



LIVERWORTS OF THE NATURE RESERVES IN WIELKOPOLSKA. 4. “DOLINA KAMIONKI”

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ABSTRACT. A list of liverworts in the reserve “Dolina Kamionki” is presented. Altogether, eleven species were catalogued (*Conocephalum salebrosum*, *Chiloscyphus pallescens*, *Lophocolea bidentata*, *Lophocolea heterophylla*, *Lophocolea minor*, *Marchantia aquatica*, *Metzgeria furcata*, *Pellia endiviifolia*, *Plagiochila asplenioides*, *Ptilidium pulcherrimum* and *Radula complanata*). Phytosociological documentation and description of phytocoenoses of *Pellio-Conocephaletum* from the reserve are given.

KEY WORDS: liverworts, *Pellio-Conocephaletum*, Dolina Kamionki, nature reserves, Wielkopolska region, Poland

INTRODUCTION

The paper continues material studies on hepaticoflora of nature reserves in Wielkopolska. Previous articles concerned the following reserves: “Las Łęgowy w Dolinie Pomianki” (GÓRSKI 2006 a), “Olbina” (GÓRSKI 2006 b) and “Dąbrowa koło Biadek Krotoszyńskich” (GÓRSKI 2006 c). “Dolina Kamionki” nature reserve protects a part of the Kamionka river valley, cutting high hillocks of end moraine. The natural arrangements that survived here have high degree of naturalness, due to diversified relief and hydrological conditions in the vicinity of the river, which eliminated economic use of the area. This region has been of interest of biologists for a long time, especially the researchers from the Department of Botany (August Cieszkowski Agricultural University). Their efforts have resulted in establishing the “Dolina Kamionki” nature reserve. Geobotanical studies carried out in the area have concerned mainly vascular plants and plant communities (STEFANEK and KICIŃSKA-NABZDYK 1974, 1978, STEFANEK 1978, KRÓL and STEFANEK 1979, STEFANEK and ANTKOWIAK 1994 a, b, STEFANEK-PAŃCZUK and ANTKOWIAK 1997). Mosses of “Dolina Kamionki” have been catalogued by URBAŃSKI (2006).

Field studies were carried out in 2006-2007. Besides floristic cataloguing, phytosociological documentation of the *Pellio-Conocephaletum* Maas 1959 – a helocrenic spring association that had no relevé documentation from Wielkopolska, was collected. Nomenclature and depiction was applied according to SZWEYKOWSKI (2006), OCHYRA et AL. (2003), MIREK et AL. (2002), and – for plant communities, according to BRZEG and WOJTERSKA (2001).

PROFILE OF THE RESERVE

General data

The “Dolina Kamionki” nature reserve functions under the regulation no. 30/2004 of Wielkopolski Voivod from 18 March 2004 (Dz. Urz. Woj. Wielkopolskiego No. 41 pos. 1004). The reserve has been founded to “preserve a complex of river valley ecosystems and their characteristic plant species for scientific and educational purposes”.

The reserve is situated in the Wielkopolskie Voivodship, Międzyzchód district, and Międzyzchód commune. In geobotanical classification of Poland (SZAFFER 1977), the reserve is situated in the Lubuski District. The area of the reserve (59.16 ha) belongs to the treasury and is under management of PGL Lasy Państwowe (National Forest Authority), Forest Inspectorate Bolewice (Papiernia Forestry). In the organization plan of the Forest Inspectorate Bolewice, the area of the reserve is appointed as units: 4c, d, f, g, h, i, j, l, m, n, o, p, r, 5a, b, 7a, b, f, g, 8a, b, c, d (Fig. 1).

Geological characteristics and relief

The Valley of the Kamionka River is a deep gutter, moulded by thaw waters of the Baltic glacier (Poznań stadial). The valley runs meridionally from Lewice to Międzyzchód, where it joins with the ice-marginal valley of Warta. The area of the reserve encompasses a region where the river flows through high hillocks of end moraine. Deep indentation opens water-bearing beds, which means occurrence of spring areas supplying the Kamionka river. The edges of the valley are steep, with inclination up to 40° and eastern (left bank) or western (right bank) exposition. The slopes are crossed by ravines

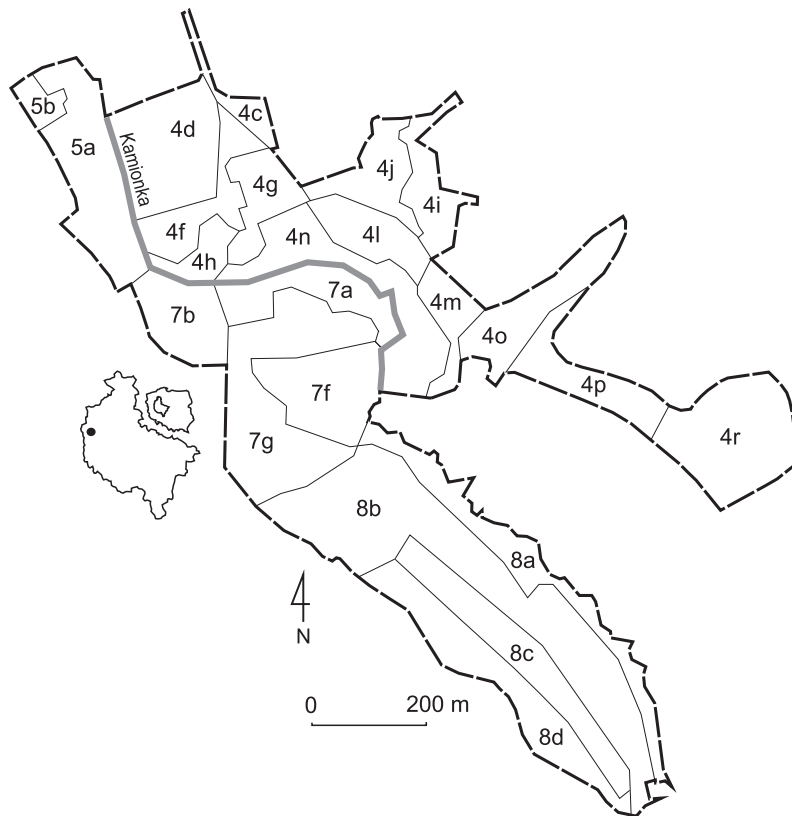


FIG. 1. Survey map of the "Dolina Kamionki" nature reserve

of various inclination. The two deepest ones are located in subunit 4r and contain spring areas with streams.

The Kamionka river flows through the reserve from south to north. In the central part, the river bends. Such a shape slows down the flow and causes swamping on the southern side of the bend.

Soils and habitat types of the forest

The relief determines distribution of soil types in the reserve. Two distinct regions can be distinguished: the bottom of the valley with high level of subsoil waters, and steep slopes of the valley, where subsoil waters lie a few meters below the ground.

Brown soils made of heap clay and clay sands can be found in the valley slopes, whereas hydrogenic soils are at the bottom of the valley. The following soil types were localized in the reserve: low peats (units 4d, 5a and 7f), peat muck soils (parts of units 4d, n, 5a, 7a, b, f, 8a), delivial brown soil (the border of units 8b and 8a, unit 4i and j), acid brown soil (subunits 4f, g, and 8b), rust brown soil (subunits 8c and d), and fawn brown soil (subunit 7g) (Plan Urządzenia Lasu Nadleśnictwa Bolewice 2006-2015).

The following habitat types of the forests occur in the reserve:

- ash forest (OJ): subunits 4n, 5a, 7a and 8a,
- alder forest (OI): subunits 4d, 7b and f,
- fresh forest (Lśw): 4i, j, m, r, 7g, 8b, c and d,
- mixed fresh forest (LMśw): 4c, f, g, o and p.

Surface waters

Several streams flow off spring areas of slopes. Highly moisturized bottom of the valley forms permanent swamps (subunits 7f, 5a, 4h, and 4l). The Kamionka river

flows through the valley; however, as of 2007, it does not belong to the reserve.

Current vegetation of the reserve

High variability of geomorphological-geological and hydrological conditions in the reserve has led to rich catalogue of plant communities. The biggest area is covered by forest ecosystems, i.e. oak-hornbeam forest (*Galio sylvatici-Carpinetum*) and alder forests (*Carici elongatae-Alnetum*). Alder-ash forests (*Fraxino-Alnetum*), acid beech forests (*Luzulo pilosae-Fagetum*) and substitute communities (mostly on mixed forest habitat) have lesser participation. Reed and sedge areas as well as overgrowing meadows can be found in alder and alder-ash forests. Wellhead helocrenic spring communities with patches of *Cardamino-Chrysosplenietum alternifolii* Maas 1959 and *Pellio-Conocephaletum* Maas 1959 are a plant cover phenomenon of the reserve.

RESULTS

Liverwort flora

Eleven species of liverworts were found in the "Dolina Kamionki" nature reserve. Thallom liverworts, connected with runny or flow water are especially rich. *Pellia endiviifolia* and *Conocephalum salebrosum* occur in helocrenic spring communities near small watercourses. They form seepage spring areas of *Pellio-Conocephaletum* type or aggregative patches with domination of one of those species. Another ground species is *Plagiochila asplenioides*, an indicator plant for forests of high level of naturalness, determined by CIEŚLIŃSKI ET AL. (1996) as a relict of primeval forests. A moss from this group in

the reserve is *Homalia trichomanoides* (URBAŃSKI 2006). It is worth to note a presence of *Lophocolea minor*, an epigeic species that is rare in Wielkopolska. Epiphytic liverworts, i.e. *Radula complanata* and *Metzgeria furcata*, are frequent in unit 8b, in lower parts of slopes, where oak-hornbeam forest with high participation of beech borders with alder forest. They grow mostly on stately sycamore maples, and also on beeches, ashes, and even horse chestnuts. Epixylic liverworts typical for deciduous forests were not found in the reserve, with the exception of common *Lophocolea heterophylla*. The lack of epixylic liverworts is caused by low amount of well-decomposed dead wood in the forest bottom.

List of species

Abbreviations: 4r, 8a – nos. of forest units numery

Conocephalum salebrosum Szweyk. et al. – soily slope, near watercourse (4l and 4r); on soil of slopes near Kamionka river (8a); on soil near stream (8b),

Chiloscyphus pallescens (Ehrh. ex Hoffm.) Dumort. – on soil near river, 8a,

Lophocolea bidentata (L.) Dumort. – on slope (4c); on soil in helocrenic spring (4l),

Lophocolea heterophylla (Schrad.) Dumort. – present in every forest unit, on dead and live wood, less frequent on soil,

Lophocolea minor Nees – on soil of slope in *Galio-Carpinetum*, 4l,

Marchantia aquatica (Nees) Burgeff – on soil, 8b,

Metzgeria furcata (L.) Dumort. – rotten trunk and bark of *Fagus sylvatica* (4r); on *Acer platanoides*, less frequent on *Fagus sylvatica* (8b),

Pellia endiviifolia (Dicks.) Dumort. – in ditch (4r); unit 4l, on stone in helocrenic spring (4l); on soil near Kamionka river (8a); on soil and stones in helocrenic spring (8b),

Plagiochila asplenioides (L. emend. Taylor) Dumort. – in helocrenic spring (4l); on soil near Kamionka river (8a); on stone in a stream (8b),

Ptilidium pulcherrimum (G. Weber) Vanio – on bark of *Betula pendula* (4i),

Radula complanata (L.) Dumort. – on bark of *Acer platanoides*, less frequent on *Fagus sylvatica*, *Fraxinus excelsior*, and even *Aesculus hippocastanum*, 8b.

commutata and *Rhizomnium punctatum*. Rich habitat is emphasized by constant, albeit small dash of other mosses, i.e. *Mnium hornum*, *Fissidens taxifolius*, and vascular plants: *Aegopodium podagraria*, *Viola reichenbachiana*, *Galeobdolon luteum* and *Brachypodium sylvaticum*.

In Wielkopolska, the association *Pellio-Conocephaletum* is directly endangered (category E; BRZEG and WOJTERSKA 2001).

TABLE 1. Phytocoenoses of *Pellio-Conocephaletum* Mass 1959 in "Dolina Kamionki" nature reserve

No.	1	2	3	4
No. of relevé	21	20	22	7
Moss cover d (%)	90	80	95	95
Herb cover c (%)	2	2	2	2
Forest unit	4l	4r	8a	8a
ChAss. Pellio-Conocephaletum				
<i>Pellia endiviifolia</i> (p.max.p. v. <i>furcigera</i>)	2b.2	2a.2	1.2	1.2
<i>Conocephalum salebrosum</i>	.	3.4	4.4	3.4
ChCl. Montio-Cardaminetea				
<i>Palustriella commutata</i>	.	1.2	1.2	3.3
<i>Rhizomnium punctatum</i>	1.2	+	.	.
<i>Cratoneuron filicinum</i>	1.2	.	.	.
ChCl. Querco-Fagetea				
<i>Galeobdolon luteum</i>	.	+	+	+
<i>Plagiomnium undulatum</i>	.	.	.	2.1
<i>Pulmonaria obscura</i>	.	.	.	+
<i>Viola reichenbachiana</i>	.	+	.	.
<i>Aegopodium podagraria</i>	+	.	.	.
<i>Brachypodium sylvaticum</i>	r	.	.	.
Others				
<i>Oxyrrhynchium hians</i>	1.2	1.1	1.2	.
<i>Mnium hornum</i>	+	1.2	.	+
<i>Oxalis acetosella</i>	.	.	+	+
<i>Fissidens adianthoides</i>	3.2	.	.	.
<i>Lophocolea bidentata</i>	1.1	.	.	.
<i>Fissidens taxifolius</i>	.	2.1	.	.
<i>Brachythecium rutabulum</i>	.	+	.	.
<i>Rosulabryum capillare</i>	.	.	1.2	.
<i>Deschampsia caespitosa</i>	r	.	+	.

PHYTOCOENOSES OF PELLIO-CONOCEPHALETUM

Phytocoenoses *Pellio-Conocephaletum* are present in the reserve in the vicinity of spring areas, at the bottom of slopes, moraine embankments, and near outflows of water. The phytocoenoses grow on soil of slopes where water drips permanently or even temporary. They were recorded in forest units 4f, 4l and 8a and occur in rich deciduous forests, mainly *Galio-Carpinetum*, in complex with *Cardamino-Chryso-splenietum alternifolii*, or in spring areas with domination of *Palustriella commutata*.

Liverworts, mostly *Conocephalum salebrosum* and *Pellia ediviifolia* var. *furcigera* dominate in the plant cover of patches (Table 1). Besides liverworts, the phytocoenoses include spring area mosses, i.e. *Palustriella*

Threats for liverwort flora

A potential threat for liverwort flora, especially epiphytes, is any activity that changes humidity inside forest ecosystems in the reserve (KLAMA 2003, 2004, GÓRSKI and URBAŃSKI 2005). These are losing the forest stand, removing the brushwood or any actions leading to wind-driven drying out. It is important to leave dead wood at the bottom of the forest. Current water conditions of the valley, including its purity, should be preserved. The Kamionka river should be included into the reserve area as soon as possible, as this will facilitate defining protection tasks (the river determines the nature of the entire reserve).

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