

## HERBARIUM DATA ON BRYOPHYTES FROM THE EASTERN PART OF LITHUANIA (1934–1940) IN THE CONTEXT OF SCIENCE HISTORY AND LANDSCAPE CHANGES

Ilona JUKONIENĖ\*, Monika SUBKAITĖ, Aurika RIČKIENĖ

Nature Research Centre, Institute of Botany, Žaliūjū Ežerų Str. 49, Vilnius LT-08406, Lithuania

\*Corresponding author. E-mail: [ilona.jukoniene@gamtc.lt](mailto:ilona.jukoniene@gamtc.lt)

### Abstract

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The paper deals with bryophytes collected by Polish researchers from the mires in the eastern part of Lithuania in 1934–1940 and deposited at the Herbarium of W. Szafer Institute of Botany, Polish Academy of Sciences (KRAM). The collection provides data on bryophyte diversity and distribution patterns in the mires of Lithuania. The collection (868 specimens) was revised in 2016–2017. Almost 90% of all herbarium specimens were collected by Irena Dąbkowska. The specimens were identified by the collectors themselves or by Polish bryologist Zygmunt Czubiński; 254 specimens of the collection were not identified. After revision, a total of 112 bryophyte species were ascertained in the collection, two of these (*Palustriella decipiens* and *Polytrichum swartzii*) have not been reported to Lithuania before. The specimens were collected in 47 localities, the mires in nearly half of them at the moment are disturbed due to drainage or use for peat extraction. Information about the localities of rare species *Hamatocaulis vernicosus*, *Meesia triquetra* and *Mesoptychia rutheana* is valuable for the estimation of their population status.

**Keywords:** bogs, drainage, fens, Irena Dąbkowska, KRAM, mires, transitional mires.

### INTRODUCTION

Herbarium is an integral part of research on plant diversity. A specimen stored in a herbarium is an archive document, which proves species distribution in a certain territory and habitat at a certain time. The survey of herbarium data reveals species new to particular territories of science (ANDRIUŠAITYTĖ & JUKONIENĖ, 2000; BEBBER et al., 2010; ELLIS & HARRINGTON, 2009); adjust species ranges and tendencies of distribution (WOODS et al., 2005; LOISELLE et al., 2008; VIGALONDO et al., 2016). Along with the scientific advances, recently, the specimens have become a subject for biochemical and genetic studies (COZZOLINO et al., 2007; HERPIN, 1997; NIELSEN et al., 2017). The current use of herbaria follows scientific advances and social priorities (BESNARD et al., 2018). Despite herbaria are gold mine of information

in plant studies, due to various reasons, especially inadequate funding, natural history collections for years remain inaccessible to researchers or are being closed (FUNK, 2004).

Since the late 20th century, herbarium data on bryophytes in Lithuania have been used for the assessment of bryophyte diversity and distribution patterns, checking of rare species localities, evaluation of population changes and compiling protected species lists (ANDRIUŠAITYTĖ & JUKONIENĖ, 2000; JUKONIENĖ, 2003, 2007; SÖDERSTRÖM, 1996, 1998; SÖDERSTRÖM et al., 2002). The analyses were based on the data from the Herbaria of Vilnius University (WI) and the Institute of Botany (BILAS), collected by local researchers. Due to historical conditions, some areas of the present territory of Lithuania at the beginning of the 20th century were investigated by the researchers from other countries. In 1919–1939,

Vilnius Region functioned as part of Poland. For the development of education and science, Polish government reopened Vilnius University at the end of August 1919 and named it Stephen Batory University (Uniwersytet Stefana Batorego). The task of the University was to organize studies in Vilnius Region, to prepare educated generation, which should restore economics and agriculture in the territory. For nature studies, the Department of Mathematics and Nature was established. Its stuff, like in all European Universities, investigated biodiversity, structure of different ecosystems, etc. However, the economic difficulties of the state and insufficient financing caused slow development of investigations on huge ecosystems such as mires, which requires significant human resources. To achieve greater results, special projects with the specialists from Poland scientific institutions were initiated. So, in 1933–1937, a project started, which enhanced the studies on peatlands in the north-eastern part of Poland, i.e. also Vilnius Region. It was performed in collaboration with the scientists from the State Institute of Geology in Warsaw and the researchers from the Department of Minerology and Petrography of the University of Stephen Batory. The project was supported by the Polish National Fund of Culture (KÖHLER, 2003; the archive data LCSA, f. 175). The research was in accordance with the general trends in peatland research and assimilation in Europe. The growth of peat manufacturing industry in Europe started in the second half of the 19th century and it became widespread by the second half of the 20th century (GERDING et al., 2015). The main aim of wetland studies was to clarify prevalence of peat bogs and their occurrence conditions in order to use peat in the construction of houses, fertilization of the fields, for storage of products, etc. Besides peatland studies in Vilnius Region, from the beginning till the middle of the 20th century, wetlands were also widely explored habitats in other parts of Lithuania. Peatlands of Klaipėda Region, which belonged to Germany from the middle of the 19th century till 1923, were investigated by German botanists C.A. Weber, H. Reimers and K. Hueck. Lithuanian botanists under supervision of K. Brundza performed studies in Kamanos and Šepeta mire complexes. The data obtained during the investigations of German and Lithuanian botanists were presented in exhaustive monographs (WEBER, 1902; REIMERS & HUECK, 1929; BRUNDTA,

1937, 1940). Though studies on vegetation of peatlands in Vilnius Region have not been presented in detail in the publications, it is known that during the research a large herbarium has been collected. STACH (1938) has confirmed that one of the main researchers of the project Irena Dąbkowska has submitted 425 plant specimens from peatlands in Vilnius region to the Physiographic Museum of the Polish Academy of Agriculture (PAA). P. Köhler (2003) has noted that in 1936 I. Dąbkowska submitted to the museum 500 specimens of bryophytes from Vilnius Region and that now part of this collection belongs to the Herbarium of W. Szafer Institute of Botany, Polish Academy of Sciences (KRAM). So far, neither the collection of vascular plants nor of bryophytes have been explored to evaluate plant diversity and distribution patterns in Lithuania till now.

I. Dąbkowska's bryophyte collection from Vilnius Region was analysed by Zygmunt Czubiński in 1947, who stated that it consisted of 80 moss, 21 *Sphagnum* and five liverwort species from the wetlands of Vilnius and Navahrudak provinces. His preliminary review shows that this historical material can provide valuable information on bryophyte diversity and be significant for the evaluation of landscape changes in bryoflora of Lithuania. This was our main challenge, when we started exploring I. Dąbkowska's bryophyte collection at KRAM Herbarium in 2016.

## MATERIALS AND METHODS

At the KRAM Herbarium, we studied over 1000 bryophyte specimens from the localities that during the period of the collection belonged to Švenčionys and Vilnius–Trakai counties. A total of 868 specimens were selected for the analysis.

Currently, the territories of Švenčionys and Vilnius–Trakai counties belong to Lithuania and Belarus. By using historical maps (MAPSTER, 2012), we ascertained, which locality belongs to the present territory of Lithuania. In the case when several localities had the same name, other indications (date of collection, rivers, lakes, etc.) on the labels were used. The localities that currently belong to Belarus were excluded from the analysis. The exception was the territories occurring near the boundary of Lithuania – Romanishki, Rudnia, Sharkaŭshchyna (Szarkovszczyzna) (near the River Struna). Indication of these territories

on the labels means that the specimens could be collected both in Lithuania and Belarus.

Before our revisions, over 600 specimens were identified by Polish researchers, registered and deposited at the KRAM Herbarium. On the labels of unidentified specimens, the locality, habitat, date of the collection and the collector were indicated (sometimes only the locality). After the determination, the specimens were split and, besides the KRAM, inserted also into the Herbarium of the Institute of Botany, Nature Research Centre, Vilnius (BILAS).

For the current view of the mires, aerial images 2016 from HMIT-BALTIC (2001–2019) were used.

Moss species names follow HILL et al. (2006) (except the genus *Niphotrichum*, species names of which are provided according to OCHYRA et al. (2003)), those of liverworts – SÖDERSTRÖM et al. (2016).

Protected bryophyte species were provided according to the list approved by the Minister of Environment of Lithuania (LIETUVOS APLINKOS MINISTRAS, 2018).

Locality names are provided according to state languages of the countries to which they belong (Lithuanian or Belarus (Latin spelling)).

The biographical data of Polish researchers were taken from special biographical papers (KÖHLER, 2003; CELIŃSKI, 1968), digital resources (iPSB, 2014), Lithuanian Central State Archive (LCSA f. 175). We also used information from personal discussions with Polish bryologist Professor R. Ochyra. To justify and explain the compilation of the bryophyte collection from Vilnius Region in the KRAM, we used original publications of collectors and identifiers (DĄBKOWSKA, 1937, 1938; CZUBIŃSKI 1947; CZUBIŃSKI & ŚWITALSKA, 1937).

## RESULTS

### Collectors and Identifiers

The studied material was collected in 1936–1940 (Fig. 1). Most specimens were collected by I. Dąbkowska (Table 1). Part of the material (about 30%) was collected by E. Kulikowska and I. Rejment in 1938.

Only one third of the specimens were determined by their collectors. Nearly 20% of the material was determined by Z. Czubiński (Table 1). Among those who identified the collections, we found also the

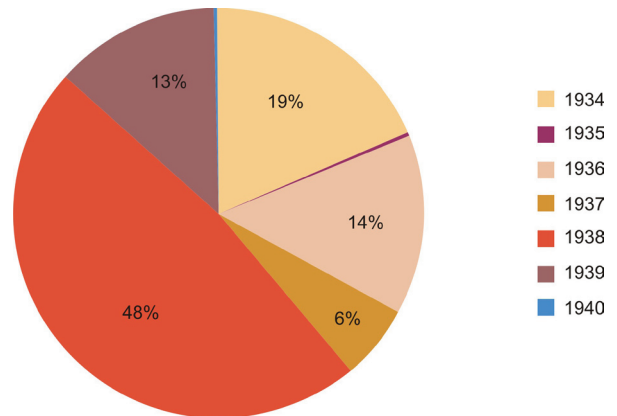


Fig. 1. Percentage of bryophyte specimens from the eastern part of Lithuania (KRAM), collected in different years (1934–1940)

Table 1. Collectors and identifiers of bryophyte specimens from the eastern part of Lithuania (KRAM)

Researcher	Number of specimens	
	Collected	Determined
Z. Czubiński		186
I. Dąbkowska	736	266
E. Kulikowska	99	78
I. Rejment	21	42
H. Świtalska		42
Unknown	12	

name of H. Świtalska. Part of the collection (254) was not identified.

### The sites and habitats investigated

The studied material was collected from 44 localities in the present territory of Lithuania and from three localities that currently occur in Belarus, but are very close to the border of Lithuania (Fig. 2, Table 2).

The data on bryophyte diversity from the territories are different. From nearly half of the localities less than 10 specimens were collected. The largest number of the specimens was collected near Svirkiškė and Šarkaūshchyna. The territories with the highest number of bryophyte species were in accordance with those, where the collected number of the specimens was the largest – Svirkiškės and Šarkaūshchyna (Table 2).

The habitat was indicated on 70% of the specimen labels. Half of the specimens were collected in transitional mires, the other half – quite evenly in bog and fens. Other habitats (mixed forests, dry pine forests) made a small part of the collection (Fig. 3).

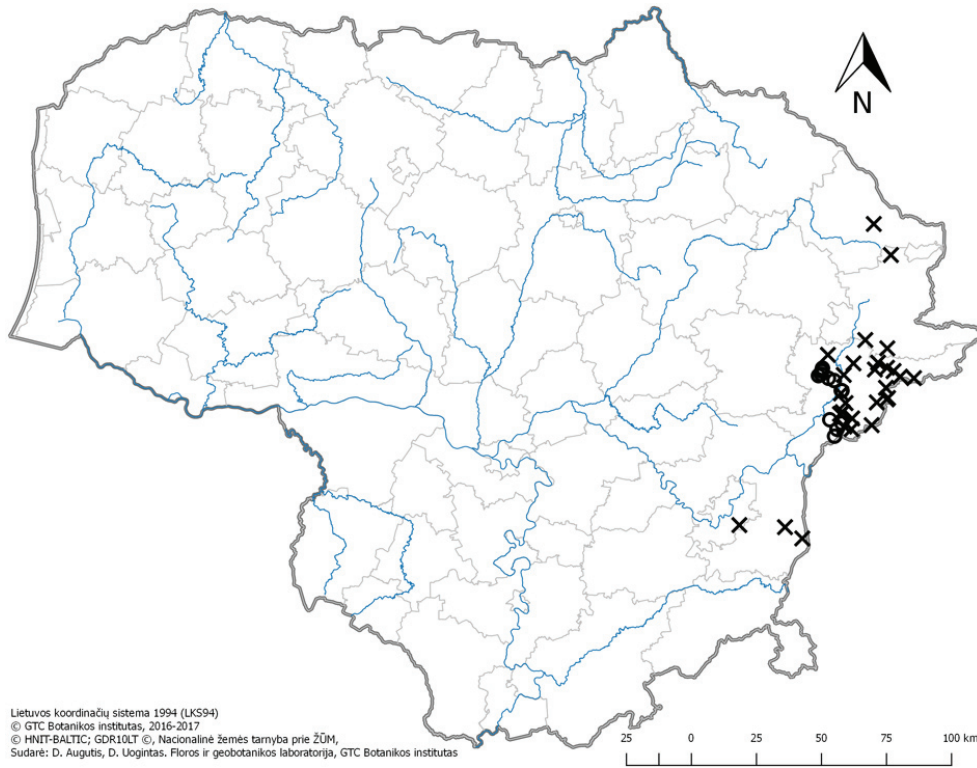


Fig. 2. Map of localities in which bryophyte specimens were collected by I. Dąbkowska and other Polish researchers in 1934–1940. Disturbed mires are marked with x

### Bryophyte diversity

A total of 113 species were ascertained from eastern Lithuania (Table 3), of these only five liverwort species (*Calypogeia trichomanis*, *Fuscocephalozia connivens*, *Marchantia polymorpha*, *Mesoptychia rutheana* and *Mylia anomala*). The species *Sphagnum magellanicum* (64 specimens), *Polytrichum strictum* (45), *Calliergonella cuspidata* (38), *Sphagnum capillifolium* (35), *Sphagnum fuscum* (33), *Aulacomnium palustre* (29 specimens), *Hamatocaulis vernicosus* (28) and *Bryum pseudotriquetrum* (25) were presented most abundantly.

After the revision of 614 specimens identified previously, 94 bryophyte species were revealed; 542 previous assignments of the species were confirmed, 72 of the specimens were re-determined. The result of re-determinations – two bryophyte species new to Lithuania: *Palustriella decipiens* (two localities) and *Polytrichum swartzii* (one locality).

Among the specimens that were without determination, 72 species were ascertained; of these, 41 species were the same as among the revised specimens, 31 species were new.

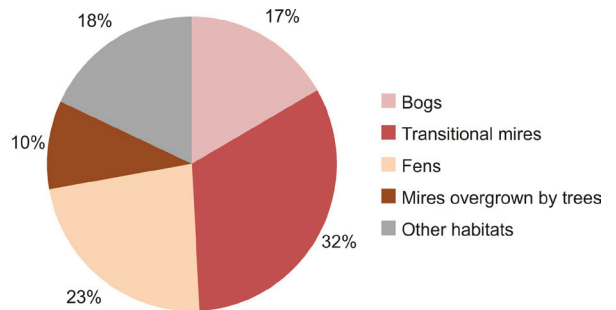


Fig. 3. Percentage of bryophyte specimens from the eastern part of Lithuania (KRAM), collected in various habitats

### Anthropogenic activity

The comparison of historical and recent maps revealed that nearly half of the mires investigated in 1934–1940 have been disturbed (Fig. 2). On the other hand, some of the studied peatlands have been included into the protected territories: the Girutiškis Strict Nature Reserve (Balinis, Petrežeris, Verlinas), the Baltasamanė Telmological Reserve (Akolionėja), the Perūnas Telmological Reserve (Acintas and Perūnas).

The studied material covered the data on distribu-

Table 2. Localities of the bryophyte specimens collected in the mires of the eastern part of Lithuania in the first half of the 20th century

Original name of the locality	The name indicated on the label	District	Protected territory	Number of specimens	Number of species
Acintas	Ocieniec	Švenčionys	Perūnas Telmological Reserve	68	35
Aidukai	Hajduki	Švenčionys	Sirveta Regional Park	11	8
Akolionėja	Okolonia	Švenčionys	Baltasamanė Telmological Reserve	30	19
Aliai	Ole	Švenčionys		24	16
Antaliedė	Antoledzie	Švenčionys	Labanoras Regional Park	2	1
Antasarė	Antresory	Švenčionys		1	1
Ažuraistis	Ažurojscie	Švenčionys		1	1
Balinis	jez. Balinis	Švenčionys	Girutiškis SNR	30	12
Bevainiškė	Bewojniszki	Švenčionys		6	6
Ceikiniai	Cejkinie	Ignalina		1	1
Darinė	Darynie	Švenčionys		2	1
Dūkštas	Dukszty	Ignalina		7	7
Dvilonys	Dzwilany	Švenčionys		12	7
Gražuliai	Grazule	Švenčionys		7	7
Guriai	Gory	Vilnius		3	3
Januliškis	Januliszki	Švenčionys	Labanoras	6	6
Juodenis	Jodianis	Švenčionys		2	2
Karosinėlis	Karasiowka	Švenčionys		19	14
Kazitiškis	Kozaczyzna	Ignalina		2	2
Kena	Kiena	Vilnius		25	17
Kirdeikiškė	Kirdejkiški	Švenčionys		11	8
Kisieliškės	Kisieliszki	Vilnius		2	2
Paglūstė	Poglusze	Švenčionys		8	8
Pagulbinė	Pogulbino	Zarasai		11	8
Pailgis	Poilga	Švenčionys		5	3
Papelekiai	Popieliki	Švenčionys		16	13
Pašaminė	Poszumien	Švenčionys		1	1
Perūnas	Piorun	Švenčionys	Perūnas telmological reserve	17	12
Petrežeris	jez. Petražoris	Švenčionys	Girutiškis SNR	58	18
	Pohulanka	Švenčionys		1	1
	Powejnie	Švenčionys		1	1
Raudonalaukis	Czerwone Pole	Švenčionys		1	1
Romanishki	Romaniszki	Belarus		8	7
Rudnia	Rudnia	Belarus		1	1
Sakalninkai	Sokolniki	Vilnius		2	2
Šarkaūshchyna	Szarkowszczyzna	Belarus		180	54
Staškai	Staszki	Švenčionys		4	4
Sudota	Sudata	Švenčionys		11	8
Svirkiškė	Swirkiszki	Švenčionys		135	48
Šumskas	Szumsk	Vilnius		45	31
Švenčionėliai	Nowe Swiecziany	Švenčionys		23	16
Tadarina	Teodoryno	Švenčionys		7	7
Tartakas	Tartaki	Švenčionys		19	17
Trys pušys	Trzy sosny	Švenčionys		2	1
Vajuonis	jez. Wajunie	Ignalina		7	6
Verlino ežeras	jez. Werpšcinis	Švenčionys	Girutiškis SNR	19	13
Vitalina	Witulino	Švenčionys		5	4
Žasinais	Zusiny	Švenčionys		9	7



Table 3. List of bryophyte species collected in the eastern part of Lithuania in 1934–1940 by Polish botanists

Species	Number of specimens	Number of localities
<i>Abietinella abietina</i> (Hedw.) M. Fleisch.	6	3
<i>Amblystegium subtile</i> (Hedw.) Schimp.	1	1
<i>Antitrichia curtipendula</i> (Hedw.) Brid.	1	1
<i>Aulacomnium palustre</i> (Hedw.) Schwägr.	29	17
<i>Brachytheciastrum velutinum</i> (Hedw.) Ignatov & Huttunen	2	1
<i>Brachythecium rutabulum</i> (Hedw.) Schimp.	1	1
<i>Brachythecium salebrosum</i> (Hoffm. ex F. Weber & D. Mohr) Schimp.	2	2
<i>Bryum pseudotriquetrum</i> (Hedw.) P. Gaertn.	25	18
<i>Callicladium haldanianum</i> (Grev.) H.A. Crum	1	1
<i>Calliergon cordifolium</i> (Hedw.) Kindb.	3	2
<i>Calliergon giganteum</i> (Schimp.) Kindb.	16	11
<i>Calliergonella cuspidata</i> (Hedw.) Loeske	38	22
<i>Calypogeia trichomanis</i> (L.) Corda	1	1
<i>Campylium protensum</i> (Brid.) Kindb.	2	2
<i>Campylium stellatum</i> (Hedw.) Lange & C.E.O. Jensen	20	9
<i>Ceratodon purpureus</i> (Hedw.) Brid.	1	1
<i>Cinclidium stygium</i> Sw.	1	1
<i>Climacium dendroides</i> (Hedw.) F. Weber & D. Mohr	13	10
<i>Cratoneuron filicinum</i> (Hedw.) Spruce	3	3
<i>Dicranella cerviculata</i> (Hedw.) Schimp.	1	1
<i>Dicranum bonjeanii</i> De Not.	8	1
<i>Dicranum flagellare</i> Hedw.	6	3
<i>Dicranum flexicaule</i> Brid.	1	1
<i>Dicranum montanum</i> Hedw.	5	4
<i>Dicranum polysetum</i> Sw.	13	7
<i>Dicranum scoparium</i> Hedw.	9	10
<i>Dicranum undulatum</i> Schrad. ex Brid.	7	4
<i>Drepanocladus aduncus</i> (Hedw.) Warnst.	10	3
<i>Drepanocladus sendtneri</i> (Schimp. Ex. H. Mull.) Warnst.	4	3
<i>Eurhynchiastrum pulchellum</i> (Hedw.) Ignatov & Huttunen	2	1
<i>Eurhynchium angustirete</i> (Broth.) T.J.Kop.	1	1
<i>Fissidens adianthoides</i> Hedw.	10	5
<i>Fontinalis antipyretica</i> Hedw.	2	2
<i>Funaria hygrometrica</i> Hedw.	1	1
<i>Fuscocephaloziopsis connivens</i> (Dicks.) Váňa et L. Söderstr.	3	3
<i>Hamatocaulis vernicosus</i> (Mitt.) Hedenäs	28	15
<i>Helodium blandowii</i> (F. Weber & D. Mohr) Warnst.	11	10
<i>Hylocomium splendens</i> (Hedw.) Schimp.	9	7
<i>Hypnum cupressiforme</i> Hedw.	4	3
<i>Hypnum pallescens</i> (Hedw.) P. Beauv.	1	1
<i>Leptodictyum riparium</i> (Hedw.) Warnst.	1	1
<i>Leucobryum glaucum</i> (Hedw.) Ångstr.	1	1
<i>Marchantia polymorpha</i> L.	1	1
<i>Meesia triquetra</i> (L. ex Jolycl.) Ångstr.	7	4
<i>Mesoptychia rutheana</i> (Limpr.) L. Söderstr. et Váňa	2	1
<i>Mylia anomala</i> (Hook.) S. Gra	1	1
<i>Niphotrichum canescens</i> (Hedw.) Bednarek-Ochyra et Ochyra	2	1
<i>Odontoschisma denudatum</i> (Mart.) Dumort.	1	1
<i>Oxyrrhynchium hians</i> (Hedw.) Loeske	1	1
<i>Paludella squarrosa</i> (Hedw.) Brid.	19	11
<i>Palustriella decipiens</i> (De Not.) Ochyra	2	2
<i>Philonotis fontana</i> (Hedw.) Brid.	8	6
<i>Plagiochila asplenioides</i> (L.) Dumort.	2	1
<i>Plagiomnium affine</i> (Blandow ex Funck) T.J. Kop.	1	1
<i>Plagiomnium cuspidatum</i> (Hedw.) T.J. Kop.	4	3

Species	Number of specimens	Number of localities
<i>Plagiomnium elatum</i> (Bruch et Schimp.) T.J. Kop.	3	3
<i>Plagiomnium ellipticum</i> (Brid.) T.J. Kop.	13	10
<i>Plagiomnium undulatum</i> (Hedw.) T.J. Kop.	1	1
<i>Plagiothecium curvifolium</i> Schlieph. ex Limpr.	5	3
<i>Plagiothecium denticulatum</i> (Hedw.) Schimp.	1	1
<i>Plagiothecium laetum</i> Schimp.	1	1
<i>Pleurozium schreberi</i> (Brid.) Mitt.	18	10
<i>Pohlia nutans</i> (Hedw.) Lindb.	6	3
<i>Polytrichastrum formosum</i> (Hedw.) G.L. Sm.	1	1
<i>Polytrichastrum longisetum</i> (Sw. ex Brid.) G.L. Sm.	4	2
<i>Polytrichum commune</i> Hedw.	5	5
<i>Polytrichum juniperinum</i> Hedw.	4	4
<i>Polytrichum strictum</i> Menzies ex Brid.	45	15
<i>Polytrichum swartzii</i> Hartm.	1	1
<i>Ptilium crista-castrensis</i> (Hedw.) De Not.	5	4
<i>Pylaisia polyantha</i> (Hedw.) Schimp.	1	1
<i>Rhizomnium punctatum</i> (Hedw.) T.J. Kop.	3	2
<i>Rhytidiadelphus squarrosus</i> (Hedw.) Warnst.	5	3
<i>Rhytidiadelphus triquetrus</i> (Hedw.) Warnst.	11	8
<i>Sanionia uncinata</i> (Hedw.) Loeske	4	1
<i>Sciuro-hypnum oedipodium</i> (Mitt.) Ignatov & Huttunen	2	1
<i>Scorpidium cossonii</i> (Schimp.) Hedenäs	34	13
<i>Scorpidium scorpioides</i> (Hedw.) Limpr.	8	8
<i>Syntrichia ruralis</i> (Hedw.) F. Weber & D. Mohr	2	2
<i>Sphagnum angustifolium</i> (C.E.O. Jensen ex Russow) C.E.O. Jensen	1	1
<i>Sphagnum capillifolium</i> (Ehrh.) Hedw.	35	13
<i>Sphagnum centrale</i> C.E.O. Jensen	11	7
<i>Sphagnum contortum</i> K.F. Schultz	5	5
<i>Sphagnum cuspidatum</i> Ehrh. ex Hoffm.	5	3
<i>Sphagnum fallax</i> (H. Klinggr.) H. Klinggr.	3	3
<i>Sphagnum fimbriatum</i> Wilson	2	1
<i>Sphagnum flexuosum</i> Dozy & Molk.	2	2
<i>Sphagnum fuscum</i> (Schimp.) H. Klinggr.	33	14
<i>Sphagnum girgensohnii</i> Russow	1	1
<i>Sphagnum magellanicum</i> Brid.	64	16
<i>Sphagnum majus</i> (Russow) C.E.O. Jensen	5	4
<i>Sphagnum obtusum</i> Warnst.	8	5
<i>Sphagnum palustre</i> L.	5	5
<i>Sphagnum papillosum</i> Lindb.	6	2
<i>Sphagnum rubellum</i> Wilson	20	8
<i>Sphagnum russowii</i> Warnst.	1	1
<i>Sphagnum squarrosum</i> Crome	2	1
<i>Sphagnum subnitens</i> Russow & Warnst.	6	3
<i>Sphagnum subsecundum</i> Nees.	1	1
<i>Sphagnum teres</i> (Schimp.) Ångstr.	21	10
<i>Sphagnum warnstorffii</i> Russow	32	10
<i>Splachnum ampullaceum</i> Hedw.	3	2
<i>Straminergon stramineum</i> (Dicks ex Brid.) Hedenäs	2	1
<i>Tetraphis pellucida</i> Hedw.	5	4
<i>Thuidium assimile</i> (Mitt.) A. Jaeger	7	4
<i>Thuidium delicatulum</i> (Hedw.) Schimp.	7	4
<i>Thuidium recognitum</i> (Hedw.) Lindb.	3	2
<i>Thuidium tamariscinum</i> (Hedw.) Schimp.	2	1
<i>Tomentypnum nitens</i> (Hedw.) Loeske	25	12
<i>Trichocolea tomentella</i> (Ehrh.) Dumort.	1	1
<i>Warnstorfia exannulata</i> (Schimp.) Loeske	3	3
<i>Warnstorfia fluitans</i> (Hedw.) Loeske	3	2

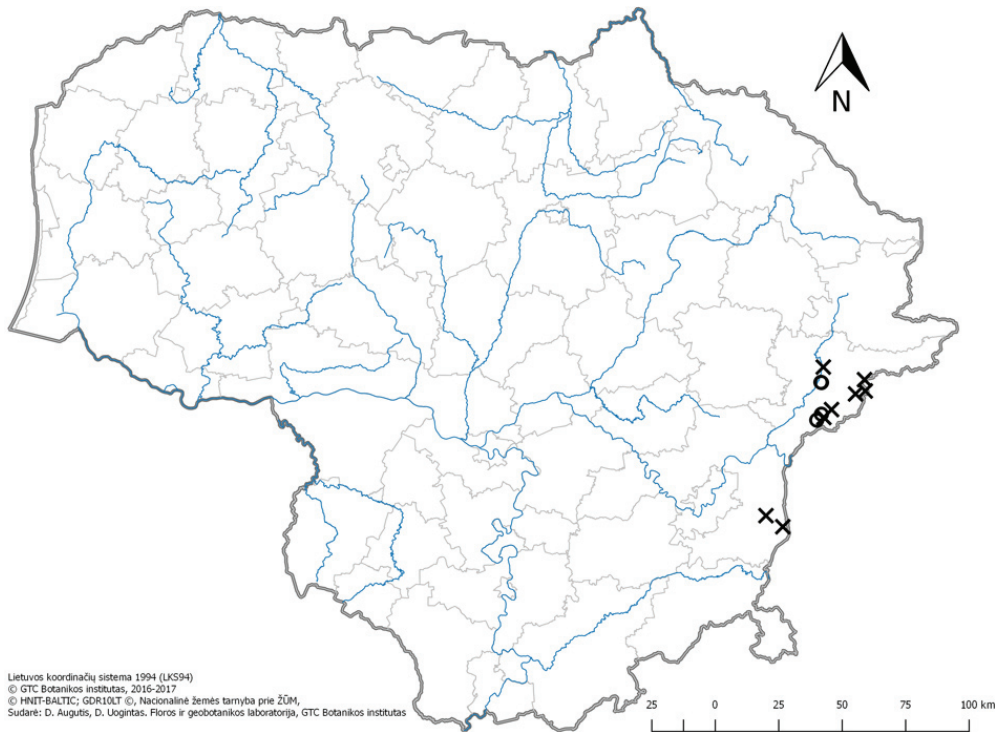


Fig. 4. Present status of the habitats of *Hamatocaulis vernicosus* recorded in the eastern part of Lithuania in 1934–1940. Disturbed localities are marked with x

tion of six bryophyte species recently included into the List of Protected Species of Lithuania: *Hamatocaulis vernicosus* (28 localities), *Meesia triquetra* (7), *Antitrichia curtipendula* (1), *Mesoptychia ruthenana* (1), *Sphagnum subnitens* (6), *Trichocolea tomentella* (1).

The only indicated locality of *Mesoptychia ruthenana* ascertained in the fens near Svirkiškė has been disturbed. Also most habitats of *Meesia triquetra* and *Hamatocaulis vernicosus* have been lost (Fig. 4).

## DISCUSSION

### Historical aspects

First, we would like to discuss biographical-historical links between collectors and identifiers and discrepancies between the literature and herbarium data.

The collector of the main part of bryophyte collection from Vilnius Region currently stored in KRAM was Irena Dąbkowska. She graduated Jagiellonian University in Krakow in 1927, and then continued studies at the Institute of Plant Systematics of the

University of Lviv (presently Ivan Franko National University of Lviv). Before starting investigations on the peatlands of Vilnius Region, she had already great experience in peatland studies. In 1930–1933, together with Professor Stanisław Kulczyński (1895–1975), she investigated the peatlands in the eastern, north-eastern and northern parts of Polesia. In 1932, she defended her doctoral thesis “Zatorfienia dolinne Łany” (Peat cover of the Łań River Valley) and gained the doctoral degree of philosophy of sciences in botany and geology. In 1930–1936, she also collaborated with Professor Bolesław Hryniewiecki from the University of Warsaw, in 1934–1938 – with scientists from the State Institute of Geology in Warsaw. In 1933, she held a permanent position of the botanist in the Museum of Physiography of the Polish Academy of Agriculture (PAA) (KÖHLER, 2003). According to P. Köhler (2003), I. Dąbkowska participated in the project for the peatland studies in the north-eastern part of Poland. In 1935, these studies included peatlands in Novohrudok and Vilnius provinces, in 1936 – Švenčionys and Michalishki counties in Vilnius province, and in 1937, the environs of the villages Swir and Kaziany (present Belarus)



were investigated. Despite the project was financed by the Polish National Fund of Culture until 1937, P. Köhler (2003) has indicated that I. Dąbkowska studied peatlands of Vilnius Region also in 1938 (exact region is not provided). The analysis of the herbarium material in the KRAM bryophyte collection also proves that the research of peatlands of Vilnius Region in 1938 was in progress and it continued in later years until 1940. The largest number of specimens from eastern Lithuania was dated back namely to 1938–1940, most of these were not identified. To date, only I. Dąbkowska's bryophyte herbarium collected in 1934–1937 has been analysed (CZUBIŃSKI, 1947). We found only few specimens collected in the eastern part of Lithuania in 1935 and 1937, because during that time, as it was stated above, mostly peatlands of present Belarus (Novohrudok province, Swir and Koziary environs) were investigated (KÖHLER, 2003).

It is important to note that in 1938, besides I. Dąbkowska, one third of the specimens were collected also by I. Rejment and E. Kulikowska. Irena Rejment (I. Rejment-Grochowska) was a doctoral student at the University of Warsaw in 1936–1939. She studied under the guidance of Professor B. Hryniewiecki, and in 1940 defended doctoral thesis on liverworts in the Silesian Beskids. Later she became a professor at the Institute of Botany of the University of Warsaw (iPSB, 2014-2019). She published the first volume of the Liverwort Flora of Poland (dealing with thallose hepatics; REJMENT, 1971) and also series of Hepatic Flora in Fresh Water Flora of Poland (PODBIELKOWSKI et al., 1986). Possibly I. Dąbkowska collaborated with I. Rejment during the time spent at the University of Warsaw, working with Prof. B. Hryniewiecki. It is interesting to notice that the specimens collected and identified by her from peatlands of Vilnius Region were not only of liverworts; they covered *Sphagnum* and other mosses. E. Kulikowska (first name unknown) probably was a collaborator of S. Kuleżyński in the project of drainage of the Polesia peatlands (R. Ochyra personal discussion). However, no data are available about this researcher and we do not know how she was relating to mire research in eastern Lithuania. In 1937–1938, during the investigations of peatlands in Vilnius Region, I. Dąbkowska headed four research groups (KÖHLER, 2003). It is not excluded that both I. Rejment and E. Kulikowska were members of some of these.

After the revision, we found that only a part of the material was determined by I. Dąbkowska or other collectors. A considerable part of the collection was determined by Z. Czubiński. Some specimens were identified by H. Świtalska, who probably cooperated with botanist Z. Czubiński from the University of Poznan. In 1937, Z. Czubiński and H. Świtalska published common work about bogs in “Wielkopolska” Region (CZUBIŃSKI & ŚWITALSKA, 1937).

### Bryophyte diversity and landscape changes

In 1947, Z. Czubiński noticed that the collection from Švenčionys and Vilnius counties collected by I. Dąbkowska was very valuable for the studies on bryoflora of Vilnius Region. All the 27 localities mentioned by Z. Czubiński for Švenčionys and Vilnius counties were also found indicated on the labels of the specimens revised by us. According to Z. Czubiński, the bryophyte collection of I. Dąbkowska consisted of 106 bryophyte species. He characterized most species as widely distributed in mire habitats, meanwhile distinguished several species (*Helodium blandowii*, *Paludella squarrosa*, *Pseudocalliergon trifarium* and *Pseudocalliergon lycopodioides*) as subglacial relicts. *Paludella squarrosa* and *Helodium blandowii* were also quite abundantly presented among the specimens studied by us. The specimens of other subglacial relict *Pseudocalliergon trifarium* were not found in the collection, despite that the specimens of other species collected in the same locality (Žąsinai) and at the same time (3 August 1936) were ascertained. We did not figure out if the specimen of *Pseudocalliergon lycopodioides*, mentioned by Z. Czubiński, was collected in the present territory of Lithuania. The full list of species from bryophyte collection of I. I. Dąbkowska in Z. Czubiński's analysis was not provided, so we could not make a more detailed comparison with the specimens ascertained during our research, though the number of species in both studies was similar.

I. Dąbkowska herself has not published any research concerning bryophyte diversity in Vilnius Region. Meanwhile, some bryophyte species (*Sphagnum fuscum*, *S. magellanicum*, *S. warnstorffii*, *Polytrichum commune*, *P. strictum*, *Pleurozium schreberi*, etc.) were mentioned in her paper in the localities of *Betula nana* in Vilnius Region (DĄBKOWSKA, 1938).

Besides ascertaining bryophyte diversity in the

peatlands of the eastern part of Lithuania, our study also revealed two new to Lithuania bryophyte species *Palustriella decipiens* (ELLIS et al., 2019) and *Polytrichum swartzii*. The main range of both species is in northern regions – boreal-arctic (*Palustriella decipiens*) and arctic (*Polytrichum swartzii*) (DIERSSEN, 2001), new data present knowledge about their distribution in the outskirts of their ranges or outside them.

Another important aspect of the historical herbarium from the eastern part of Lithuania – data on the distribution of some species are essential for the species population status assessment. *Mesoptychia rutheana* had been known from two localities before these studies, one of which is disturbed (JUKONIENĖ, 2007). The herbarium material from KRAM provided data on the second disturbed locality of the species. *Hamatocaulis vernicosus* is quite widely distributed species in the mires of Lithuania (JUKONIENĖ, 2007). Meanwhile, the studied historical data illustrated how many localities of the species have been lost (Fig. 4).

The herbarium material on bryophyte diversity in the eastern part of Lithuania collected by I. Dąbkowska alongside with the investigations carried out by J. Pipinys twenty years later (PIPINYS, 1961) make the basis for assessing the impact of landscape changes on bryological diversity in Lithuania. Nowadays, the peatlands occupy only less than 10% of the landscape and are one of the most threatened ecosystems in the country. Since the beginning of the 20th century, a lot of natural peatlands have been drained and transformed into land suitable for agriculture. The drainage of the wetlands was especially intensive in the 60s of the 20th century. As a result, about 70% of the peatlands have been disturbed or their natural processes have been interrupted (POVILAITIS et al., 2011). Polish researchers have investigated mostly transitional mires and fens, which dominate among other Lithuanian peatlands (8% of the Lithuanian area) (TAMINSKAS et al., 2011). Most of these are found in the studied area – the Rivers Dauguva basin and Žeimena sub-basin. As most of the mires are quite small in size, peat extraction in the region is developed less. Meanwhile, a lot of fens and transitional mires have been drained for agricultural purposes. Nowadays, more than 75% of these are affected by drainage and its impact on landscape changes is unquestionable (TAMINSKAS et al., 2011).

Our study provides similar results – mire habitats in nearly half of the localities studied by Polish botanists currently have been disturbed, mostly drained. So, the collected specimens are witnesses of bryophyte diversity of already disturbed habitats in some territories.

The studied material is also important for the knowledge about bryoflora of particular territories. We found information about bryoflora of some territories to be quite exhaustive. Firstly, the mire complexes near the recently drained Rivers Santaka and Struna should be mentioned. The data from the KRAM Herbarium are the only ones characterizing the vegetation of these lost habitats.

Not all sites investigated 80 years ago have been disturbed; recently some of these have occurred within the protected territories. We revealed 25 species collected by I. Dąbkowska at the sites (Balinis, Petrežeris and Verlinas) recently included into the Girutiškis Strict Nature Reserve.

The value of these provisional data on such territories should not be underestimated. The historical data are a starting point for the investigations on bryoflora of these territories and for monitoring of the population status of rare species (*Hamatocaulis vernicosus*, *Polytrichum swartzii*, *Sphagnum subnitens*).

So, the study of historical material from the eastern part of Lithuania proved to be valuable in various aspects. The importance of providing data on bryophyte diversity in the mires and new bryophyte species of the country is self-evident. Not less important are the data on previously unknown localities of rare species and their recent status showing tendencies to changes in their populations in the context of landscape changes. It is also important to emphasize that the collection possess the only information on bryophyte diversity in the territories with presently totally disturbed mire habitats. Finally, primary data on bryophyte diversity in protected territories make the basis for further monitoring of the population status of species.

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## SAMANŲ RINKINIAI IŠ RYTŲ LIETUVOS (1934–1940) MOKSLO ISTORIJOS IR KRAŠTOVAIZDŽIO POKYČIŲ ASPEKTAIS

Iłona JUKONIENĖ\*, Monika SUBKAITĖ, Aurika RIČKIENĖ

### Santrauka

Straipsnyje analizuojami lenkų botanikų 1934–1940 metų 868 samanų rinkiniai iš Rytų Lietuvos pelkių. Šiuo metu ši kolekcija saugoma Lenkijos mokslų akademijos V. Šaferio botanikos instituto herbariume (KRAM). Apie 90 % pavyzdžių surinko Irena Dąbkowska. Beveik du trečdaliai jų buvo identifikuoti pačių kolektorių arba lenkų botaniko Zygmunto Czubinskio; 254 pavyzdžiai buvo neidentifikuoti. Po visų pavyzdžių revizijos jie buvo priskirti 112 rūšių, iš kurių dvi rūšys (*Palustriella decipiens*

ir *Polytrichum swartzii*) iki šiol Lietuvoje nebuvo žinomos. Informacija apie retų samanų rūšių *Hamatocaulis vernicosus*, *Meesia triquetra* ir *Mesoptychia rutheana* radavietes yra svarbi jų populiacijų būklės pokyčių vertinimui. Pavyzdžiai buvo surinkti 44 vietovėse, esančiose dabartinėje Lietuvos teritorijoje, trys vietovės šiuo metu yra netoli Lietuvos sienos Baltarusijoje. Beveik pusėje lenkų botanikų tirtų teritorijų pelkės yra pažeistos dėl sausinimo ir durpių gavybos.