



BRYOPHYTES OF THE GÓRA GROJEC NATURE RESERVE
IN THE WYŻYNA WOŹNICKO-WIELUŃSKA (SILESIA PROVINCE, POLAND)

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ABSTRACT. In 2002, 2009 and 2010 bryological investigations were carried out in the Góra Grojec Nature Reserve located in the Wyżyna Woźnicko-Wieluńska in Silesia Province. As a result the localities of 60 taxa of bryophytes were found. In this area some interesting species which are protected, endangered and/or regionally rare in Poland occur. These are e.g. *Anomodon viticulosus*, *Orthotrichum stramineum*, *Porella platyphylla* and *Ulota bruchii*.

KEY WORDS: bryophytes, mosses, liverworts, distribution, nature reserves, Wyżyna Woźnicko-Wieluńska, Lubliniec district, Silesia Province, Poland

INTRODUCTION

Wyżyna Woźnicko-Wieluńska is an upland region located in Silesia Province in southern Poland. It is divided into some mesoregions, namely Wyżyna Wieluńska, Obniżenie Liswarty, Obniżenie Górnej Warty, Próg Woźnicki and Próg Herbowski (KONDRACKI 1994). The bryophyte flora is unequally investigated. The best known is the moss flora of Wyżyna Wieluńska (FOJCIK 1999), whereas from other regions the data are scanty. Especially poorly is the bryoflora of Próg Woźnicki known, where the Góra Grojec Nature Reserve is located. Several data from this mesoregion were published in papers by KLAMA et AL. (1999), STEBEL (2003, 2006 a, b), STEBEL and FOJCIK (2003) and STEBEL et AL. (2008).

STUDY AREA

The Góra Grojec Nature Reserve was established in 1996 over an area of 17.53 hectares in order to protect the well-preserved old stands of deciduous forest. It is located on the small hill called 'Góra Grojec' in the Psary village near Woźniki (Lubliniec district, Silesia Province). Lime-oak-hornbeam *Tilio cordatae-Carpinetum betuli* forest is a dominant plant community in the reserve. In the herb layer there are many protected and regionally rare vascular plants, among others *Asarum europaeum* L., *Daphne mezereum* L., *Galium odoratum* (L.) Scop., *Hepatica nobilis* Schreb. and *Lilium martagon* L. (HEREŹNIAK 2002).

AIM OF THE STUDY AND RESEARCH
METHODS

Bryological studies were conducted in the reserve in 2002, 2009 and 2010. The aim was to accurately establish the number and frequency of moss species, as well as to present the floristic characteristics of habitats and identify their key bryological value. A species list in alphabetical order is provided (Table 1). For each species the following information is given: frequency (scale: 1-2 records – very rare, 3-5 – rare, 6-15 – frequent, over 15 – common), habitat as well as observations on the presence of sporophytes and gemmae. Bryophyte nomenclature mainly follows KLAMA (2006 b) and OCHYRA et AL. (2003). Threatened species in Poland are given according KLAMA (2006 a) and ŻARNOWIEC et AL. (2004), while those in Europe are as given by SCHUMACKER and MARTINY (1995).

RESULTS

General remarks

The bryoflora of the reserve comprises 60 taxa (59 species and one variety) of which three are liverworts and 57 mosses. As in most local floras, the analysis of frequency showed (Fig. 1) that the largest groups were the very rare taxa (55.0%), than frequent (18.3%), rare (15.0%) and common (11.7%).

Sporophytes were observed in 31 taxa (51.7% of the bryoflora) and gemmae in six (10.0%).

TABLE 1. Bryophytes of the Góra Grojec Nature Reserve

| Taxa name | I | II | III |
|--|------|---------|-----|
| 1 | 2 | 3 | 4 |
| Liverworts Marchantiophyta | | | |
| 1. <i>Lophocolea bidentata</i> (L.) Dumort. | v.r. | B | – |
| 2. <i>L. heterophylla</i> (Schrad.) Dumort. | f. | A, D | s |
| 3. * <i>Porella platyphylla</i> (L.) Pfeiff. | v.r. | C | – |
| Mosses Bryophyta | | | |
| 1. <i>Amblystegium serpens</i> (Hedw.) Schimp. | r. | A, D | s |
| 2. !! <i>Anomodon viticulosus</i> (Hedw.) Hook. & Taylor | v.r. | C | – |
| 3. <i>Atrichum undulatum</i> (Hedw.) P. Beauv. | c. | B, D | s |
| 4. <i>Aulacomnium androgynum</i> (Hedw.) Schwägr. | r. | D | g |
| 5. <i>Brachytheciastrum velutinum</i> (Hedw.) Ignatov & Huttunen | c. | A, B, D | s |
| 6. <i>Brachythecium rutabulum</i> (Hedw.) Schimp. | c. | A, B, D | s |
| 7. <i>B. salebrosum</i> (F. Weber & D. Mohr) Schimp. | f. | A, C, D | s |
| 8. <i>Bryoerythrophyllum recurvirostrum</i> (Hedw.) P.C. Chen | v.r. | C | s |
| 9. • <i>Callicladium haldanianum</i> (Grev.) H.A. Crum | v.r. | A, D | s |
| 10. <i>Campyliadelphus chrysophyllus</i> (Brid.) R.S. Chopra | v.r. | B | – |
| 11. <i>Ceratodon purpureus</i> (Hedw.) Brid. | r. | A, B | s |
| 12. <i>Ctenidium molluscum</i> (Hedw.) Mitt. | v.r. | B | – |
| 13. <i>Dicranella heteromalla</i> (Hedw.) Schimp. | f. | A, B, D | s |
| 14. <i>Dicranoweisia cirrata</i> (Hedw.) Lindb. | v.r. | A | s |
| 15. ! <i>Dicranum scoparium</i> Hedw. | r. | A, D | – |
| 16. <i>Fissidens taxifolius</i> Hedw. | v.r. | B | s |
| 17. <i>Herzogiella seligeri</i> (Brid.) Z. Iwats. | r. | D | s |
| 18. !! <i>Homalia trichomanoides</i> (Hedw.) Schimp. | v.r. | C | – |
| 19. <i>Homalothecium sericeum</i> (Hedw.) Schimp. | v.r. | C | – |
| 20. <i>Homomallium incurvatum</i> (Brid.) Loeske | v.r. | C | – |
| 21. <i>Hypnum cupressiforme</i> Hedw. var. <i>cupressiforme</i> | c. | A, C | s |
| 22. <i>H. cupressiforme</i> Hedw. var. <i>filiforme</i> Brid. | v.r. | A | – |
| 23. <i>H. pallescens</i> (Hedw.) P. Beauv. | r. | A | s |
| 24. <i>Isothecium alopecuroides</i> (Dubois) Isov. | v.r. | A, C | – |
| 25. <i>Leskea polycarpa</i> Hedw. | v.r. | C | s |
| 26. <i>Mnium hornum</i> Hedw. | f. | A, B, D | s |
| 27. <i>Orthodicranum montanum</i> (Hedw.) Loeske | c. | A, D | – |
| 28. <i>O. tauricum</i> (Sapjegin) Smirnova | v.r. | A | g |
| 29. <i>Orthotrichum affine</i> Brid. | v.r. | A | s |
| 30. <i>O. anomalum</i> Hedw. | v.r. | A | s |
| 31. <i>O. pumilum</i> Sw. ex anon. | v.r. | A | s |
| 32. * <i>Orthotrichum stramineum</i> Brid. | v.r. | A | s |
| 33. <i>Oxyrrhynchium hians</i> (Hedw.) Loeske | f. | B | – |

TABLE 1 – cont.

| 1 | 2 | 3 | 4 |
|--|------|---------|------|
| 34. <i>Plagiomnium affine</i> (Funck) T.J. Kop. | r. | B | – |
| 35. <i>P. cuspidatum</i> (Hedw.) T.J. Kop. | f. | A, C, D | s |
| 36. <i>P. rostratum</i> (Schrad.) T.J. Kop. | v.r. | C | – |
| 37. <i>P. undulatum</i> (Hedw.) T.J. Kop. | r. | B | – |
| 38. <i>Plagiothecium cavifolium</i> (Brid.) Z. Iwats. | f. | B | s |
| 39. <i>P. curvifolium</i> Limpr. | v.r. | D | s |
| 40. <i>P. denticulatum</i> (Hedw.) Schimp. | r. | D | – |
| 41. <i>P. laetum</i> Schimp. | f. | A, B, D | s |
| 42. <i>P. nemorale</i> (Mitt.) A. Jaeger | f. | B | g |
| 43. <i>Platygyrium repens</i> (Brid.) Loeske | f. | A, D | s, g |
| 44. <i>Pohlia nutans</i> (Hedw.) Lindb. | f. | B, D | s |
| 45. <i>Polytrichastrum formosum</i> (Hedw.) G.L. Sm. | c. | B, D | s |
| 46. ! <i>Pseudoscleropodium purum</i> (Hedw.) Broth. | v.r. | B | – |
| 47. <i>Pterigynandrum filiforme</i> Hedw. | v.r. | A | – |
| 48. <i>Pylaisia polyantha</i> (Hedw.) Schimp. | v.r. | A | s |
| 49. <i>Rosulabryum capillare</i> (Hedw.) J.R. Spence | v.r. | B | – |
| 50. <i>R. moravicum</i> (Podp.) Ochyra & Stebel | c. | A, D | g |
| 51. <i>Schistidium dupretii</i> (Thér.) W.A. Weber | v.r. | C | s |
| 52. <i>Sciuro-hypnum populeum</i> (Hedw.) Ignatov & Huttunen | v.r. | A, C | s |
| 53. <i>Syntrichia ruralis</i> (Hedw.) F. Weber & D. Mohr | v.r. | C | – |
| 54. <i>Taxiphyllum wissgrillii</i> (Garov.) Wijk & Margad. | v.r. | C | – |
| 55. <i>Tetraphis pellucida</i> Hedw. | v.r. | D | g |
| 56. ! <i>Thuidium assimile</i> (Mitt.) A. Jaeger | v.r. | B | – |
| 57. !! * <i>Ulota bruchii</i> Brid. | v.r. | A | – |

Key:

1. !! – species strictly protected in Poland, ! – species partly protected in Poland, ● – species threatened in Europe, * – species threatened in Poland.

2. Frequency: c. – common, f. – frequent, r. – rare, v.r. – very rare.

3. Substrata: A – bark, B – soil, C – rock, D – rotten wood.

4. Notes: g – gemmae were observed, s – sporophytes were observed.

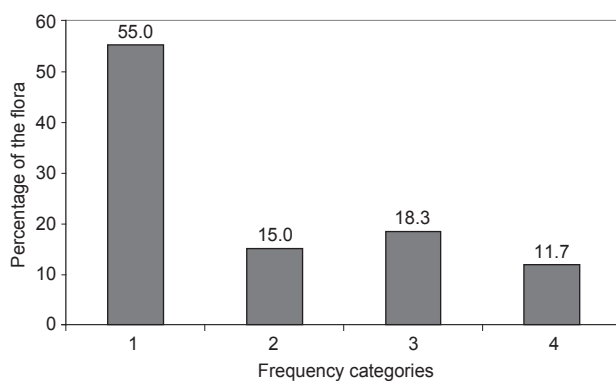


FIG. 1. Frequency of mosses: 1 – very rare, 2 – rare, 3 – frequent, 4 – common

Mountain taxa

In the area of the reserve seven species considered as and mountain taxa occur. According to the classification proposed by STEBEL (2006 c), they are *Ctenidium molluscum*, *Homomallium incurvatum*, *Hypnum pallenscens*, *Pterigynandrum filiforme*, *Sciuro-hypnum populeum*, *Taxiphyllum wissgrillii* and *Ulota bruchii*. They are mainly montane species, associated with the lower mountain forest belt. In the reserve they occur in various types of habitats, e.g. soil (*Ctenidium molluscum*), limestone (*Homomallium incurvatum*, *Sciuro-hypnum populeum* and *Taxiphyllum wissgrillii*) and bark (*Hypnum pallenscens*, *Pterigynandrum filiforme*, *Sciuro-hypnum populeum* and *Ulota bruchii*). Altogether, mountain element include 11.7% of the bryoflora of the reserve.

Protected and threatened taxa

In the Góra Grojec Nature Reserve numerous bryophyte species which are protected by law in Poland and/or threatened occur. There are three strictly protected taxa (*Anomodon viticulosus*, *Homalia trichomanoides* and *Ulota bruchii*), three partly protected (*Dicranum scoparium*, *Pseudoscleropodium purum* and *Thuidium assimile*), one threatened in Europe (*Callicladium haldanianum*) and three threatened in Poland (*Orthotrichum stramineum*, *Porella platyphylla* and *Ulota bruchii*). Information on these taxa appears in Table 1 and details about some more interesting ones are discussed below.

Interesting components of the bryoflora

Among the bryophytes found in the Góra Grojec Nature Reserve (Fig. 2), the following species deserve

Porella platyphylla – liverwort of ecology and distribution similar to *Anomodon viticulosus*. In the reserve it occurs together with *Anomodon viticulosus* and *Homalia trichomanoides* in the area of about 1 m².

Pterigynandrum filiforme – epiphytic moss in Silesia Province occurring mainly in the Beskidy Mountains. In the reserve it grows on bark of *Carpinus betulus* in the western part (about 1 dm² together).

Ulota bruchii – an epiphytic moss, very rare in Silesia Province. In Góra Grojec it was found on bark of *Quercus* sp. log in the western part (about 1 cm²).

Occurrence of bryophytes in the main substrate types

Soil. Twenty one taxa were found here (35.0% of the bryoflora), 12 of which (20.0%) were locally exclusively associated with this type of substrate (Fig. 3). Most of

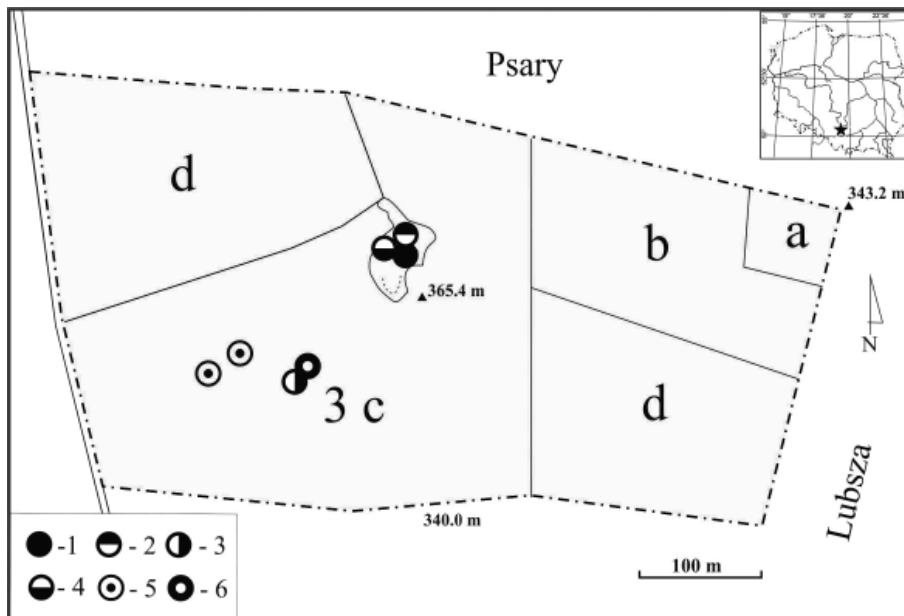


FIG. 2. Distribution of selected bryophytes: 1 – *Anomodon viticulosus*, 2 – *Homomallium incurvatum*, 3 – *Orthotrichum stramineum*, 4 – *Pterigynandrum filiforme*, 5 – *Taxiphyllum wissgrillii*, 6 – *Ulota bruchii*

special attention (the area covered by particular populations is given in brackets):

Anomodon viticulosus – epiphytic-epilithic moss, strictly protected in Poland. In Silesia Province in recent years it has occurred frequently only on limestone outcrops, mainly in the Wyżyna Częstochowska (FOJCIK 2010), in other parts it is very rare. In the reserve it grows on limestone outcrop in old limestone excavation (about 1 m²).

Homalia trichomanoides – moss of ecology and distribution similar to *Anomodon viticulosus*. In the reserve it occurs at the same place like previous species, but in smaller quantity (about 0.1 m²).

Orthotrichum stramineum – an epiphytic moss, considered to be endangered in Poland (category V), but in recent years the number of its localities has been steadily growing. In Góra Grojec it was found on bark of *Quercus* sp. log in the western part (about 1 cm²).

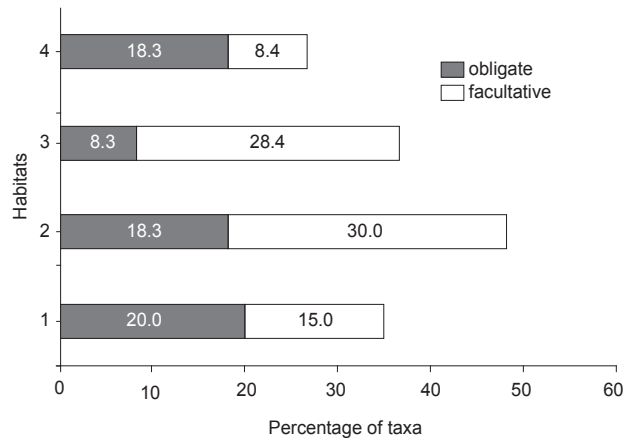


FIG. 3. Occurrence of bryophytes in the substratum types distinguished: 1 – soil, 2 – bark, 3 – rotten wood, 4 – limestone

them grew in places with exposed mineral soil. The most common were *Atrichum undulatum*, *Brachythecium rutabulum*, *Oxyrrhynchium hians* and *Polytrichastrum formosum*.

Bark. On the bark of trees and shrubs 29 taxa were found (48.3% of the bryoflora), 11 (18.3%) of which were exclusively associated with this habitat (Fig. 3). Bryophytes occurring on bark form the largest habitat group in the reserve. The rarest are species from the family Orthotrichaceae, such as *Orthotrichum affine*, *O. stramineum* and *Ulota bruchii*. Noteworthy were *Dicranoweisia cirrata* and *Orthodicranum tauricum*, mosses which have spread rapidly in Poland in recent years (STEBEL and PLÁŠEK 2001, STEBEL et AL. 2008).

Rotten wood. Here 22 taxa were found (36.7% of the bryoflora), five of which (8.3%) were locally exclusively associated with this type of substrate (Fig. 3). The most frequent are multisubstrate species such as *Brachytheciastrum velutinum*, *Brachythecium rutabulum*, *Herzogiella seligeri*, *Hypnum cupressiforme* and *Orthodicranum montanum*.

Rock. Epilithic taxa formed the smallest group (16 taxa, 26.7% of the bryoflora, Fig. 3). There were 11 species (18.3% of the bryoflora) confined to rock habitats. Many of them are rare, protected and endangered, for example *Anomodon viticulosus*, *Homalia trichomanoides*, *Homalothecium sericeum*, *Homomallium incurvatum*, *Porella platyphylla* and *Taxiphyllum wissgrillii*. Limestone is among the most important habitat types for the conservation of biodiversity in the reserve.

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