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## New records of rare and endangered mosses from the Bieszczady Zachodnie Range and the Carpathian Foothills

Nowe stanowiska rzadkich i zagrożonych mchów  
z Bieszczadów Zachodnich i Pogórza Karpackiego

### SUMMARY

A list of 71 rare mosses collected in the Bieszczady Zachodnie Range and the Carpathian Foothills, is presented. All of the species are new to the investigated regions. Among the taxa the most interesting seem to be saxicolous mosses, namely *Amphidium mougeotii*, *Orthogrimmia donniana*, *Sciuro-hypnum flotowianum* and *Seligeria donniana* as well as torrenticolous species *Fissidens crassipes* and epiphyte mosses *Zygodon dentatus* and *Zygodon rupestris*. Also, of great importance from bryogeographical standpoint are taxa which are placed in category R in *The Red Data Book of European Bryophytes*. These are: *Amblystegium radicale*, *Brachydontium trichodes* and *Neckera besseri*. In addition, species threatened in Poland and Polish part of the Carpathians are indicated.

### STRESZCZENIE

W pracy zamieszczono wykaz stanowisk 71 rzadkich gatunków mchów stwierdzonych po raz pierwszy w obrębie Bieszczadów Zachodnich i poszczególnych regionów Pogórza Karpackiego. Do najcenniejszych składników muskoflory badanego terenu należą naskalne mchy *Amphidium mougeotii*, *Orthogrimmia donniana*, *Sciuro-hypnum flotowianum* i *Seligeria donniana*, gatunek potokowy *Fissidens crassipes* oraz epifityczne mchy *Zygodon dentatus* i *Zygodon rupestris*. Godne uwagi są również stanowiska *Amblystegium radicale*, *Brachydontium trichodes* i *Nec-*

*ker a besseri*, gatunków zagrożonych w Europie. Dodatkowo, wyróżniono mchy zagrożone na obszarze Polski oraz w obrębie polskiej części Karpat.

**Key words:** rare and/or endangered mosses, distribution, ecology, Bieszczady Zachodnie Range, Carpathian Foothills, SE Poland.

## INTRODUCTION

The main aim of the present study is to provide a list of rare and interesting mosses from the most eastern part of the Polish Carpathians. The material was collected during some of the bryological investigations carried out in 2002–2005 in the Bieszczady Zachodnie Range and the Carpathian Foothills (Fig. 1).

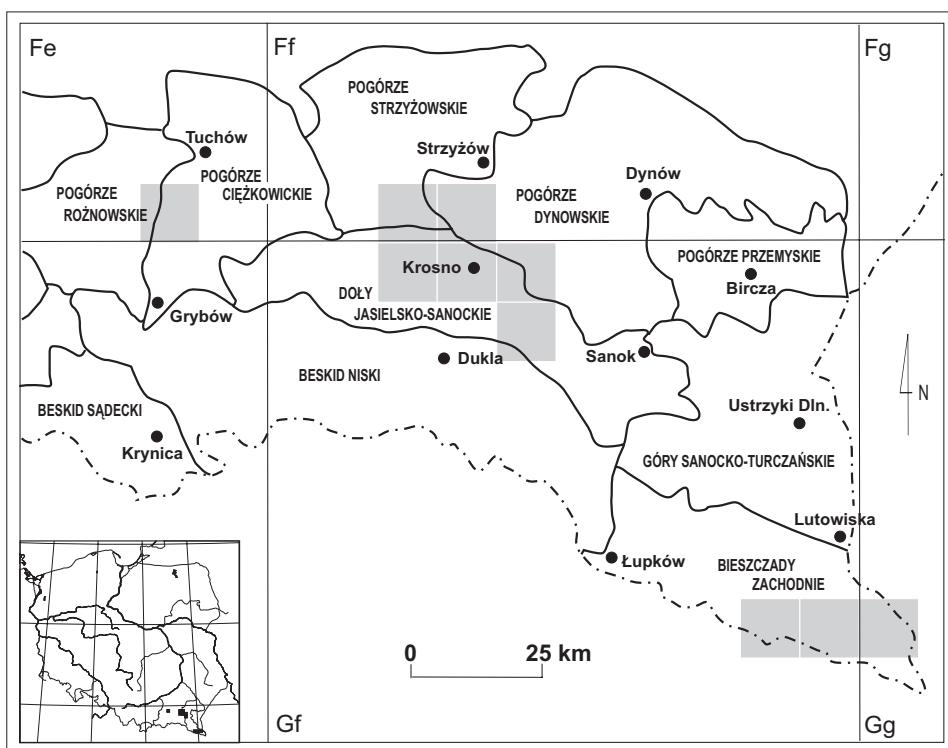


Fig. 1. Location of the investigated regions

From a bryological standpoint the Bieszczady Zachodnie Range seems to be one of the most interesting regions in the Carpathians. The first information about mosses was published by Lisowski (5), who reported 206 taxa of mosses from this mountain range. Subsequently, Ochyra (6) presented additional moss records from this part of the Polish Carpathians. The present work is based on the investigation carried out within the present boundaries of the National Park of Bieszczady and results in adding 13 new species to the bryoflora of the region.

Apart from the Bieszczady Zachodnie Range, the Carpathian Foothills belongs to the botanically least known areas in Poland. High population density and anthropogenic changes in the

natural environment have discouraged bryologists from carrying out investigations in this area. Some information about mosses from the western part of the Carpathian Foothills was given by Stebel (11, 12), whereas the only work dealing with mosses in the eastern part of the region was recently published by the autor (1). In the present paper there are additional records from the Dynowskie Foothills (Pogórze Dynowskie) and also from the Ciężkowickie Foothills (Pogórze Ciężkowickie) and the Jasło-Sanok Basin (Doły Jasielsko-Sanockie).

### RED-LISTED SPECIES

According to the current red-list of mosses (13), 14 species belong to the group of threatened plants in Poland, mostly being in R category of threat (8 species). All of them, except *Amblystegium radicale*, which was not reported so far from the Carpathians, are also endangered in the Polish part of this mountain chain. Additionally, 3 species, namely *Amblystegium radicale*, *Brachydontium trichodes* and *Neckera besseri*, acknowledged as threatened in Europe (10) were noted. All of the threatened species are listed in Table 1.

Table 1. Red-listed species in Europe, Poland and the Polish part of the Carpathians

Name of species	Threat category		
	Poland	the Carpathians	Europe
<i>Acaulon muticum</i>	R	E	–
<i>Amblystegium radicale</i>	R	–	R
<i>Brachydontium trichodes</i>	R	R	R
<i>Campylopus flexuosus</i>	I	R	–
<i>Campylopus pyriformis</i>	E	I	–
<i>Fissidens crassipes</i>	E	E	–
<i>Neckera besseri</i>	R	R	R
<i>Orthotrichum lyellii</i>	R	V	–
<i>Orthotrichum stramineum</i>	V	V	–
<i>Sciuro-hypnum flotowianum</i>	R	R	–
<i>Seligeria donniana</i>	R	R	–
<i>Syntrichia latifolia</i>	R	R	–
<i>Zygodon dentatus</i>	E	E	–
<i>Zygodon rupestris</i>	E	E	–

## LIST OF SPECIES

The mosses are listed in alphabetical order. Specimens are housed in the Herbarium of the Department of Botany and Mycology UMCS (LBL B). The nomenclature of taxa follows Ochyra et al. (8). For each species the following data are given: ATMOS grid square, locality, habitat, altitude, notes on the occurrence of sporophytes and gemmae.

Abbreviations: BZ – Bieszczady Zachodnie Range, JSB – Jasło-Sanok Basin, PC – Ciężkowickie Foothills, PD – Dynowskie Foothills, m – m a.s.l., *c. gem.* – with gemmae, *c. spor.* – with sporophytes.

*Abietinella abietina* (Hedw.) M. Fleisch. – PD: [Ff 93] Węglówka village, xerothermic grassland, 350 m.

*Acaulon muticum* (Schreb. ex Hedw.) Müll. Hal. – JSB: [Gf 02] Krosno town, abandoned sandstone excavation near the road to Sporne village, *c. spor.*, 300 m.

*Amblystegium radicale* (P. Beauv.) Schimp. – BZ: [Gf 69] Wołosate village, peat-bog near the road to Ustrzyki Górne village, 675 m. This rare lowland plant characteristic of decaying vegetation on marshy ground and peat cuttings (4), was found on rotten wood in the marginal part of the peat-bog, together with *Plagiothecium denticulatum* and *Straminergon stramineum*.

*Ampidium mougeotii* (Schimp.) Schimp. – PC: [Fe 98] “Wodospad Ciężkowicki” nature reserve in Ciężkowice town, vertical sandstone rocks in a waterfall, 350 m. In Poland very rare plant, occurring only in mountain areas, where it grows on wet and sheltered non-calcareous rocks (7). This is the first locality of this species from the Carpathian Foothills.

*Anomodon viticulosus* (Hedw.) Hook. & Taylor – PD: [Ff 93] Odrzykoń village, sandstone rocks near the castle ruins, 450 m, *c. spor.*; [Ff 93] Czarny Dział ridge N of Węglówka village, sandstone outcrops in beech forest, 450 m.

*Atrichum tenellum* (Röhl.) Bruch & Schimp. – PD: [Ff 93] Bonarówka village, fallow field, 325 m, *c. spor.*

*Aulacomnium palustre* (Hedw.) Schwägr. – PD: [Ff 93] Bonarówka village, on the ground in fir forest, 350 m; [Ff 93] Czarnorzeki village, wayside slope, a bank of a small spring, 375 m.

*Brachydontium trichodes* (F. Weber) Milde – PD: [Ff 93] Czarnorzeki village, shaded sandstone near the Czarny Potok stream, 450 m, *c. spor.*; [Ff 93] Odrzykoń village, shaded sandstone in fir-pine forest, 400 m, *c. spor.*

*Brachythecium salebrosum* (Hoffm. ex F. Weber & D. Mohr) Schimp. – PD: [Gf 04] Brzozów town, xerothermic grassland near the road to Zmiennica village, 350 m, *c. spor.*

*Bryum pseudotriquetrum* (Hedw.) P. Gaertn., E. Mey. & Scherb. – PD: [Gf 04] fir forest W of Brzozów town, concrete in a source of a stream, 350 m.

*Callicladium haldanianum* (Grev.) H. A. Crum – PC: [Ff 98] “Skamieniaste Miasto” nature reserve in Ciężkowice town, eroded sandstone, 350 m, *c. spor.*

*Campylium stellatum* (Hedw.) Lange & C. E. O. Jensen – PD: [Gf 04] mixed forest W of Brzozów town, on wet soil in bog-spring, 350 m.

*Campylopus flexuosus* (Hedw.) Brid. – PD: [Ff 93] Krasna village, humic soil in coniferous forest, 375 m; [Ff 93] Odrzykoń village, humic soil and sandstone rocks in fir-pine forest, 425 m; [Ff 93] “Prządki” nature reserve in Czarnorzeki village, eroded sandstone rocks, 475 m. Vegetative propagation was frequent (flagelliform shoots in leaf axils), inconspicuous sporophytes were collected only once (“Prządki” nature reserve).

*Campylopus pyriformis* (Schultz) Brid. – BZ: [Gf 69] Wołosate village, peat-bog near the road to Ustrzyki Górne village, 675 m.

*Ctenidium molluscum* (Hedw.) Mitt. – PD: [Ff 93] Czarnorzeki village, beech forest, on shaded stone by the Czarny Potok stream, 450 m, *c. spor.*

*Cynodontium polycarpon* (Hedw.) Schimp. – PC: [Fe 98] “Skamieniaste Miasto” nature reserve in Ciężkowice town, eroded sandstone rocks, 350 m, *c. spor.*; PD: [Ff 93] “Prządki” nature reserve in Czarnorzeki village, eroded sandstone rocks, 475 m, *c. spor.*

*Dichodontium pellucidum* (Hedw.) Schimp. – PD: [Ff 93] Bonarówka village, on stones in a stream, 325 m, *c. spor.*

*Dicranella rufescens* (Dicks.) Schimp. – PD: [Ff 93] Odrzykoń village, on mineral soil in a forest, 400 m, *c. spor.*

*Dicranodontium denudatum* (Brid.) E. Britton – PC: [Fe 98] “Skamieniaste Miasto” nature reserve in Ciężkowice town, eroded sandstone rocks, 350 m; PD: [Ff 93] “Prządki” nature reserve in Czarnorzeki village, shaded sandstone rocks, 475 m, *c. spor.*

*Dicranum polysetum* Sw. *ex anon.* – PD: [Ff 93] Bonarówka, on the ground in fir forest, 350 m.

*Ditrichum heteromallum* (Hedw.) E. Britton – PD: [Gf 04] mixed forest W of Brzozów town, wayside slope, 350 m, *c. spor.*; [Ff 93] Węglówka village, wayside slope in fir forest, 375 m, *c. spor.*

*Encalypta streptocarpa* Hedw. – PD: [Ff 93] Odrzykoń village, ruins of the castle, 450 m, *c. gem.*

*Fissidens crassipes* Wilson *ex Bruch & Schimp.* – JSB: [Gf 03] Krosno town, stones in the Wisłok river, 280 m, *c. spor.* It grows here in large quantity together with *Fontinalis antipyretica* and *Leptodictyum riparium*.

*Gyroweisia tenuis* (Schrad. *ex Hedw.*) Schimp. – PD: [Ff 93] Bonarówka village, base of the shist wall by the stream, 325 m. Collected plants were very

small-sized and grew in sterile condition but had characteristic gemmae on the rhizoids.

*Hedwigia ciliata* (Hedw.) Ehrh. ex P. Beauv. – PC: [Fe 98] “Skamieniałe Miasto” nature reserve in Ciężkowice town, scarcely on shaded sandstone, 350 m.

*Heterocladium heteropterum* (Brid.) Schimp. – PC: [Fe 98] “Wodospad Ciężkowicki” nature reserve in Ciężkowice town, in large quantity on wet sandstone rocks and roots of trees on the top of the waterfall, 350 m. In Poland this acidophilous moss is relatively rare and occurs almost exclusively in the southern part of the country (2, 3).

*Homalia trichomanoides* (Hedw.) Schimp. – PD: [Ff 93] Bonarówka village, bark on the lower part of an alder tree, 300 m, *c. spor.*

*Homalothecium sericeum* (Hedw.) Schimp. – PD: [Ff 93] Odrzykoń village, ruins of the castle, 450 m.

*Homomallium incurvatum* (Schrad. ex Brid.) Loeske – PD: [Ff 93] Czarny Dział ridge N of Węglówka village, shaded sandstone outcrops in beech forest, 450 m, *c. spor.*

*Hylocomium splendens* (Hedw.) Schimp. – PD: [Ff 82] Jazowa village, grassy slope on the edge of the forest, 300 m.

*Hypnum lindbergii* Mitt. – PD: [Ff 93] Węglówka village, wayside slope, 325 m.

*Leskeella nervosa* (Brid.) Loeske – PD: [Ff 93] Bonarówka village, on the bark of streamside trees, 325 m, *c. gem.*, *c. spor.*

*Mnium hornum* Hedw. – PC: [Fe 98] “Skamieniałe Miasto” nature reserve in Ciężkowice town, shaded sandstone, 350 m; PD: [Ff 82] Jazowa village, at the base of tree trunks in wet place by the road, 300 m.

*Neckera besserii* (Lobarz.) Jur. – BZ: [Gg 60] SW slope of the Halicz Mt., shaded sandstone rocks, 1275 m; [Gf 68] Wetlina village, sandstone outcrops in beech forest, 900 m. This saxicolous moss is restricted in its occurrence to calcareous areas of the southern part of the country (9).

*Orthogrimmia donniana* (Sm.) Ochyra & Żarnowiec – BZ: [Gf 68] Połonina Wetlińska subalpine meadow, exposed sandstone rocks, 1150 m.

*Orthotrichum lyellii* Hook. & Taylor – PD: [Ff 93] Bonarówka village, on the bark of willow tree, 325 m. Collected plants were sterile and produced gemmae abundantly.

*Orthotrichum speciosum* Nees – PD: [Gf 04] Brzozów town, on the bark of roadside trees, 325 m, *c. spor.*

*Orthotrichum stramineum* Hornsch. ex Brid. – BZ: [Gf 68] SW slope of the Dział Mt., bark of an old beech tree, 800 m, *c. spor.*

*Palustriella commutata* (Hedw.) Ochyra – PD: [Ff 93] Odrzykoń village, beech forest, on wet soil in bog-spring, 450 m.

*Paraleucobryum longifolium* (Ehrh. ex Hedw.) Loeske – PD: [Ff 93] “Prządki” nature reserve in Czarnorzeki village, shaded sandstone rocks, 475 m.

*Philonotis fontana* (Hedw.) Brid. – PD: [Ff 93] Odrzykoń village, on wet soil in a forest, 400 m.

*Plagiothecium cavifolium* (Brid.) Z. Iwats. – PD: [Ff 93] Odrzykoń village, at the base of sandstone rock and on soil in shady ravine near the castle ruins, 450 m, *c. spor.*

*Plagiothecium laetum* Schimp. – PD: [Ff 93] Odrzykoń village, shaded sandstone rock near the castle ruins, 450 m, *c. spor.*

*Platyhypnidium riparioides* (Hedw.) Dixon – PD: [Ff 93] Czarnorzeki village, stones in the Czarny Potok stream, 425 m.

*Pogonatum aloides* (Hedw.) P. Beauv. – PC: [Fe 98] “Skamieniałe Miasto” nature reserve in Ciężkowice town, on eroded sandstone, 350 m, *c. spor.*; PD: [Ff 93] Odrzykoń village, on mineral soil in fir forest, 425 m, *c. spor.*

*Pogonatum urnigerum* (Hedw.) P. Beauv. – PD: [Ff 82], Kobyle village, abandoned sandstone excavation, 300 m, *c. spor.*

*Polytrichum commune* Hedw. – PD: [Ff 93] Bonarówka village, on the ground in fir forest, 350 m, *c. spor.*; [Ff 93] Czarnorzeki village, wet meadow on the edge of the forest, 400 m.

*Pseudoscleropodium purum* (Hedw.) M. Fleisch ex Broth. – PC: [Fe 98] Ciężkowice town, margin of footpath in fir forest, 350 m; PD: [Ff 93] Bonarówka village, on the ground in fir forest, 350 m.

*Pseudotaxiphyllum elegans* (Brid.) Z. Iwats. – PC: [Fe 98] “Skamieniałe Miasto” nature reserve in Ciężkowice town, shaded sandstone rocks, 350 m, *c. gem.*

*Pterigynandrum filiforme* Hedw. – PD: [Ff 82] Jazowa village, sandstone rock in a forest, 350 m.

*Ptilium crista-castrensis* (Hedw.) De Not. – PD: [Ff 93] Bonarówka village, few stems in a ditch near fir forest, 350 m.

*Rhytidiadelphus triquetrus* (Hedw.) Warnst. – PD: [Gf 04] fir forest W of Brzozów town, wayside slope, 350 m; [Ff 93] Czarnorzeki village, margin of footpath in beech forest, 425 m.

*Rosulabryum capillare* (Hedw.) J. R. Spence – PD: [Ff 93] Odrzykoń village, shaded slope in the forest, 450 m, *c. spor.*

*Sciuro-hypnum flotowianum* (Sendtn.) Ignatov & Huttunen – BZ: [Gf 68] Połonina Wetlińska subalpine meadow, exposed sandstone rocks, 1150 m.

*Sciuro-hypnum reflexum* (Starke) Ignatov & Huttunen – PD: [Ff 93] Bonarówka village, on the bark at lower part of sycamore tree, 350 m, *c. spor.*



*Seligeria donniana* (Sm.) Müll. Hal. – PD: [Ff 93] Góra Królewska Mt., wayside sandstone near the peak, 550 m, *c. spor.*

*Seligeria recurvata* (Hedw.) Bruch & Schimp. – PD: [Ff 93] Czarny Dział ridge N of Węglówka village, shaded sandstone outcrops, 425 m, *c. spor.*

*Sphagnum angustifolium* (C. E. O. Jensen ex Russow) C. E. O. Jensen – BZ: [Gf 69] Wołosate village, peat-bog near the road to Ustrzyki Górne village, 675 m.

*Sphagnum centrale* C. E. O. Jensen – BZ: [Gf 68] Moczarne village, streamside meadow in a valley of the Górna Solinka stream, 700 m.

*Sphagnum contortum* Schultz – BZ: [Gf 68] Moczarne village, streamside meadow in a valley of the Górna Solinka stream, 700 m; [Gf 68] Moczarne village, bank of a spring above the Beskidnik stream, 725 m.

*Sphagnum denticulatum* Brid. – BZ: [Gf 68] Moczarne village, at base of short cutting above the Górna Solinka stream, together with *Sphagnum cuspidatum*, *Sphagnum squarrosum* and *Juncus* spp., 725 m.

*Straminergon stramineum* (Dicks. ex Brid.) Hedenäs – BZ: [Gf 69] Wołosate village, peat-bog near the road to Ustrzyki Górne village, 675 m.

*Syntrichia latifolia* (Bruch ex Hartm.) Huebener – JSB: [Gf 02] Krosno town, on asphalt path in a park, 300 m, *c. gem.*

*Thuidium tamariscinum* (Hedw.) Schimp. – PD: [Gf 04] Jabłonica Polska village, on wet soil in beech forest, 375 m, *c. spor.*

*Tortella tortuosa* (Hedw.) Limpr. – PD: [Ff 93] Czarny Dział ridge N of Węglówka village, on shaded sandstone, 425 m, *c. spor.*

*Tortula subulata* Hedw. – PD: [Ff 82] Kobyle village, in hornbeam forest by the road, 300 m, *c. spor.*

*Warnstorfia exannulata* (Schimp.) Loeske – PD: [Ff 93] Czarnorzeki village, on wet ground in wayside ditch, 400 m.

*Warnstorfia fluitans* (Hedw.) Loeske – PD: [Ff 93] Bonarówka village, small water pit in fir forest, 350 m.

*Weissia longifolia* Mitt. – JSB: [Gf 02] Krosno town, abandoned sandstone excavation near the road to Sporne village, 300 m, *c. spor.*

*Zygodon dentatus* (Limpr.) Karttunen – BZ: [Gf 68] Moczarne village, on the bark of a sycamore tree above the Górna Solinka stream, 675 m, *c. gem.*

*Zygodon rupestris* Schimp. ex Lorentz – BZ: [Gf 68], SW slope of the Dział Mt., on the bark of an old beech tree, 800 m, *c. gem.*

#### ACKNOWLEDGEMENTS

I would like to express my warmest thanks to Dr Jan Żarnowiec, Bielsko-Biała, for checking determinations of some difficult species.



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