

BRYOPHYTES OF THE „MAŁY LASEK” ECOLOGICAL AREA IN TYCHY (RÓWNINA PSZCZYŃSKA)

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ABSTRACT: In 2009 and 2010 bryological investigations were carried out in the „Mały Lasek” ecological area located in Tychy town in the Równina Pszczyńska. As a result the localities of 47 species of bryophytes were found. In this area some interesting species occur – protected, endangered and (or) regionally rare in Poland, e.g. *Calypogeia fissa* (L.) Raddi, *Callicladium haldanianum* (Grev.) H.A.Crum and *Sphagnum compactum* Lam. & DC. Thirteen species reported from this area, for example *Lophozia capitata* (Hook.) Macoun, *Riccardia incurvata* Lindb. and *Sphagnum subsecundum* Nees, have not been confirmed.

KEY WORDS: mosses, liverworts, distribution, threatened bryophytes, Silesia Province, Tychy, Poland

Introduction

Disused excavations of mineral resources, widely regarded as wasteland, are in many cases habitats of protected and endangered species of plants, fungi and animals. Especially, in areas strongly transformed by human activity, they are, sometimes the only, refuge for species which lost their natural stations as a result of industry development and intensification of agriculture. In numerous bryological papers concerning such objects, many rare bryophyte species are mentioned (for example Koła 1969; Wilczyńska 1973; Stebel 1997; Fojcik 1999; Stebel 2000; Fojcik, Stebel 2001; Stebel 2006, 2011). Some of abandoned excavations are protected by law, the example is „Mały Lasek” protected as an ecological area since 2004. It covers a moist area with hollows which probably, at least partly, appeared as a result of sand exploitation by local population. Unfortunately, this object is closely surrounded by urbanized

areas and roads, which are a great danger for its existence. The paper presents the current state of bryophyte flora of this object.

Study area

The „Mały Lasek” ecological area was established in 2004 over an area of about 8.837 square meters in order to protect mainly the peat-bog vegetation (Anonymus 2004b). It is located in Tychy town, near the Sikorskiego Street (GPS coordinates 50°5'14.2"N 18°59'47.93"E). Young *Betula pendula* forest is a dominating plant community in the ecological area. In some water-bodies and moist depressions water and rush vegetation occurs (Fig. 1). The main values of the ecological area was the occurrence of many protected and threatened animals and vascular plants, for example *Centaureum erythraea* Rafn, *Comarum palustre* L., *Dactylorhiza majalis* (Rchb.) P. F. Hunt & Summerh., *Drosera rotundifolia* L., *Hydrocotyle vulgaris* L. and *Lycopodiella inundata* (L.) Holub (Buszman et al. 1996; Anonymus 2004b). In the early 90's of twenty century many rare bryophytes were collected from this area, for example *Riccardia incurvata* Lindb. and *Lophozia capitata* (Hook.) Macoun. (Stebel 1997). In 2009, as a result of building works, this object was partly destroyed and stations of some species haven't been confirmed.

Aim of the study and research methods

Bryological studies in the „Mały Lasek” were conducted in the 2009 and 2010. Their aim was to establish accurately 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, gemmae and perianths. Bryophyte nomenclature follows mainly Klama (2006a) and Ochrya, Żarnowiec and Bednarek-Ochrya (2003). Protected species in Poland are given after ‘The Order of the Minister of the Environment’ (Anonymus 2004a), threatened species in Poland are given according to Klama (2006b) and Żarnowiec et al. (2004), in Europe to Schumacker and Martiny (1995) and in Silesia Province to Stebel et al. (2011).

Characteristics of the bryoflora

General remarks

The present bryoflora of the ecological area comprises 47 species of which 5 are liverworts and 42 are mosses. Occurrence of 13 species were not confirmed (Table 1). As in most local floras, the analysis of frequency showed that the largest groups were the rare (42.6%) and very rare (38.3%) species (Fig. 2). Sporophytes were observed in 12 species (25.5% of the bryoflora) and gemmae in 2 (4.3%). One liverwort species was collected with perianths.

Nowadays in the „Mały Lasek” ecological area there are 5 strictly protected taxa (Fig. 3), 9 partly protected, 1 threatened in Europe, 1 threatened in Poland and 1 threatened in Silesia Province. Information on these taxa appears in Table 1.

Interesting components of the bryoflora

Among the bryophytes found in the „Mały Lasek” ecological area, the following species deserve special attention (the area covered by particular populations is given in brackets):

Callicladium haldanianum (Grev.) H.A.Crum – mostly epixylic or epiphytic species, fairly frequent in Silesia, considered as threatened in Europe in category RT (regionally threatened) (Schumacker and Martiny 1995). In the „Mały Lasek” small population (about 2 dm²) occurred on rotten stump.

Calypogeia fissa (L.) Raddi – liverwort of insufficiently known distribution in Poland (Szweykowski 2006) considered here as threatened in category I (indeterminate) (Klama 2006b). In Silesia known from several stations (based on herbarium specimens revised by J. Szweykowski housed in SOSN). Fairly large population (about 5 dm²) was found in the „Mały Lasek”.

Tortula acaulon (With.) R.H. Zander – Ephemeral moss, fairly frequent in Poland, especially in its western part, till this time not reported from the Równina Pszczyńska region (Stebel 1997). Small population (about 3 cm²) occurred in the „Mały Lasek” on wet, clayey soil.

Occurrence of bryophytes in the main substrate types

Soil. Terrestrial mosses (38 species, 80.9%) form the largest habitat group in the bryoflora of the „Mały Lasek” ecological area. Among them as many as 31 (66.0%) were locally exclusively associated with this type of substrate (Fig. 4). Most of them grew in places with exposed mineral soil. The most common were *Barbula unguiculata* Hedw., *Brachythecium albicans* (Hedw.) Schimp. and *Ceratodon purpureus* (Hedw.) Brid. Noteworthy was the *Tortula acaulon*, a species new the Równina Pszczyńska region (Stebel 1997).

Bark of living trees. On bark of trees and shrubs only 7 species were found (14.9% of the bryoflora), 3 (6.4%) of which were exclusively associated with this habitat (Fig. 4). All bryophytes grew on the bark of *Betula pendula* Roth and *Alnus glutinosa* (L.) Gaertn. They are common species, i.e. *Amblystegium serpens* (Hedw.) Schimp., *Brachytheciastrum velutinum* (Hedw.) Ignatov & Huttunen and *Lophocolea heterophylla* (Schrad.) Dumort.

Rotten wood. The bryophytes on rotten wood (7 species, 14.9% of the flora) included the frequent or common multisubstrate species such as *Brachythecium rutabulum* (Hedw.) Schimp. and *Cephalozia bicuspidata* (L.) Dumort. Confined to decaying wood were only 2 species (4.3% of the bryoflora, Fig. 4), i.e. *Callicladium haldanianum* and *Plagiothecium denticulatum* (Hedw.) Schimp.

Water. In small ponds and wet hollows 5 bryophyte species occurred (10.6% of the bryoflora). Two (4.3%), i.e. *Calliergon cordifolium* (Hedw.) Kindb. and *Drepanocladus aduncus* (Hedw.) Warnst. were exclusive to this habitat (Fig. 4). Frequent species was only *Calliergonella cuspidata* (Hedw.) Loeske.

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Table 1. Bryophytes of the „Mały Lasek” Ecological area.

SPECIES NAME	I	II	III
Liverworts Marchantiophyta			
*♦ <i>Calypogeia fissa</i> (L.) Raddi	v.r.	B	-
<i>Cephalozia bicuspidata</i> (L.) Dumort.	r.	B, C	<i>p</i>
<i>Lophocolea heterophylla</i> (Schräd.) Dumort.	f.	A, B, C	<i>s</i>
<i>Riccia fluitans</i> L.	v.r.	B, D	-
<i>Riccia glauca</i> L.	v.r.	B	-
Mosses Bryophyta			
<i>Amblystegium serpens</i> (Hedw.) Schimp.	f.	A, B	<i>s</i>
<i>Atrichum undulatum</i> (Hedw.) P.Beauv.	f.	B	<i>s</i>
! <i>Aulacomnium palustre</i> (Hedw.) Schwägr.	v.r.	B	-
<i>Barbula unguiculata</i> Hedw.	c.	B	<i>s</i>
<i>Brachytheciastrum velutinum</i> (Hedw.) Ignatov & Huttunen	v.r.	A	<i>s</i>
<i>Brachythecium albicans</i> (Hedw.) Schmp.	c.	B	-
<i>Brachythecium rutabulum</i> (Hedw.) Schimp.	r.	B, C	<i>s</i>
<i>Bryum argenteum</i> Hedw.	f.	B	<i>s</i>
<i>Bryum caespiticiu</i> m Hedw.	r.	B	<i>s</i>
<i>Bryum klinggraeffii</i> Schimp.	v.r.	B	<i>g</i>
<i>Bryum subapiculatum</i> Hampe	v.r.	B	<i>g</i>
● <i>Callicladium haldanianum</i> (Grev.) H.A.Crum	v.r.	C	-
<i>Calliergon cordifolium</i> (Hedw.) Kindb.	v.r.	D	-
! <i>Calliergonella cuspidata</i> (Hedw.) Loeske	f.	B, D	-
<i>Ceratodon purpureus</i> (Hedw.) Brid.	c.	B	<i>s</i>
! <i>Climacium dendroides</i> (Hedw.) F.Weber & D.Mohr	r.	B	-
! <i>Dicranum scoparium</i> Hedw.	v.r.	A	-
<i>Drepanocladus aduncus</i> (Hedw.) Warnst.	v.r.	D	-
<i>Drepanocladus polycarpus</i> (Voit) Warnst.	r.	B, D	-
<i>Funaria hygrometrica</i> Hedw.	r.	B	<i>s</i>
<i>Hypnum cupressiforme</i> Hedw.	r	A, C	-
<i>Leptobryum pyriforme</i> (Hedw.) Wilson	r.	B	-

<i>Orthodicranum montanum</i> (Hedw.) Loeske	v.r.	A	-
<i>Oxyrrhynchium hians</i> (Hedw.) Loeske	r.	B	-
<i>Plagiomnium affine</i> (Funck) T.J.Kop.	r.	B	-
<i>Plagiomnium undulatum</i> (Hedw.) T.J.Kop.	r.	B	-
<i>Plagiothecium curvifolium</i> Limpr.	r.	A, C	-
<i>Plagiothecium denticulatum</i> (Hedw.) Schimp.	r.	C	-
! <i>Pleurozium schreberi</i> (Brid.) Mitt.	r.	B	-
<i>Pohlia nutans</i> (Hedw.) Lindb.	f.	B	s
! <i>Polytrichum commune</i> Hedw.	r.	B	-
<i>Polytrichum juniperinum</i> Hedw.	v.r.	B	-
<i>Polytrichum piliferum</i> Hedw.	v.r.	B	-
! <i>Pseudoscleropodium purum</i> (Hedw.) Broth.	r.	B	-
! <i>Rhytidiadelphus squarrosus</i> (Hedw.) Warnst.	r.	B	-
!! <i>Sphagnum capillifolium</i> (Ehrh.) Hedw.	r.	B	-
!! <i>Sphagnum compactum</i> Lam. & DC.	r.	B	-
! <i>Sphagnum fallax</i> (H.Klinggr.) H.Klinggr.	r.	B	-
!! <i>Sphagnum fimbriatum</i> Wilson	v.r.	B	-
!! <i>Sphagnum flexuosum</i> Dozy & Molk.	v.r.	B	-
!! <i>Sphagnum girgensohni</i> Russow.	v.r.	B	-
<i>Tortula acaulon</i> (With.) R.H.Zander	v.r.	B	s
Species not confirmed			
Liverworts Marchantiophyta			
<i>Cephaloziella divaricata</i> (Sm.) Schiffn.	-	B	-
!! *♦ <i>Lophozia capitata</i> (Hook.) Macoun	-	B	-
<i>Jungermannia gracillima</i> Sm.	-	B	-
!! *♦ <i>Riccardia incurvata</i> Lindb.	-	B	-
Mosses Bryophyta			
<i>Dicranella cerviculata</i> (Hedw.) Schimp.	-	B	s
<i>Philonotis fontana</i> (Hedw.) Brid.	-	D	-
<i>Pohlia bulbifera</i> (Warnst.) Warnst.	-	B	g
<i>Pohlia camptotrachela</i> (Renauld & Cardot) Broth.	-	B	g
!! <i>Sphagnum denticulatum</i> Brid.	-	D	-
!! <i>Sphagnum palustre</i> L.	-	B	-

!! ♦ <i>Sphagnum subsecundum</i> Nees	-	B	-
<i>Straminergon stramineum</i> (Brid.) Hedenäs	-	B	-
<i>Warnstorfia exannulata</i> (Schimp.) Loeske	-	D	-

Legend:

! – species partly protected in Poland; !! – species strictly protected in Poland; ● – species threatened in Europe; * – species threatened in Poland; ♦ – species threatened in Silesia Province.

I. Frequency: c. – common; f. – frequent; r. – rare; v.r. – very rare.

II. Substrata: A – bark of living trees; B – soil; C – rotten wood; D – water.

III. Notes: *g* – with gemmae; *p* – with perianths; *s* – with sporophytes.



Fig. 1. View on the „Mały Lasek” ecological area (photo by A. Stebel, July 2010).

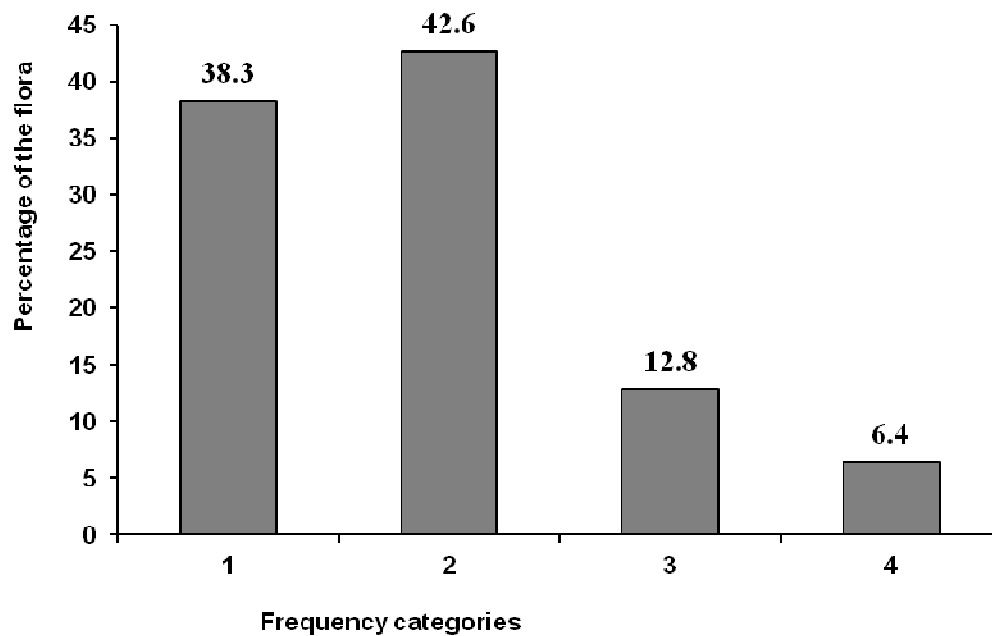


Fig. 2. Frequency of mosses. 1 – very rare, 2 – rare, 3 – frequent, 4 – common.

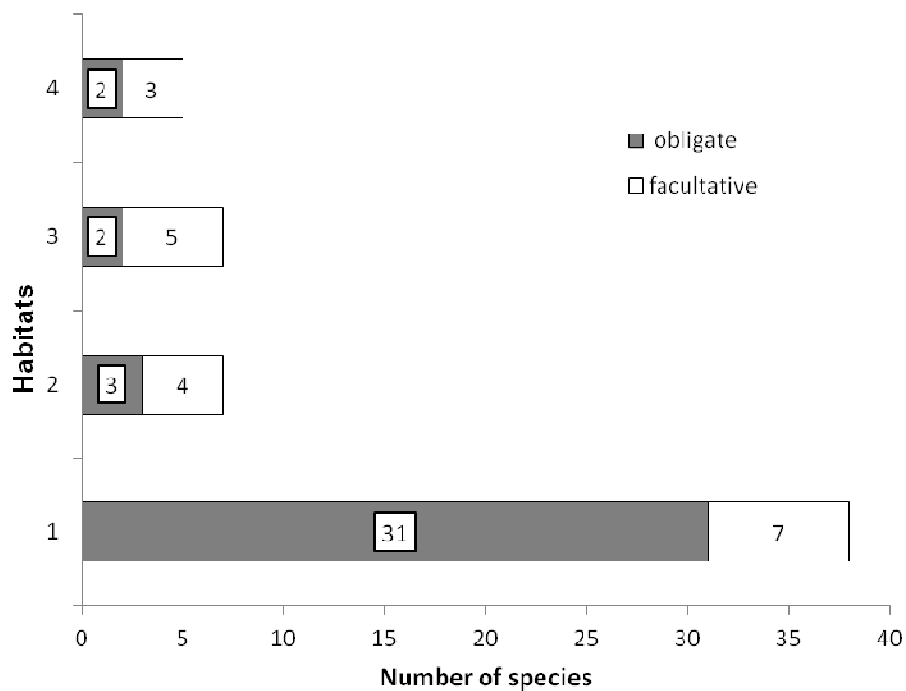


Fig. 3. Occurrence of bryophytes in the substratum types distinguished (the present state). 1 – soil, 2 – bark of living trees, 3 – rotten wood, 4 – water.



Fig. 4. Acute-leaved Bog-moss *Sphagnum capillifolium*, species strictly protected in Poland, in the „Mały Lasek” ecological area (photo by A. Stebel, September 2009).