many localities in the lowland part of Poland, in the Carpathians still rare, but number of its localities quickly increases. Reported from the following regions: the Beskid Mały (Stebel 1995, 2010), Beskid Wysoki (Stebel & Fojcik 2005), Dynowskie Foothills (Armata 2005), Bieszczady Zachodnie (Stebel & Żarnowiec 2010), Orawsko-Jordanowskie Foothills (Stebel & Vončina 2014), Gorce (Stebel *et al.* 2016) and Rożnowskie Foothills (Stebel 2016a).

Orthotrichum patens (Fig. 5) – rare epiphytic moss, recently found on many sites in various regions of Poland. In the Carpathians known from the following regions: the Beskid Mały (Stebel 2010), Silesian Beskid (Stebel 2006), Pieniny (Stebel *et al.* 2010), Dynowskie Foothills (Armata 2005), Orawsko-Jordanowskie Foothills (Stebel & Vončina 2014), Beskid Niski (Stebel 2016b) and Gorce (Stebel *et al.* 2016).

Weissia squarrosa – very rare species in Poland. For the first time this species was mentioned in the paper by Itzigsohn (1848) from the vicinity of Frankfurt (Oder). After the Second World War Frankfurt was divided between Germany and Poland. Polish eastern part is at present an independent town Ślubice thus it is unclear, if the locality was in western or eastern part of Frankfurt. Next locality was published wrongly from the vicinity of the Pyrnik village near Zielona Góra (Limprecht 1874) but the specimens in fact represented *Weissia rostellata* (Limprecht 1876). Third locality was found in Wrocław (Limprecht 1876), in the place called ‘Kratzbusch’ (at present a part of the Wrocław Zoological Garden). Until now it has been the only certain locality of *Weissia squarrosa* in Poland. In the whole Western Carpathians recently *Weissia squarrosa* was reported from the Czech part of the Silesian Beskid (Plášek & Stebel 2002).

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