

# Bryophytes of the Roztocze region (Poland and Ukraine)

A checklist of liverworts and mosses

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COVER:

Moss *Eurhynchium angustirete* – photo and project R. Zubel

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*This book is dedicated to  
the late Prof. dr hab. Kazimierz Karczmarz (1933-2011)  
for his outstanding contributions in the field of Polish bryology,  
and for his special long-standing commitment in the bryophyte studies  
of the Roztocze region*



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## INTRODUCTION

The Roztocze region is a transboundary area of Poland and Ukraine. It is formed by a 185 km long and 15–28 km wide range of hills with a surface area of 3,377 km<sup>2</sup> situated between Kraśnik (PL) and L'viv (UA). The hills form plateaus and ridges with an absolute altitude from 290 to 400 m

a.s.l. and height differences exceeding 200 m (Buraczyński 2002b, Fig. 1). The specific location, climate, as well as geomorphological, hydrological, and edaphic conditions exert an influence on the high environmental value of the region, including the great diversity of the flora present there.

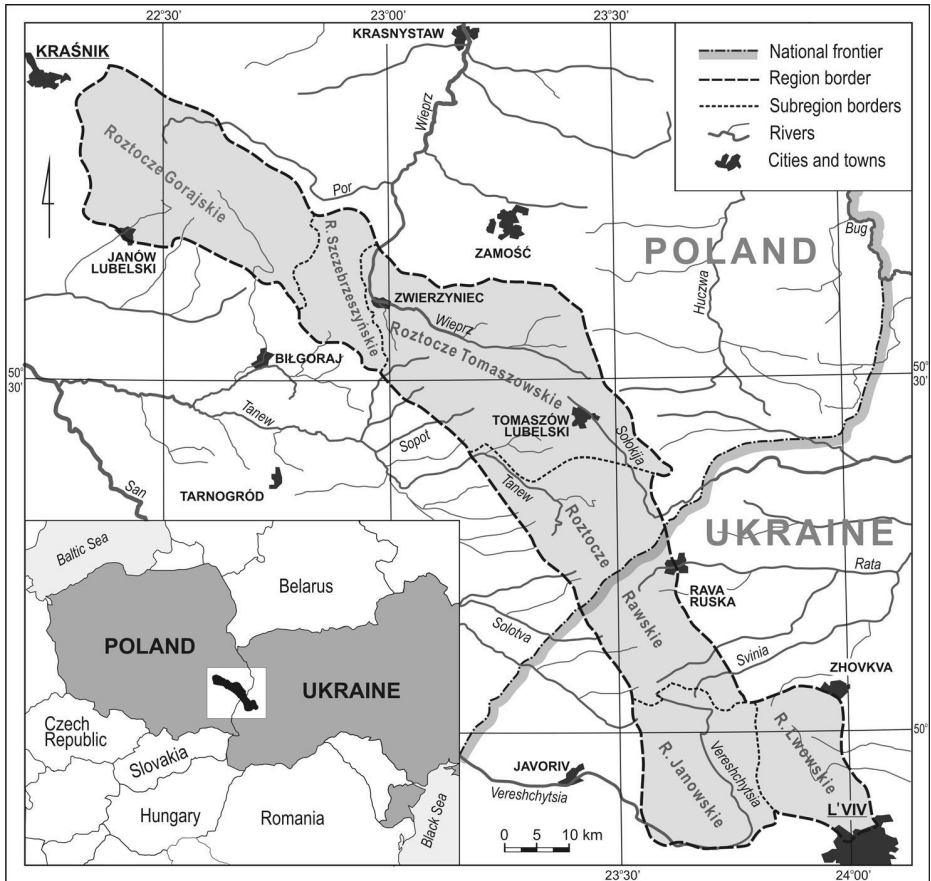


Fig. 1. The Roztocze region – location and topography [adapted from Buraczyński *et al.* (2013), Fig. 1.1.]

This paper constitutes the first full summary of data on bryophytes occurring in the Roztocze region collected during bryological investigations for over 160 years. Thanks to the creative efforts of Polish and Ukrainian experts working together, a comprehensive critical list of bryophyte and liverwort species has been compiled. The elabo-

ration of Polish bryophyte data and the assembly of the list were accomplished by R. Zubel, while the Ukrainian materials were prepared by the other authors. The list is a starting point both for further analyses based on the full reports of the localities of species and for planning further investigations of these groups of organisms.

## CHARACTERISTICS OF THE ROZTOCZE REGION

**Geology.** The Roztocze region is situated on the border of two large structural units of Europe: the Precambrian East-European Platform and the Palaeozoic structures of Western Europe. The Teisseyre-Tornquist zone that runs along their borderline is one of the longest tectonic faults in Central Europe in the form of a distinct escarpment zone with many specific geological, terrain, and hydrological features. Mesozoic Jurassic rocks covered by a complex of Upper Cretaceous rocks are the basic geological structural unit of the Roztocze region. The complex is formed of calcareous and carbonate-silica rocks (limestone, marls, opokas, and gaizes) exhibiting varied resistance to erosion processes. Over a vast area, these rocks (with the exception of the eastern part of the region) are covered by glaciation formations, in particular those originating from the last glacial period (Aeolian loesses and sands). Loesses cover the western part of the region quite densely, whereas Aeolian sands dominate in the central part. In turn, the eastern part of the Roztocze region is dominated by weathering-re-

sistant limestones, which in many sites reach the surface in the form of outcrops and inselbergs. Sand formations are more scarce, and they are mainly accumulated on the valley bottoms and at the foot of the hills. Similarly, loesses form small patches near L'viv in the south-eastern part of the region (Buraczyński 1995, 2002a; Kondracki 2002; Brzezińska-Wójcik & Harasimiuk 2013, Buraczyński *et al.* 2013).

**Division.** Due to its diverse geological structure and land features, the Roztocze region is divided into smaller units. There are two concepts of how this division should take place. Buraczyński (1995, 2000c, Fig. 1) distinguishes six subregions: Goraj (R. Gorajskie), Szczebrzeszyn (R. Szczebrzeszyńskie), Tomaszów (R. Tomaszowskie), Rawa (R. Rawskie), Janów (R. Janowskie), and L'viv Roztocze (R. Lwowskie). In turn, Kondracki (2002) divides the area into three mesoregions: Western, Central, and Eastern Roztocze.

**Soils.** The varied geological background and the hydrological and climatic conditions have resulted in the

formation of a varied soil cover. Autogenic soils (fawn soils, brown soils, podzols) formed on loesses, sands, and gaizes dominate. The soil cover comprises patches of lithogenic soils formed on a rock substratum (rendzinas) or hydrogenic soils (silty-peat and gley soils) present in river valleys and interdunal depressions (Turski 2002).

**Climate.** The climate of the Roztocze region has a transitional character, with continental air masses having a distinct impact on conditions. The vegetation period lasts on average 207 days. In comparison with neighbouring regions, the climate of the region is slightly colder, with an annual precipitation sum of ca. 660 mm (Kaszewski *et al.* 2002).

**Hydrology.** The range of Roztocze hills divides the local water systems, i.e. the Baltic Sea (Wieprz, Bug, and San catchment) and the Black Sea (Dniestr catchment). The hydrological system is varied and is characterised by an irregular density. The water-course network is particularly dense in the central part of the Roztocze region, where the Wieprz, Tanew, and Solokija with their tributaries (Jeleń, Sopot, Szum, and Tylicz) are the biggest rivers. In turn, the lowest number of watercourses are found in the western (Gorajec, Por) and eastern (Rata, Vereshchytisia) parts of the region. Additionally, there are numerous springs (ca. 450 in the region) in the escarpment zone, which are mainly recharged from Tertiary and Cretaceous aquifers (Michalczyk & Kowalczyk 2002).

**Plant cover.** The varied physiographic conditions are reflected in the chara-

cter of the flora and vegetation of the Roztocze region. The landscape is dominated by forest communities dissected by meadows, pastures, and crop fields. The species composition and vegetation structure of the area have been well explored on both the Polish (Izdebski *et al.* 1992a, Izdebski 2002 [including references therein], Lorens *et al.* 2013) and Ukrainian sides (Soroka 2002, 2004, 2008a-c, 2009). The forests communities comprise 18 associations from the classes Vaccinio-Piceetea (pine and mixed forests), Querco-Fagetea (oak-linden-hornbeam, beech, and riparian deciduous forests), Alnetea glutinosae (willow scrubs and alder woodlands), and Oxycocco-Sphagneteta (continental raised bogs). Among all these associations, the Carpathian beech forest (*Dentario glandulosae-Fagetum*), the subcontinental oak-linden-hornbeam forest (*Tilio-Carpinetum*), the fresh pine forest (*Leucobryo-Pinetum*), and the upland mixed fir forest (*Abietetum polonicum*) represent a large portion. In turn, non-forest areas comprise mire, fen, and peatbog communities from the classes Phragmitetea and Scheuchzerio-Caricetea fuscae, as well as meadow communities (class Molinio-Arrhenatheretea). They are also accompanied by aquatic communities from the classes Lemnetea, Charetea, Potamogetonetea, and Utricularietea, as well as synanthropic vegetation (*Stellarietea mediae* class).

Due to the high variability of the land features, habitat conditions, and water relations, there is distinct zonality of occurrence of the forest plant communities.

Riparian and alder forests are present in river and spring valleys, whereas the sub-boreal moist mixed forest forms a narrow belt at the foot of the slopes. Sandy plains and dunes are dominated by sub-oceanic fresh coniferous forests. In the interdunal depressions, there are communities of raised and transitional bogs surrounded by swamp or fresh coniferous forests. The steep northern slopes of the hills are dominated by fir forests, which are gradually replaced by the Carpathian beech forest at higher altitudes. In turn, the lower parts of long and flat slopes are most frequently overgrown by the continental mixed oak-pine forest (instead of the fir forest) and in the upper part by the subcontinental oak-linden-hornbeam forest (Izdebski 2002).

**Protection.** For the most effective conservation of the natural values of the Roztocze region, a comprehensive

protection system has been developed, which is implemented in nearly 70% of the region's surface area in various forms. The system includes: Roztocze (PL) and Javoriv (UA) national parks, 5 landscape parks (PL: Szczebrzeszyn LP, Krasnobród LP, Puszcza Solska LP, South Roztocze LP; UA: Rava LP), 4 protected landscape areas, and 13 nature reserves (Fig. 2). A transboundary biosphere reserve named "Roztocze" is currently being developed to provide comprehensive protection to the natural, cultural, and historical heritage of the whole region. At present, this form of protection is ensured on the Ukrainian side only (Chmielewski 2013, Grabowski *et al.* 2013, Kałamucka & Grabowski 2013). Additionally, a number of EU priority habitats have been established in the region under the Natura 2000 network (Lorens & Stachyra 2013).

#### LOCAL DETERMINANTS OF THE OCCURRENCE OF BRYOFLORA

With its high geological, edaphic, hydrological, and floristic diversity, the Roztocze region, the major part of which is under protection, offers rich habitats and substrata in the form of accessible microhabitats and ecological niches suitable for the development of bryophytes (mosses and liverworts). On the one hand, these are initial mineral substrata (loesses, sands, stones, rocks, and shallow epilithic soils) and, on the other hand, dead (humus, peat, decaying wood) or

live (bark of living trees) organic substrata. These types of the substratum are present in habitats that are varied in terms of trophic and pH (from acidic peatbog systems to alkaline water-heads and karst springs) as well as humidity and light conditions (from aquatic, meadow, and forest communities to xerothermic grasslands). All these elements of both an animate and inanimate nature contribute directly to the diversity and high species richness of the bryoflora.

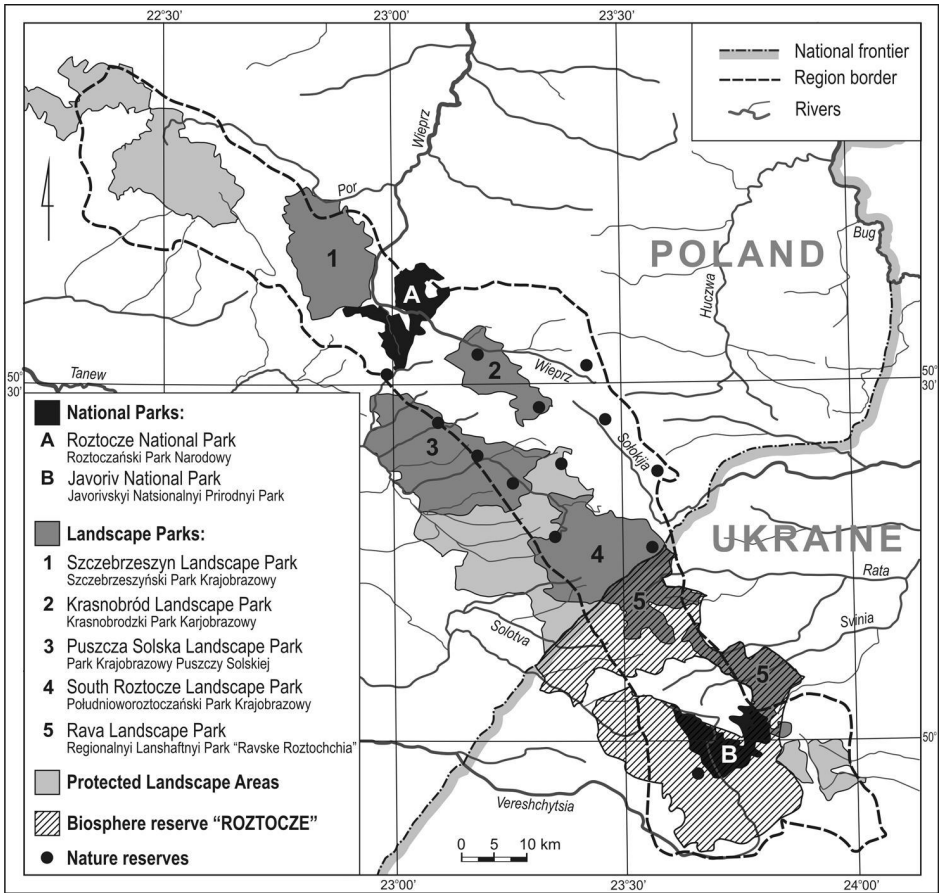


Fig. 2. Protection system of the Roztocze region [adapted from Grabowski *et al.* (2013), Fig. 1.3.]

HISTORICAL OUTLINE OF BRYOLOGICAL STUDIES

Irrespective of the geopolitical divisions and changing borderlines, the natural uniqueness of the Roztocze region has been explored since the first half of the 19<sup>th</sup> century by researchers of many fields of science, including bryologists. Bryological investigations, first initiated by Łoborzewski (1847, 1849), have been carried out in this area for nearly 170 years. At the end of the 19<sup>th</sup>

century, research results were published by Czerkawski (1867), Rehman (1879), Krupa (1885), Błoński (1890), and Geheeb (1899). At the beginning of the 20<sup>th</sup> century, papers by Lilienfeldówna (1910, 1911, 1914), Żmuda (1911, 1912), and Wiśniewski (1923) were published. Single reports on bryophytes were also published during World War II (Pyasets'kyi 1942). The second half

of the 20<sup>th</sup> century and the beginning of this century has been a period of intensive bryological investigations in the region on both sides of the border. The bryological literature from that time comprises papers focused on numerous subjects. They include:

1. Contributive papers containing simple lists of species together with their localities or data about interesting or rare bryoflora components (e.g. Kuc 1955, 1958, 1963; Lazarenko 1955; Lisowski 1957, 1958; Szweykowski 1957; Pałowa & Kuc 1959; Karczmarz 1960, 1964b, 1965c, 1967; Mel'nychuk 1961, 1962; Bradis & Rubcov 1966; Lazarenko *et al.* 1971; Bloch & Karczmarz 1973a, 1973b; Mamczarz 1973, 1974; Ulychna 1977, 1978; Ulychna & Voronina 1978; Virchenko 1990; Zubel 2009a, 2009b, 2014a-d, 2015a-c; Zubel *et al.* 2009; Stebel 2013; Fudali *et al.* 2015; Stebel *et al.* 2015; Zubel & Tracz 2015);
2. Local or regional floras presented in the form of monographs or synthetic comprehensive reports on bryophytes – bryofloristic, bryogeographic, and bryocoenotic as well as ecological reports (e.g. Slobodyan 1951; Kuc 1964; Zerov 1964; Mickiewicz 1965; Bachuryrna & Mel'nychuk 1987, 1988, 1989, 2003; Bloch 1988; Danylkiv & Soroka 1989; Karczmarz 1994; Karczmarz *et al.* 1997; Danylkiv *et al.* 2002; Rabyk 2003, 2006; Mamchur 2003; Rabyk & Danylkiv 2004; Shcherbachenko & Rabyk 2004; Karczmarz & Bloch 2008; Lorens *et al.* 2013);
3. Series of herbarium publications: *Bryotheca polonica* (Żmuda 1911, 1912; Lisowski 1957), *Hepaticae Poloniae exsiccatae* (Lilienfeldówna 1910, 1914), *Hepaticae Exsiccati Palatinatus Lublinensis* (Karczmarz 1965a, 1966a, 1968a; Karczmarz & Mamczarz 1974), *Musci Exsiccati Palatinatus Lublinensis* (Karczmarz 1964a, 1965b, 1966b, 1968b), *Musci Europaei Orientalis Exsiccati* (Karczmarz & Mickiewicz 1971; Karczmarz *et al.* 1974, 1975) and results of revisions of herbarium material (Grabarz 1969, Mendelak 1977);
4. Volumes of the *Atlas of geographical distribution of spore plants in Poland*, series IV – liverworts (Szweykowski 1962, 1964, 1966a-c, 1967ab, 1968ab, 1969, 1971ab; Szweykowski & Koźlicka 1974ab, 1977ab, 1980ab) and series V – mosses (Ochyra *et al.* 1985a-d, 1988a-k, 1990, 1992ab; Ochyra & Szmajda 1983);
5. Floristic and phytosociological reports on forest and peatland vegetation in protected areas (national and landscape parks, nature reserves) mentioning moss and liverwort species (Izdebski 1959, 1961, 1962ab, 1963ab, 1964, 1965, 1966, 1967, 1972; Izdebska & Szyrna 1961; Kimsa 1974; Czarnecka 1978; Fijałkowski & Łuczycka-Popiel 1989; Lorens *et al.* 1991; Izdebski *et al.* 1992a, 1992b; Łuczycka-Popiel 1992; Łuczycka-Popiel & Wawer 1992; Soroka 2002, 2004, 2008a-c, 2009; Tracz 2014). These papers provide important information, as

the herbarium material of the bryophyte species from phytosociological relevés was identified or verified by specialists (e.g. K. Karczmarz, M. Bloch, R. Zubel).

The rich literature on the bryological investigations conducted in the Roztocze region comprises over 130 publications. However, it does not reflect the full richness of this group of plants or the complete state of knowledge of the entire bryoflora. The results obtained hitherto in the smaller Ukrainian part of the region have been fully summarised

(Danylkiv & Soroka 1989; Danylkiv *et al.* 2002). By contrast, the investigations carried out in the nearly three-fold larger Polish Roztocze region are still insufficiently presented. The synthetic papers published so far are usually focused on protected or naturally valuable areas (Karczmarz 1994; Lorens *et al.* 2013). However, recently the authors of the species list that is the subject of this paper have elaborated upon the preliminary synthetic summary concerning the bryoflora of the entire Roztocze region (Zubel *et al.* 2015).

## CHARACTERISTICS OF THE BRYOFLORA

**Species richness.** The bryoflora of the Roztocze region comprises 425 species in total. Its main components are mosses (335 species, 80% of the flora) and a lower number of liverworts (90 species, 20%). This is a substantial number, as it constitutes ca. one-quarter of European (Grolle & Long 2000, Hill *et al.* 2006), over one-half of Ukrainian (Boiko 2014), and nearly a half of Polish bryoflora (Ochyra *et al.* 2003, Szweykowski 2006). Additionally, two members of Anthocerotophyta phylum (hornworts) were reported from the Roztocze: *Anthoceros punctatus* L. from both sides of the region (Krupa 1885; Zerov 1964, Karczmarz 1967), whereas *Phaeoceros leavis* (L.) Prosk. from the Polish side only (Karczmarz 1967, 1968a; Bloch & Karczmarz 1973a). The herbarium specimens of them has not been available for the re-examination (probably missing); therefore, the species has not been included to the current

checklist (for more details see under the chapter *Introduction to the checklist*).

**Taxonomic diversity.** The bryophyte species reported from the Roztocze region represent 2 phyla, 5 classes, 25 orders, 69 families, and 182 genera. In the phylum Bryophyta, the class Bryopsida is characterised by the highest species richness on a regional scale, as it comprises nearly 70% of the moss flora. The orders Hypnales (117 species), Bryales (55), Dicranales (40), and Pottiales (40) have the greatest number of species, and Pottiaceae (39), Bryaceae (32), Amblystegiaceae (29), and Brachytheciaceae (28) are the species-richest families. The richest genera are represented by *Sphagnum* (26), *Bryum* (21), *Orthotrichum* (10), and *Hypnum* (9). In the case of liverworts, the class Jungermanniopsida, which comprises 85% of the whole liverwort flora, has the highest species richness along with



the order Jungermanniales, which is represented by 54 species (60% of liverwort flora). Families with the highest species richness include Lophoziaceae (10), Ricciaceae (9), and Cephaloziaceae (8), whereas *Riccia* (8), *Calypogeia* (6), and *Scapania* (5) are the richest genera. It is noteworthy that nearly one-third of the bryophyte families and over half of the genera reported from the Roztocze region are represented by a single species. In many cases, these are highly valuable and rare taxa, which constitute an interesting part of the bryoflora of the region.

#### Threatened and protected species.

Protected and/or threatened species comprise almost one-third of the bryoflora. They include 64 protected species (58 – partially, 6 – strictly), 18 threatened species, and 41 species classified to both types (Rozporządzenie 2014, Klama 2006b, Żarnowiec *et al.* 2004, Didukh 2009). Threatened species comprise the greatest number of rare

(R category), vulnerable (V category), and endangered species (E category), i.e. 18, 17, and 16 species respectively. Bryophytes with an indeterminate status (I category) form a small group (8 species). Among all threatened bryophytes, the species endangered in Europe (*Anomodon rostratus*, *Funaria microstoma*) and/or priority species for the European Union such as *Dicranum viride*, *Buxbaumia viridis*, and *Hamatocaulis vernicosus* are present in the Roztocze region (Schumacker & Martiny 1995).

#### Local heterogeneity and diversity of flora.

In total, 425 species, including 90 liverwort species and 335 moss species have been recorded in the area of the Roztocze region (Tab. 1). As many as 355 species in the Polish part of the region and 377 species in the area belonging to Ukraine have been found. Of these, 307 species, i.e. 72% of the flora, were common for both parts of the Roztocze (63% of liverwort flora and 75% of moss flora).

Tab. 1. Number of bryophyte species from the major taxonomic units and their share in both parts of the Roztocze region (Poland and Ukraine).

PHYLUM Class	Number of species			
	Exclusive		Common	Total
	Poland	Ukraine		
<b>MARCHANTIOPHYTA</b>	<b>19</b>	<b>14</b>	<b>57</b>	<b>90</b>
Marchantiopsida	4	2	8	14
Jungermanniopsida	15	12	49	76
<b>BRYOPHYTA</b>	<b>29</b>	<b>56</b>	<b>250</b>	<b>335</b>
Sphagnopsida	6	2	18	26
Polytrichopsida	1	–	15	16
Bryopsida	22	54	217	293
<b>Total</b>	<b>48</b>	<b>70</b>	<b>307</b>	<b>425</b>
<b>Poland</b>	<b>48</b>	–	<b>307</b>	<b>355</b>
<b>Ukraine</b>	–	<b>70</b>	<b>307</b>	<b>377</b>

The full extent of the diversity of the local bryoflora is revealed through comparison of the number of exclusive species on each side. Up to 48 species were noted exclusively on the Polish side of the Roztocze region, whereas a substantially greater number, i.e. 70 exclusive species, were reported from the Ukrainian side. Worthy of note here is the greater number of liverwort species exclusive on the Polish side (5 species more) and, simultaneously, the greater number of moss species on the Ukrainian side (as many as 27). There are 70 exclusive species in the Ukrainian part of the Roztocze region (14 liverworts and 56 mosses). It is worth mentioning such liverworts as *Apometzgeria pubescens*, *Cephaloziella spinigera*, *Diplophyllum obtusifolium*, *Marsupella funckii*, *Mylia taylorii*, *Pedinophyllum interruptum*, and *Riccardia incurvata*, and moss species *Amblyodon dealbatus*, *Bryum algovicum*, *Bucklandiella heterosticha*, *Cyrto-hypnum minutulum*, *Entosthodon fascicularis*, *Hygroamblystegium humile*, *Microbryum davallianum*, *Physcomitrium eurystomum*, *Plagiopus oederiana*, *Pleuridium acuminatum*, *Protobryum bryoides*, *Timmia bavarica*, *T. megapolitana*, and *Trichodon cylindricus*. In turn, 48 exclusive taxa (19 liverworts, 29 mosses) have been reported from the Polish part of the region. This group includes such liverworts as *Calypogeia suecica*, *Geocalyx graveolens*, *Metzgeria conjugata*, *Mylia anomala*, *Odontoschisma denudatum*, *Riccardia palmata*, *Riccia rhenana*, and *Scapania calcicola*, and mosses *Hilpertia velenovskiyi*, *Hypnum jutlandicum*, *Pogonatum nanum*, *Pseudobryum cinclidioides*,

*Pseudocrossidium revolutum*, *Sphagnum compactum*, *Sph. papillosum*, and *Syntrichia calcicola*.

The differences mentioned above are associated with three important factors. The Polish part of the Roztocze region covers a substantially larger surface area (nearly three-quarters of the total) than the Ukrainian part. This has a strong influence on the diversity of ecological and edaphic conditions and the availability of habitats and substrata available for colonisation by bryophytes. The human factor, i.e. the varied intensity of investigations conducted on both sides of the region resulting in differences in the level of bryological exploration on each side, is also important. The varied substratum-habitat conditions, in particular the abundance of limestone outcrops in the Ukrainian part of the region, seems to be the most essential of these factors. This substratum, which is attractive for bryophytes, occurs less frequently on the Polish side, which are dominated by loess formations, a substratum for completely different plant communities with a distinctive composition of bryoflora.

#### **Specific features of bryophyte flora.**

The geographical position of the Roztocze region, its land features, and specific character of the climate (continental and Atlantic climate impact) had a significant effect on the development of the vegetation cover in the post-glacial periods. Consequently, the bryophyte flora exhibits certain specific characteristics, i.e. the presence of montane and relic species, and comprises

species representing various geographical elements (Atlantic, Pontic, Mediterranean, Boreal) or species associated with specific habitats or substrata.

1. The Montane element is clearly distinct and comprises over 20% of the bryophyte flora. The group of bryophytes representing this element is dominated by montane (=forest belt)

species (67%) and multizonal montane species (27%), whereas the submontane species group has a small share (Tab. 2). In the Roztocze region, montane mosses and liverworts occur most abundantly in fir, beech, and spruce forest communities. Their occurrence is centred in areas rich in limestone outcrops.

Tab. 2. Montane bryophytes of the Roztocze region [classification in accordance with Klama (1996) and Stebel (2006)]

MAIN GROUP Subgroup	Liverworts	Mosses	Total
<b>SUBMONTANE SPECIES</b>	–	5	5
<b>MULTIZONAL MONTANE SPECIES</b>	8	19	27
<b>MONTANE (=FOREST BELT) SPECIES</b>	20	47	67
lower forest belt species	14	22	36
upper forest belt species	–	1	1
lower and upper forest belt species	6	24	30
<b>Total</b>	<b>28</b>	<b>71</b>	<b>99</b>

2. The Pontic element mainly comprises xerothermic mosses growing on a loess and chalk substratum (*Tortula acaulon*, *Hilpertia velenovskyi*) and Mediterranean species (*Didymodon insulanus*, *D. ferrugineus*, *Gyroweisia tenuis*, *Hypnum cupressiforme* var. *lacunosum*, *Pterygoneurum ovatum*, *P. subsessile*).
3. The Subatlantic element is represented by epigeic and epixylic mosses, e.g. *Aulacomnium androgynum*, *Campylopus pyriformis*, *Fissidens taxifolius*, *Hypnum jutlandicum*, *Mnium hornum*, *Orthodicranum flagellare*, *Platygyrium repens*, and *Pogonatum nanum*, and liverworts

*Lejeunea cavifolia* and *Trichocolea tomentella*;

4. The Boreal element is represented by peatbog mosses (glacial relicts) e.g. *Bryum neodamense*, *Calliergon trifarium*, *Drepanocladus lycopodioides*, *Helodium blandowii*, *Hypnum pratense*, *Meesia triquetra*, *Pseudobryum cinclidioides*, *Scorpidium scorpioides*, and *Tomentypnum nitens*;
5. Species associated with forests account for over half of the bryophyte flora, reaching distinct predominance, which is related to the substantial forest cover (50%) of the

- entire region (Izdebski 2002). They include liverworts that are considered relics of primeval forests, e.g. *Fuscocephaloziopsis catenulata*, *Bazzania trilobata*, and *Plagiochila asplenioides* (Klama 2002) and mosses with the same status e.g. *Anomodon longifolius*, *Buxbaumia viridis*, *Dicranodontium denudatum*, *Dicranum viride*, *Homalia trichomanoides*, or *Serpoleskea subtilis* (Stebel & Żarnowiec 2014).
6. Species that are rare in the belt of Central European Uplands are represented by epixylic bryophytes associated with fir and spruce forests (*Myliia taylorii*, *Riccardia palmata*, *Calypogeia suecica*) and exposed peat (*Odontoschisma fluitans*, *Myliia anomala*, *Riccardia incurvata*).
  7. Calciphilous species include liverworts *Mesoptychia badensis*, *Scapania calcicola*, *Pedinophyllum interruptum*, *Apometzgeria pubescens*, *Preissia quadrata*, and *Reboulia hemisphaerica*, and mosses *Timmia bavarica*, *T. megapolitana*, *Tortella inclinata*, and *Weissia condensa*.
  8. Epilithic and epiphytic flora is represented by epiphytes and epilithic species (e.g. *Neckera crispa*, *N. complanata*, *Pterigynandrum filiforme*, *Metzgeria conjugata*, and *Lejeunea cavifolia*) and typical saxicolous mosses (*Fissidens pusillus*, *Homalothecium philippeanum*, *Neckera bessi*, *Thamnobryum alopecurum*, *Taxiphyllum wissgrillii*, and *Trichostomum tenuirostre*).
- Human impact.** An important factor determining the current composition of the bryoflora is anthropopressure. Despite the wide-ranging protection, the bryoflora of the Roztocze region has been undergoing progressive synanthropisation which is reflected in processes:
1. Apophytisation, i.e. expansion of the ranges of native species into anthropogenic habitats, e.g. concrete structures colonised by *Dryptodon pulvinatus*, *Schistidium apocarpum*, *Orthotrichum diaphanum* and *Tortula muralis* or the spread of species in natural habitats altered by external factors, e.g. acidification (acid rain), global climate change, or local microclimate factors. The phenomenon affects species that were formerly rare but are evidently expanding their occurrence range at present, e.g. *Platygyrium repens*, *Orthodicranum montanum*, and *Hypnum pallescens* (Fojcik 2011);
  2. Neophytisation, i.e. encroachment of alien species, for instance the invasive moss *Campylopus introflexus*, which is rapidly spreading across the European continent (Essl & Lambdon 2009, Fudali *et al.* 2009). This species has been reported from the Polish and Ukrainian parts of the Roztocze region (Zubel *et al.* 2009, Rabyk 2014 unpubl.), and near L'viv on the south-eastern border of the area (Lobachevska & Sochan'czak 2010).

## CONCLUSIONS

Summarising the results of the bryological research that has been conducted in the Roztocze region for over one and a half century, it should be emphasised that the majority of the papers were published in the 1950s, 1960s, and 1970s. Comparing this fact with the current rate and direction of environment transformations indicates that the available literature data on the bryophyte species richness and diversity should be verified and updated. The current list of species has been expan-

ded to include several new species from localities discovered in recent years or described in unpublished herbarium collections. The need for reliable verification of the existing herbarium collections, including the necessity of re-identifying many moss and liverwort species, is also apparent due to the current rapid progress in plant taxonomy – even at the stage of compiling this species list, some identification reports were questioned or the presence of some bryophyte species was excluded.

## INTRODUCTION TO THE CHECKLIST

**Nomenclature and taxonomic arrangement.** The nomenclature of liverworts follows mostly Grole & Long (2000) and Klama (2006a), albeit some changes were implemented in accordance with recent studies (Váňa *et al.* 2012, 2013; Söderström *et al.* 2013). The names of mosses were mainly used in accordance with Ochyra *et al.* (2003), partially with Hill *et al.* (2006), and with small novelties proposed by Stebel (2006), Ochyra & Stebel (2008) and Stebel *et al.* (2010). The applied delimitation and the systematic arrangement of the higher taxonomic levels (from phylum to genera) follow Ochyra *et al.* (2003) for mosses and Klama (2006a) for liverworts.

**Hornworts (Anthocerotophyta).** Apart from liverworts and mosses, two members of Anthocerotophyta phylum has been reported from the Roztocze region. The species are scheduled below with the names used in the source papers. The herbarium material of these species has not been available for the re-examination, as well as the taxonomic conceptions of them applied by particular authors has been unknown; therefore, the species has been mentioned here, but not placed in the checklist:

1. *Anthoceros punctatus* L. [= *Anthoceros agrestis* Paton ?] reported from Ukraine (Krupa 1885; Zerov 1964) and Poland (Karczmarz 1967);
2. *Phaeoceros laevis* (L.) Prosk. [= *Phaeoceros carolinianus* (Michx.) Prosk. ?]

reported from Poland by Karczmarz (1967, 1968a – as an exsiccate) as well as by Bloch & Karczmarz (1973a).

**Checklist structure and applied data assumptions.** The checklist is prefaced by a systematically ordered schedule of the genera of bryophytes (liverworts and mosses) presented in the list. The species in the list are ordered alphabetically within the respective divisions (Marchantiophyta and Bryophyta). Subspecies and varieties as well as the fossil species were listed too. The listed species are described by:

- a) the current scientific name with the authority;
- b) the synonym(s) used by particular author(s) in the source paper(s), if the published name was different to the name accepted in the list;
- c) short information about the occupied substratum in accordance with the information included in the source paper(s) or on the herbarium labels;
- d) full bibliographic data – listed separately for the Polish and Ukrainian parts of the region;
- e) a short note if a comment or explanation was necessary.

For all the analysed source materials, the records of the species not cited in the text but presented on the attached distribution maps were taken into consideration whenever their occurrence in the Roztocze region was simply reco-

gnised in the presented figures. Furthermore, for the summarised studies, e.g. the work by Kuc (1964) related to the Polish upland belt or other congruent investigations, only species that were directly named as being exclusively present in the Roztocze region, *not those which were common to the whole study area*, were taken into consideration. For records from bryosociological and phytosociological papers, the year of publication is followed by the number of table, which presented the source of the record(s).

**Herbarium materials.** In all cases where species data were based on original herbarium specimens only, detailed information is given in parentheses after the acronym, e.g. LBL (*leg.* K. Karczmarz, 12 Sep 1967; *rev.* R. Zubel 10 Apr 2014). Additionally, placement of the herbarium acronym(s) without the above details at the end of the cited papers means that the adequate herbal material of the species is deposited in the particular collection(s).

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## SYSTEMATIC ARRANGEMENT OF THE SPECIES

### Liverworts

Phylum: *Marchantiophyta* (Stotler & Crand.-Stotl.) Stotler & Crand.-Stotl.

Class: *Marchantiopsida* Stotler & Crand.-Stotl.

Subclass: *Sphaerocarpiidae* Stotler & Crand.-Stotl.

Order: *Marchantiales* Limpr.

Family: *Aytoniaceae* Cavers

Genera: *Reboulia* Raddi, *Mannia* Opiz

Family: *Conocephalaceae* Müll.Frib. ex Grolle

Genus: *Conocephalum* Hill

Family: *Marchantiaceae*

Genera: *Preissia* Corda, *Marchantia* L.

Order: *Ricciales* Schljakov *emend.* Stotler & Crand.-Stotl.

Family: *Ricciaceae* Rchb.

Genera: *Ricciocarpos* Corda, *Riccia* L.

Class: *Jungermanniopsida* Stotler & Crand.-Stotl.

Subclass: *Metzgeriidae* Barthol.-Began

Order: *Blasiales* (R.M. Schust.) Stotler & Crand.-Stotl.

Family: *Blasiaceae* H.Klinggr.

Genus: *Blasia* L.

Order: *Fossombroniales* Schljakov *emend.* Stotler & Crand.-Stotl.

Family: *Fossombroniaceae* Hazl.

Genus: *Fossombronia* Raddi

Family: *Pelliaceae* H.Klinggr.

Genus: *Pellia* Raddi

Order: *Metzgeriales* Schljakov *emend.* Stotler & Crand.-Stotl.

Family: *Aneuraceae* H.Klinggr.

Genera: *Aneura* Dumort., *Riccardia* Gray



Family: ***Metzgeriaceae*** H.Klinggr.

Genera: *Apometzgeria* Kuwah., *Metzgeria* Raddi

Subclass: ***Jungermanniidae*** Engl. *emend.* Stotler & Crand.-Stotl.

Order: ***Lepicoleales*** Stotler & Crand.-Stotl.

Family: ***Ptilidiaceae*** H.Klinggr.

Genus: *Ptilidium* Ness

Family: ***Trichocoleaceae*** Nakai

Genus: *Trichocolea* Dumort.

Order: ***Jungermanniales*** H.Klinggr. *emend.* Stotler & Crand.-Stotl.

Family: ***Pseudolepicoleaceae*** Fulford & J.Taylor

Genus: *Blepharostoma* (Dumort.) Dumort.

Family: ***Geocalyceae*** H.Klinggr.

Genera: *Lophocolea* (Dumort.) Dumort., *Chiloscyphus* Corda, *Geocalyx* Ness,

Family: ***Plagiochillaceae*** (Jörg) Müll.Frib. & Herzog *in* Müller

Genera: *Pedinophyllum* (Lindb.) Lindb., *Plagiochila* (Dumort.) Dumort.

Family: ***Calypogeiaceae*** Müll.Frib. Arnell *in* Holmberg

Genus: *Calypogeia* Raddi

Family: ***Lepidoziaceae*** Limpr. *in* Cohn.

Genera: *Lepidozia* (Dumort.) Dumort., *Bazzania* Gray

Family: ***Cephaloziaceae*** Mig.

Genera: *Cephalozia* (Dumort.) Dumort., *Fuscocephaloziopsis* Fulford, *Nowellia* Mitt., *Odontoschisma* (Dumort.) Dumort. [= *Cladopodiella* H.Buch]

Family: ***Cephaloziellaceae*** Douin

Genus: *Cephaloziella* (Spruce) Schiffn.

Family: ***Jungermanniaceae*** Rchb.

Genera: *Mylia* Gray [= *Leiomylia* J.J.Engel & Braggins], *Jungermannia* L.

Family: ***Lophoziaceae*** Cavers

Genera: *Barbilophozia* Loeske, *Lophozia* (Dumort.) Dumort., *Mesoptychia* (Lindb. et Arnell) A.Evans [= *Leiocolea* (Müll.Frib.) H.Buch], *Gymnocolea* (Dumort.) Dumort., *Tritomaria* Schiffn. *ex* Loeske, *Jamesoniella* (Spruce) F.Lees

Family: ***Gymnomitriaceae*** H.Klinggr.

Genus: *Marsupella* Dumort.

Family: ***Scapaniaceae*** Mig.

Genera: *Diplophyllum* (Dumort.) Dumort., *Scapania* (Dumort.) Dumort.

Order: ***Porellales*** (R.M. Schust.) Schljakov *emend.* Stotler & Crand.-Stotl.

Family: ***Porellaceae*** Cavers

Genus: *Porella* L.

Family: ***Jubulaceae*** H.Klinggr.

Genus: *Frullania* Raddi

Family: ***Lejeuneaceae*** Casares-Gil

Genus: *Lejeunea* Lib.

Order: ***Radulales*** (R.M. Schust.) Schljakov *emend.* Stotler & Crand.-Stotl.

Family: ***Radulaceae*** (Dumort.) Müll.Frib.

Genus: *Radula* Dumort.

## Mosses

Phylum: *Bryophyta* Schimp.

Class: *Sphagnopsida* (Engl.) Ochyra

Subclass: *Sphagnidae* Engl.

Order: *Sphagnales* Limpr.

Family: *Sphagnaceae* Dumort.

Genus: *Sphagnum* L.

Class: *Polytrichopsida* Vitt, Goffinet & Hedd. ex Ochyra, Żarnowiec & Bednarek-Ochyra

Subclass: *Polytrichidae* (W.Frey) Ochyra

Order: *Polytrichales* M.Fleisch.

Family: *Polytrichaceae* Schwägr.

Genera: *Atrichum* P.Beauv., *Pogonatum* P.Beauv., *Polytrichastrum* G.L.Sm.,  
*Polytrichum* Hedw.

Subclass: *Tetraphidiidae* (M.Fleisch.) Ochyra

Order: *Tetraphidales* M.Fleisch.

Family: *Tetraphidaceae* Schimp.

Genus: *Tetraphis* Hedw.

Subclass: *Buxbaumiidae* (M.Fleisch.) Ochyra

Order: *Buxbaumiales* M.Fleisch.

Family: *Buxbaumiaceae* Schimp.

Genus: *Buxbaumia* Hedw.

Class: *Bryopsida* (Limpr.) Rothm.

Subclass: *Diphysciidae* (M.Fleisch.) Ochyra

Order: *Diphysciales* M.Fleisch.

Family: *Diphysciaceae* M.Fleisch.

Genus: *Diphyscium* D.Mohr

Subclass: *Funariidae* (W.Frey) Ochyra

Order: *Funariales* M.Fleisch.

Family: *Funariaceae* Schwägr.

Genera: *Physcomitrella* Bruch & Schimp., *Physcomitrium* (Brid.) Brid., *Funaria*  
Hedw., *Entosthodon* Schwägr.

Subclass: *Timmiidae* Ochyra

Order: *Timmiales* (M.Fleisch.) Ochyra

Family: *Timmiaceae* Schimp.

Genus: *Timmia* Hedw.

Subclass: *Encalyptidae* Vitt, Goffinet & Hedd. ex Ochyra, Żarnowiec & Bednarek-Ochyra

Order: *Encalyptales* Dixon

Family: *Encalyptaceae* Schimp.

Genus: *Encalypta* Hedw.

Subclass: *Dicranidae* (W.Frey) Ochyra

Order: *Dicranales* H.Philib. ex M.Fleisch.

Family: *Fissidentaceae* Schimp.

Genus: *Fissidens* Hedw.

Family: *Ditrichaceae* Limpr.

Genera: *Ditrichum* Timm ex Hampe, *Trichodon* Schimp., *Pleuridium* Rabenh.,  
*Ceratodon* Brid., *Distichium* Bruch & Schimp.

Family: *Dicranaceae* Schimp.

Genera: *Dicranum* Hedw., *Orthodicranum* (Bruch & Schimp.) Loeske,  
*Paraleucobryum* (Limpr.) Loeske, *Dicranella* (Müll.Hal.) Schimp.,  
*Campylopus* Brid., *Dicranodontium* Bruch & Schimp., *Dichodontium*  
Schimp.

Family: *Leucobryaceae* Schimp.

Genus: *Leucobryum* Hampe

Order: *Grimmiales* M.Fleisch.

Family: *Seligeriaceae* Schimp.

Genus: *Seligeria* Bruch & Schimp.

Family: *Grimmiaceae* Arn.

Genera: *Grimmia* Hedw., *Dryptodon* Brid., *Schistidium* Bruch & Schimp.,  
*Racomitrium* Brid., *Niphotrichum* (Bednarek-Ochyra) Bednarek-Ochyra  
& Ochyra, *Bucklandiella* Roiv.

Order: *Pottiales* M.Fleisch

Family: *Pottiaceae* Schimp.

Genus: *Crossidium*

Family: *Ephemeraceae* Schimp.

Genus: *Ephemerum* Hampe.

Family: **Pottiaceae** Schimp.

Genera: *Trichostomum* Bruch, *Tortella* (Lindb.) Limpr., *Bryoerythrophyllum* P.C.Chen, *Pseudocrossidium* R.S.Williams, *Gyroweisia* Schimp., *Barbula* Hedw., *Didymodon* Hedw., *Weissia* Hedw., *Pterygoneurum* Jur., *Aloina* Kindb., *Tortula* Hedw., *Protobryum* J.Guerra & Cano, *Microbryum* Schimp., *Acaulon* Müll.Hal., *Syntrichia* Brid., *Hilpertia* R.H.Zander

Subclass: **Orthotrichidae** (Dixon) Ochyra

Order: **Orthotrichales** Dixon

Family: **Orthotrichaceae** Arn.

Genus: *Orthotrichum* Hedw., *Ulotia* D.Mohr

Order: **Hedwigiales** Ochyra

Family: **Hedwigiaceae** Schimp.

Genus: *Hedwigia* P.Beauv.

Order: **Splachnales** (M.Fleisch.) Ochyra

Family: **Splachnaceae** Grev. & Arn.

Genus: *Splachnum* Hedw.

Family: **Meesiaceae** Schimp.

Genera: *Meesia* Hedw., *Paludella* Brid., *Amblyodon* P.Beauv., *Leptobryum* (Bruch & Schimp.) Wilson

Subclass: **Bryidae** Engl.

Order: **Bryales** Limpr.

Family: **Bryaceae** Schwägr.

Genera: *Pohlia* Hedw., *Bryum* Hedw., *Rhodobryum* (Schimp.) Limpr., *Rosulabryum* J.R.Spence

Family: **Aulacomniaceae** Schimp.

Genus: *Aulacomnium* Schwägr.

Family: **Bartramiaceae** Schwägr.

Genera: *Bartramia* Hedw., *Plagiopus* Brid., *Philonotis* Brid.

Family: **Cinclidiaceae** Kindb.

Genus: *Rhizomnium* (Mitt. ex Broth.) T.J.Kop.

Family: **Plagiomniaceae** T.J.Kop.

Genera: *Plagiomnium* T.J.Kop., *Pseudobryum* (Kindb.) T.J.Kop.

Family: **Mniaceae** Schwägr.

Genus: *Mnium* Hedw.

Subclass: **Hypnidae** W.R.Buck, Goffinet & A.J.Shaw

Order: **Hypnales** (M.Fleisch.) W.R.Buck & Vitt

Family: **Climaciaceae** Kindb.

Genus: *Climacium* F.Weber & D.Mohr

Family: **Fontinalaceae** Schimp.

Genus: *Fontinalis* Hedw.

Family: **Leucodontaceae** Schimp.

Genus: *Leucodon* Schwägr.

Family: **Anomodontaceae** Kindb.

Genus: *Anomodon* Hook. & Taylor

Family: **Neckeraceae** Schimp.

Genera: *Neckera* Hedw., *Homalia* (Brid.) Bruch. & Schimp.

Family: **Thamnobryaceae** Margad. & During

Genus: *Thamnobryum* Nieuwl.

Family: **Echinodiaceae** Broth.

Genus: *Isothecium* Brid.

Family: **Pterigynandraceae** Schimp.

Genus: *Pterigynandrum* Hedw.

Family: **Leskeaceae** Schimp.

Genera: *Leskea* Hedw., *Leskeella* (Limpr.) Loeske, *Orthotheciella* (Müll.Hal.) Ochyra

Family: **Thuidiaceae** Schimp.

Genera: *Thuidium* Schimp., *Cyrto-hypnum* Hampe & Lorentz, *Abietinella* Müll.Hal.

Family: **Helodiaceae** (M.Fleisch.) Ochyra

Genera: *Helodium* Warnst., *Palustriella* Ochyra

Family: **Hylocomiaceae** (Broth.) M.Fleisch.

Genera: *Hylocomium* Schimp., *Pleurozium* Mitt., *Hylocomiadelphus* Ochyra & Stebel, *Rhytidiadelphus* (Limpr.) Warnst.

Family: **Cratoneuraceae** Mönk.

Genus: *Cratoneuron* (Sull.) Spruce

Family: ***Brachytheciaceae*** Schimp.

Genera: *Homalothecium* Schimp., *Brachytheciastrum* Ignatov & Huttunen, *Eurhynchiastrum* Ignatov & Huttunen, *Kindbergia* Ochyra, *Brachythecium* Schimp., *Sciuro-hypnum* Hampe, *Cirriphyllum* Grout, *Oxyrrhynchium* (Schimp.) Warnst., *Platyhypnidium* M.Fleisch., *Rhynchostegium* Schimp., *Pseudoscleropodium* (Limpr.) M.Fleisch. ex Broth., *Eurhynchium* Schimp., *Plasteurhynchium* M.Fleisch. ex Broth.

Family: ***Plagiotheciaceae*** (Broth.) M.Fleisch.

Genus: *Plagiothecium* Schimp.

Family: ***Amblystegiaceae*** Kindb.

Genera: *Amblystegium* Schimp., *Serpoleskea* (Limpr.) Loeske, *Hygroamblystegium* Loeske, *Leptodictyum* (Schimp.) Warnst., *Straminergon* Hedenäs, *Calliargon* (Sull.) Kindb., *Scorpidium* (Schimp.) Limpr., *Tomentypnum* Loeske, *Drepanocladus* (Müll.Hal.) G.Roth, *Pseudocalliargon* (Limpr.) Loeske, *Limprichtia* Loeske, *Hamatocaulis* Hedenäs, *Warnstorfia* Loeske, *Sanionia* Loeske, *Campylium* (Sull.) Mitt., *Campyliadelphus* (Kindb.) R.S.Chopra, *Campylidium* (Kindb.) Ochyra, *Hygrohypnum* Lindb.

Family: ***Hypnaceae*** Schimp.

Genera: *Pylaisia* Schimp., *Platygyrium* Schimp., *Buckiella* Ireland, *Hypnum* Hedw., *Ptilium* De Not., *Homomallium* (Schimp.) Loeske, *Callicladium* H.A.Crum, *Calliargonella* Loeske, *Herzogiella* Broth., *Taxiphyllum* M.Fleisch., *Ctenidium* (Schimp.) Mitt.

## CHECKLIST OF LIVERWORTS

### **Explanations:**

SYNONYMS – all used synonyms of the species, in accordance with names published in the source materials; SUBSTRATE – all occupied substrates given in the particular publications; LBL – Herbarium of the Department of Botany and Mycology, Maria Curie-Skłodowska University (PL); LWD – Collections of bryophytes of the State Museum of Natural History, NAS of Ukraine (UA); LWFU – Herbarium of Ukrainian State Forestry University (UA); LWKS – Herbarium of the Institute of Ecology of the Carpathians, NAS of Ukraine (UA).

*Aneura incurvata* → *Riccardia incurvata*

*Aneura latifrons* → *Riccardia latifrons*

*Aneura multifida* → *Riccardia multifida*

*Aneura pinguis* (L.) Dumort.

SYNONYMS: *Riccardia pinguis* (L.) Gray.

SUBSTRATE: soil, humus, decaying wood.

**Poland:** Karczmarz 1965a (as an exsiccate), 1967, 1968a (as an exsiccate); Mamczarz 1973; Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002; Shcherbachenko & Rabyk 2004; Rabyk & Danylkiv 2008; LBL, LWKS & LWD.

*Apometzgeria pubescens* (Schrank) Kuwan

SYNONYMS: *Metzgeria pubescens* (Schrank) Raddi

SUBSTRATE: bark of deciduous trees.

**Ukraine:** Krupa 1885; Zerov 1964; Danylkiv *et al.* 2002.

*Barbilophozia barbata* (Schmidel *ex* Schreb.) Loeske

SYNONYMS: *Lophozia barbata* (Schmidel *ex* Schreb.) Dumort.

SUBSTRATE: mineral soil, rocks, humus.

**Poland:** Karczmarz 1967, 1968a (as an exsiccate); Mamczarz 1974; Bloch 1976, 1988 (tab. 38); LBL.

**Ukraine:** Krupa 1885; Zerov 1964; Danylkiv *et al.* 2002.



***Bazzania trilobata* (L.) Gray**SYNONYMS: *Bazzania trilobata* (L.) Lindberg

SUBSTRATE: soil, humus, decaying wood, base of trees.

**Poland:** Szweykowski 1962; Karczmarz 1966a (as an exsiccate), 1967, 1994; Mamczarz 1973, 1974; Bloch 1976, 1988 (tab. 19, 38); Fijałkowski & Łuczycka-Popiel 1989 (tab. 6); Lorens *et al.* 1991 (tab. 1), 2013; Izdebski *et al.* 1992a (tab. 13); Zubel 2009b; Tracz 2014; Fudali *et al.* 2015; LBL.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Soroka 2002; LWKS & LWFU.

***Blasia pusilla* L.**

SUBSTRATE: soil, loamy soil.

**Poland:** Szweykowski 1957; Karczmarz 1966a (as an exsiccate), 1967; Bloch 1976, 1988 (tab. 29, 35); LBL.

**Ukraine:** Krupa 1885; Zerov 1964; Ulychna 1976; Danylkiv *et al.* 2002; LWD.

***Blepharostoma trichophyllum* (L.) Dumort.**SYNONYMS: *Blepharostoma trichophyllum* (L.) Dumort. var. *trichophyllum*

SUBSTRATE: decaying wood, humus, soil, occasionally loess and base of trees.

**Poland:** Szweykowski 1957, 1966c; Karczmarz 1966a (as an exsiccate), 1967; Mamczarz 1974; Bloch 1976, 1988 (tab. 17-20, 24); Lorens *et al.* 2013; Fudali *et al.* 2015.

**Ukraine:** Krupa 1885; Zerov 1964; Danylkiv *et al.* 2002; LWKS.

***Calypogeia azurea* Stotler & Crotz**SYNONYMS: *Calypogeia trichomanis* (L.) Corda, *Calypogeia Trichomanis* Corda

SUBSTRATE: soil, decaying wood, occasionally base of trees.

**Poland:** Szweykowski 1957; Karczmarz 1966a (as an exsiccate), 1967; Bloch & Karczmarz 1973b; Lorens *et al.* 2013; Zubel 2014a; Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Zerov 1964; Danylkiv *et al.* 2002.

***Calypogeia integristipula* Steph.**SYNONYMS: *Calypogeia meylanii* Buch

SUBSTRATE: soil, humus, decaying wood, occasionally base of trees.

**Poland:** Szweykowski 1957; Karczmarz 1966a (as an exsiccate), 1967; Bloch 1976, 1988 (tab. 19); Fudali *et al.* 2015; LBL. Karczmarz 1967; Lorens *et al.* 2013.

*Calypogeia meylanii* → *Calypogeia integristipula*

***Calypogeia muelleriana*** (Schiffn.) Müll.Frib.SYNONYMS: *Calypogeia mülleriana* (Schiffn.) Müll.

SUBSTRATE: soil, humus, decaying wood.

**Poland:** Karczmarz 1967, 1994; Mamczarz 1974; Bloch 1976, 1988 (tab. 24, 38); Karczmarz & Bloch 2008; Maciejewski & Zubel 2009c; Fudali *et al.* 2015; LBL.

*Calypogeia mülleriana* → ***Calypogeia muelleriana******Calypogeia neesiana*** (C.Massal. & Carestia) Müll.Frib.

SUBSTRATE: humus, decaying wood.

**Poland:** Karczmarz 1967; Mamczarz 1973; Bloch 1976, 1988 (tab. 18-20, 38); Izdebski *et al.* 1992a (tab. 25); Lorens *et al.* 2013; LBL.

**Ukraine:** Rabyk & Danylkiv 2008; LWKS.

*Calypogeia trichomanis* → ***Calypogeia azurea******Calypogeia sphagnicola*** (Arnell & J.Perss.) Warnst. & Loeske

SUBSTRATE: humus.

**Poland:** Lorens *et al.* 1991 (tab. 1); Izdebski *et al.* 1992a (tab. 13).

***Calypogeia suecica*** (Arnell & J.Perss.) Müll.Frib.

SUBSTRATE: decaying wood.

**Poland:** Lorens *et al.* 2013, Fudali *et al.* 2015.

***Cephalozia bicuspidata*** (L.) Dumort.

SUBSTRATE: soil, decaying wood, occasionally base of trees.

**Poland:** Szweykowski 1957; Karczmarz 1967; Mamczarz 1973, 1974; Bloch 1976, 1988 (tab. 17, 18, 19); Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Lilienfeldówna 1910 (as an exsiccate); Danylkiv *et al.* 2002; LWD.

*Cephalozia catenulata* → ***Fuscocephaloziosis catenulata****Cephalozia connivens* → ***Fuscocephaloziosis connivens****Cephalozia fluitans* → ***Odontoschisma fluitans****Cephalozia lunulifolia* → ***Fuscocephaloziosis lunulifolia****Cephalozia pleniceps* → ***Fuscocephaloziosis pleniceps***

***Cephaloziella divaricata*** (Sm.) Schiffn.

SYNONYMS: *Cephaloziella Starkei* (Funck ex Nees) Schiffn., *Cephaloziella starkei* (Funck) Schiffn.

SUBSTRATE: sand, rocks, loamy soil.

**Poland:** Karczmarz 1967; Bloch 1976, 1988 (tab. 36, 37); Łuczycka-Popiel 1992 (tab. 1); Maciejewski & Zubeł 2009a; LBL.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002.

*Cephaloziella elegans* → ***Cephaloziella rubella*** var. *elegans*

***Cephaloziella hampeana*** (Nees) Schiffn.

SUBSTRATE: damp soil.

**Poland:** Karczmarz 1967, 1968a (as an exsiccate).

**Ukraine:** LWKS (*leg.* I.V. Rabyk, 6 Jul 2000).

***Cephaloziella rubella*** (Nees) Warnst. var. *rubella*

SUBSTRATE: sandy and loamy soil.

**Poland:** Karczmarz 1966a (as an exsiccate), 1967; Mamczarz 1973, 1974; Izdebski *et al.* 1992a (tab. 10); LBL.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002.

var. *elegans* (Heeg) R.M. Schust.

SYNONYMS: *Cephaloziella elegans* (Heeg) Schiffn.

SUBSTRATE: sandy soil.

**Ukraine:** Rabyk & Danylkiv 2004; LWKS.

*Cephaloziella starkei* → ***Cephaloziella divaricata***

***Cephaloziella spinigera*** (Lindb.) Jörg.

SYNONYMS: *Cephaloziella subdentata* Warnst.

SUBSTRATE: peat.

**Ukraine:** Rabyk & Danylkiv 2008; LWKS.

*Cephaloziella subdentata* → ***Cephaloziella spinigera***

*Chiloscyphus coadonatus* → ***Lophocolea bidentata***

*Chiloscyphus minor* → ***Lophocolea minor***

***Chiloscyphus pallescens*** (Ehrh. ex Hoffm.) Dumort.

SYNONYMS: *Chiloscyphus pallescens* (Ehrh. ex Hoffm.) Dumort. var. *fontana* Müll. Frib.

SUBSTRATE: soil, humus, decaying wood, occasionally base of trees.

**Poland:** Szweykowski 1957 (also as var. *fontana*); Karczmarz 1966a (as an exsiccate), 1967; Mamczarz 1973, 1974; Izdebski *et al.* 1992a; Fudali *et al.* 2015; LBL.

**Ukraine:** Danylkiv *et al.* 2002; LWKS.

*Chiloscyphus pallescens* var. *fontana* → ***Chiloscyphus pallescens***

***Chiloscyphus polyanthos*** (L.) Corda var. ***polyanthos***

SUBSTRATE: soil, soil in water, decaying wood, occasionally base of trees in moist places.

**Poland:** Karczmarz 1966a (as an exsiccate), 1967; Mamczarz 1973, 1974; Bloch 1976, 1988 (tab. 19); Fijałkowski & Łuczycka-Popiel 1989 (tab. 6); Izdebski *et al.* 1992a (tab. 21); Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; LWKS.

var. ***rivularis*** (Schrad.) Gottsche *et al.*

SYNONYMS: *Chiloscyphus rivularis* (Schrad.) Hazsl.

SUBSTRATE: soil in water, roots of trees in water.

**Poland:** Karczmarz 1967; Mamczarz 1973, 1974; LBL.

**Ukraine:** Rabyk & Danylkiv 2008; LWKS.

*Chiloscyphus profundus* → ***Lophocolea heterophylla***

*Chiloscyphus rivularis* → ***Chiloscyphus polyanthos*** var. ***rivularis***

*Cladopodiella fluitans* → ***Odontoschisma fluitans***

***Conocephalum conicum*** (L.) Dumort. sensu lato (see *Note* below)

SUBSTRATE: soil, humus, stones, sandstone and Miocene limestone outcrops.

**Poland:** Szweykowski 1957, 1968a; Karczmarz 1965a (as an exsiccate), 1994; Bloch 1976, 1988 (tab. 6, 7, 22); Łuczycka-Popiel & Wawer 1992 (tab. 1).

**Ukraine:** Krupa 1885; Zerov 1964; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

NOTE: Szweykowski *et al.* (2005) divided the *C. conicum* complex into two separate species *C. conicum* s. str. and *C. salebrosum*. All data published before 2005 and cited above belong to *C. conicum* s. lat. except the specimens from the Polish Roztocze preserved in LBL herbarium. All published data based on these materials, revised by R. Zubeł & A. Opielowska (unpubl.), are placed in *C. conicum* sensu stricto or *C. salebrosum* (see below).

***Conocephalum conicum*** (L.) Dumort. sensu stricto

SUBSTRATE: mineral soil, humus.

**Poland:** Karczmarz 1967; Mamczarz 1973, 1974; Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

***Conocephalum salebrosum*** Szweykowski, Buczkowska & Odrzykoski

SUBSTRATE: soil, occasionally decaying wood.

**Poland:** Karczmarz 1966a (as an exsiccate), 1967 (as *C. conicum* s. lat. – rev. R. Zubel & A. Opielowska, 01.12.2010, LBL); Lorens *et al.* 2013; Fudali *et al.* 2015; Zubel 2015a; LBL.

***Diplophyllum albicans*** (L.) Dumort.

SUBSTRATE: soil, rocks.

**Ukraine:** Krupa 1885; Zerov 1964; Danylkiv *et al.* 2002.

***Diplophyllum obtusifolium*** (Hook.) Dumort.

SUBSTRATE: soil.

**Ukraine:** Krupa 1885; Zerov 1964; Danylkiv *et al.* 2002.

*Fossombronia cristata* → ***Fossombronia wondraczekii******Fossombronia wondraczekii*** (Corda) Lindb.SYNONYMS: *Fossombronia cristata* Lindb.

SUBSTRATE: mineral soil.

**Poland:** Karczmarz 1967, 1994; Bloch & Karczmarz 1973a; Bloch 1990.

**Ukraine:** Krupa 1885; Zerov 1964; Danylkiv *et al.* 2002.

***Frullania dilatata*** (L.) Dumort.

SUBSTRATE: bark of deciduous (occasionally coniferous) trees, rocks.

**Poland:** Szweykowski 1957; Mickiewicz 1965; Karczmarz 1967, 1990, 1994; Mamczarz 1973, 1974; Bloch 1976, 1988 (tab. 10-16); Szweykowski & Koźlicka 1977b; Łuczycka-Popiel 1992 (tab. 1); Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Zerov 1964; Danylkiv *et al.* 2002.

***Fuscocephalozia catenulata*** (Huebener) Váňa *et* L.Söderstr.SYNONYMS: *Cephalozia catenulata* (Huebener) Lindb.

SUBSTRATE: decaying wood.

**Poland:** Zubel 2009b; Lorens *et al.* 2013; Fudali *et al.* 2015.

**Ukraine:** Rabyk *et al.* 2011; LWKS.

***Fuscocephalozia connivens*** (Dicks.) Váňa *et* L.Söderstr.SYNONYMS: *Cephalozia connivens* (Dicks.) Lindb.

SUBSTRATE: decaying wood, humus.

**Poland:** Karczmarz 1967; Mamczarz 1974; Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; LWKS.

***Fuscocephaloziopsis lunulifolia*** (Dumort.) Váňa *et al.* L.Söderstr.

SYNONYMS: *Cephalozia lunulifolia* (Dumort.) Dumort.

SUBSTRATE: decaying wood.

**Poland:** Lorens *et al.* 2013; Fudali *et al.* 2015.

***Fuscocephaloziopsis pleniceps*** (Austin) Váňa *et al.* L.Söderstr.

SYNONYMS: *Cephalozia pleniceps* (Austin) Lindb.

SUBSTRATE: decaying wood, rocks, soil at base of alders (*Alnus glutinosa*).

**Poland:** Karczmarz 1967; LBL.

**Ukraine:** Lilienfeldówna 1911; Zerov 1964; Danylkiv *et al.* 2002.

***Geocalyx graveolens*** (Schrad.) Nees

SUBSTRATE: humus, decaying wood, occasionally base of trees.

**Poland:** Bloch 1990; Zubel 2009a; Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

***Gymnocolea inflata*** (Huds.) Dumort.

SUBSTRATE: among *Sphagnum* stems.

**Ukraine:** Krupa 1885; Lilienfeldówna 1911 (see *Note* below); Zerov 1964; Danylkiv *et al.* 2002.

NOTE: The species was given in remark after *Cladopodiella (Odontoschisma) fluitans* as *Jungermannia (Gymnocolea) inflata*.

***Isopaches bicrenatus*** (Schmidel) H. Buch

SYNONYMS: *Lophozia bicrenata* (Schmidel ex Hoffm.) Dumort.

SUBSTRATE: sandy soil.

**Poland:** Karczmarz 1967; LBL.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002.

***Jamesoniella autumnalis*** (DC.) Steph.

SUBSTRATE: decaying wood, humus, base of trees.

**Poland:** Karczmarz 1967, 1968a (as an exsiccate), 1994; Bloch & Karczmarz 1973b; Mamczarz 1973, 1974; Bloch 1976, 1988 (tab. 17, 20); Maciejewski & Zubel 2009c; Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

***Jungermannia caespiticia*** Lindenb.

SUBSTRATE: sandy soil.

**Ukraine:** Rabyk & Danylkiv 2004, 2005; LWKS.

***Jungermannia gracillima* Sm.**SYNONYMS: *Solenostoma crenulatum* (Sm.) Mitt.

SUBSTRATE: soil, loess.

**Poland:** Karczmarz 1967.**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002.***Jungermannia hyalina* Lyell**SYNONYMS: *Jungermannia hyalina* Hook., *Plectocolea hyalina* (Lyell) Mitten.

SUBSTRATE: soil.

**Poland:** Szweykowski 1957; Karczmarz 1967, 1968a (as an exsiccate); Mamczarz 1974; LBL.**Ukraine:** Krupa 1885; Lilienfeldówna 1914 (as *Eucalyx hyalinus* in admixture of *Scapania curta* exsiccate sample); Zerov 1964; Danylkiv *et al.* 2002.***Jungermannia leiantha* Grolle**

SUBSTRATE: humus, decaying wood, soil, base of trees.

**Poland:** Lorens *et al.* 2013; Fudali *et al.* 2015.**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.*Leiocolea badensis* → ***Mesoptychia badensis****Leiocolea collaris* → ***Mesoptychia bantriensis****Leiocolea heterocolpos* → ***Mesoptychia heterocolpos****Leiocolea muelleri* → ***Mesoptychia collaris****Leiocolea mülleri* → ***Mesoptychia collaris******Lejeunea cavifolia* (Ehrh.) Lindb.**

SUBSTRATE: bark of deciduous trees.

**Poland:** Mickiewicz 1965; Karczmarz 1967, 1968a (as an exsiccate); Szweykowski & Koźlicka 1974b; Bloch 1976, 1988 (tab. 10-12, 14); Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.***Lepidozia reptans* (L.) Dumort.**

SUBSTRATE: decaying wood, humus, soil, occasionally loess and bark of trees.

**Poland:** Szweykowski 1957; Karczmarz 1965a (as an exsiccate), 1967; Mamczarz 1973, 1974; Szweykowski & Koźlicka 1977a; Bloch 1976, 1988 (tab. 10, 11, 17-20, 24); Lorens *et al.* 1991 (tab. 1), 2013; Izdebski *et al.* 1992a (tab. 13); Łuczycza-Popiel 1992 (tab. 1); Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Zerov 1964; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; LWKS & LWFU.

***Lophocolea bidentata*** (L.) Dumort. (including *L. cuspidata*, see *Note* below)

SYNONYMS: *Chiloscyphus coadonatus* (Sw.) Engel *et* Schust., *Lophocolea cuspidata* (Ness) Limpr.

SUBSTRATE: soil, humus, decaying wood, base of trees.

**Poland:** Szweykowski 1957; Karczmarz 1967 (also as *L. cuspidata*), 1994; Mamczarz 1974; Bloch 1976, 1988 (tab. 35); Izdebski *et al.* 1992a (tab. 13, as *L. cuspidata*); Tracz 2014; Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Lilienfeldówna 1910 (as an exsiccate); Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; LWKS.

NOTE: According to Grolle & Long (2000), *L. cuspidata* (Ness) Limpr. is a synonym of *L. bidentata*.

*Lophocolea cuspidata* → ***Lophocolea bidentata***

***Lophocolea heterophylla*** (Schrad.) Dumort.

SYNONYMS: *Chiloscyphus profundus* (Nees) Engel *et* Schust.

SUBSTRATE: decaying wood, bark of coniferous and deciduous trees, stones, rocks, humus.

**Poland:** Szweykowski 1957 (see *Note* below), 1967a; Izdebski 1962b (tab. 4); Karczmarz 1965a (as an exsiccate), 1967; Mickiewicz 1965; Mamczarz 1973, 1974; Bloch 1976, 1988 (tab. 10-12, 17, 19, 20); Lorens *et al.* 1991 (tab. 1), 2013; Izdebski *et al.* 1992a (tab. 10, 13-15, 18-21, 23-25, 27-29, 33, 36); Łuczycka-Popiel 1992 (tab. 1); Maciejewski & Zubel 2009a; Tracz 2014; Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Lilienfeldówna 1911 (as species co-occurring with *Nowellia curvifolia*); Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; LWKS, LWD & LWFU.

NOTE: Szweykowski (1967a) cited four localities of the species from the Roztocze region, and used his own paper from 1957 as the source, but *L. heterophylla* unfortunately was not listed in this work. For this reason the later publication by this author (from 1967) should be taken as the main data source.

***Lophocolea minor*** Nees

SYNONYMS: *Chiloscyphus minor* (Nees) Engel *et* Schust.

SUBSTRATE: loamy and sandy soil.

**Poland:** Karczmarz 1967; Bloch 1976, 1988 (tab. 24, 35, 36); Łuczycka-Popiel 1992 (tab. 1); LBL.

**Ukraine:** Krupa 1885; Zerov 1964; Danylkiv *et al.* 2002.



*Lophozia badensis* → *Mesoptychia badensis*

*Lophozia barbata* → *Barbilophozia barbata*

*Lophozia bicrenata* → *Isopaches bicrenatus*

*Lophozia collaris* → *Mesoptychia collaris*

***Lophozia excisa*** (Dicks.) Dumort.

SUBSTRATE: soil.

**Poland:** Karczmarz 1967, 1968a (as an exsiccate); Bloch 1976, 1988 (tab. 37); LBL.

**Ukraine:** Krupa 1885; Zerov 1964; Danylkiv *et al.* 2002.

***Lophozia incisa*** (Schrad.) Dumort.

SUBSTRATE: decaying wood, damp soil.

**Poland:** Karczmarz 1967; Mamczarz 1973, 1974; Szweykowski & Koźlicka 1974a; Bloch 1976, 1988 (tab. 19); LBL.

**Ukraine:** Krupa 1885; Zerov 1964; Danylkiv *et al.* 2002.

***Lophozia ventricosa*** (Dicks.) Dumort.

SUBSTRATE: soil.

**Ukraine:** Krupa 1885; Zerov 1964; Danylkiv *et al.* 2002.

*Madotheca laevigata* → *Porella arboris-vitae*

*Madotheca platyphylla* → *Porella platyphylla*

*Mannia fragrans* → see under the list of doubtful/excluded species

*Marchantia aquatica* → *Marchantia polymorpha* subsp. *polymorpha*

*Marchantia polymorpha* → *Marchantia polymorpha* sensu lato

*Marchantia polymorpha* var. *terrestris* → *Marchantia polymorpha* sensu lato

***Marchantia polymorpha*** L. sensu lato (see *Note* below)

SYNONYMS: *Marchantia polymorpha* L. var. *terrestris* (without variety author)

SUBSTRATE: soil, decaying wood.

**Poland:** Karczmarz 1967, 1994; Bloch 1976, 1988 (tab. 31 – var. *terrestris*); Izdebski *et al.* 1992a (tab. 19, 21, 23, 25, 33), 1992b (tab. 5); LBL.

**Ukraine:** Danylkiv *et al.* 2002.

NOTE: All published data referring to *Marchantia polymorpha* without specification to the subspecies *ruderalis* or *polymorpha* are included here. In turn, data of *M. aquatica* are placed in *M. polymorpha* subsp. *polymorpha* (see below).

***Marchantia polymorpha* L. subsp. *polymorpha***

SYNONYMS: *Marchantia aquatica* L. (see *Note* below)

SUBSTRATE: soil, peat, occasionally decaying wood in water and base of trees in moist places.

**Poland:** Karczmarz 1967; Mamczarz 1973, 1974; Łuczycka-Popiel 1989 (tab. 1); Izdebski *et al.* 1992a (tab. 32-34); Fudali *et al.* 2015; LBL.

**Ukraine:** Lilienfeldówna 1910 (as an exsiccate); Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Shcherbachenko & Rabyk 2004; Soroka 2008a; LWKS, LWD & LWFU.

NOTE: All published data referring to *Marchantia aquatica* L. are included here. However data of *Marchantia polymorpha* without specification to the subspecies *ruderalis* or *polymorpha* are placed in *M. polymorpha* sensu lato.

***Marchantia polymorpha* L. subsp. *ruderalis***

SUBSTRATE: soil, decaying wood.

**Poland:** Fudali *et al.* 2015.

*Marchantia polymorpha* var. *terrestris* → ***Marchantia polymorpha*** sensu lato

***Marsupella funckii* (F. Weber & D. Mohr) Dumort.**

SUBSTRATE: soil.

**Ukraine:** Krupa 1885; Zerov 1964; Danylkiv *et al.* 2002.

***Mesoptychia badensis* (Gottsche ex Rabenh.) L. Söderstr. et Váňa**

SYNONYMS: *Leiocolea badensis* (Gottsche) Jörg., *Lophozia badensis* (Gottsche) Schiffn.

SUBSTRATE: Miocene limestone outcrops and boulders, calcareous soil, stones.

**Poland:** Karczmarz 1967, 1968a (as an exsiccate); Bloch 1990; LBL.

**Ukraine:** Ulychna 1976; LWD.

***Mesoptychia bantriensis* (Hook.) L. Söderstr. et Váňa (see *Note* below)**

SYNONYMS: *Leiocolea collaris* (Nees) Schljakov, *Leiocolea muelleri* (Nees ex Lindenb.) Jörg., *Leiocolea mülleri* (Nees) Jörg., *Lophozia collaris* (Nees) Dum.

SUBSTRATE: loess, Miocene limestone outcrops.

**Poland:** Szweykowski 1957; Karczmarz 1967, 1994; Bloch 1976, 1988 (tab. 4).

**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.

NOTE: *Mesoptychia bantriensis* [= *Lophozia bantriensis* (Hook.) Jörg.] is accepted here in a broad sense including *M. collaris* (Nees) L. Söderstr. et Váňa [= *Leiocolea collaris* (Nees) Schljakov, *Lophozia collaris* (Nees) Dum.] (Górski & Váňa 2014), and comprising *Leiocolea muelleri* (Nees ex Lindenb.) Jörg. in accordance with Schumacker & Váňa (2005).

*Mesoptychia collaris* → see above under the *Note* of *Mesoptychia bantriensis*

***Mesoptychia heterocolpos*** (Thed. ex Hartm.) L.Söderstr. et Váňa

SYNONYMS: *Leiocolea heterocolpos* (Thed. ex Hartm.) H.Buch

SUBSTRATE: loess, calcareous stones.

**Poland:** Szweykowski 1957 (also as fig. 1, p. 116); Karczmarz 1967.

**Ukraine:** LWKS (*leg.* I.V. Rabyk, 6 Jul 2000).

***Metzgeria conjugata*** Lindb.

SUBSTRATE: limestone boulders, bark of deciduous trees.

**Poland:** Karczmarz 1967, 1968a (as an exsiccate); Bloch 1990; Karczmarz & Bloch 2008; Lorens *et al.* 2013; Fudali *et al.* 2015.

***Metzgeria furcata*** (L.) Dumort.

SYNONYMS: *Metzgeria furcata* (L.) Dumort. fo. *furcata*, *Metzgeria furcata* (L.) Dumort. fo. *ulvula* Nees, *Metzgeria furcata* (L.) Dumort. var. *furcata*, *Metzgeria furcata* (L.) Dumort. var. *ulvula* Nees

SUBSTRATE: bark of trees, rocks, occasionally on loess and decaying wood.

**Poland:** Szweykowski 1957, 1968b; Mickiewicz 1965 (also as var. *ulvula*); Karczmarz 1966a (as an exsiccate – fo. *furcata*), 1967, 1968a (as an exsiccate – fo. *ulvula*), 1990; Mamczarz 1974; Bloch 1976, 1988 (tab. 10-14 – fo. *furcata*; tab. 10, 12-14 – fo. *ulvula*); Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002 (as var. *furcata* and var. *ulvula*); LWKS & LWFU.

*Metzgeria furcata* fo. *furcata* → ***Metzgeria furcata***

*Metzgeria furcata* var. *furcata* → ***Metzgeria furcata***

*Metzgeria furcata* fo. *ulvula* → ***Metzgeria furcata***

*Metzgeria furcata* var. *ulvula* → ***Metzgeria furcata***

*Metzgeria pubescens* → ***Apometzgeria pubescens***

***Mylia anomala*** (Hook.) Gray

SYNONYMS: *Leiomylia anomala* (Hook.) J.J.Engel & Braggins

SUBSTRATE: peat, among *Sphagnum* stems.

**Poland:** Szweykowski 1964; Lorens *et al.* 1991 (tab. 1); Izdebski *et al.* 1992a (tab. 8, 25).

***Mylia taylorii*** (Hook.) Gray

SUBSTRATE: soil, decaying wood.

**Ukraine:** Krupa 1885; Zerov 1964; Karczmarz *et al.* 1997; Danylkiv *et al.* 2002.

***Nowellia curvifolia*** (Dicks.) Mitt.

SUBSTRATE: decaying wood.

**Poland:** Karczmarz 1967, 1994; Szweykowski 1969; Bloch 1976, 1988 (tab. 17); Maciejewski & Zubel 2009c; Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

**Ukraine:** Lilienfeldówna 1911; Zerov 1964; Danylkiv *et al.* 2002.

***Odontoschisma denudatum*** (Mart.) Dumort.

SUBSTRATE: humus, decaying wood.

**Poland:** Zubel 2014c; Fudali *et al.* 2015; LBL.

***Odontoschisma fluitans*** (Nees) L.Söderstr. *et* Váňa

SYNONYMS: *Cladopodiella fluitans* (Nees) H.Buch, *Cephalozia fluitans* (Nees) Spruce

SUBSTRATE: peat, water, among *Sphagnum* stems.

**Poland:** Bloch 1976, 1988 (in both without locality); Lorens *et al.* 1991 (tab. 1); Izdebski *et al.* 1992a (tab. 5); Zubel 2009a; Zubel & Maciejewski 2009; Lorens *et al.* 2013; LBL.

**Ukraine:** Lilienfeldówna 1910 (as an exsiccate), 1911; Danylkiv *et al.* 2002.

***Pedinophyllum interruptum*** (Nees) Kaal.

SUBSTRATE: calcareous rocks, soil.

**Ukraine:** Karczmarz *et al.* 1997; Danylkiv *et al.* 2002; LWKS & LWFU.

***Pellia endiviifolia*** (Dicks.) Dumort.

SYNONYMS: *Pellia fabbroniana* Raddi, *Pellia fabbroniana* Radii fo. *furcigera* Hook

SUBSTRATE: soil, Miocene limestone outcrops.

**Poland:** Karczmarz 1966a (as admixture in *Pellia epiphylla* exsiccate), 1967 (also as fo. *furcigera*); Bloch 1976, 1988 (tab. 7, 27); Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

**Ukraine:** Rabyk & Danylkiv 2004, 2005; LWKS.

***Pellia epiphylla*** (L.) Corda

SUBSTRATE: soil, humus, occasionally decaying wood.

**Poland:** Karczmarz 1966a (as an exsiccate), 1967, 1994; Mamczarz 1973, 1974; Bloch 1976, 1988 (tab. 7, 38); Lorens *et al.* 1991 (tab. 1), 2013; Izdebski *et al.* 1992a (tab. 19, 21, 23, 25); Łuczycka-Popiel & Wawer 1992 (tab. 1); Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002; LWD.

*Pellia fabbroniana* → ***Pellia endiviifolia***

*Pellia fabbroniana* fo. *furcigera* → ***Pellia endiviifolia***

***Pellia neesiana*** (Gottsche) Limpr.

SUBSTRATE: soil, loamy soil.

**Poland:** Szweykowski 1957; Karczmarz 1967; LBL.

**Ukraine:** Lilienfeldówna 1910 (as an exsiccate).

***Plagiochila asplenioides*** (L. emend. Taylor) Dumort.

SYNONYMS: *Plagiochila major* (Ness) Arnell

SUBSTRATE: soil, humus, stones, occasionally decaying wood and base of trees in moist places.

**Poland:** Izdebska & Szynal 1961 (tab. 1); Izdebski 1962a (tab. 4, 6), 1962b (tab. 1, 8, 11), 1963a (tab. 1, 4), 1963b (tab. 1, 2), 1964 (tab. 1), 1966 (tab. 2), 1967 (tab. 3), 1972 (tab. 2); Karczmarz 1967, 1968a (as an exsiccate), 1994; Szweykowski 1971b; Mamczarz 1973, 1974; Bloch & Karczmarz 1973b; Bloch 1976, 1988; Fijałkowski & Łuczycka-Popiel 1989 (tab. 6); Łuczycka-Popiel & Wawer 1992 (tab. 1); Maciejewski & Zubel 2009b, 2009c; Zubel 2009b; Lorens *et al.* 2013; Tracz 2014; Fudali *et al.* 2015; LBL.

**Ukraine:** Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; LWKS.

*Plagiochila major* → ***Plagiochila asplenioides***

***Plagiochila porelloides*** (Torrey ex Nees) Lindenb.

SUBSTRATE: soil, humus, stones, rocks, decaying wood, base and trunk of trees.

**Poland:** Szweykowski 1957, 1971a; Mickiewicz 1965; Karczmarz 1966a (as an exsiccate), 1967, 1994; Mamczarz 1973, 1974; Bloch 1976, 1988 (tab. 4, 7, 10, 12, 22, 24, 35, 36, 38); Izdebski *et al.* 1992a (tab. 13, 14, 19, 24), 1992b (tab. 4); Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

**Ukraine:** LWKS (*leg.* I.V. Rabyk, 6 Jul 2000), LWFU.

*Plectocolea hyalina* → ***Jungermannia hyalina***

***Porella arboris-vitae*** (With.) Grolle

SYNONYMS: *Madotheca laevigata* (Schrad.) Dumort.

SUBSTRATE: bark of *Fagus sylvatica*.

**Poland:** Szweykowski 1957 (also as fig. 1, p. 116); Karczmarz 1967, 1990 (see *Note* below), 1994.

NOTE: According to Karczmarz (1990), *P. arboris-vitae* disappeared from its locality, but the same author cited the species again (Karczmarz 1994).

***Porella platyphylla* (L.) Pfeiff.**

SYNONYMS: *Madotheca platyphylla* (L.) Dum., *Porella platyphylloidea* (Schwein.) Lindb.

SUBSTRATE: bark of deciduous trees, limestone and sandstone rocks.

**Poland:** Szweykowski 1957 (as *P. platyphylla* and *P. platyphylloidea* – see *Note* below); Karczmarz 1967, 1990, 1994; Bloch 1976, 1988 (tab. 4, 5, 10, 12-14), 1990; Maciejewski & Zubel 2009c; Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Lilienfeldówna 1910 (as an exsiccate); Zerov 1964; Danylkiv *et al.* 2002; LWKS & LWFU.

NOTE: *P. platyphylloidea* is conspecific with *P. platyphylla* (Grolle & Long 2000).

***Porella platyphylloidea* → *Porella platyphylla******Porella* × *baueri* (Schiffn.) C.E.O.Jensen**

SUBSTRATE: bark of *Fagus sylvatica*.

**Poland:** Szweykowski 1957 (also as fig. 1, p. 116); Karczmarz 1967, 1990 (see *Note* below), 1994; Bloch 1990; Lorens *et al.* 2013.

NOTE: According to Karczmarz (1990), *P. baueri* disappeared from its locality, but the same author has cited the species again (Karczmarz 1994).

***Preissia commutata* → *Preissia quadrata******Preissia quadrata* (Scop.) Nees**

SYNONYMS: *Preissia commutata* (Lindenb.) Nees

SUBSTRATE: mineral soil, rocks.

**Poland:** Szweykowski 1957, 1967b; Karczmarz 1967; Lorens *et al.* 2013.

**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Soroka 2002; LWKS.

***Ptilidium ciliare* (L.) Hampe**

SUBSTRATE: sand, base of trees, decaying wood.

**Poland:** Szweykowski 1966a; Karczmarz 1967; Bloch & Karczmarz 1973b; Mamczarz 1974; Izdebski *et al.* 1992a (tab. 14); LBL.

**Ukraine:** Krupa 1885; Zerov 1964; Danylkiv *et al.* 2002.

***Ptilidium pulcherrimum* (Weber) Vain.**

SUBSTRATE: bark of coniferous and deciduous trees, decaying wood, rocks.

**Poland:** Szweykowski 1957, 1966b; Karczmarz 1965a (as an exsiccate), 1967, 1994; Mamczarz 1973, 1974; Bloch & Karczmarz 1973b; Bloch 1976, 1988 (tab. 10, 11, 17, 20); Karczmarz *et al.* 1997; Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS, LWD & LWFU.

***Radula complanata* (L.) Dumort.**

SUBSTRATE: bark of deciduous trees, Miocene limestone outcrops.

**Poland:** Szweykowski 1957; Karczmarz 1965a (as an exsiccate), 1967, 1990, 1994; Mickiewicz 1965; Mamczarz 1973, 1974; Bloch 1976, 1988 (tab. 5, 10, 12-16); Karczmarz *et al.* 1997; Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002; LWKS & LWFU.

***Reboulia hemisphaerica* (L.) Raddi**

SUBSTRATE: sandstone rocks (carpathian flysh).

**Ukraine:** Rabyk & Danylkiv 2004; LWKS.

***Riccardia incurvata* Lindb.**

SYNONYMS: *Aneura incurvata* (Lindb.) Steph.

SUBSTRATE: sand.

**Ukraine:** Lilienfeldówna 1911; Zerov 1964; Danylkiv *et al.* 2002.

***Riccardia latifrons* (Lindb.) Lindb.**

SYNONYMS: *Aneura latifrons* Lindb.

SUBSTRATE: decaying wood, humus.

**Poland:** Karczmarz 1965a (as an exsiccate), 1967, 1994; Mamczarz 1973, 1974; Mendelak 1977; Szweykowski & Koźlicka 1980a; Bloch 1976, 1988 (tab. 17, 18); Maciejewski & Zubel 2009c; Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

***Riccardia multifida* (L.) Gray**

SYNONYMS: *Aneura multifida* Dumort.

SUBSTRATE: soil.

**Poland:** Szweykowski 1957; Karczmarz 1967, 1968a (as an exsiccate); Mamczarz 1974; Mendelak 1977; LBL.

**Ukraine:** Krupa 1885; Zerov 1964; Danylkiv *et al.* 2002.

***Riccardia palmata* (Hedw.) Carruth.**

SUBSTRATE: decaying wood.

**Poland:** Szweykowski 1957; Karczmarz 1967; Bloch & Karczmarz 1973b; Mamczarz 1974; Karczmarz & Mamczarz 1974 (as an exsiccate); Mendelak 1977; Szweykowski & Koźlicka 1980b; Bloch 1976, 1988 (tab. 17); Izdebski *et al.* 1992a (tab. 25); Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

*Riccardia pinguis* → *Aneura pinguis*

***Riccia bifurca*** Hoffm.

SUBSTRATE: soil.

**Poland:** Bloch & Karczmarz 1973a.**Ukraine:** Krupa 1885; Zerov 1964; Danylkiv *et al.* 2002; LWKS.***Riccia cavernosa*** Hoffm.SYNONYMS: *Riccia crystallina* L.

SUBSTRATE: soil.

**Ukraine:** Krupa 1885 (as *R. crystallina*); Zerov 1964; Danylkiv *et al.* 2002.***Riccia ciliata*** Hoffm.

SUBSTRATE: soil.

**Poland:** Karczmarz 1967; LBL.**Ukraine:** Krupa 1885; Zerov 1964; Danylkiv *et al.* 2002.*Riccia crystallina* → ***Riccia cavernosa******Riccia fluitans*** L.

SUBSTRATE: water, damp soil.

**Poland:** Karczmarz 1967, 1994; Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.**Ukraine:** Lilienfeldówna 1910 (as an exsiccate); Zerov 1964; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Soroka 2008a, 2008b; LBL, LWKS, LWD & LWFU.***Riccia glauca*** L.

SUBSTRATE: soil, calcareous soil.

**Poland:** Karczmarz 1967, 1968a (as an exsiccate); Bloch & Karczmarz 1973a.**Ukraine:** Krupa 1885. Zerov 1964; Danylkiv *et al.* 2002.*Riccia heubeneriana* → see under the list of doubtful/excluded species***Riccia rhenana*** Lorb. *ex* Mull.Frib.

SUBSTRATE: water, damp soil.

**Poland:** Karczmarz 1967, 1968a (as an exsiccate); LBL.***Riccia sorocarpa*** Bisch.

SUBSTRATE: soil.

**Poland:** Karczmarz 1967; Lorens *et al.* 2013; LBL.



***Riccia warnstorffii*** Limpr. ex Warnst.

SUBSTRATE: soil.

**Poland:** Karczmarz 1967; LBL.***Ricciocarpos natans*** (L.) Corda

SUBSTRATE: water, damp soil.

**Poland:** Lorens *et al.* 2013; Zubel 2015b; LBL.**Ukraine:** Lilienfeldówna 1910 (as an exsiccate); Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Soroka 2002, 2008a, 2008b; LWKS & LWFU.***Scapania calcicola*** (Arnell & J.Perss.) Ingham

SUBSTRATE: calcareous soil.

**Poland:** Karczmarz 1967, 1968a (as an exsiccate); LBL.***Scapania curta*** (Mart.) Dumort.

SUBSTRATE: loamy soil.

**Poland:** Szweykowski 1957; Karczmarz 1966a (as an exsiccate), 1967; LBL.**Ukraine:** Lilienfeldówna 1914 (as an exsiccate).***Scapania irrigua*** (Nees) Nees

SUBSTRATE: peaty-sand soil.

**Poland:** Karczmarz 1967; LBL.***Scapania mucronata*** H.Buch

SUBSTRATE: loess, loamy soil.

**Poland:** Szweykowski 1957, Karczmarz 1967; LBL.***Scapania nemorea*** (L.) GrolleSYNONYMS: *Scapania nemorosa* Dumort.

SUBSTRATE: soil, rocks.

**Ukraine:** Krupa 1885; Zerov 1964; Danylkiv *et al.* 2002.*Scapania nemorosa* → ***Scapania nemorea****Scapania parvifolia* → see under the list of doubtful/excluded species*Scapania scandica* fo. *parvifolia* → see under the list of doubtful/excluded species*Solenostoma crenulatum* → ***Jungermannia gracillima***

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***Trichocolea tomentella*** (Ehrh.) Dumort.

SUBSTRATE: soil, humus, decaying wood.

**Poland:** Izdebski 1963a (tab. 1); Karczmarz 1965a (as an exsiccate), 1967, 1994; Mamczarz 1973, 1974; Bloch & Karczmarz 1973b; Izdebski *et al.* 1992a (tab. 24); Karczmarz 1994; Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Lilienfeldówna 1910 (as an exsiccate); Zerov 1964; Danylkiv *et al.* 2002.

*Tritomaria exsecta* → see under the list of doubtful/excluded species



## CHECKLIST OF MOSSES

### Explanations:

SYNONYMS – all used synonyms of the species, in accordance with names published in the source materials; SUBSTRATE – all occupied substrates given in the particular publications; LBL – Herbarium of the Department of Botany and Mycology, Maria Curie-Skłodowska University (PL); LWD – Collections of bryophytes of the State Museum of Natural History, NAS of Ukraine (UA); LWFU – Herbarium of Ukrainian State Forestry University (UA); LWKS – Herbarium of the Institute of Ecology of the Carpathians, NAS of Ukraine (UA).

### *Abietinella abietina* (Hedw.) M.Fleisch.

SYNONYMS: *Thuidium abietinum* (Hedw.) Schimp.

SUBSTRATE: Miocene limestone outcrops, rocks, soil.

**Poland:** Błoński 1890; Kuc 1958, 1963; Lisowski 1958; Karczmarz 1965b (as an exsiccate); Bloch & Karczmarz 1973a; Mamczarz 1974; Bloch 1976, 1988 (tab. 5); LBL.

**Ukraine:** Wiśniewski 1923; Danylkiv *et al.* 2002; LWKS & LWFU.

### *Acaulon muticum* (Schreb. *ex* Hedw.) Müll.Hal.

SYNONYMS: *Sphaerangium muticum* (Hedw.) Schimp.

SUBSTRATE: soil.

**Poland:** Kuc 1963, 1964; Bloch 1990.

**Ukraine:** Ulychna 1978; LWD.

### *Acrocladium cuspidatum* → *Calliergonella cuspidata*

### *Aloina ambigua* (Bruch & Schimp.) Limpr.

SYNONYMS: *Aloina ericaefolia* Kindb., *Barbula ambigua* Bruch & Schimp.

SUBSTRATE: loess, loamy soil.

**Poland:** Karczmarz 1960.

**Ukraine:** Rabyk & Danylkiv 2005; LWKS.

### *Aloina brevirostris* (Hook. & Grev.) Kindb.

SUBSTRATE: loess.

**Poland:** Kuc 1963; 1964 (species excluded from Polish part of the Region, see *Note* below).

**Ukraine:** LWKS (*leg.* I.V. Rabyk, 15 Jul 2003).

NOTE: Kuc (1964) reported the occurrence of *A. brevirostris* as citation of own earlier work, but the species unfortunately was not listed in this source paper (Kuc 1963).

*Aloina ericaefolia* → *Aloina ambigua*

*Aloina rigida* (Hedw.) Limpr.

SUBSTRATE: loamy soil, loess.

**Poland:** Lisowski 1957 (as an exsiccate), 1958; Karczmarz 1960; Kuc 1963; Bloch 1976, 1988 (tab. 29).

**Ukraine:** Lazarenko *et al.* 1971; Ulychna 1978; Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2005; LWKS & LWD.

*Amblyodon dealbatus* (Sw. *ex* Hedw.) P.Beauv.

SUBSTRATE: peatbog.

**Ukraine:** Krupa 1885; Bachuryna & Mel'nychuk 1989.

*Amblystegium subtile* → *Serpoleskea subtilis*

*Amblystegiella subtilis* → *Serpoleskea subtilis*

*Amblystegium confervoides* → *Serpoleskea confervoides*

*Amblystegium juratzkanum* Schimp.

SYNONYMS: *Amblystegium serpens* (Hedw.) Schimp. var. *juratzkanum* (Schimp.) Rau & Herv.

SUBSTRATE: soil, decaying wood.

**Poland:** Lisowski 1958; Kuc 1963; Fudali *et al.* 2015.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.

*Amblystegium kochii* → *Leptodictyum humile*

*Amblystegium riparium* → *Leptodictyum riparium*

*Amblystegium riparium* fo. *longifolium* → *Leptodictyum riparium*

*Amblystegium serpens* (Hedw.) Schimp.

SUBSTRATE: soil, loamy soil, Miocene limestone outcrops, bark of deciduous trees, concrete elements.

**Poland:** Błoński 1890; Lisowski 1958; Kuc 1963; Mickiewicz 1965; Bloch & Karczmarz 1973a; Bloch 1976, 1988 (tab. 5, 6, 12-16, 24, 27, 31, 35, 36); Izdebski *et al.* 1992a (tab. 21, 33), 1992b (tab. 4); Fudali *et al.* 2015; LBL.

**Ukraine:** Wiśniewski 1923; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Shcherbachenko & Rabyk 2004; LWKS & LWFU.

*Amblystegium serpens* var. *juratzkanum* → *Amblystegium juratzkanum*

*Amblystegium subtile* → *Serpoleskea subtilis*

*Amblystegium varium* → *Orthotheciella varia*

*Anisothecium rubrum* → *Dicranella varia*

*Anisothecium varium* → *Dicranella varia*

***Anomodon attenuatus*** (Hedw.) Huebener

SUBSTRATE: Miocene limestone outcrops, bark of deciduous trees.

**Poland:** Błoński 1890; Lisowski 1958; Kuc 1963; Karczmarz 1967 (tab. 3-5); Bloch 1976, 1988 (tab. 5, 6, 10, 12-15); Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

**Ukraine:** Czerkawski 1867; Krupa 1885; Wiśniewski 1923; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

***Anomodon longifolius*** (Schleich. *ex* Brid.) Hartm.

SUBSTRATE: Miocene limestone outcrops, bark of deciduous trees.

**Poland:** Błoński 1890; Kuc 1958, 1963; Lisowski 1958; Karczmarz 1967 (tab. 4, 5); Mamczarz 1973; Bloch 1976, 1988 (tab. 5, 12-14); Lorens *et al.* 2013; LBL.

**Ukraine:** Łobarzewski 1847; Czerkawski 1867; Krupa 1885; Wiśniewski 1923; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.

***Anomodon rostratus*** (Hedw.) Schimp.

SUBSTRATE: tree trunks.

**Ukraine:** Danylkiv *et al.* 2002; LWKS.

***Anomodon viticulosus*** (Hedw.) Hook. & Taylor

SUBSTRATE: Miocene limestone outcrops, bark of deciduous trees.

**Poland:** Błoński 1890; Kuc 1958, 1963; Lisowski 1958; Karczmarz 1965c, 1967 (tab. 5), 1994; Mamczarz 1973; Bloch & Karczmarz 1973a; Bloch 1976, 1988 (tab. 4, 5, 13, 14); Izdebski *et al.* 1992b (tab. 4); Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Wiśniewski 1923; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

***Atrichum angustatum*** (Brid.) Bruch & Schimp.

SYNONYMS: *Catharinea angustata* (Brid.) Brid.

SUBSTRATE: soil, loess.

**Poland:** Kuc 1963, 1964 (also as fig. 11, p. 58).

**Ukraine:** Krupa 1885; Shcherbachenko & Rabyk 2004; LWKS.

***Atrichum flavisetum* Mitt.**SYNONYMS: *Catharinea Haussknechtii* (Jur. & Milde) Broth.

SUBSTRATE: calcareous soil, loess.

**Poland:** Lisowski 1957 (as an exsiccate), 1958; Kuc 1963, 1964 (also as fig. 10, p. 58); Karczmarz 1964a (as an exsiccate), 1964b, 1994; Bloch 1976, 1988 (tab. 22); Łuczycka-Popiel 1992 (tab. 1); Karczmarz & Bloch 2008; LBL.

***Atrichum tenellum* (Röhl.) Bruch & Schimp.**SYNONYMS: *Catharinea tenella* Röhl., *Catharinea undulata* var. *minor* (Hedw.) F. Weber & D. Mohr

SUBSTRATE: damp sand.

**Poland:** Kuc 1963, 1964 as fig. 12 (p. 59).

**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; LWKS.

***Atrichum undulatum* (Hedw.) P. Beauv.**SYNONYMS: *Catharinea undulata* (L.) Weber et Mohr.

SUBSTRATE: soil, humus, decaying wood, base of trees.

**Poland:** Lisowski 1958; Izdebski 1962a (tab. 4, 6), 1962b (tab. 1, 4, 8, 11), 1963a (tab. 1, 7), 1964 (tab. 1), 1966 (tab. 3), 1967 (tab. 3), 1972 (tab. 2); Szynal 1962 (tab. 12); Kuc 1963; Karczmarz 1965c; Mamczarz 1973, 1974; Kimsa 1974 (tab. 1); Bloch 1976, 1988 (tab. 22, 24, 27, 35, 36, 38); Czarnecka 1978 (tab. 1); Fijałkowski & Łuczycka-Popiel 1989 (tab. 4-7, 9); Łuczycka-Popiel 1989 (tab. 1); Izdebski *et al.* 1992a (tab. 11, 13-16, 18, 19, 21, 23-25, 27-29, 35, 36), 1992b (tab. 4); Maciejewski & Zubel 2009a, 2009b; Lorens *et al.* 2013; Tracz 2014; Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Żmuda 1911 (as an exsiccate); Tymrakiewicz 1928; Lazarenko *et al.* 1971; Ulychna 1978; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; Soroka 2008a, 2008b; LWKS, LWD & LWFU.

***Aulacomnium androgynum* (Hedw.) Schwägr.**

SUBSTRATE: decaying wood.

**Poland:** Lisowski 1958; Kuc 1963, 1964 as fig. 29 (p. 136); Bloch & Karczmarz 1973a; Karczmarz 1994; Lorens *et al.* 2013; Fudali *et al.* 2015.

**Ukraine:** Rabyk & Danylkiv 2004; LWKS.

***Aulacomnium palustre* (Hedw.) Schwägr.**

SUBSTRATE: peat, damp soil, humus, decaying wood.

**Poland:** Lisowski 1958; Izdebski 1961 (tab. 7, 11), 1962a (tab. 4), 1963a (tab. 4), 1963b (tab. 2), 1966 (tab. 2), 1972 (tab. 2); Szynal 1962 (tab. 7); Kuc 1963; Karczmarz 1965c; Bloch & Karczmarz 1973a, 1973b; Kimsa 1974 (tab. 1);

Mamczarz 1974; Lorens *et al.* 1991 (tab. 1); Izdebski *et al.* 1992a (tab. 6, 9, 10, 13, 33, 34, 36-38); Tracz 2014; Fudali *et al.* 2015.

**Ukraine:** Krupa 1885; Tymrakiewicz 1928; Danylkiv & Soroka 1989; Soroka 2008a, 2008b; LWKS & LWFU.

*Barbula ambigua* → *Aloina ambigua*

***Barbula convoluta*** Hedw.

SYNONYMS: *Streblotrichum convolutum* (Hedw.) P. Beauv.

SUBSTRATE: eroded rock material, rock crevices, stone walls, soil, loess.

**Poland:** Kuc 1958, 1963; Lisowski 1958; Karczmarz 1960; Mamczarz 1974; Bloch 1976, 1988 (tab. 22, 27); Izdebski *et al.* 1992b (s. 263); Fudali *et al.* 2015.

**Ukraine:** Krupa 1885; Lazarenko *et al.* 1971; Bachuryyna & Mel'nychuk 1989; Danylkiv & Soroka 1989; LWKS.

*Barbula cylindrica* → *Didymodon insulanus*

*Barbula fallax* → *Didymodon fallax*

*Barbula hornschuchiana* → *Pseudocrossidium hornschuchianum*

*Barbula muralis* → *Tortula muralis*

*Barbula papillosa* → *Syntrichia papillosa*

*Barbula pulvinata* → *Syntrichia virescens*

*Barbula reflexa* → *Didymodon ferrugineus*

*Barbula revoluta* → *Pseudocrossidium revolutum*

*Barbula rigidula* → *Didymodon rigidulus*

*Barbula rigidula* var. *densa* → *Didymodon rigidulus*

*Barbula ruralis* → *Syntrichia ruralis*

*Barbula subulata* → *Tortula subulata*

*Barbula tortuosa* → *Tortella tortuosa*

*Barbula vinealis* → *Didymodon vinealis*



*Barbula insidiosa* → *Didymodon spadiceus*

***Barbula unguiculata*** Hedw.

SUBSTRATE: loamy soil, loess, sand, concrete elements.

**Poland:** Lisowski 1958; Kuc 1963; Mamczarz 1974; Bloch 1976, 1988 (tab. 29, 31, 36); Fudali *et al.* 2015.

**Ukraine:** Krupa 1885; Lazarenko *et al.* 1971; Danylkiv & Soroka 1989; Rabyk & Danylkiv 2005; LWKS & LWFU.

***Bartramia ithyphylla*** Brid.

SUBSTRATE: calcareous soil, loess, Miocene limestone outcrops.

**Poland:** Kuc 1963; Karczmarz 1964a (as an exsiccate), 1965c; 1994; Bloch & Karczmarz 1973a, 1973b; Bloch 1976, 1988 (tab. 22, 24); Ochyra *et al.* 1992a; Karczmarz & Bloch 2008; Lorens *et al.* 2013.

*Bartramia oederi* → *Plagiopus oederiana*

***Bartramia pomiformis*** Hedw.

SUBSTRATE: sandy soil.

**Poland:** Lisowski 1958, Kuc 1963, Ochyra *et al.* 1992b; Karczmarz 1994; Lorens *et al.* 2013.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002.

***Brachytheciastrum velutinum*** (Hedw.) Ignatov & Huttunen var. *velutinum*

SYNONYMS: *Brachythecium velutinum* (Hedw.) Schimp.

SUBSTRATE: Miocene limestone outcrops, bark of deciduous and coniferous trees, decaying wood, soil.

**Poland:** Lisowski 1958; Izdebski 1962b (tab. 1, 4, 8), 1963b (tab. 2), 1964 (tab. 1), 1966 (tab. 3), 1967 (tab. 3); Kuc 1963; Mickiewicz 1965; Karczmarz 1967 (tab. 2, 4, 5); Mamczarz 1973, 1974; Kimsa 1974 (tab. 1); Bloch 1976, 1988 (tab. 4, 5, 7, 10, 12, 13, 15, 18, 20, 24, 35, 36); Izdebski *et al.* 1992a (tab. 15, 19, 20, 28, 33); Łuczycka-Popiel & Wawer 1992 (tab. 1); Fudali *et al.* 2015; LBL.

**Ukraine:** Wiśniewski 1923; Żmuda 1912 (as an exsiccate); Danylkiv & Soroka 1989; Shcherbachenko & Rabyk 2004; Rabyk & Danylkiv 2005; LWKS & LWFU.

var. *salicinum* (Schimp.) Ochyra & Żarnowiec

SYNONYMS: *Brachythecium velutinum* (Hedw.) Schimp. var. *salicinum* (Schimp.) Mönk.

SUBSTRATE: soil.

**Poland:** Karczmarz 1965c, 1968b (as an exsiccate).

***Brachythecium albicans*** (Hedw.) Schimp.

SUBSTRATE: soil.

**Poland:** Lisowski 1957 (as an exsiccate), 1958; Kuc 1963; Bloch 1976, 1988 (tab. 22); Fijałkowski & Łuczycka-Popiel 1989 (tab. 7, 9); Fudali *et al.* 2015; LBL.

**Ukraine:** Wiśniewski 1923; Danylkiv & Soroka 1989; Rabyk & Danylkiv 2005; Soroka 2008a, 2008b; LWKS & LWFU.

***Brachythecium campestre*** (Müll.Hal.) Schimp.

SUBSTRATE: soil, decaying wood.

**Poland:** LBL (*leg.* K. Karczmarz, 10 Jun 1988).

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2005; LWKS & LWFU.

*Brachythecium curtum* → ***Sciuro-hypnum oedipodium***

***Brachythecium glareosum*** (Bruch ex Spruce) Schimp.

SUBSTRATE: soil, loess, loamy soil, eroded rock material.

**Poland:** Lisowski 1958; Kuc 1963.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2005; LWKS & LWFU.

***Brachythecium mildeanum*** (Schimp.) Schimp.

SUBSTRATE: damp soil.

**Poland:** Lisowski 1958; LBL.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

*Brachythecium plumosum* → ***Sciuro-hypnum plumosum***

*Brachythecium populeum* → ***Sciuro-hypnum populeum***

*Brachythecium reflexum* → ***Sciuro-hypnum reflexum***

***Brachythecium rivulare*** Schimp.

SUBSTRATE: water, damp soil, humus, occasionally damp decaying wood.

**Poland:** Mamczarz 1974; Izdebski *et al.* 1992a (tab. 33); Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

**Ukraine:** Shcherbachenko & Rabyk 2004; LWKS & LWFU.

***Brachythecium rutabulum* (Hedw.) Schimp.**

SUBSTRATE: soil, humus, decaying wood, bark of trees.

**Poland:** Lisowski 1958; Izdebski 1963a (tab. 1, 7), 1963b (tab. 2); Kuc 1963; Karczmarz 1965c; Mickiewicz 1965; Mamczarz 1973, 1974; Lorens *et al.* 1991 (tab. 1); Izdebski *et al.* 1992a (tab. 10, 11, 13-16, 18, 19, 21, 24, 25, 27-29, 32, 33, 35, 36), 1992b (s. 263); Łuczycka-Popiel 1992 (tab. 1); Łuczycka-Popiel & Wawer 1992 (tab. 1); Tracz 2014; Fudali *et al.* 2015; LBL.

**Ukraine:** Wiśniewski 1923; Danylkiv & Soroka 1989; Shcherbachenko & Rabyk 2004; Rabyk & Danylkiv 2005; LWKS & LWFU.

***Brachythecium salebrosum* (Hoffm. ex F.Weber & D.Mohr) Schimp.**

SUBSTRATE: decaying wood, bark of trees, occasionally soil and concrete elements.

**Poland:** Lisowski 1958; Izdebski 1962b (tab. 1, 8), 1963b (tab. 2), 1964 (tab. 1); Kuc 1963; Karczmarz 1965b (as an exsiccate), 1967 (tab. 2-4); Mamczarz 1973, 1974; Bloch & Karczmarz 1973a; Bloch 1976, 1988 (tab. 11, 12, 14, 17, 18, 20, 35); Izdebski *et al.* 1992a (tab. 18, 20, 24, 28, 32, 33-36), 1992b (tab. 5); Fudali *et al.* 2015; LBL.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Shcherbachenko & Rabyk 2004; Rabyk & Danylkiv 2008; LWKS & LWFU.

***Brachythecium starkei* → *Sciuro-hypnum starkei******Brachythecium tommasinii* (Sendtn. ex Boulay) Ignatov & Huttunen**

SYNONYMS: *Cirriphyllum tenuinerve* (Lindb.) Wijk & Margad., *Cirriphyllum vaucheri* (Schimp.) Loeske & M.Fleisch., *Cirriphyllum tommasinii* (Sendtn. ex Boulay) Grout

SUBSTRATE: Miocene limestone outcrops, eroded rock material.

**Poland:** Kuc 1958, 1963, 1964 (also as fig. 43, p. 183); Bloch 1976, 1988 (tab. 4, 5); LBL.

**Ukraine:** Rabyk & Danylkiv 2004, 2008; LWKS.

***Brachythecium velutinum* → *Brachytheciastrum velutinum******Brachythecium velutinum* var. *salicinum* → *Brachytheciastrum velutinum* var. *salicinum******Breidleria arcuata* → *Hypnum lindbergii******Breidleria pratensis* → *Hypnum pratense******Bryoerythrophyllum recurvirostrum* (Hedw.) P.C.Chen**

SYNONYMS: *Erythrophyllum rubellum* (Hoffm.) Loeske, *Didymodon rubellus* Bruch & Schimp.

SUBSTRATE: Miocene limestone outcrops, eroded rock material, occasionally concrete elements and stone walls.

**Poland:** Lisowski 1958; Karczmarz 1960, 1964a (as an exsiccate), 1965c; Kuc 1963; Mamczarz 1974; Fudali *et al.* 2015.

**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

*Bryum affine* → *Bryum creberrimum*

*Bryum algovicum* Sendtn. ex Müll.Hal.

SYNONYMS: *Bryum pendulum* (Hornsch.) Schimp.

SUBSTRATE: wet soil.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002; LWKS.

*Bryum amblyodon* Bruch & Schimp.

SYNONYMS: *Bryum inclinatum* (Sw. ex Brid.) Blandow

SUBSTRATE: wet, waterlogged soil.

**Ukraine:** Krupa 1885.

*Bryum inclinatum* → *Bryum amblyodon*

*Bryum archangelicum* Bruch & Schimp.

SUBSTRATE: wet soil.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002.

*Bryum argenteum* Hedw.

SUBSTRATE: sand, loamy soil, loess, concrete elements.

**Poland:** Lisowski 1958; Karczmarz 1960, 1967 (tab. 1), 1994; Kuc 1963; Bloch 1976, 1988 (tab. 29, 31, 36); Lorens *et al.* 2013; Fudali *et al.* 2015.

**Ukraine:** Czerkawski 1867; Krupa 1885; Lazarenko *et al.* 1971; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Shcherbachenko & Rabyk 2004; Soroka 2008a; LWKS & LWFU.

*Bryum atropurpureum* → *Bryum bicolor*

*Bryum badium* (Bruch ex Brid.) Schimp.

SUBSTRATE: wet and damp soil.

**Ukraine:** Krupa 1885.

*Bryum bicolor* Bruch & Schimp.

SYNONYMS: *Bryum atropurpureum* Bruch & Schimp.

SUBSTRATE: soil.

**Ukraine:** Krupa 1885.

*Bryum bimum* → *Bryum pseudotriquetrum* var. *bimum*

*Bryum caespiticium* Hedw. var. *caespiticium*

SUBSTRATE: sand, soil, loess, Miocene limestone rocks, concrete elements.

**Poland:** Kuc 1963; Bloch 1976, 1988 (tab. 31); Fijałkowski & Łuczycka-Popiel 1989 (tab. 4, 5, 9); Łuczycka-Popiel 1989 (tab. 1); Karczmarz 1994; Lorens *et al.* 2013; Fudali *et al.* 2015.

**Ukraine:** Czerkawski 1867; Krupa 1885; Lazarenko *et al.* 1971; Danylkiv *et al.* 2002; Soroka 2008a; LWKS & LWFU.

var. *imbricatum* Bruch & Schimp.

SUBSTRATE: loess.

**Poland:** Bloch 1976, 1988 (tab. 29).

*Bryum capillare* → *Rosulabryum capillare*

*Bryum capillare* var. *flaccidum* → *Rosulabryum moravicum*

*Bryum cirrhatum* → *Bryum pallescens*

*Bryum creberrimum* Taylor

SYNONYMS: *Bryum affine* Lindb. & Arnell

SUBSTRATE: damp humus (atypical substrate – remark of M. Kuc).

**Poland:** Kuc 1963.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

*Bryum dichotomum* Hedw.

SUBSTRATE: soil.

**Ukraine:** LWKS (*leg.* I.V. Rabyk, 21 Oct 2008).

*Bryum erythrocarpon* → *Bryum subapiculatum*

*Bryum funckii* Schwägr.

SUBSTRATE: loamy soil, loess.

**Poland:** Lisowski 1957 (as an exsiccate), 1958 (see *Note* below); Kuc 1964 as fig 27 (p. 127).

**Ukraine:** Krupa 1885; Rabyk & Danylkiv 2005; LWKS.

NOTE: Lisowski (1958) gives two localities of *B. funckii* from the Roztocze region, but one of them published earlier as an exsiccate in 1957, and after him (1958) and Kuc (1964) is laid in the Wyżyna Lubelska Upland.

***Bryum intermedium*** (Brid.) Blandow

SUBSTRATE: wet sand, soil.

**Ukraine:** Bachuryna & Mel'nychuk 1989.***Bryum knowltonii*** BarnesSYNONYMS: *Bryum lacustre* (F.Weber & D.Mohr) Blandow

SUBSTRATE: wet sand, soil.

**Ukraine:** Danylkiv & Soroka 1989; LWFU.*Bryum lacustre* → ***Bryum knowltonii****Bryum neodamense* var. *ovatum* → ***Bryum subneodamense****Bryum ovatum* → ***Bryum subneodamense******Bryum pallens*** Sw. ex anon.

SUBSTRATE: damp and wet soil.

**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.***Bryum pallescens*** Schleich. ex Schwägr.SYNONYMS: *Bryum cirrhatum* Hoppe & Hornsch.

SUBSTRATE: sandy and loamy soil.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002; LWD.*Bryum pendulum* → ***Bryum algovicum******Bryum pseudotriquetrum*** (Hedw.) P.Gaertn., B.Mey. & Scherb. var. ***pseudotriquetrum***SYNONYMS: *Bryum ventricosum* Relh.

SUBSTRATE: damp soil, humus, occasionally decaying wood.

**Poland:** Lisowski 1958; Kuc 1963; Bloch & Karczmarz 1973b; Mamczarz 1974; Izdebski *et al.* 1992a (tab. 19, 32-36), 1992b (tab. 5); Fudali *et al.* 2015.**Ukraine:** Krupa 1885; Shcherbachenko & Rabyk 2004; LWKS.var. ***bimum*** Schleich. ex Schwägr.SYNONYMS: *Bryum bimum* (Brid.) Turner.

SUBSTRATE: peat.

**Ukraine:** Krupa 1885.*Bryum roseum* → ***Rhodobryum roseum***

***Bryum rubens*** Mitt.

SUBSTRATE: soil.

**Poland:** Fudali *et al.* 2015.***Bryum subapiculatum*** HampeSYNONYMS: *Bryum erythrocarpon* Schwägr.

SUBSTRATE: sandy soil.

**Poland:** Karczmarz 1965c.**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; LWKS.***Bryum subneodamense*** Kindb.SYNONYMS: *Bryum neodamense* Itzigs. var. *ovatum* Lindb. & Arnell, *Bryum ovatum* Jur.

SUBSTRATE: wet soil.

**Poland:** Kuc 1963, 1964; Bloch 1990.***Bryum torquescens*** Bruch & Schimp.

SUBSTRATE: limestone cliffs covered by humus.

**Ukraine:** LWKS (*leg.* I.V. Rabyk, 10 Aug 2000 & 15 Jul 2003; *leg.* I.S. Danylkiv, 8 May 2003).***Bryum turbinatum*** (Hedw.) Turner

SUBSTRATE: damp sandy soil.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002.*Bryum ventricosum* → ***Bryum pseudotriquetrum******Bryum uliginosum*** (Brid.) Bruch & Schimp.

SUBSTRATE: peat, wet sandy soil.

**Ukraine:** Krupa 1885; Vysots'ka *et al.* 1983; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.***Buckiella undulata*** (Hedw.) IrelandSYNONYMS: *Plagiothecium undulatum* (Hedw.) Schimp.

SUBSTRATE: humus.

**Poland:** Lorens *et al.* 2013; Fudali *et al.* 2015; Zubeł & Tracz 2015.**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.***Bucklandiella heterosticha*** (Hedw.) Bednarek-Ochyra & OchyraSYNONYMS: *Racomitrium heterostichum* (Hedw.) Brid.

SUBSTRATE: dry exposed rocks.

**Ukraine:** Danylkiv *et al.* 2002; LWKS.

***Buxbaumia aphylla*** Hedw.

SUBSTRATE: sandy soil.

**Poland:** Lisowski 1958; Izdebski 1963b (tab. 2); Kuc 1963; Karczmarz 1965c, 1994; Mamczarz 1974; Maciejewski & Zubel 2009a; LBL.**Ukraine:** Mel'nychuk 1961; Lazarenko *et al.* 1971; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.***Buxbaumia viridis*** (Moug. ex Lam. & DC.) Brid. ex Moug. & Nestl.SUBSTRATE: decaying coniferous wood (*Picea abies*, *Abies alba*).**Poland:** Kuc 1963, 1964 (also as fig. 8, p. 55); Karczmarz 1965c, 1994; Bloch & Karczmarz 1973a; Szmajda *et al.* 1991b; Karczmarz & Bloch 2008; Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.**Ukraine:** Krupa 1885; Bachuryrna & Mel'nychuk 1978; Ulychna 1978; Danylkiv *et al.* 2002; LWD.***Callicladium haldanianum*** (Grev.) H.A.CrumSYNONYMS: *Heterophyllum haldanianum* (Grev.) M.Fleisch.

SUBSTRATE: soil, decaying wood, bark of trees.

**Poland:** Lisowski 1958; Kuc 1964; Lorens *et al.* 2013; Stebel 2013; Fudali *et al.* 2015; LBL.**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.***Calliergon cordifolium*** (Hedw.) Kindb.

SUBSTRATE: water, damp soil, humus.

**Poland:** Lisowski 1958; Kuc 1963; Karczmarz 1964a (as an exsiccate), 1965c; Izdebski 1972 (tab. 2); Bloch & Karczmarz 1973b; Mamczarz 1974; Fijałkowski & Łuczycka-Popiel 1989 (tab. 5); Izdebski *et al.* 1992a (tab. 21, 24, 25, 29, 33-36), 1992b (tab. 5); Fudali *et al.* 2015; LBL.**Ukraine:** Wiśniewski 1923; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Shcherbachenko & Rabyk 2004; LWKS & LWFU.***Calliergon giganteum*** (Schimp.) Kindb.

SUBSTRATE: water.

**Poland:** Lisowski 1958, Kuc 1963, Fijałkowski & Łuczycka-Popiel 1989 (tab. 2, 3, 5); Izdebski *et al.* 1992a (tab. 33, 34); LBL.**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Soroka 2002; LWKS & LWFU.*Calliergon cuspidatum* → *Calliergonella cuspidata*



*Calliergon cuspidatum* var. *acuteramosa* → *Calliergonella cuspidata*

*Calliergon cuspidatum* var. *pungens* → *Calliergonella cuspidata*

*Calliergon stramineum* → *Straminergon stramineum*

*Calliergon trifarium* → *Pseudocalliergon trifarium*

***Calliergonella cuspidata*** (Hedw.) Loeske

SYNONYMS: *Acrocladium cuspidatum* (Hedw.) Lindb., *Calliergon cuspidatum* (Hedw.) Kindb., *Calliergon cuspidatum* (Hedw.) Kindb. var. *acuteramosa* (Bauer ex Karczm.) Bloch & Karczm. *comb. inval.*, *Calliergon cuspidatum* (Hedw.) Kindb. var. *pungens* (Schimp.) Warnst.

SUBSTRATE: soil, water, peat, humus, decaying wood, damp concrete elements.

**Poland:** Lisowski 1958; Izdebski 1963a (tab. 1), 1963b (tab. 2), 1964 (tab. 1), 1966 (tab. 3), 1972 (tab. 2); Kuc 1963; Karczmarz 1965b (as an exsiccate – var. *pungens*), 1965c, 1966b (as an exsiccate – var. *acuteramosa*); Mameczarz 1973, 1974; Bloch & Karczmarz 1973a, 1973b; Fijałkowski & Łuczycka-Popiel 1989 (tab. 2, 5, 9); Lorens *et al.* 1991 (tab. 1); Izdebski *et al.* 1992a (tab. 10, 11, 14, 21, 24, 25, 29, 32-36), 1992b (tab. 4); Fudali *et al.* 2015; LBL.

**Ukraine:** Tymrakiewicz 1928; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

*Calliergonella lindbergii* → *Hypnum lindbergii*

*Camptothecium lutescens* → *Homalothecium lutescens*

*Camptothecium nitens* → *Tomentypnum nitens*

*Camptothecium philippeanum* → *Homalothecium philippeanum*

*Camptothecium philipei* → *Homalothecium philippeanum*

*Camptothecium sericeum* → *Homalothecium sericeum*

*Camptothecium trichodes* → *Tomentypnum nitens*

***Campyliadelphus chrysophyllus*** (Brid.) R.S.Chopra

SYNONYMS: *Campylium chrysophyllum* (Brid.) Lange, *Hypnum chrysophyllum* Brid.

SUBSTRATE: loess, Miocene limestone outcrops.

**Poland:** Lisowski 1957 (as an exsiccate), 1958; Kuc 1963; Bloch & Karczmarz 1973a; Bloch 1976, 1988 (tab. 4); Izdebski *et al.* 1992b; LBL.

**Ukraine:** Krupa 1885; LWKS (*leg.* I.V. Rabyk, 15 Jul 2003).

***Campyliadelphus elodes*** (Lindb.) KandaSYNONYMS: *Campylium helodes* Broth.

SUBSTRATE: damp soil.

**Poland:** Kuc 1963; Bloch & Karczmarz 1973b; Bloch 1990.*Campylium chrysophyllum* → ***Campyliadelphus chrysophyllus****Campylium helodes* → ***Campyliadelphus elodes****Campylium hispidulum* var. *sommerfeltii* → ***Campylophyllopsis calcarea****Campylium polygamum* → ***Drepanocladus polygamus****Campylium protensum* → ***Campylium stellatum*** var. *protensum****Campylium stellatum*** (Hedw.) Lange & C.E.O.Jensen var. *stellatum*

SUBSTRATE: damp and wet soil.

**Poland:** Kuc 1963.**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.var. *protensum* (Brid.) BryhnSYNONYMS: *Campylium protensum* (Brid.) Kindb.

SUBSTRATE: damp and wet soil.

**Poland:** LBL (*leg.* K. Izdebski, Jun 1957; *det.* K. Karczmarz).*Campylium sommerfeltii* (Myrin) Bryhn. → ***Campylophyllopsis calcarea****Campylium sommerfeltii* (Myrin) Lange → ***Campylophyllopsis sommerfeltii******Campylophyllopsis calcarea*** (Crundwell & Nyholm) OchyraSYNONYMS: *Campylium hispidulum* (Brid.) Mitt. var. *sommerfeltii* (Myr.) Lindb., *Campylium hispidulum* Mitt. var. *sommerfeltii* Lindb., *Campylium sommerfeltii* (Myrin) Bryhn.

SUBSTRATE: eroded limestone rock material.

**Poland:** Lisowski 1958; Kuc 1963; Bloch & Karczmarz 1973a.***Campylophyllopsis sommerfeltii*** (Myrin) OchyraSYNONYMS: *Campylium sommerfeltii* (Myrin) Lange.

SUBSTRATE: rocks, decaying wood (atypical substratum).

**Poland:** Fudali *et al.* 2015.**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

*Campylopus fragilis* var. *pyriformis* → *Campylopus pyriformis*

*Campylopus turfaceus* → *Campylopus pyriformis*

*Campylopus introflexus* (Hedw.) Brid.

SUBSTRATE: sandy soil.

**Poland:** Zubel *et al.* 2009.

**Ukraine:** LWKS (*leg.* I.V. Rabyk, 25 Jul 2014).

*Campylopus pyriformis* (Schultz) Brid.

SYNONYMS: *Campylopus turfaceus* Schimp., *Campylopus fragilis* (Brid.) Bruch & Schimp. var. *pyriformis* (Schultz) Ångstr.

SUBSTRATE: dried peat.

**Poland:** Kuc 1963, 1964; Bloch 1990.

**Ukraine:** Krupa 1885.

*Catharinea angustata* → *Atrichum angustatum*

*Catharinea Haussknechtii* → *Atrichum flavisetum*

*Catharinea tenella* → *Atrichum tenellum*

*Catharinea undulata* → *Atrichum undulatum*

*Catharinea undulata* var. *minor* → *Atrichum tenellum*

*Ceratodon purpureus* (Hedw.) Brid.

SUBSTRATE: sand, soil, Miocene limestone outcrops, concrete elements, decaying wood.

**Poland:** Kuc 1958, 1963; Lisowski 1958; Izdebski 1966 (tab. 2), 1972 (tab. 2); Mameczarz 1974; Bloch 1976, 1988 (tab. 5, 22, 31); Fijałkowski & Łuczycka-Popiel 1989 (tab. 8); Łuczycka-Popiel 1989 (tab. 1); Izdebski *et al.* 1992a (tab. 16, 33, 35, 36), 1992b (s. 263); Karczmarz 1994; Karczmarz *et al.* 1997; Fudali *et al.* 2015.

**Ukraine:** Krupa 1885; Żmuda 1912 (as an exsiccate); Tymrakiewicz 1928; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Soroka 2008a, 2008b; LWKS & LWFU.

*Cirriphyllum crassinervium* (Taylor) Loeske & M.Fleisch.

SUBSTRATE: Miocene limestone outcrops.

**Poland:** Lisowski 1958; Kuc 1963, 1964.

**Ukraine:** Rabyk & Danylkiv 2004; LWKS.

***Cirriphyllum piliferum*** (Hedw.) Grout

SUBSTRATE: soil, humus.

**Poland:** Lisowski 1958; Kuc 1963; Karczmarz 1965c; Bloch & Karczmarz 1973b; Izdebski *et al.* 1992a (tab. 15, 18, 20, 21, 24, 25, 36); Łuczycka-Popiel 1992 (tab. 1); Fudali *et al.* 2015; LBL.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

*Cirriphyllum tenuinerve* → ***Brachythecium tommasinii***

*Cirriphyllum tommasinii* → ***Brachythecium tommasinii***

*Cirriphyllum vaucheri* → ***Brachythecium tommasinii***

***Climacium dendroides*** (Hedw.) F.Weber & D.MohrSYNONYMS: *Climacium dendroides* (Hedw.) F.Weber & D.Mohr var. *fruitans* Huebener

SUBSTRATE: damp soil, soil, humus, decaying wood, base of trees.

**Poland:** Błoński 1890; Lisowski 1958; Izdebski 1963a (tab. 1), 1963b (tab. 2), 1966 (tab. 3), 1972 (tab. 2); Kuc 1963; Mamczarz 1973, 1974; Bloch & Karczmarz 1973a (as var. *fruitans*), 1973b; Fijałkowski & Łuczycka-Popiel 1989 (tab. 2, 9); Izdebski *et al.* 1992a (tab. 21, 23, 24, 29, 32-36); Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

**Ukraine:** Czerkawski 1867; Krupa 1885; Tymrakiewicz 1928; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Shcherbachenko & Rabyk 2004; Soroka 2008a, 2008b; LWKS & LWFU.

*Climacium dendroides* var. *fruitans* → ***Climacium dendroides***

***Cratoneuron filicinum*** (Hedw.) SpruceSYNONYMS: *Cratoneuron filicinum* (Hedw.) Spruce var. *fallax* (Brid.) G.Roth

SUBSTRATE: damp soil, humus, decaying wood, occasionally loess.

**Poland:** Lisowski 1958; Kuc 1963; Karczmarz 1964a (as an exsiccate – var. *fallax*); 1965c; Mamczarz 1974; Fudali *et al.* 2015; LBL.

**Ukraine:** Wiśniewski 1923; Danylkiv *et al.* 2002; LWKS.

***Cyrto-hypnum minutulum*** (Hedw.) W.R.Buck & H.A.CrumSYNONYMS: *Thuidium minutulum* (Hedw.) Schimp.

SUBSTRATE: soil close to old oak's roots.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002.

*Cratoneuron filicinum* var. *fallax* → ***Cratoneuron filicinum***

***Ctenidium molluscum*** (Hedw.) Mitt.

SUBSTRATE: calcareous soil, Miocene limestone outcrops.

**Poland:** Kuc 1963; Bloch 1976, 1988 (tab. 4, 7); Karczmarz & Bloch 2008; Lorens *et al.* 2013; LBL.**Ukraine:** LWKS (*leg.* I.V. Rabyk, 30 Aug 2002 & 13 May 2004).***Crossidium squamiferum*** (Viv.) Jur.

SUBSTRATE: calcareous soil.

**Ukraine:** Ulychna 1978; LWD.***Dichodontium pellucidum*** (Hedw.) Schimp.

SUBSTRATE: damp soil, Miocene limestone outcrops.

**Poland:** Lisowski 1958; Kuc 1963, 1964 (also as fig. 17, p. 76); Karczmarz 1966b (as an exsiccate); Lorens *et al.* 2013.***Dicranella cerviculata*** (Hedw.) Schimp.

SUBSTRATE: wet sand, soil, occasionally loamy soil.

**Poland:** Kuc 1963; Bloch 1976, 1988 (tab. 36); Lorens *et al.* 2013; Fudali *et al.* 2015.**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Rabyk & Danylkiv 2005, 2008; LWKS & LWD.***Dicranella crispa*** (Hedw.) Schimp.SYNONYMS: *Dicranella vaginalis* (Dicks.) Lindb.

SUBSTRATE: loess.

**Poland:** Kuc 1963; Bloch 1976, 1988.**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002.***Dicranella heteromalla*** (Hedw.) Schimp.

SUBSTRATE: sand, soil, loamy soil, decaying wood, base of trees.

**Poland:** Lisowski 1958; Izdebski 1962b (tab. 8, 11), 1963b (tab. 2); Kuc 1963; Mamczarz 1973, 1974; Bloch 1976, 1988 (tab. 19, 22, 24, 35, 37); Lorens *et al.* 1991 (tab. 1); Izdebski *et al.* 1992a (tab. 8-10, 13, 14, 18-20, 23, 25, 29); Łuczycka-Popiel 1992 (tab. 1); Łuczycka-Popiel & Wawer 1992 (tab. 1); Karczmarz 1994; Maciejewski & Zubel 2009a; Tracz 2014; Fudali *et al.* 2015.**Ukraine:** Ulychna 1978; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; LWKS, LWFU & LWD.*Dicranella rubra* → ***Dicranella varia***

***Dicranella rufescens*** (Dicks.) Schimp.

SUBSTRATE: soil.

**Ukraine:** Krupa 1885; Bachuryna & Mel'nychuk 1987; Danylkiv *et al.* 2002.*Dicranella schreberi* → ***Dicranella schreberiana******Dicranella schreberiana*** (Hedw.) DixonSYNONYMS: *Dicranella schreberi* (Hedw.) Schimp.

SUBSTRATE: loess.

**Poland:** Kuc 1963.**Ukraine:** Krupa 1885; Ulychna 1978; Lazarenko *et al.* 1971; LWKS & LWD.***Dicranella subulata*** (Hedw.) Schimp.

SUBSTRATE: loess.

**Poland:** Karczmarz 1960.**Ukraine:** Rabyk & Danylkiv 2004; LWKS.***Dicranella varia*** (Hedw.) Schimp.SYNONYMS: *Anisothecium rubrum* Lindb., *Anisothecium varium* (Hedw.) Mitt., *Dicranella rubra* Lindb.

SUBSTRATE: loamy soil.

**Poland:** Lisowski 1958; Kuc 1963; Karczmarz 1965b (as an exsiccate), 1965c; Bloch 1976, 1988 (tab. 27, 36).**Ukraine:** Krupa 1885; Żmuda 1912 (as an exsiccate); Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.*Dicranella vaginalis* → ***Dicranella crispa******Dicranodontium denudatum*** (Brid.) E. Britton

SUBSTRATE: humus, decaying wood.

**Poland:** Lisowski 1958; Kuc 1964 (also as fig. 17, p. 76); Karczmarz 1994; Lorens *et al.* 2013; Fudali *et al.* 2015.**Ukraine:** Ulychna 1978; Danylkiv *et al.* 2002; LWD.***Dicranum bonjeanii*** De Not.SYNONYMS: *Dicranum palustre* Brid. ex Schumach.

SUBSTRATE: damp peaty soil.

**Poland:** Lisowski 1958; Kuc 1963.**Ukraine:** Tymrakiewicz 1928; Ulychna 1978; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; LWKS, LWD & LWFU.

*Dicranum flagellare* → ***Orthodicranum flagellare***

***Dicranum fuscescens*** Sm.

SUBSTRATE: soil.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.

*Dicranum majus* → see under the list of doubtful/excluded species

*Dicranum longifolium* → ***Paraleucobryum longifolium***

*Dicranum montanum* → ***Orthodicranum montanum***

*Dicranum palustre* → ***Dicranum bonjeanii***

***Dicranum polysetum*** Sw. *ex anon.*

SYNONYMS: *Dicranum undulatum* Ehrh. *ex* F. Weber & D. Mohr

SUBSTRATE: soil, humus.

**Poland:** Lisowski 1958; Izdebska & Szynal 1961 (tab. 1); Izdebski 1961 (tab. 7, 11), 1962a (tab. 1, 6), 1963a (tab. 1, 4), 1963b (tab. 2), 1964 (tab. 1), 1966 (tab. 2), 1967 (tab. 2), 1972 (tab. 2); Szynal 1962 (tab. 7); Kuc 1963; Karczmarz 1965c; Mamczarz 1973, 1974; Kimsa 1974 (tab. 1); Bloch 1976, 1988 (tab. 37, 38); Fijałkowski & Łuczycka-Popiel 1989 (tab. 6, 7); Lorens *et al.* 1991 (tab. 1); Izdebski *et al.* 1992a (tab. 5, 6, 8-10, 13-16, 21, 25, 27, 34, 36), 1992b (tab. 4); Łuczycka-Popiel 1992 (tab. 1); Maciejewski & Zubel 2009a, 2009b; Lorens *et al.* 2013; Tracz 2014; Fudali *et al.* 2015.

**Ukraine:** Krupa 1885; Ulychna 1978; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; Soroka 2008a, 2008b; LWKS, LWD & LWFU.

***Dicranum scoparium*** Hedw.

SUBSTRATE: soil, humus, decaying wood, base of coniferous and deciduous trees.

**Poland:** Lisowski 1958; Izdebski 1962a (tab. 4, 6), 1962b (tab. 4), 1963b (tab. 1, 2), 1964 (tab. 1), 1966 (tab. 2), 1967 (tab. 2), 1972 (tab. 2); Szynal 1962 (tab. 8, 12); Kuc 1963; Karczmarz 1965b (as an exsiccate), 1967 (tab. 2, 6); Mamczarz 1973, 1974; Kimsa 1974 (tab. 1); Bloch 1976, 1988 (tab. 10-12, 17-20, 37, 38); Fijałkowski & Łuczycka-Popiel 1989 (tab. 8); Lorens *et al.* 1991 (tab. 1); Izdebski *et al.* 1992a (tab. 6, 8-10, 13, 14, 20, 24, 25, 27, 35, 38); Łuczycka-Popiel & Wawer 1992 (tab. 1); Maciejewski & Zubel 2009a, 2009b; Tracz 2014; Fudali *et al.* 2015.

**Ukraine:** Ulychna 1978; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; Soroka 2008a-c; LWKS, LWD & LWFU.

***Dicranum spurium*** Hedw.

SUBSTRATE: sand, humus.

**Poland:** Lisowski 1957 (as an exsiccate), 1958; Kuc 1963, 1964; Izdebski 1966 (tab. 2); Bloch 1976, 1988 (tab. 37).

*Dicranum undulatum* → ***Dicranum polysetum******Dicranum viride*** (Sull. & Lesq.) Lindb.

SUBSTRATE: bark of deciduous trees, occasionally decaying wood.

**Poland:** Lisowski 1958; Kuc 1964; Lorens *et al.* 2013; Fudali *et al.* 2015; Stebel *et al.* 2015.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

***Didymodon fallax*** (Hedw.) R.H.ZanderSYNONYMS: *Barbula fallax* Hedw.

SUBSTRATE: loess, Miocene limestone outcrops.

**Poland:** Lisowski 1957 (as an exsiccate), 1958; Karczmarz 1960; Kuc 1963.

**Ukraine:** Krupa 1885; Żmuda 1912 (as an exsiccate); Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.

***Didymodon ferrugineus*** (Schimp. *ex* Besch.) M.O.HillSYNONYMS: *Barbula reflexa* (Brid.) Brid.

SUBSTRATE: calcareous soil.

**Poland:** Kuc 1963.

**Ukraine:** Bachuryrna & Mel'nychuk 1988.

***Didymodon insulanus*** (De Not.) M.O.HillSYNONYMS: *Barbula cylindrica* (Taylor) Schimp.

SUBSTRATE: loess.

**Poland:** Lisowski 1958; Kuc 1964.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.

***Didymodon rigidulus*** Hedw.SYNONYMS: *Barbula rigidula* (Hedw.) Milde, *Barbula rigidula* (Hedw.) Milde var. *densa* (Bruch & Schimp.) Schimp.

SUBSTRATE: loamy soil, loess, concrete elements.

**Poland:** Kuc 1958, 1963; Lisowski 1958; Karczmarz 1960, 1965b (as an exsiccate – var. *densa*), 1965c; Bloch & Karczmarz 1973a; Bloch 1976, 1988 (tab. 29); Lorens *et al.* 2013; Fudali *et al.* 2015.

**Ukraine:** Danylkiv & Soroka 1989; Rabyk & Danylkiv 2008; LWKS & LWFU.



*Didymodon rubellus* → *Bryoerythrophyllum recurvirostrum*

***Didymodon spadiceus*** (Mitt.) Limpr.

SYNONYMS: *Barbula insidiosa* Jur. & Milde

SUBSTRATE: without data.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002.

***Didymodon vinealis*** (Brid.) R.H.Zander

SYNONYMS: *Barbula vinealis* Brid.

SUBSTRATE: soil.

**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Shcherbachenko & Rabyk 2004; LWKS.

***Diphyscium foliosum*** (Hedw.) D.Mohr

SYNONYMS: *Diphyscium sessile* Lindb.

SUBSTRATE: soil, loess.

**Poland:** Lisowski 1958; Kuc 1963, 1964 as fig. 9 (p. 56); Bloch & Karczmarz 1973a; Bloch 1976, 1988 (tab. 22, 24); Ochyra *et al.* 1990; Karczmarz 1994; Karczmarz & Bloch 2008; Lorens *et al.* 2013; LBL.

**Ukraine:** Krupa 1885; Slobodyan 1951; Ulychna 1978; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Soroka 2002; LWKS & LWFU.

*Diphyscium sessile* → *Diphyscium foliosum*

***Distichium capillaceum*** (Hedw.) Bruch & Schimp.

SUBSTRATE: loamy soil.

**Poland:** Lisowski 1958; Ochyra *et al.* 1988g; Karczmarz 1994; Karczmarz & Bloch 2008; Lorens *et al.* 2013.

**Ukraine:** Rehman 1879; Krupa 1885; Danylkiv & Soroka 1989; Soroka 2002; LWKS.

*Ditrichum cylindricum* → *Trichodon cylindricus*

***Ditrichum flexicaule*** (Schwägr.) Hampe

SYNONYMS: *Leptotrichum flexicaule* (Schwägr.) Hampe

SUBSTRATE: calcareous outcrops, rocks.

**Poland:** Kuc 1963, 1964 as fig. 14 (p. 67).

**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Rabyk & Danylkiv 2008; LWKS.

***Ditrichum heteromallum*** (Hedw.) E. Britton

SYNONYMS: *Ditrichum homomallum* (Hedw.) Hampe, *Leptotrichum homomallum* (Hedw.) Hampe

SUBSTRATE: loess.

**Poland:** Kuc 1963; Karczmarz 1967 (tab. 1); Bloch & Karczmarz 1973a; Bloch 1976, 1988 (tab. 22); LBL.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002; LWKS.

*Ditrichum homomallum* → ***Ditrichum heteromallum***

***Ditrichum lineare*** (Sw.) Lindb.

SYNONYMS: *Ditrichum vaginans* (Sull.) Hampe

SUBSTRATE: loess.

**Poland:** Kuc 1963.

***Ditrichum pallidum*** (Hedw.) Hampe

SYNONYMS: *Leptotrichum pallidum* (Hedw.) Hampe

SUBSTRATE: soil.

**Poland:** Fudali *et al.* 2015.

**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Soroka 2002; LWKS.

***Ditrichum pusillum*** (Hedw.) Hampe

SYNONYMS: *Leptotrichum tortile* (Schrad.) Hampe

SUBSTRATE: damp and wet soil.

**Ukraine:** Krupa 1885.

*Ditrichum vaginans* → ***Ditrichum lineare***

*Dolichotheca seligeri* → ***Herzogiella seligeri***

*Dolichotheca silesiaca* → ***Herzogiella seligeri***

***Drepanocladus aduncus*** (Hedw.) Warnst.

SYNONYMS: *Hypnum aduncum* Hedw.

SUBSTRATE: water, damp soil, damp decaying wood.

**Poland:** Szafran 1952 (fossil material); Izdebski 1961 (tab. 11), 1963b (tab. 2); Kuc 1963; Karczmarz 1965c; Fijałkowski & Łuczycka-Popiel 1989 (tab. 2, 5, 9); Izdebski *et al.* 1992a (tab. 32, 33, 36); Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Shcherbachenko & Rabyk 2004; LWKS.

*Drepanocladu aduncus* var. *kneiffii* → ***Drepanocladus polycarpus***

*Drepanocladus exannulatus* → ***Warnstorfia exannulata***

*Drepanocladus fluitans* → ***Warnstorfia fluitans***

*Drepanocladus fluitans* fo. *inundatus* → ***Warnstorfia fluitans***

***Drepanocladus polycarpus*** (Blandow ex Voit) Warnst.

SYNONYMS: *Drepanocladu aduncus* (Hedw.) Warnst. var. *kneiffii* (Schimp.) Mönk.

SUBSTRATE: water, dried peat, wet sandy soil.

**Poland:** Szafran 1952 (fossil material); Lisowski 1958; Kuc 1963; Bloch & Karczmarz 1973b.

**Ukraine:** Krupa 1885.

***Drepanocladus polygamus*** (Schimp.) Hedenäs

SYNONYMS: *Campylium polygamum* (Bruch & Schimp.) Bryhn.

SUBSTRATE: soil.

**Poland:** Mamczarz 1974.

**Ukraine:** Danylkiv *et al.* 2002; Shcherbachenko & Rabyk 2004; LWKS.

*Drepanocladus revolvens* → ***Limprichtia revolvens***

***Drepanocladus sendtneri*** (Schimp.) Warnst.

SYNONYMS: *Hypnum sendtneri* Schimp. ex H.Müll.

SUBSTRATE: wet soil.

**Ukraine:** Krupa 1885.

*Drepanocladus uncinatus* → ***Sanionia uncinata***

*Drepanocladus vernicosus* → ***Hamatocaulis vernicosus***

***Dryptodon pulvinatus*** (Hedw.) Brid.

SYNONYMS: *Grimmia pulvinata* (Hedw.) Sm.

SUBSTRATE: calcareous rocks.

**Poland:** Kuc 1963.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002; LWKS.

***Encalypta ciliata*** Hedw.

SUBSTRATE: calcareous stones.

**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; LWKS.

*Encalypta contorta* → *Encalypta streptocarpa*

*Encalypta extintoria* → *Encalypta vulgaris*

*Encalypta streptocarpa* Hedw.

SYNONYMS: *Encalypta contorta* Hoppe ex Lindb.

SUBSTRATE: Miocene limestone outcrops, stone walls, eroded rock material.

**Poland:** Kuc 1958, 1963; Lisowski 1958; Karczmarz 1965c; Bloch & Karczmarz 1973a; Bloch 1976, 1988 (tab. 4, 6).

**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

*Encalypta vulgaris* Hedw.

SYNONYMS: *Encalypta extintoria* Sw. ex Lindb.

SUBSTRATE: Miocene limestone outcrops, loamy soil, loess.

**Poland:** Lisowski 1958; Kuc 1963; Bloch 1976, 1988 (tab. 6).

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002; LWKS.

*Entodon schreberi* → *Pleurozium schreberi*

*Entosthodon fascicularis* (Hedw.) Müll.Hal.

SYNONYMS: *Funaria fascicularis* (Hedw.) Lindb.

SUBSTRATE: damp soil.

**Poland:** Bloch & Karczmarz 1973a.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002.

*Ephemerum serratum* (Schreb. ex Hedw.) Hampe

SUBSTRATE: loamy soil.

**Ukraine:** Krupa 1885; Karczmarz *et al.* 1997; Danylkiv *et al.* 2002.

*Erythrophyllum rubellum* → *Bryoerythrophyllum recurvirostrum*

*Eurhynchiastrum pulchellum* (Hedw.) Ignatov & Huttunen var. *pulchellum*

SYNONYMS: *Eurhynchium pulchellum* (Hedw.) Jenn., *Eurhynchium strigosum* (Hoffm. ex F.Weber & D.Mohr) Schimp.

SUBSTRATE: soil, calcareous soil.

**Poland:** Izdebski 1962b (tab. 11), 1963a (tab. 4), 1963b (tab. 2); Kuc 1963; Bloch 1976, 1988 (tab. 22, 24, 36); Izdebski *et al.* 1992a (tab. 20); LBL.

**Ukraine:** Wiśniewski 1923; Danylkiv *et al.* 2002; LWKS.

var. *praecox* (Sw. ex Hedw.) Ochyra & Żarnowiec

SYNONYMS: *Eurhynchium strigosum* (Hoffm. ex F. Weber & D. Mohr) Schimp. var. *praecox* (Hedw.) Husn.

SUBSTRATE: loamy soil.

**Poland:** Lisowski 1958.

*Eurhynchium angustirete* (Broth.) T.J.Kop.

SYNONYMS: *Eurhynchium zetterstedtii* Strømer

SUBSTRATE: loamy soil, soil, humus, occasionally decaying wood and base of trees.

**Poland:** Błoński 1890; Lisowski 1958; Izdebska & Szynal 1961 (tab. 1); Izdebski 1962a (tab. 6), 1962b (tab. 1, 4, 8, 11), 1963a (tab. 1, 4, 7), 1963b (tab. 2), 1964 (tab. 1), 1965 (tab. 5), 1966 (tab. 2, 3), 1967 (tab. 2, 3), 1972 (tab. 2); Szynal 1962 (tab. 12); Kuc 1963; Karczmarz 1965b (as an exsiccate), 1965c; Mamczarz 1973, 1974; Kimsa 1974 (tab. 1); Bloch 1976, 1988 (tab. 18, 35, 36); Czarnecka 1978 (tab. 1); Fijałkowski & Łuczycka-Popiel 1989 (tab. 4-7, 9); Izdebski *et al.* 1992a (tab. 13-16, 18-21, 24, 25, 28, 29), 1992b (tab. 4); Łuczycka-Popiel & Wawer 1992 (tab. 1); Maciejewski & Zubel 2009a; Zubel 2009b; Lorens *et al.* 2013; Tracz 2014; Fudali *et al.* 2015; LBL.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Soroka 2008a, 2008b; LWKS & LWFU.

*Eurhynchium striatum* → see under the list of doubtful/excluded species

*Eurhynchium strigosum* var. *praecox* → *Eurhynchiastrum pulchellum* var. *praecox*

*Eurhynchium swarzii* → *Oxyrrhynchium hians*

*Eurhynchium praelongum* → *Kindbergia praelonga*

*Eurhynchium pulchellum* → *Eurhynchiastrum pulchellum*

*Eurhynchium vaucheri* → *Hypnum vaucheri*

*Eurhynchium zetterstedtii* → *Eurhynchium angustirete*

*Fissidens adianthoides* Hedw.

SUBSTRATE: soil, humus, peat, decaying wood, damp base of trees, stones and concrete elements.

**Poland:** Lisowski 1958; Kuc 1963; Mamczarz 1974; Lorens *et al.* 1991 (tab. 1); Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.

*Fissidens bloxamii* → *Fissidens exilis*

*Fissidens bryoides* Hedw.

SUBSTRATE: loamy soil.

**Poland:** Kuc 1963; Karczmarz 1964a (as an exsiccate), 1965c, 1994; Bloch 1976, 1988 (tab. 35, 36); LBL.

**Ukraine:** Krupa 1885; Lazarenko *et al.* 1971; Bachuryna & Mel'nychuk 1987; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.

*Fissidens crassipes* Wilson *ex* Bruch & Schimp.

SUBSTRATE: wet stones.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.

*Fissidens cristatus* → *Fissidens dubius*

*Fissidens cristatus* var. *mucronatus* → *Fissidens dubius* var. *mucronatus*

*Fissidens dubius* P.Beauv. var. *dubius*

SYNONYMS: *Fissidens cristatus* Wilson *ex* Mitt.

SUBSTRATE: bare soil.

**Poland:** Kuc 1963, 1964.

**Ukraine:** Ulychna 1978; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.

var. *mucronatus* (Breidl. *ex* Limpr.) Kartt., Hedenäs & L. Söderstr.

SYNONYMS: *Fissidens cristatus* Wilson *ex* Mitt. var. *mucronatus* (Breidl.) Waldh.

SUBSTRATE: loamy soil.

**Poland:** LBL (*leg.* K. Karczmarz, 26 Sep 1970).

*Fissidens exilis* Hedw.

SYNONYMS: *Fissidens bloxamii* Wilson

SUBSTRATE: soil.

**Ukraine:** Krupa 1885; Rabyk & Danylkiv 2004; LWKS.

*Fissidens gracilifolius* Brugg.-Nann. & Nyholm

SUBSTRATE: calcareous stones.

**Poland:** LBL (*leg.* M. Król, 25 Aug 1964; *rev.* R. Ochyra, 2 Mar 1990)

*Fissidens osmundoides* Hedw.

SUBSTRATE: wet soil.

**Ukraine:** Ulychna 1978; LWD.

***Fissidens pusillus* (Wilson) Milde**

SUBSTRATE: Miocene limestone outcrops, stones.

**Poland:** Kuc 1958, 1963, 1964 as fig. 13 (p. 64); Lisowski 1958; Karczmarz 1964a (as an exsiccate), 1965c, 1994; Bloch 1976, 1988 (tab. 6); Karczmarz & Bloch 2008; Lorens *et al.* 2013.

**Ukraine:** Krupa 1885; Bachuryrna & Mel'nychuk 1987; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

***Fissidens taxifolius* Hedw.**

SUBSTRATE: loamy soil, humus, Miocene limestone outcrops.

**Poland:** Lisowski 1958; Izdebski 1962b (tab. 4), 1963b (tab. 2); Kuc 1963; Karczmarz 1964a (as an exsiccate), 1965c, 1994; Bloch & Karczmarz 1973a; Bloch 1976, 1988 (tab. 4, 7, 35); Izdebski *et al.* 1992a (tab. 15, 18, 20), 1992b (in the text, p. 263); Zubel 2009b; Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Bachuryrna & Mel'nychuk 1987; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

***Fontinalis antipyretica* Hedw. var. *antipyretica***

SUBSTRATE: stones and rocks in water.

**Poland:** Błoński 1890; Lisowski 1958; Karczmarz 1965c, 1968b (as an exsiccate), 1994; Mamczarz 1974; Fijałkowski & Łuczycka-Popiel 1989 (tab. 1, 4); Lorens *et al.* 2013; LBL.

**Ukraine:** Czerkawski 1867; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

var. ***gracilis*** (Lindb.) Schimp.

SUBSTRATE: stones and rocks in water.

**Poland:** Mamczarz 1974.

***Funaria fascicularis* → *Entosthodon fascicularis******Funaria hygrometrica* Hedw.**

SUBSTRATE: sand, soil.

**Poland:** Lisowski 1958; Kuc 1963; Mamczarz 1974; Bloch 1976, 1988 (tab. 31); Lorens *et al.* 2013; Fudali *et al.* 2015.

**Ukraine:** Krupa 1885; Żmuda 1912 (as an exsiccate); Tymrakiewicz 1928; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Shcherbachenko & Rabyk 2004; Rabyk & Danylkiv 2005, 2008; Soroka 2008a; LWKS & LWFU.

***Funaria microstoma*** Bruch ex Schimp.

SUBSTRATE: peat, damp and wet soil.

**Ukraine:** Krupa 1885; Karczmarz *et al.* 1997; Danylkiv *et al.* 2002.*Georgia pellucida* → ***Tetraphis pellucida*** Hedw.***Grimmia anodon*** Bruch & Schimp.

SUBSTRATE: dry and sunny rocks.

**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.*Grimmia apocarpa* → ***Schistidium apocarpum****Grimmia pulvinata* → ***Dryptodon pulvinatus******Gyroweisia tenuis*** (Schrad. ex Hedw.) Schimp.

SUBSTRATE: crevices of Miocene sandstone outcrops.

**Poland:** Kuc 1963; 1964.**Ukraine:** Bachuryna & Mel'nychuk 1988; Danylkiv & Soroka 1989; LWD.***Hamatocaulis vernicosus*** (Mitt.) HedenäsSYNONYMS: *Drepanocladus vernicosus* (Lindb.) Warnst., *Hypnum vernicosum* Lindb.

SUBSTRATE: damp soil.

**Poland:** Szafran 1952 (fossil material); Lisowski 1958; Kuc 1963; Lorens *et al.* 2013.**Ukraine:** Krupa 1885; Tymrakiewicz 1928; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWD.***Hedwigia ciliata*** (Hedw.) P.Beauv.

SUBSTRATE: rocks, granite boulder (memorial's element).

**Poland:** Ochyra *et al.* 1988h; Zubel 2014b; LBL.**Ukraine:** Rehman 1879; Lazarenko *et al.* 1971; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.***Helodium blandowii*** (F. Weber & D. Mohr) Warnst.SYNONYMS: *Thuidium lanatum* (Strm ex Brid.) I.HagenSUBSTRATE: among *Sphagnum* stems, hummocks at base of *Salix* shrubs.**Poland:** Bloch & Karczmarz 1973a; Ochyra *et al.* 1988c; LBL.



***Herzogiella seligeri* (Brid.) Z.Iwats.**

SYNONYMS: *Dolichotheca seligeri* (Brid.) Loeske, *Dolichotheca silesiaca* (F.Weber & D.Mohr) M.Fleisch., *Isopterygium seligeri* (Brid.) Dixon, *Plagiothecium silesiacum* (F.Weber & D.Mohr) Schimp., *Sharpiella seligeri* (Brid.) Z. Iwats.

SUBSTRATE: decaying wood, humus, soil, base of trees.

**Poland:** Błoński 1890; Lisowski 1958; Izdebski 1962b (tab. 4), 1963b (tab. 2); Kuc 1963; Mamczarz 1973, 1974; Bloch 1976, 1988 (tab. 17, 18, 20); Izdebski *et al.* 1992a (tab. 21, 24); Karczmarz 1994; Maciejewski & Zubel 2009a; Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

**Ukraine:** Czerkawski 1867; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; LWKS & LWFU.

***Heterophyllum haldanianum* → *Callicladium haldanianum******Hilpertia velenovskyi* (Schiffn.) R.H.Zander**

SYNONYMS: *Tortula velenovskyi* Schniffn.

SUBSTRATE: loess.

**Poland:** Karczmarz 1960; Kuc 1963, 1964 (also as fig. 24, p. 108); Ochyra & Szmajda 1983.

***Homalia trichomanoides* (Hedw.) Schimp.**

SUBSTRATE: bark of deciduous trees, Miocene limestone outcrops, occasionally decaying wood.

**Poland:** Błoński 1890; Lisowski 1958; Kuc 1963; Karczmarz 1964a (as an exsiccate), 1965c, 1967 (tab. 4, 5), 1990, 1994; Mickiewicz 1965; Mamczarz 1973; Bloch 1976, 1988 (tab. 5, 12-14); Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

***Homalothecium lutescens* (Hedw.) H.Rob.**

SYNONYMS: *Camptothecium lutescens* (Hedw.) Schimp.

SUBSTRATE: calcareous soil.

**Poland:** Lisowski 1957 (as an exsiccate), 1958; Kuc 1963; Bloch & Karczmarz 1973a; Karczmarz *et al.* 1974 (as an exsiccate), 1975 (as an exsiccate); Izdebski *et al.* 1992b; LBL.

**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.

***Homalothecium philippeanum* (Spruce) Schimp.**

SYNONYMS: *Camptothecium philippeanum* (Spruce) Kindb., *Camptothecium philippeae* Kindb.

SUBSTRATE: Miocene limestone outcrops, eroded rock material.

**Poland:** Kuc 1958, 1963, 1964 as fig. 40 (p. 175); Karczmarz 1964a (as an exsiccate), 1994; Ochyra *et al.* 1985d; Lorens *et al.* 2013; LBL.

**Ukraine:** Rabyk & Danylkiv 2004; LWKS.

***Homalothecium sericeum*** (Hedw.) Schimp.

SYNONYMS: *Camptothecium sericeum* (Hedw.) Kindb.

SUBSTRATE: Miocene limestone outcrops, bark of deciduous trees, occasionally concrete elements.

**Poland:** Błoński 1890; Kuc 1958, 1963; Lisowski 1958; Karczmarz 1967 (tab. 4); Bloch 1976, 1988 (tab. 4, 5, 12, 14); Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

**Ukraine:** Czerkawski 1867; Krupa 1885; Wiśniewski 1923; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.

***Homomallium incurvatum*** (Schrad. ex Brid.) Loeske

SUBSTRATE: bark of trees, rocks.

**Poland:** Lisowski 1958; Kuc 1964; Karczmarz 1994; LBL.

**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Shcherbachenko & Rabyk 2004; LWKS & LWFU.

*Hygroamblystegium humile* → ***Leptodictyum humile***

***Hygroamblystegium tenax*** (Hedw.) Jenn.

SUBSTRATE: soil beside a stream.

**Poland:** LBL (*leg.* B. Czarnecka, 6 May 1997; *det.* M. Bloch; *rev.* R. Zubeł 25 Mar 2015).

**Ukraine:** Rabyk & Danylkiv 2008; LWKS.

***Hygrohypnum luridum*** (Hedw.) Jenn.

SUBSTRATE: damp concrete elements.

**Poland:** Lorens *et al.* 2013; Fudali *et al.* 2015.

**Ukraine:** Łobarzewski 1849; Danylkiv *et al.* 2002.

***Hylocomiadelphus triquetrus*** (Hedw.) Ochyra & Stebel

SYNONYMS: *Rhytidiadelphus triquetrus* (Hedw.) Warnst.

SUBSTRATE: soil, loess, occasionally humus and decaying wood.

**Poland:** Lisowski 1958; Izdebska & Szyal 1961 (tab. 1); Izdebski 1962b (tab. 1, 4, 11), 1963a (tab. 7), 1963b (tab. 2), 1964 (tab. 1), 1967 (tab. 2); Kuc 1963; Bloch & Karczmarz 1973a; Mamczarz 1974; Bloch 1976, 1988 (tab. 20, 35, 36); Fudali *et al.* 2015; LBL.

**Ukraine:** Wiśniewski 1923; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.

***Hylocomium splendens*** (Hedw.) Schimp.

SUBSTRATE: soil, humus, decaying wood.

**Poland:** Lisowski 1958; Izdebska & Szynal 1961 (tab. 1); Izdebski 1962a (tab. 1, 4, 6), 1962b (tab. 1, 11), 1963a (tab. 4, 7), 1963b (tab. 2), 1964 (tab. 1), 1966 (tab. 2), 1967, 1972 (tab. 2); Szynal 1962 (tab. 8-10, 12); Kuc 1963; Karczmarz 1965b (as an exsiccate), 1965c, 1994; Mamczarz 1973, 1974; Kimsa 1974 (tab. 1); Bloch 1976, 1988 (tab. 38); Fijałkowski & Łuczycka-Popiel 1989 (tab. 6-8); Lorens *et al.* 1991 (tab. 1), 2013; Izdebski *et al.* 1992a (tab. 8-10, 13-16, 24, 25, 27), 1992b (tab. 4); Łuczycka-Popiel 1992 (tab. 1); Łuczycka-Popiel & Wawer 1992 (tab. 1); Maciejewski & Zubel 2009a, 2009b; Tracz 2014; Fudali *et al.* 2015; LBL.

**Ukraine:** Czerkawski 1867; Pyasets'kyy 1942; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

*Hymenostomum microstomum* → ***Wiessia brachycarpa***

*Hypnum aduncum* → ***Drepanocladus aduncum***

*Hypnum arcuatum* → ***Hypnum lindbergii***

*Hypnum chrysophyllum* → ***Campyliadelphus chrysophyllum***

*Hypnum callichroum* → see under the list of doubtful/excluded species

***Hypnum cupressiforme*** Hedw. var. ***cupressiforme***

SUBSTRATE: decaying wood, Miocene limestone outcrops, bark of coniferous and deciduous trees, soil.

**Poland:** Kuc 1958, 1963; Lisowski 1958; Izdebski 1962a (tab. 4, 6), 1963a (tab. 7), 1963b (tab. 2), 1964 (tab. 1); Szynal 1962 (tab. 9); Karczmarz 1965c, 1967 (tab. 2, 6), 1968b (as an exsiccate); Mickiewicz 1965; Mamczarz 1973, 1974; Bloch 1976, 1988 (tab. 4, 5, 10-13, 16, 17, 18, 19, 20); Fijałkowski & Łuczycka-Popiel 1989 (tab. 4-7); Łuczycka-Popiel 1989 (tab. 1); Izdebski *et al.* 1992a (tab. 13-16, 18, 21, 24, 27, 33), 1992b (tab. 4, 5); Karczmarz *et al.* 1997; Maciejewski & Zubel 2009a; Lorens *et al.* 2013; Tracz 2014; Fudali *et al.* 2015; LBL.

**Ukraine:** Pyasets'kyy 1942; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; Soroka 2008a-c; LWKS & LWFU.

var. ***filiforme*** Brid.

SUBSTRATE: bark of coniferous and deciduous trees.

**Poland:** Lisowski 1958; Kuc 1963; Karczmarz 1965c, 1967 (tab. 3, 4); Mickiewicz 1965; Mamczarz 1974; Bloch 1976, 1988 (tab. 10-13, 15); Fudali *et al.* 2015.

var. *lacunosum* Brid.

SUBSTRATE: Miocene limestone outcrops.

**Poland:** Lisowski 1958; Bloch 1976, 1988 (tab. 4).

*Hypnum ericetorum* → *Hypnum jutlandicum*

*Hypnum fertile* Sendtn.

SUBSTRATE: decaying wood.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; LWKS & LWFU.

*Hypnum imponens* Hedw.

SUBSTRATE: soil, stones, bark of deciduous trees.

**Ukraine:** Rabyk & Danylkiv 2004; LWKS.

*Hypnum jutlandicum* Holmen & E. Warncke

SYNONYMS: *Hypnum ericetorum* Brid.

SUBSTRATE: sand, decaying wood.

**Poland:** Lisowski 1958.

*Hypnum lycopodioides* → *Pseudocalliergon lycopodioides*

*Hypnum lindbergii* Mitt.

SYNONYMS: *Calliergonella lindbergii* (Mitt.) Hedenäs, *Hypnum arcuatum* Hedw., *Breidleria arcuata* (Molendo) Loeske

SUBSTRATE: loamy soil, concrete elements.

**Poland:** Lisowski 1957 (as an exsiccate), 1958; Kuc 1963; Karczmarz 1964a (as an exsiccate); Karczmarz & Mickiewicz 1971 (as an exsiccate); Bloch & Karczmarz 1973a; Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Rabyk & Danylkiv 2004; LWKS.

*Hypnum pallescens* (Hedw.) P. Beauv.

SYNONYMS: *Hypnum reptile* Michx.

SUBSTRATE: bark of trees, decaying wood, humus.

**Poland:** Lisowski 1957 (as an exsiccate), 1958; Kuc 1963, 1964; Karczmarz 1965c, 1994; Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Wiśniewski 1923; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.

***Hypnum pratense*** W.D.J.Koch ex SpruceSYNONYMS: *Breidleria pratensis* (W.D.J.Koch ex Spruce) Loeske

SUBSTRATE: eroded schistose.

**Poland:** Karczmarz 1964a (as an exsiccate); 1965c.*Hypnum reptile* → ***Hypnum pallescens******Hypnum recurvatum*** (Lindb. et Arnell) Kindb.

SUBSTRATE: limestone cliffs covered by humus.

**Ukraine:** Rabyk & Danylkiv 2004; LWKS.*Hypnum sendtneri* → ***Drepanocladus sendtneri******Hypnum vaucheri*** Lesq.SYNONYMS: *Eurhynchium vaucheri* (Lesq.) Schimp.

SUBSTRATE: calcareous soil.

**Ukraine:** Czerkawski 1867; LWKS.*Hypnum vernicosum* → ***Hamatocaulis vernicosus****Isopterygium seligeri* → ***Herzogiella seligeri******Isothecium alopecuroides*** (Lam. ex Dubois) Isov.SYNONYMS: *Isothecium myurum* Brid., *Isothecium viviparum* Lindb.

SUBSTRATE: bark of deciduous trees, Miocene limestone outcrops, occasionally decaying wood.

**Poland:** Błoński 1890; Lisowski 1958; Kuc 1963; Karczmarz 1964a (as an exsiccate); 1967 (tab. 4, 5), 1990, 1994; Bloch 1976, 1988 (tab. 5-7, 10, 12-14); Izdebski *et al.* 1992a (tab. 21); Karczmarz *et al.* 1997; Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.**Ukraine:** Wiśniewski 1923; Danylkiv *et al.* 2002; LWKS.*Isothecium myosuroides* → see under the list of doubtful/excluded species*Isothecium filescens* → ***Plasteurhynchium striatulum****Isothecium myurum* → ***Isothecium alopecuroides****Isothecium striatulum* → ***Plasteurhynchium striatulum****Isothecium striatulum* fo. *cavernarum* → ***Plasteurhynchium striatulum****Isothecium viviparum* → ***Isothecium alopecuroides***

***Kindbergia praelonga*** (Hedw.) OchyraSYNONYMS: *Eyrhynchium praelongum* (Hedw.) Schimp.

SUBSTRATE: damp soil.

**Poland:** Błoński 1890; Izdebski *et al.* 1992a (tab. 18-20); Fudali *et al.* 2015.**Ukraine:** Wiśniewski 1923; Danylkiv *et al.* 2002; LWKS.***Leptobryum pyriforme*** (Hedw.) Wilson

SUBSTRATE: soil.

**Poland:** Lisowski 1957 (as an exsiccate), 1958; Kuc 1963; Karczmarz 1994; Fudali *et al.* 2015.**Ukraine:** Czerkawski 1867; Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS, LWD & LWFU.***Leptodictyum humile*** (P. Beauv.) OchyraSYNONYMS: *Leptodictyum kochii* (Schimp.) Warnst., *Amblystegium kochii* Schimp., *Hygroamblystegium humile* (P. Beauv.) Vanderp., Goffinet & Hedenas

SUBSTRATE: damp soil.

**Ukraine:** Krupa 1885; Geheeb 1899; Danylkiv *et al.* 2002; LWD.*Leptodictyum kochii* → ***Leptodictyum humile******Leptodictyum riparium*** (Hedw.) Warnst.SYNONYMS: *Amblystegium riparium* (Hedw.) Schimp., *Amblystegium riparium* (Hedw.) Schimp. fo. *longifolium* (Schultz) Warnst.

SUBSTRATE: water, damp soil, soil, decaying wood.

**Poland:** Błoński 1890; Kuc 1963; Karczmarz 1964a (as an exsiccate), 1965c; Mamczarz 1973, 1974; Izdebski *et al.* 1992a (tab. 32, 33, 35, 36), 1992b (tab. 5); Fudali *et al.* 2015; LBL.**Ukraine:** Wiśniewski 1923; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2004; LWKS, LWD & LWFU.*Leptotrichum flexicaule* → ***Ditrichum flexicaule****Leptotrichum homomallum* → ***Ditrichum heteromallum****Leptotrichum pallidum* → ***Ditrichum pallidum****Leptotrichum tortile* → ***Ditrichum pusillum****Leskea nervosa* → ***Leskeella nervosa***

***Leskea polycarpa*** Hedw.

SUBSTRATE: bark of deciduous trees.

**Poland:** Błoński 1890; Karczmarz 1967 (tab. 4); Bloch 1976, 1988 (tab. 12-14); Lorens *et al.* 2013; Fudali *et al.* 2015.

**Ukraine:** Krupa 1885; Wiśniewski 1923; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.

***Leskeella nervosa*** (Brid.) Loeske

SYNONYMS: *Leskea nervosa* (Brid.) Myrin

SUBSTRATE: bark of trees, Miocene limestone outcrops, occasionally decaying wood.

**Poland:** Lisowski 1958; Kuc 1958, 1963; Karczmarz 1965b (as an exsiccate), 1965c, 1967 (tab. 4, 5); Mickiewicz 1965; Mamczarz 1973; Bloch 1976, 1988 (tab. 5, 6, 14); Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002; LWKS & LWFU.

***Leucobryum glaucum*** (Hedw.) Ångstr.

SUBSTRATE: soil, humus, decaying wood.

**Poland:** Kuc 1955, 1963; Lisowski 1958; Izdebski 1961 (tab. 7), 1962a (tab. 1, 4), 1963a (tab. 1, 4, 7), 1963b (tab. 2), 1964 (tab. 1), 1966 (tab. 2), 1967 (tab. 2), 1972 (tab. 2); Szynal 1962 (tab. 8, 10); Karczmarz 1965b (as an exsiccate); Mamczarz 1973, 1974; Kimsa 1974 (tab. 1); Bloch 1976, 1988 (tab. 18, 19, 37); Fijałkowski & Łuczycka-Popiel 1989 (tab. 6-8); Lorens *et al.* 1991 (tab. 1); Izdebski *et al.* 1992a (tab. 5, 6, 8-10, 13, 14, 16, 25, 29), 1992b (tab. 4); Łuczycka-Popiel 1992 (tab. 1); Maciejewski & Zubel 2009a; Tracz 2014; Fudali *et al.* 2015.

**Ukraine:** Rehman 1879; Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Soroka 2008a-c; LWKS & LWFU.

***Leucodon sciuroides*** (Hedw.) Schwägr.

SYNONYMS: *Leucodon sciuroides* (Hedw.) Schwägr. fo. *gemmifera* (without form author)

SUBSTRATE: bark of deciduous (occasionally coniferous) trees, Miocene limestone outcrops, stone walls.

**Poland:** Błoński 1890; Kuc 1958, 1963; Lisowski 1958; Karczmarz 1965c, 1966b (as an exsiccate), 1967 (tab. 4-6), 1994; Mickiewicz 1965; Bloch 1976, 1988 (tab. 5, 10-15; tab. 16 – fo. *gemmifera*); Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Wiśniewski 1923; Danylkiv *et al.* 2002; LWKS.

*Leucodon sciuroides* fo. *gemmifera* → ***Leucodon sciuroides***

***Limprichtia revolvens*** (Sw. ex anon.) LoeskeSYNONYMS: *Drepanocladus revolvens* (Sw.) Warnst.

SUBSTRATE: damp soil.

**Poland:** Szafran 1952 (fossil material); Kuc 1963; Bloch & Karczmarz 1973a; Izdebski *et al.* 1992a (tab. 33, 34), 1992b (tab. 5); LBL.

***Meesia longiseta*** Hedw.

SUBSTRATE: without data.

**Poland:** Szafran 1952; Ochyra *et al.* 1988a (in both as fossil material).

*Meesea triquetra* → ***Meesia triquetra******Meesia triquetra*** (L. ex Jolycl.) Ångstr.SYNONYMS: *Meesea triquetra* Ångstr., *Meesia tristicha* BruchSUBSTRATE: wet soil and peat, among stems of *Limprichtia revolvens*.

**Poland:** Kuc 1963, 1964 as fig. 32 (p. 139); Bloch & Karczmarz 1973a, 1973b; Ochyra *et al.* 1988b; Bloch 1990.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002.

*Meesia tristicha* → ***Meesia triquetra******Microbryum davallianum*** (Sm.) R.H.ZanderSYNONYMS: *Pottia davalliana* (Sm.) C.E.O.Jensen, *Pottia minutula* (Schwägr.) Fürnr. ex Hampe

SUBSTRATE: loamy soil.

**Poland:** Bloch & Karczmarz 1973a.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002.

*Mniobryum albicans* → ***Pohlia wahlenbergii****Mniobryum carneum* → ***Pohlia melanodon****Mniobryum wahlenbergii* → ***Pohlia wahlenbergii****Mnium affine* → ***Plagiomnium affine****Mnium affine* var. *elatum* → ***Plagiomnium elatum****Mnium ambiguum* → ***Mnium lycopodioides****Mnium cinclidioides* → ***Pseudobryum cinclidioides****Mnium cuspidatum* → ***Plagiomnium cuspidatum***



***Mnium hornum*** Hedw.

SUBSTRATE: soil, humus, decaying wood, base of trees.

**Poland:** Szynal 1962 (tab. 12); Izdebski 1962b (tab. 8), 1963a (tab. 1), 1963b (tab. 2); Kuc 1963; Karczmarz 1965c, 1966b (as an exsiccate), 1994; Mamczarz 1973; Bloch 1976, 1988 (tab. 19); Fudali *et al.* 2015.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.

***Mnium lycopodioides*** Schwägr.

SYNONYMS: *Mnium ambiguum* H.Müll.

SUBSTRATE: wet soil.

**Ukraine:** Danylkiv *et al.* 2002; LWKS.

***Mnium marginatum*** (Dicks.) P.Beauv.

SYNONYMS: *Mnium serratum* Schrad. ex Brid.

SUBSTRATE: soil.

**Poland:** Lisowski 1958; Izdebski *et al.* 1992a (tab. 20, 21). Lorens *et al.* 2013

**Ukraine:** Krupa 1885; Lazarenko *et al.* 1971; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.

*Mnium medium* → ***Plagiomnium medium***

*Mnium punctatum* → ***Rhizomnium punctatum***

*Mnium rostratum* → ***Plagiomnium rostratum***

*Mnium rostratum* var. *rugicum* → ***Plagiomnium ellipticum***

*Mnium rugicum* → ***Plagiomnium ellipticum***

*Mnium seligeri* → ***Plagiomnium elatum***

*Mnium serratum* → ***Mnium marginatum***

***Mnium stellare*** Reichard ex Hedw.

SUBSTRATE: soil, loess, damp stones, Miocene limestone outcrops.

**Poland:** Kuc 1958, 1963; Lisowski 1958; Izdebski 1962b (tab. 8), 1963b (tab. 2), 1966 (tab. 3), 1967 (tab. 3); Karczmarz 1964a (as an exsiccate), 1965c, 1994; Mickiewicz 1965; Mamczarz 1974; Bloch 1976, 1988 (tab. 12); Izdebski *et al.* 1992a (tab. 19); Maciejewski & Zubel 2009c; Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

***Mnium thomsonii*** Schimp.

SUBSTRATE: stony soil.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.*Mnium undulatum* → ***Plagiomnium undulatum******Neckera besseri*** (Lobarz.) Jur.SYNONYMS: *Neckera webbiana* (Mont.) Düll

SUBSTRATE: Miocene limestone outcrops.

**Poland:** Kuc 1958, 1963, 1964 (also as fig. 31, p. 139); Bloch 1976, 1988 (tab. 5); Ochyra *et al.* 1988k; LBL.**Ukraine:** Wiśniewski 1923; Danylkiv *et al.* 2002; LWKS & LWFU.***Neckera complanata*** (Hedw.) Huebener

SUBSTRATE: Miocene limestone outcrops, bark of deciduous trees, occasionally decaying wood.

**Poland:** Kuc 1958, 1963; Lisowski 1958; Karczmarz 1964a (as an exsiccate), 1965c; 1967 (tab. 4, 5) 1994; Mickiewicz 1965; Karczmarz *et al.* 1974 (as an exsiccate); Bloch 1976, 1988 (tab. 5, 12, 13); Ochyra *et al.* 1988j; Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.**Ukraine:** Krupa 1885; Wiśniewski 1923; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.***Neckera crispa*** Hedw.

SUBSTRATE: Miocene limestone outcrops, bark of deciduous trees.

**Poland:** Kuc 1958, 1963, 1964 as fig. 35 (p. 151); Karczmarz 1964a (as an exsiccate), 1965c, 1994; Bloch 1976, 1988 (tab. 4, 5, 12); Ochyra *et al.* 1988i; Lorens *et al.* 2013; LBL.**Ukraine:** Krupa 1885.***Neckera pennata*** Hedw.

SUBSTRATE: bark of deciduous trees.

**Poland:** Błoński 1890; Lisowski 1958; Kuc 1963, 1964 (also as fig. 36, p. 151); Mickiewicz 1965; Bloch 1976, 1988 (tab. 13, 14); Karczmarz 1994; Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.**Ukraine:** Wiśniewski 1923; Danylkiv *et al.* 2002; LWKS.*Neckera webbiana* → ***Neckera besseri***

***Niphotrichum canescens*** (Hedw.) Bednarek-Ochyra & OchyraSYNONYMS: *Racomitrium canescens* (Timm) Brid.

SUBSTRATE: soil, sand, Miocene limestone outcrops.

**Poland:** Kuc 1958, 1963; Lisowski 1958; Karczmarz 1964a (as an exsiccate), 1965c; Mamczarz 1973, 1974; Bloch 1976, 1988 (tab. 5); Fijałkowski & Łuczycka-Popiel 1989 (tab. 3); Karczmarz *et al.* 1997; LBL.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002; LWD & LWFU.

***Orthodicranum flagellare*** (Hedw.) LoeskeSYNONYMS: *Dicranum flagellare* Hedw.

SUBSTRATE: decaying wood, bark of trees.

**Poland:** Lisowski 1958; Kuc 1963; Karczmarz 1965c, 1994; Bloch 1976, 1988 (tab. 17); Lorens *et al.* 2013; Fudali *et al.* 2015.

**Ukraine:** Ulychna 1978; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWD.

***Orthodicranum montanum*** (Hedw.) LoeskeSYNONYMS: *Dicranum montanum* Hedw.

SUBSTRATE: bark of coniferous and deciduous trees, decaying wood, soil, humus.

**Poland:** Lisowski 1957 (as an exsiccate), 1958; Kuc 1963; Karczmarz 1965c, 1966b (as an exsiccate), 1967 (tab. 5, 6); Mickiewicz 1965; Mamczarz 1973, 1974; Bloch 1976, 1988 (tab. 10-14, 17-19); Izdebski *et al.* 1992a (tab. 10, 20); Łuczycka-Popiel 1992 (tab. 1); Karczmarz *et al.* 1997; Maciejewski & Zubel 2009a; Tracz 2014; Fudali *et al.* 2015.

**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2005; LWKS & LWFU.

***Orthodicranum tauricum*** (Sapjegin) Smimova

SUBSTRATE: decaying wood, bark of trees.

**Poland:** Fudali *et al.* 2015.

***Orthotheciella varia*** (Hedw.) OchyraSYNONYMS: *Amblystegium varium* (Hedw.) Lindb.

SUBSTRATE: soil, decaying wood.

**Poland:** Kuc 1963; Fudali *et al.* 2015; LBL.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2005; LWKS & LWFU.

***Orthotrichum affine*** Schrad. *ex* Brid.SYNONYMS: *Orthotrichum fastigiatum* Bruch *ex* Brid.

SUBSTRATE: bark of trees.

**Poland:** Fudali *et al.* 2015.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002; LWD.

***Orthotrichum anomalum*** Hedw.

SUBSTRATE: stone wall, Miocene limestone outcrops, concrete elements.

**Poland:** Lisowski 1957 (as an exsiccate), 1958; Kuc 1958, 1963; Bloch 1976, 1988 (tab. 5); Fudali *et al.* 2015.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

***Orthotrichum cupulatum*** Brid.

SUBSTRATE: calcareous rocks.

**Ukraine:** Danylkiv *et al.* 2002; LWKS.

***Orthotrichum diaphanum*** Schrad. ex Brid.

SUBSTRATE: concrete elements, bark of trees.

**Poland:** Karczmarz 1965c; Bloch & Karczmarz 1973a; Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002; LWD & LWFU.

*Orthotrichum fallax* → ***Orthotrichum pumilum***

*Orthotrichum fastigiatum* → ***Orthotrichum affine***

*Orthotrichum leiocarpum* → ***Orthotrichum striatum***

***Orthotrichum lyellii*** Hook. & Taylor

SUBSTRATE: bark of deciduous trees (*Fagus sylvatica*).

**Poland:** Mickiewicz 1965; Fudali *et al.* 2015.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002.

***Orthotrichum obtusifolium*** Brid.

SUBSTRATE: bark of deciduous trees.

**Poland:** Lisowski 1958; Kuc 1963; Bloch & Karczmarz 1973a; Bloch 1976, 1988 (tab. 16); Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002; LWKS.

***Orthotrichum pumilum*** Sw. ex anon.

SYNONYMS: *Orthotrichum fallax* Bruch ex Brid.

SUBSTRATE: bark of deciduous trees.

**Poland:** Fudali *et al.* 2015.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002.

***Orthotrichum speciosum*** Nees

SUBSTRATE: bark of deciduous trees, occasionally concrete elements.

**Poland:** Karczmarz 1965c; Mamczarz 1974; Fudali *et al.* 2015.

**Ukraine:** Krupa 1885; Lazarenko *et al.* 1971; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS, LWD & LWFU.

***Orthotrichum stramineum*** Hornsch. *ex* Brid

SUBSTRATE: bark of deciduous trees.

**Poland:** Karczmarz 1967 (tab. 4); Bloch 1976, 1988 (tab. 13); LBL.

**Ukraine:** Lazarenko *et al.* 1971; Danylkiv *et al.* 2002; LWKS.

***Orthotrichum striatum*** Hedw.

SYNONYMS: *Orthotrichum leiocarpum* Bruch & Schimp.

SUBSTRATE: bark of beeches and oaks.

**Poland:** Karczmarz 1967 (tab. 3); Bloch 1976, 1988 (tab. 15); LBL.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002.

***Oxyrrhynchium hians*** (Hedw.) Loeske

SYNONYMS: *Eurhynchium swarzii* (Turner) Hobkirk., *Oxyrrhynchium swarzii* (Turner) Hobkirk. var. *atrovirens* (Brid.) Dixon, *Oxyrrhynchium swarzii* (Turner) Warnst.

SUBSTRATE: soil, humus, decaying wood, Miocene limestone outcrops, calcareous soil, concrete elements.

**Poland:** Lisowski 1957 (as an exsiccate), 1958; Izdebski 1962b (tab. 1), 1963b (tab. 2); Kuc 1963; Karczmarz 1965c; Mamczarz 1973, 1974; Bloch & Karczmarz 1973a; Bloch 1976, 1988 (tab. 4, 5, 7, 22, 24, 27, 35, 36); Fijałkowski & Łuczycza-Popiel 1989 (tab. 6, 7); Izdebski *et al.* 1992b (in text p. 263, tab. 4); Fudali *et al.* 2015; LBL.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS, LWD & LWFU.

***Oxyrrhynchium schleicheri*** (R.Hedw.) Röll

SYNONYMS: *Oxyrrhynchium swarzii* (Turner) Warnst. var. *abbreviatum* (Turner) Jäggli

SUBSTRATE: calcareous soil.

**Poland:** Lisowski 1957 (as an exsiccate), 1958.

*Oxyrrhynchium swarzii* → ***Oxyrrhynchium hians***

*Oxyrrhynchium swarzii* var. *atrovirens* → ***Oxyrrhynchium hians***

*Oxyrrhynchium swarzii* var. *abbreviatum* → ***Oxyrrhynchium schleicheri***

*Oxystegus cylindricus* → ***Trichostomum tenuirostre***

***Paludella squarrosa*** (Hedw.) Brid.

SUBSTRATE: wet soil.

**Ukraine:** Karczmarz *et al.* 1997; Danylkiv *et al.* 2002.***Palustriella commutata*** (Hedw.) Ochyra

SUBSTRATE: wet soil.

**Ukraine:** Danylkiv *et al.* 2002; LWKS.***Paraleucobryum longifolium*** (Ehrh. ex Hedw.) LoeskeSYNONYMS: *Dicranum longifolium* Ehrh. ex Hedw.

SUBSTRATE: decaying wood, bark of deciduous trees.

**Poland:** Mamczarz 1974; Bloch 1976, 1988 (tab. 12, 17).*Phascum acaulon* → *Tortula acaulon**Phascum bryoides* → *Protobryum bryoides**Phascum cuspidatum* → *Tortula acaulon****Philonotis caespitosa*** Jur.

SUBSTRATE: damp soil.

**Poland:** Lisowski 1958; Kuc 1964; Bloch 1990.***Philonotis calcarea*** (Bruch & Schimp.) Schimp.

SUBSTRATE: wet soil.

**Poland:** Karczmarz 1965c.***Philonotis fontana*** (Hedw.) Brid.

SUBSTRATE: wet soil, peaty soil.

**Poland:** Lisowski 1958; Kuc 1963; Karczmarz 1965c, 1994. Mamczarz 1974.**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002; LWD.***Philonotis marchica*** (Hedw.) Brid.

SUBSTRATE: wet soil.

**Ukraine:** Krupa 1885; Tymrakiewicz 1928; Danylkiv *et al.* 2002.***Physcomitrella patens*** (Hedw.) Bruch & Schimp.

SUBSTRATE: soil.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002; LWD.*Physcomitrium acuminatum* → *Physcomitrium eurystomum*

***Physcomitrium eurystomum*** Sendtn.SYNONYMS: *Physcomitrium acuminatum* Bruch & Schimp.

SUBSTRATE: soil.

**Ukraine:** Krupa 1885; Tymrakiewicz 1928; Danylkiv *et al.* 2002.***Physcomitrium pyriforme*** (Hedw.) Bruch & Schimp.

SUBSTRATE: soil.

**Poland:** Kuc 1963, Karczmarz 1965c, 1994; Bloch & Karczmarz 1973a.**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; LWKS.***Plagiomnium affine*** (Blandow *ex* Funck) T.J.Kop.SYNONYMS: *Mnium affine* Blandow *ex* Funck

SUBSTRATE: soil, humus, decaying wood, base of trees, Miocene limestone outcrops.

**Poland:** Lisowski 1958; Izdebska & Szynal 1961 (tab. 1); Izdebski 1962a (tab. 4, 6), 1962b (tab. 8), 1963a (tab. 1, 4, 7), 1963b (tab. 2), 1972 (tab. 2); Szynal 1962 (tab. 9, 12); Kuc 1963; Mamczarz 1973, 1974; Bloch & Karczmarz 1973b; Kimsa 1974 (tab. 1); Bloch 1976, 1988 (tab. 4, 35); Czarnecka 1978 (tab. 1); Fijałkowski & Łuczycka-Popiel 1989 (tab. 3, 5, 7); Fijałkowski & Łuczycka-Popiel 1989 (tab. 4-6, 9); Łuczycka-Popiel 1989 (tab. 1); Lorens *et al.* 1991 (tab. 1); Izdebski *et al.* 1992a (tab. 9-11, 13-16, 18-21, 24, 25, 27-29, 35); Łuczycka-Popiel 1992 (tab. 1); Łuczycka-Popiel & Wawer 1992 (tab. 1); Maciejewski & Zubel 2009a, 2009b; Zubel 2009b; Tracz 2014; Fudali *et al.* 2015.**Ukraine:** Krupa 1885; Lazarenko *et al.* 1971; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; LWKS, LWD & LWFU.***Plagiomnium cuspidatum*** (Hedw.) T.J.Kop.SYNONYMS: *Mnium cuspidatum* Hedw.

SUBSTRATE: soil, humus, decaying wood, bark of deciduous trees, Miocene limestone outcrops, concrete elements.

**Poland:** Lisowski 1958; Izdebska & Szynal 1961 (tab. 1); Izdebski 1962a (tab. 6), 1962b (tab. 1, 4, 8, 11), 1963a (tab. 1, 7), 1963b (tab. 2), 1966 (tab. 3), 1967 (tab. 3), 1972 (tab. 2); Szynal 1962 (tab. 12); Kuc 1963; Mamczarz 1974; Bloch 1976, 1988 (tab. 4, 5, 12, 24, 35, 36); Fijałkowski & Łuczycka-Popiel 1989 (tab. 4-7, 9); Łuczycka-Popiel 1989 (tab. 1); Izdebski *et al.* 1992a (tab. 18-21, 24, 25, 28, 33), 1992b (in text p. 263, tab. 4); Fudali *et al.* 2015.**Ukraine:** Krupa 1885; Pyasets'kyi 1942; Lazarenko *et al.* 1971; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; LWKS, LWD & LWFU.

***Plagiomnium elatum*** (Bruch & Schimp.) T.J.Kop.

SYNONYMS: *Mnium affine* Blandow ex Funck var. *elatum* Bruch & Schimp., *Mnium seligeri* Jur.

SUBSTRATE: water, damp soil, humus, peat.

**Poland:** Lisowski 1958; Izdebski 1962b (tab. 1, 4), 1964 (tab. 1), 1965 (tab. 5), 1966 (tab. 2, 3), 1967 (tab. 2), 1972 (tab. 2); Kuc 1963; Karczmarz 1965b (as an exsiccate), 1994; Bloch & Karczmarz 1973a; Fijałkowski & Łuczycka-Popiel 1989 (tab. 4-7); Izdebski *et al.* 1992a (tab. 11, 13, 14, 16, 20, 21, 24, 25, 28, 29, 32-37), 1992b (tab. 4, 5); Lorens *et al.* 2013; Fudali *et al.* 2015.

**Ukraine:** Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; LWKS.

***Plagiomnium ellipticum*** (Brid.) T.J.Kop.

SYNONYMS: *Mnium rostratum* Schrad. var. *rugicum* Bruch & Schimp., *Mnium rugicum* Laurer

SUBSTRATE: soil, decaying wood.

**Poland:** Mamczarz 1973; Lorens *et al.* 2013; Fudali *et al.* 2015.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; LWKS, LWD & LWFU.

***Plagiomnium medium*** (Bruch & Schimp.) T.J.Kop.

SYNONYMS: *Mnium medium* Bruch & Schimp.

SUBSTRATE: soil, decaying wood.

**Poland:** Izdebski 1959, 1962a (tab. 6), 1962b (tab. 8), 1963b (tab. 2), 1964 (tab. 1); Szynal 1962 (tab. 12); Kuc 1964; Lorens *et al.* 2013.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

***Plagiomnium rostratum*** (Schrad.) T.J.Kop.

SYNONYMS: *Mnium rostratum* Schrad.

SUBSTRATE: humus, soil.

**Poland:** Izdebski 1962a (tab. 6), 1962b (tab. 1), 1963a (tab. 7), 1963b (tab. 2), 1964 (tab. 1); Kuc 1963; Mamczarz 1973, 1974; Izdebski *et al.* 1992a (tab. 32, 33, 35, 36), 1992b (tab. 5); Tracz 2014; Fudali *et al.* 2015.

**Ukraine:** Krupa 1885; Lazarenko *et al.* 1971; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

***Plagiomnium undulatum*** (Hedw.) T.J.Kop.

SYNONYMS: *Mnium undulatum* Hedw.

SUBSTRATE: soil, humus, decaying wood, base of trees, Miocene limestone outcrops.

**Poland:** Lisowski 1958; Izdebska & Szynal 1961 (tab. 1); Izdebski 1962a (tab. 6), 1962b (tab. 1, 4, 8), 1963a (tab. 1, 4), 1963b (tab. 2), 1964 (tab. 1), 1965 (tab. 5), 1966 (tab. 3); Szynal 1962 (tab. 12); Kuc 1963; Karczmarz



1965b (as an exsiccate); 1994; Mamczarz 1973; Kimsa 1974 (tab. 1); Bloch 1976, 1988 (tab. 7); Czarnecka 1978 (tab. 1); Fijałkowski & Łuczycka-Popiel 1989 (tab. 4-7, 9); Łuczycka-Popiel 1989 (tab. 1); Izdebski *et al.* 1992a (tab. 11, 13, 18-20, 24, 25, 28, 29, 32, 36), 1992b (tab. 4); Łuczycka-Popiel & Wawer 1992 (tab. 1); Lorens *et al.* 2013; Fudali *et al.* 2015.

**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Soroka 2008a; LWKS, LWD & LWFU.

***Plagiopus oederiana*** (Sw.) Limpr.

SYNONYMS: *Bartramia oederi* Brid.

SUBSTRATE: limestone rocks.

**Ukraine:** Krupa 1885; Karczmarz *et al.* 1997; Danylkiv *et al.* 2002.

***Plagiothecium cavifolium*** (Brid.) Z.Iwats.

SYNONYMS: *Plagiothecium roseanum* (Hampe) Bruch & Schimp.

SUBSTRATE: soil, decaying wood.

**Poland:** Błoński 1890; Lisowski 1958; Izdebski 1962b (tab. 8), 1963b (tab. 2), 1967 (tab. 3); Kuc 1963; Karczmarz 1965c; Mamczarz 1973, 1974; Izdebski *et al.* 1992a (tab. 10, 18-20, 29); Tracz 2014; Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Rabyk & Danylkiv 2004; LWKS.

***Plagiothecium curvifolium*** Schlieph. *ex* Limpr.

SUBSTRATE: soil, humus, decaying wood, bark of trees.

**Poland:** Fudali *et al.* 2015.

**Ukraine:** Lazarenko *et al.* 1971; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.

***Plagiothecium denticulatum*** (Hedw.) Schimp.

SUBSTRATE: damp soil, loamy soil, humus, decaying wood, occasionally bark of trees.

**Poland:** Błoński 1890; Lisowski 1958; Kuc 1963; Izdebski 1964 (tab. 1); Karczmarz 1964a (as an exsiccate), 1965c; Mickiewicz 1965; Bloch 1976, 1988 (tab. 20, 24, 35, 36); Izdebski *et al.* 1992a (tab. 20); Łuczycka-Popiel & Wawer 1992 (tab. 1); Fudali *et al.* 2015; LBL.

**Ukraine:** Wiśniewski 1923; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; LWKS & LWFU.

***Plagiothecium laetum*** Schimp.

SUBSTRATE: soil, humus, decaying wood, bark of coniferous and deciduous trees.

**Poland:** Kuc 1963; Karczmarz 1967 (tab. 2); Mamczarz 1973, 1974; Kimsa 1974 (tab. 1); Bloch 1976, 1988 (tab. 10-12, 17, 18, 19, 20); Lorens *et al.* 1991 (tab. 1); Izdebski *et al.* 1992a (tab. 9-11, 13-16, 20, 29), 1992b (tab.

4); Łuczycka-Popiel 1992 (tab. 1); Łuczycka-Popiel & Wawer 1992 (tab. 1); Maciejewski & Zubel 2009a; Tracz 2014; Fudali *et al.* 2015; LBL.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; LWKS, LWD & LWFU.

***Plagiothecium latebricola*** Schimp.

SUBSTRATE: wet soil, bark of trees.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.

*Plagiothecium neglectum* → ***Plagiothecium nemorale***

***Plagiothecium nemorale*** (Mitt.) A.Jaeger

SYNONYMS: *Plagiothecium neglectum* Mönk., *Plagiothecium sylvaticum* (Brid.) Bruch & Schimp.

SUBSTRATE: soil, humus, decaying wood, bark of trees.

**Poland:** Błoński 1890; Lisowski 1958; Kuc 1964; Karczmarz 1966b (as an exsiccate); Mamczarz 1974; Bloch 1976, 1988 (tab. 19); Lorens *et al.* 1991 (tab. 1); Izdebski *et al.* 1992a (tab. 9, 10, 13, 14, 21, 23-25, 27), 1992b (tab. 4); Łuczycka-Popiel & Wawer 1992 (tab. 1); Fudali *et al.* 2015.

**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

***Plagiothecium platyphyllum*** Mönk.

SUBSTRATE: soil, rocks and stones.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; LWKS & LWFU.

*Plagiothecium roseanum* → ***Plagiothecium cavifolium***

***Plagiothecium ruthei*** Limpr.

SYNONYMS: *Plagiothecium* Limpr. *ruthei* fo. *propaguliferum* (Warnst.) Limpr.

SUBSTRATE: damp soil, soil, humus, decaying wood.

**Poland:** Bloch & Karczmarz 1973b (also as fo. *propaguliferum*); Mamczarz 1973, 1974; Fudali *et al.* 2015; LBL.

*Plagiothecium ruthei* fo. *propaguliferum* → ***Plagiothecium ruthei***

*Plagiothecium silesiacum* → ***Herzogiella seligeri***

***Plagiothecium succulentum*** (Wilson) Lindb.

SUBSTRATE: base of trees.

**Poland:** Fijałkowski & Łuczycka-Popiel 1989 (tab. 6); Fudali *et al.* 2015.**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; LWKS & LWFU.*Plagiothecium sylvaticum* → ***Plagiothecium nemorale****Plagiothecium undulatum* → ***Buckiella undulata******Plasteurhynchium striatulum*** (Spruce) M.Fleisch. ex Broth.SYNONYMS: *Isothecium filescens* (Brid.) Mönk., *Isothecium striatulum* (Spruce) Kindb., *Isothecium striatulum* (Spruce) Kindb. fo. *cavernarum* (Molendo) Loeske

SUBSTRATE: Miocene limestone outcrops.

**Poland:** Kuc 1963, 1964.***Platygyrium repens*** (Brid.) Schimp.SYNONYMS: *Platygyrium repens* (Brid.) Schimp. fo. *gemmicladum* (Limpr.) Mönk., *Platygyrium repens* (Brid.) Schimp. var. *sciuroides* Saut. ex Limpr.

SUBSTRATE: bark of deciduous trees, decaying wood.

**Poland:** Błoński 1890; Lisowski 1957 (as an exsiccate – var. *sciuroides*), 1958; Karczmarz 1965c, 1967 (tab. 3, 5), 1990, 1994; Mickiewicz 1965; Bloch & Karczmarz 1973a (as fo. *gemmicladum*); Bloch 1976, 1988 (tab. 15); Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS, LWD & LWFU.*Platygyrium repens* fo. *gemmicladum* → ***Platygyrium repens****Platygyrium repens* var. *sciuroides* → ***Platygyrium repens******Platyhypnidium riparioides*** (Hedw.) DixonSYNONYMS: *Platyhypnidium rusciforme* (Brid.) Podp.

SUBSTRATE: rocks in water.

**Poland:** Lisowski 1958; Karczmarz 1968b (as an exsiccate); LBL.**Ukraine:** Krupa 1885.*Platyhypnidium rusciforme* → ***Platyhypnidium riparioides****Pleuridium alternifolium* → ***Pleuridium subulatum***

***Pleuridium acuminatum*** Lindb.

SUBSTRATE: loamy soil.

**Poland:** Kuc 1964.**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002.***Pleuridium subulatum*** (Hedw.) Rabenh.SYNONYMS: *Pleuridium subulatum* (Hedw.) Lindb., *Pleuridium alternifolium* (Dicks.) Brid., *Pleuridium alternifolium* (Dicks.) Rabenh., *Pleuridium alternifolium* Rab.

SUBSTRATE: loamy soil.

**Poland:** Lisowski 1957 (as an exsiccate), 1958; Kuc 1963, 1964; Karczmarz 1966b (as an exsiccate); LBL.**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002.***Pleurozium schreberi*** (Willd. ex Brid.) Mitt.SYNONYMS: *Entodon schreberi* (Willd. ex Brid.) Mönk.

SUBSTRATE: soil, humus, decaying wood.

**Poland:** Kuc 1958, 1963; Lisowski 1958; Izdebska & Szynal 1961 (tab. 1); Izdebski 1961 (tab. 7, 11), 1962a (tab. 1, 6), 1962b (tab. 1, 4, 11), 1963a (tab. 4, 7), 1963b (tab. 2), 1964 (tab. 1), 1966 (tab. 2, 3), 1967 (tab. 3), 1972 (tab. 2); Szynal 1962 (tab. 7-10); Karczmarz 1966b (as an exsiccate), 1990, 1994; Mamczarz 1973, 1974; Kimsa 1974 (tab. 1); Bloch 1976, 1988 (tab. 17, 22, 37, 38); Fijałkowski & Łuczycka-Popiel 1989 (tab. 6-9); Lorens *et al.* 1991 (tab. 1); Izdebski *et al.* 1992a (tab. 5, 6, 8-11, 13-16, 20, 21, 23-25, 27, 29, 35, 37, 38), 1992b (tab. 4); Łuczycka-Popiel 1992 (tab. 1); Łuczycka-Popiel & Wawer 1992 (tab. 1); Maciejewski & Zubel 2009a-c; Lorens *et al.* 2013; Tracz 2014; Fudali *et al.* 2015.**Ukraine:** Pyasets'kyy 1942; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; Soroka Soroka 2008a-c; LWKS, LWD.***Pogonatum aloides*** (Hedw.) P.Beauv.

SUBSTRATE: loess.

**Poland:** Kuc 1963; Bloch 1976, 1988 (tab. 22, 24); Łuczycka-Popiel 1992 (tab. 1); Karczmarz 1994; Lorens *et al.* 2013; LBL.**Ukraine:** Krupa 1885; Ulychna 1978; Bachuryrna & Mel'nychuk 1987; Danylkiv *et al.* 2002; LWD.***Pogonatum nanum*** (Schreb. ex Hedw.) P.Beauv.

SUBSTRATE: sand, loamy soil, loess.

**Poland:** Lisowski 1958; Kuc 1963; Karczmarz 1965c, 1994; Bloch 1976, 1988 (tab. 22, 24, 31, 36); LBL.

***Pogonatum urnigerum*** (Hedw.) P.Beauv.

SUBSTRATE: loamy soil, occasionally base of trees.

**Poland:** Lisowski 1958; Kuc 1963; Bloch 1976, 1988 (tab. 22, 24); Karczmarz 1994; Lorens *et al.* 2013; LBL.

**Ukraine:** Krupa 1885; Ulychna 1978; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.

***Pohlia annotina*** (Hedw.) Lindb.

SYNONYMS: *Webera annotina* (Hedw.) Bruch

SUBSTRATE: loess, soil on rocks, loamy soil.

**Poland:** Kuc 1963, Karczmarz 1965c.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002.

***Pohlia bulbifera*** (Warnst.) Warnst.

SUBSTRATE: loamy soil, loess.

**Poland:** Lisowski 1957 (as an exsiccate), 1958; Karczmarz 1967 (tab. 1); Karczmarz & Żarnowiec 1989 (also as fig. 6, p. 153).

***Pohlia cruda*** (Hedw.) Lindb.

SYNONYMS: *Webera cruda* (Hedw.) Fűrnr.

SUBSTRATE: soil, loess, calcareous soil.

**Poland:** Lisowski 1958; Kuc 1963; Karczmarz 1964a (as an exsiccate), 1965c; Mamczarz 1974; Bloch 1976, 1988 (tab. 22, 24, 36).

**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.

***Pohlia elongata*** Hedw.

SYNONYMS: *Webera elongata* (Hedw.) Schwägr.

SUBSTRATE: sandy soil.

**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2005, 2008; LWKS & LWFU.

***Pohlia delicatula* → *Pohlia melanodon******Pohlia melanodon*** (Brid.) A.J.Shaw

SYNONYMS: *Mniobryum carneum* (F.Weber & D.Mohr) Limpr., *Pohlia delicatula* (Mitt.) Broth, *Webera carnea* Schimp.

SUBSTRATE: soil.

**Poland:** Bloch & Karczmarz 1973a.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002; LWKS.

***Pohlia nutans*** (Hedw.) Lindb.SYNONYMS: *Webera nutans* Hedw.

SUBSTRATE: sand, soil, humus, decaying wood, base of trees.

**Poland:** Lisowski 1958; Izdebski 1961 (tab. 7), 1962a (tab. 4), 1963b (tab. 2), 1972 (tab. 2); Kuc 1963; Mamczarz 1973, 1974; Bloch & Karczmarz 1973a; Kimsa 1974 (tab. 1); Bloch 1976, 1988 (tab. 18-20, 24, 31, 35, 37, 38); Fijałkowski & Łuczycka-Popiel 1989 (tab. 6); Lorens *et al.* 1991 (tab. 1); Izdebski *et al.* 1992a (tab. 8, 10, 11, 14-16, 18-20, 23, 25, 27, 29, 33), 1992b (tab. 4); Łuczycka-Popiel & Wawer 1992 (tab. 1); Karczmarz 1994; Maciejewski & Zubel 2009a; Tracz 2014; Fudali *et al.* 2015.

**Ukraine:** Krupa 1885; Lazarenko *et al.* 1971; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS, LWD & LWFU.

***Pohlia proligera*** (Kindb.) Lindb. *ex* Broth.

SUBSTRATE: loamy soil.

**Poland:** Lisowski 1957 (as an exsiccate), 1958; Kuc 1964; Karczmarz & Żarnowiec 1989 (also as fig. 8 p. 157).

***Pohlia wahlenbergii*** (F. Weber & D. Mohr) A.L. AndrewsSYNONYMS: *Mniobryum albicans* (Wahlenb.) Limpr., *Mniobryum wahlenbergii* (F. Weber & D. Mohr) Jenn., *Webera albicans* Schimp.

SUBSTRATE: soil.

**Poland:** Kuc 1963; Bloch 1976, 1988 (tab. 22, 24); Lorens *et al.* 2013; Fudali *et al.* 2015.

**Ukraine:** Krupa 1885; Tymrakiewicz 1928; Danylkiv *et al.* 2002; LWD.

*Polytrichastrum alpinum* → see under the list of doubtful/excluded species

***Polytrichastrum formosum*** (Hedw.) G.L. Sm.SYNONYMS: *Polytrichum attenuatum* Menzies *ex* Brid., *Polytrichum formosum* Hedw.

SUBSTRATE: soil, humus, decaying wood, base of trees.

**Poland:** Kuc 1955, 1963; Lisowski 1958; Izdebska & Szynal 1961 (tab. 1); Izdebski 1962a (tab. 4, 6), 1962b (tab. 1, 4, 8, 11), 1963a (tab. 1, 4, 7), 1963b (tab. 2), 1964 (tab. 1), 1965 (tab. 5), 1966 (tab. 2, 3), 1967 (tab. 3), 1972 (tab. 2); Szynal 1962 (tab. 12); Karczmarz 1965c, 1994; Mamczarz 1973, 1974; Kimsa 1974 (tab. 1); Bloch 1976, 1988 (tab. 19, 22, 24, 27, 35-38); Czarnecka 1978 (tab. 1); Fijałkowski & Łuczycka-Popiel 1989 (tab. 5-9); Łuczycka-Popiel 1989 (tab. 1); Lorens *et al.* 1991 (tab. 1); Izdebski *et al.* 1992a (tab. 8-11, 13-16, 18, 20, 21, 23-25, 27-29, 35-38), 1992b (tab. 4); Łuczycka-Popiel 1992 (tab. 1, 5); Łuczycka-Popiel & Wawer 1992 (tab. 1); Maciejewski & Zubel 2009a-c; Zubel 2009b; Lorens *et al.* 2013; Tracz 2014; Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Ulychna 1978; Bachuryina & Mel'nychuk 1987; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2005, 2008; LWKS, LWD & LWFU.

***Polytrichastrum longisetum*** (Sw. ex Brid.) G.L.Sm.

SYNONYMS: *Polytrichum gracile* Dicks.

SUBSTRATE: soil, humus, base of alders (*Alnus glutinosa*).

**Poland:** Kuc 1963; Lorens *et al.* 1992 (tab. 38); Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Ulychna 1978; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS, LWD.

*Polytrichastrum pallidisetum* → see under the list of doubtful/excluded species

*Polytrichum attenuatum* → ***Polytrichastrum formosum***

***Polytrichum commune*** Hedw.

SYNONYMS: *Polytrichum commune* Hedw. fo. *uliginosum* (Huebener) Mönk.

SUBSTRATE: damp soil, soil, humus, peat.

**Poland:** Lisowski 1958; Izdebski 1961 (tab. 7, 11), 1962a (tab. 1, 4), 1963a (tab. 1, 4), 1963b (tab. 2), 1964 (tab. 1), 1966 (tab. 2), 1972 (tab. 2); Szynal 1962 (tab. 7, 8); Kuc 1963; Karczmarz 1965c; Mamczarz 1973, 1974; Kimsa 1974 (tab. 1); Bloch 1976, 1988 (tab. 38 – also as fo. *uliginosum*); Fijałkowski & Łuczycka-Popiel 1989 (tab. 4-7, 9); Lorens *et al.* 1991 (tab. 1), 2013; Izdebski *et al.* 1992a (tab. 5, 6, 8, 9, 11, 13, 23, 25, 29, 33-38); Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Pyasets'kyi 1942; Ulychna 1978; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Soroka 2008a-c; LWKS, LWD & LWFU.

*Polytrichum commune* fo. *uliginosum* → ***Polytrichum commune***

*Polytrichum gracile* → ***Polytrichastrum longisetum***

*Polytrichum formosum* → ***Polytrichastrum formosum***

***Polytrichum juniperinum*** Hedw.

SUBSTRATE: soil, loamy soil, sand, decaying wood.

**Poland:** Kuc 1958, 1963; Lisowski 1958; Izdebska & Szynal 1961 (tab. 1); Izdebski 1962a (tab. 4, 6), 1962b (tab. 1), 1963a (tab. 7), 1963b (tab. 2), 1964 (tab. 1), 1966 (tab. 2), 1967, 1972 (tab. 2); Szynal 1962 (tab. 8, 10, 11, 12); Karczmarz 1965c, 1994; Mamczarz 1973, 1974; Kimsa 1974 (tab. 1); Bloch 1976, 1988 (tab. 22, 24, 31, 37); Fijałkowski & Łuczycka-Popiel 1989 (tab. 6-9); Izdebski *et al.* 1992a (tab. 8, 10, 15, 36, 38); Łuczycka-Popiel & Wawer

1992 (tab. 1); Karczmarz *et al.* 1997; Lorens *et al.* 2013; Tracz 2014; Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Pyasets'kyy 1942; Ulychna 1978; Bachuryna & Mel'nychuk 1987; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2005, 2008; LWKS, LWD & LWFU.

***Polytrichum piliferum* Hedw.**

SUBSTRATE: sand, occasionally old stone walls.

**Poland:** Lisowski 1958; Izdebski 1962a (tab. 4), 1963b (tab. 2), 1966 (tab. 2); Kuc 1963; Karczmarz 1965b (as an exsiccate); Mameczarz 1973, 1974; Bloch 1976, 1988 (tab. 37); Fijałkowski & Łuczycka-Popiel 1989 (tab. 8); Izdebski *et al.* 1992a (tab. 27); Karczmarz *et al.* 1997; Maciejewski & Zubel 2009a; LBL.

**Ukraine:** Krupa 1885; Ulychna 1978; Bachuryna & Mel'nychuk 1987; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2005; Soroka 2008a, 2000b; LWKS, LWD & LWFU.

***Polytrichum strictum* Menzies ex Brid.**

SUBSTRATE: peat, damp soil, hummocks – among *Sphagnum* stems.

**Poland:** Kuc 1955, 1963; Lisowski 1958; Izdebski 1961 (tab. 7, 11), 1962a (tab. 1), 1963b (tab. 1, 2), 1966 (tab. 2), 1972 (tab. 2); Szynal 1962 (tab. 7); Kimsa 1974 (tab. 1); Lorens *et al.* 1991 (tab. 1), 2013; Izdebski *et al.* 1992a (tab. 5, 6, 8, 9, 34, 38); LBL.

**Ukraine:** Krupa 1885; Tymrakiewicz 1928; Bachuryna & Mel'nychuk 1987; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Soroka 2008a, 2008b; LWKS, LWD & LWFU.

*Pottia cavifolia* → *Pterygoneurum ovatum*

*Pottia davalliana* → *Microbryum davallianum*

*Pottia intermedia* → *Tortula modica*

*Pottia lanceolata* → *Tortula lanceola*

*Pottia minutula* → *Microbryum davallianum*

*Pottia truncatula* → *Tortula truncata*

*Pottia truncata* → *Tortula truncata*



***Protobryum bryoides*** (Dicks.) J.Guerra & CanoSYNONYMS: *Phascum bryoides* Dicks.

SUBSTRATE: soil.

**Ukraine:** Krupa 1885; Ulychna 1978; Danylkiv *et al.* 2002; LWKS & LWD.***Pseudobryum cinclidioides*** (Huebener) T.J.Kop.SYNONYMS: *Mnium cinclidioides* Huebener

SUBSTRATE: damp soil.

**Poland:** Bloch & Karczmarz 1973b; Karczmarz & Mickiewicz 1974; Karczmarz *et al.* 1974 (as an exsiccate); Mamczarz 1974; Bloch 1990; LBL.***Pseudocalliergon lycopodioides*** (Brid.) HedenäsSYNONYMS: *Hypnum lycopodioides* Brid.

SUBSTRATE: peatbog.

**Ukraine:** Krupa 1885; Wiśniewski 1923; Danylkiv *et al.* 2002.***Pseudocalliergon trifarium*** (F.Weber & D.Mohr) LoeskeSYNONYMS: *Calliergon trifarium* (Web. et Mohr) Kondb.

SUBSTRATE: wet and damp soil.

**Poland:** Kuc 1963; Ochyra *et al.* 1988d; Bloch 1990.**Ukraine:** Mel'nychuk 1962; LWKS.***Pseudocrossidium hornschuchianum*** (Schultz) R.H.ZanderSYNONYMS: *Barbula hornschuchiana* Schultz

SUBSTRATE: loess.

**Poland:** Karczmarz 1960.**Ukraine:** Danylkiv *et al.* 2002; Rabyk & Danylkiv 2005; LWKS.***Pseudocrossidium revolutum*** (Brid.) R.H.ZanderSYNONYMS: *Barbula revoluta* Brid.

SUBSTRATE: loess.

**Poland:** Karczmarz 1960, Bloch & Karczmarz 1973a.***Pseudoscleropodium purum*** (Hedw.) M.Fleisch. *ex* Broth.SYNONYMS: *Scleropodium purum* (Hedw.) Limpr.

SUBSTRATE: soil, humus.

**Poland:** Lisowski 1958; Kuc 1963; Karczmarz 1965b (as an exsiccate), 1965c; Fijałkowski & Łuczycka-Popiel 1989 (tab. 3); Fudali *et al.* 2015; LBL.**Ukraine:** LWKS (*leg.* I.V. Rabyk, 10 Aug 2000).

***Pterigynandrum filiforme*** Hedw.

SUBSTRATE: bark of deciduous trees, occasionally decaying wood and bark of coniferous trees.

**Poland:** Lisowski 1958; Kuc 1963; Karczmarz 1965c, 1966b (as an exsiccate), 1967 (tab. 4, 5), 1990, 1994; Mickiewicz 1965; Bloch 1976, 1988 (tab. 10, 12-15); Maciejewski & Zubel 2009c; Lorens *et al.* 2013; Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; LWKS (*leg.* I.V. Rabyk, 24 Jul 2000).

*Pterygoneurum cavifolium* → ***Pterygoneurum ovatum******Pterygoneurum ovatum*** (Hedw.) Dixon

SYNONYMS: *Pterygoneurum cavifolium* Jur., *Pterygoneurum pusillum* C.E.O.Jensen, *Pottia cavifolia* Ehrh. *ex Fűrnr.*

SUBSTRATE: loamy soil, loess.

**Poland:** Lisowski 1958; Karczmarz 1960, 1965c; Kuc 1963; Bloch 1976, 1988 (tab. 29).

**Ukraine:** Krupa 1885; Lazarenko *et al.* 1971; Ulychna 1978; LWKS & LWD.

*Pterygoneurum pusillum* → ***Pterygoneurum ovatum******Pterygoneurum subsessile*** (Brid.) Jur.

SUBSTRATE: loamy soil, loess.

**Poland:** Karczmarz 1960; Kuc 1963; Bloch 1976, 1988 (tab. 29).

***Ptilium crista-castrensis*** (Hedw.) De Not.

SUBSTRATE: soil, humus, decaying wood.

**Poland:** Lisowski 1958; Izdebski 1962a (tab. 1, 4, 6), 1963a (tab. 4), 1963b (tab. 2), 1966 (tab. 2), 1967 (tab. 2), 1972 (tab. 2); Kuc 1963; Karczmarz 1964a (as an exsiccate), 1965c, 1994; Mamczarz 1973, 1974; Kimsa 1974 (tab. 1); Bloch 1976, 1988 (tab. 38); Fijałkowski & Łuczycka-Popiel 1989 (tab. 4); Lorens *et al.* 1991 (tab. 1), 2013; Izdebski *et al.* 1992a (tab. 8-11, 14, 27); Maciejewski & Zubel 2009a; Tracz 2014; Fudali *et al.* 2015; LBL.

**Ukraine:** Wiśniewski 1923; Pyasets'kyi 1942; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Soroka 2008a-c; LWKS & LWFU.

***Pylaisia polyantha*** (Hedw.) Schimp.

SUBSTRATE: bark of deciduous and coniferous trees, decaying wood, occasionally concrete elements.

**Poland:** Błoński 1890; Lisowski 1957 (as an exsiccate), 1958; Kuc 1963; Karczmarz 1965c, 1967 (tab. 3, 4); Mamczarz 1973, 1974; Bloch 1976, 1988 (tab. 11-15, 17); Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Wiśniewski 1923; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS, LWD & LWFU.

*Racomitrium canescens* → *Niphotrichum canescens*

*Racomitrium heterostichum* → *Bucklandiella heterosticha*

***Rhizomnium punctatum*** (Hedw.) T.J.Kop.

SYNONYMS: *Mnium punctatum* Hedw.

SUBSTRATE: soil, humus, Miocene limestone outcrops, decaying wood, stones, occasionally bark of deciduous trees.

**Poland:** Lisowski 1958; Izdebski 1962b (tab. 8), 1963b (tab. 2), 1966 (tab. 3), 1967 (tab. 3); Kuc 1963; Karczmarz 1964a (as an exsiccate), 1965c, 1967 (tab. 2); Mameczarz 1973, 1974; Bloch 1976, 1988 (tab. 7, 12, 19, 20, 24); Lorens *et al.* 1991 (tab. 1); Izdebski *et al.* 1992a (tab. 19-21, 25, 29), 1992b (tab. 4); Łuczycka-Popiel 1992 (tab. 1); Łuczycka-Popiel & Wawer 1992 (tab. 1); Tracz 2014; Fudali *et al.* 2015.

**Ukraine:** Krupa 1885; Lazarenko *et al.* 1971; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

***Rhodobryum roseum*** (Hedw.) Limpr.

SYNONYMS: *Bryum roseum* (Hedw.) Crome

SUBSTRATE: damp soil, soil, humus, decaying wood.

**Poland:** Izdebski 1962b (tab. 8), 1963a (tab. 1), 1963b (tab. 2); Kuc 1963; Karczmarz 1964a (as an exsiccate), 1965c, 1994; Mameczarz 1974; Ochyra *et al.* 1985c; Izdebski *et al.* 1992a (tab. 33); Lorens *et al.* 2013; Fudali *et al.* 2015.

**Ukraine:** Krupa 1885; Pyasets'kyi 1942; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

*Rhynchostegium depressum* → *Taxiphyllum wissgrillii*

***Rhynchostegium murale*** (Hedw.) Schimp.

SUBSTRATE: concrete elements.

**Poland:** Lorens *et al.* 2013, Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.

***Rhytidiadelphus squarrosus*** (Hedw.) Warnst.

SUBSTRATE: soil, humus, decaying wood.

**Poland:** Lisowski 1958; Kuc 1963; Karczmarz 1965b (as an exsiccate), 1994; Mameczarz 1974; Bloch 1976, 1988 (tab. 38); Fijałkowski & Łuczycka-

Popiel 1989 (tab. 9); Izdebski *et al.* 1992a (tab. 24, 35-38), 1992b (tab. 5); Maciejewski & Zubel 2009b; Lorens *et al.* 2013; Tracz 2014; Fudali *et al.* 2015; LBL.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Shcherbachenko & Rabyk 2004; LWKS, LWD & LWFU.

***Rhytidiadelphus subpinnatus*** (Hedw.) Warnst.

SUBSTRATE: soil, humus.

**Poland:** Lorens *et al.* 2013; Fudali *et al.* 2015.

*Rhytidiadelphus triquetrus* → ***Hylocomaidelphus triquetrus***

***Rosulabryum capillare*** (Hedw.) J.R.Spence

SYNONYMS: *Bryum capillare* Hedw.

SUBSTRATE: loamy soil, soil, humus, Miocene limestone outcrops, bark of deciduous trees, decaying wood.

**Poland:** Lisowski 1958; Kuc 1963; Mamczarz 1974; Bloch 1976, 1988 (tab. 5, 10, 36); Izdebski *et al.* 1992a (tab. 35, 36), 1992b (s. 263); Fudali *et al.* 2015.

**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Shcherbachenko & Rabyk 2004; LWKS & LWFU.

*Rosulabryum laevifilum* → ***Rosulabryum moravicum***

***Rosulabryum moravicum*** (Podp.) Ochyra & Stebel

SYNONYMS: *Bryum capillare* Hedw. var. *flaccidum* (Brid.) Bruch & Schimp., *Rosulabryum laevifilum* (Syed) Ochyra

SUBSTRATE: bark of deciduous trees, decaying wood, occasionally concrete elements.

**Poland:** Lisowski 1958; Mickiewicz 1965; Karczmarz 1967 (tab. 4, 5); Bloch & Karczmarz 1973a; Mamczarz 1974; Bloch 1976, 1988 (tab. 12-14); Fudali *et al.* 2015.

***Sanionia uncinata*** (Hedw.) Loeske

SYNONYMS: *Drepanocladus uncinatus* (Hedw.) Warnst.

SUBSTRATE: decaying wood, soil, humus, bark of trees.

**Poland:** Lisowski 1958; Bloch 1976, 1988 (tab. 10, 11, 17); Lorens *et al.* 2013; Fudali *et al.* 2015.

**Ukraine:** Wiśniewski 1923; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.

***Schistidium apocarpum*** (Hedw.) Bruch & Schimp.SYNONYMS: *Grimmia apocarpa* Hedw.

SUBSTRATE: Miocene limestone outcrops, stone walls, stones.

**Poland:** Kuc 1958, 1963; Lisowski 1958; Karczmarz 1968b (as an exsiccate); Bloch 1976, 1988 (tab. 4, 5).**Ukraine:** Ulychna 1978; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2005; LWKS & LWFU.***Schistidium crassiphyllum*** H.H.Blom

SUBSTRATE: concrete elements.

**Poland:** Fudali *et al.* 2015.*Schistidium strictum* → see under the list of doubtful/excluded species*Scleropodium purum* → ***Pseudoscleropodium purum******Sciuro-hypnum oedipodium*** (Mitt.) Ignatov & HuttunenSYNONYMS: *Brachythecium curtum* (Lindb.) Limpr.

SUBSTRATE: soil, humus.

**Poland:** Lisowski 1958; Izdebski 1962b (tab. 1), 1963b (tab. 2); Maciejewski & Zubel 2009a; Fudali *et al.* 2015; LBL.**Ukraine:** Wiśniewski 1923; Danylkiv *et al.* 2002; LWD.***Sciuro-hypnum plumosum*** (Hedw.) Ignatov & HuttunenSYNONYMS: *Brachythecium plumosum* (Hedw.) Schimp.

SUBSTRATE: wet wood.

**Ukraine:** Danylkiv *et al.* 2002.***Sciuro-hypnum populeum*** (Hedw.) Ignatov & HuttunenSYNONYMS: *Brachythecium populeum* (Hedw.) Schimp.

SUBSTRATE: bark of trees, Miocene limestone outcrops.

**Poland:** Kuc 1958, 1963; Lisowski 1958; Mameczarz 1974.**Ukraine:** Wiśniewski 1923; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWD.***Sciuro-hypnum reflexum*** (Starke) Ignatov & HuttunenSYNONYMS: *Brachythecium reflexum* (Starke) Schimp.

SUBSTRATE: bark of deciduous trees, soil, decaying wood.

**Poland:** Lisowski 1958; Kuc 1963, 1964 (also as fig. 42, p. 179); Bloch 1976, 1988 (tab. 14); Lorens *et al.* 2013; Fudali *et al.* 2015.**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWD.

***Sciuro-hypnum starkei*** (Brid.) Ignatov & HuttunenSYNONYMS: *Brachythecium starkei* (Brid.) Schimp.

SUBSTRATE: humus, soil.

**Poland:** Izdebski 1962b (tab. 1), 1963a (tab. 1), 1963b (tab. 2); Kuc 1963, 1964.**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.***Scorpidium scorpioides*** (Hedw.) Limpr.

SUBSTRATE: wet soil.

**Poland:** Kuc 1963; Karczmarz 1965c; Bloch & Karczmarz 1973b; Ochyra *et al.* 1988e; Bloch 1990; LBL.***Seligeria campylopoda*** Kindb.

SUBSTRATE: Miocene limestone outcrops, calcareous stones.

**Poland:** Kuc 1963, 1964 (see *Note* below); Bloch 1976, 1988.**Ukraine:** Ulychna 1978; Karczmarz *et al.* 1997; Danylkiv *et al.* 2002; LWD.NOTE: Beside records cited above, the whole Polish data erroneously given as *S. recurvata* are placed here (comp. Ochyra *et al.* 1985a and *Note* for *S. recurvata* in the list of doubtful/excluded species).***Seligeria donniana*** (Sm.) Müll.Hal.

SUBSTRATE: limestone outcrops.

**Poland:** Kuc 1963, 1964 (also as fig. 12, p. 59).**Ukraine:** Ulychna 1978; Danylkiv *et al.* 2002; LWD.***Seligeria pusilla*** (Hedw.) Bruch & Schimp.

SUBSTRATE: Miocene limestone outcrops.

**Poland:** Kuc 1958, 1963, 1964 (also as fig. 15, p. 70); Bloch 1976, 1988 (tab. 6); Ochyra *et al.* 1985a; Lorens *et al.* 2013.**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002.*Seligeria setacea* (*S. recurvata*) → see under the list of doubtful/excluded species***Serpoleskea confervoides*** (Brid.) LoeskeSYNONYMS: *Amblystegium confervoides* (Brid.) Schimp.

SUBSTRATE: Miocene limestone outcrops.

**Poland:** Kuc 1958, 1963, 1964.**Ukraine:** Ulychna 1978; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

***Serpoleskea subtilis*** (Hedw.) Loeske

SYNONYMS: *Amblystegium subtile* (Hedw.) Schimp., *Amblystegiella subtilis* (Hedw.) Loeske

SUBSTRATE: bark of deciduous trees.

**Poland:** Błoński 1890; Lisowski 1957 (as an exsiccate), 1958; Kuc 1963; Karczmarz 1964a (as an exsiccate); Mamczarz 1973; Lorens *et al.* 2013; LBL.

**Ukraine:** Czerkawski 1867; Krupa 1885; Danylkiv *et al.* 2002; LWKS.

*Sharpiella seligeri* → ***Herzogiella seligeri***

*Sphaerangium muticum* → ***Acaulon muticum***

***Sphagnum affine*** Renault & Cardot

SYNONYMS: *Sphagnum imbricatum* var. *affine* (Renauld & Cardot) Warnst.

SUBSTRATE: soil.

**Poland:** LBL (*leg.* K. Izdebski, Jun 1972; *det.* I. Melosik, 25 May 1991).

*Sphagnum acutifolium* → ***Sphagnum capillifolium***

***Sphagnum angustifolium*** (C.E.O. Jensen *ex* Russow) C.E.O. Jensen

SYNONYMS: *Sphagnum apiculatum* H.Lindb. subsp. *parvifolium* (Warnst.) Szafran

SUBSTRATE: soil.

**Poland:** Grabarz 1969.

**Ukraine:** Rabyk & Danylkiv 2008; LWKS.

*Sphagnum apiculatum* → ***Sphagnum fallax***

*Sphagnum apiculatum* subsp. *amblyphyllum* → ***Sphagnum flexuosum***

*Sphagnum apiculatum* subsp. *parvifolium* → ***Sphagnum angustifolium***

***Sphagnum capillifolium*** (Ehrh.) Hedw.

SYNONYMS: *Sphagnum nemoreum* Scop., *Sphagnum acutifolium* Schrad.

SUBSTRATE: damp soil, humus, peat.

**Poland:** Kuc 1955, 1963; Izdebski 1961 (tab. 7), 1962a (tab. 1, 6), 1963b (tab. 2), 1964 (tab. 1), 1966 (tab. 2), 1972 (tab. 2); Karczmarz 1965c; Grabarz 1969; Mamczarz 1973, 1974; Kimsa 1974 (tab. 1); Bloch 1976, 1988 (tab. 38); Fijałkowski & Łuczycka-Popiel 1989 (tab. 4-6, 9); Lorens *et al.* 1991 (tab. 1); Izdebski *et al.* 1992a (tab. 6, 8-10, 13, 14, 23, 25, 33, 34), 1992b (tab. 4); Maciejewski & Zubel 2009a; Fudali *et al.* 2015; LBL.

**Ukraine:** Danylkiv & Soroka 1989; Rabyk & Danylkiv 2008; Soroka 2008a; LWKS & LWD.

***Sphagnum centrale*** C.E.O.Jensen

SUBSTRATE: wet soil, decaying wood.

**Ukraine:** Zerov1964; Rabyk 2003; LWKS & LWD.***Sphagnum compactum*** Lam. & DCSYNONYMS: *Sphagnum compactum* Lam. & DC var. *squarrosum* (Russow) Warnst.

SUBSTRATE: peat.

**Poland:** Kuc 1955, 1963; Grabarz 1969 (also as var. *squarrosum*).*Sphagnum compactum* var. *squarrosum* → ***Sphagnum compactum******Sphagnum contortum*** Schultz

SUBSTRATE: water.

**Poland:** Grabarz 1969; LBL (*leg.* K. Izdebski, Jun 1972; *det.* I. Melosik, 9 Sep 1999).**Ukraine:** Soroka 2008a; LWKS.*Sphagnum contortum* var. *platyphyllum* → ***Sphagnum platyphyllum******Sphagnum cuspidatum*** Ehrh. ex Hoffm.SYNONYMS: *Sphagnum cuspidatum* Ehrh. ex Hoffm. fo. *falcatum* Schimp. ex Szafran, *Sphagnum cuspidatum* Ehrh. ex Hoffm. fo. *plumosum* (Nees & Hornsch.) Szafran, *Sphagnum cuspidatum* Ehrh. ex Hoffm. fo. *plumulosum* (Schimp.) Szafran, *Sphagnum cuspidatum* Ehrh. ex Hoffm. fo. *submersum* (Schimp.) Szafran

SUBSTRATE: water, drainage ditches.

**Poland:** Kuc 1955, 1963; Izdebski 1961 (tab. 7, 11), 1963b (tab. 2), 1966 (tab. 2); Grabarz 1969; Fijałkowski & Łuczycka-Popiel 1989 (tab. 9); Lorens *et al.* 1991 (tab. 1), 2013; Izdebski *et al.* 1992a (tab. 5, 6, 8-10, 14, 23-25, 29, 35, 37), 1992b (tab. 4); LBL.*Sphagnum cuspidatum* fo. *falcatum* → ***Sphagnum cuspidatum****Sphagnum cuspidatum* fo. *plumosum* → ***Sphagnum cuspidatum****Sphagnum cuspidatum* fo. *plumulosum* → ***Sphagnum cuspidatum****Sphagnum cuspidatum* fo. *submersum* → ***Sphagnum cuspidatum******Sphagnum denticulatum*** Brid.

SUBSTRATE: wet soil in bog.

**Poland:** LBL (*leg.* K. Karczmarz 19 Sep 1967; *rev.* I. Melosik, 9 Sep 1999).



***Sphagnum fallax*** (H.Klinggr.) H.Klinggr.SYNONYMS: *Sphagnum apiculatum* H.Lindb., *Sphagnum recurvum* auct. non P.Beauv.

SUBSTRATE: damp soil, humus.

**Poland:** Szafran 1952 (fossil material); Kuc 1955, 1963, 1964; Izdebski 1961 (tab. 7, 11), 1963a (tab. 4), 1963b (tab. 1, 2), 1966 (tab. 2); Szynal 1962 (tab. 7); Grabarz 1969; Kimsa 1974 (tab. 1); Mamczarz 1974; Lorens *et al.* 1991 (tab. 1), 2013; Izdebski *et al.* 1992a (tab. 5, 6, 8-11, 24, 33-35), 1992b (tab. 4, 5); Fudali *et al.* 2015; LBL.

**Ukraine:** Zerov 1964; LWKS (*leg.* I.V. Rabyk 21 Aug 2002 & 27 Jul 2004), LWD.

***Sphagnum fimbriatum*** Wilson

SUBSTRATE: damp soil and humus.

**Poland:** Bloch & Karczmarz 1973a; Lorens *et al.* 1991 (tab. 1); Izdebski *et al.* 1992a (tab. 13); Maciejewski & Zubel 2009a; Fudali *et al.* 2015.

***Sphagnum flexuosum*** Dozy & Molk.SYNONYMS: *Sphagnum apiculatum* H.Lindb. subsp. *amblyphyllum* (Russow) Szafran

SUBSTRATE: wet soil, humus.

**Poland:** Kuc 1963; Grabarz 1969 (also as *S. apiculatum* subsp. *amblyphyllum*); Mamczarz 1974; Izdebski *et al.* 1992a (tab. 33, 34); LBL.

***Sphagnum fuscum*** (Schimp.) H.Klinggr.SYNONYMS: *Sphagnum rubellum* Wilson subsp. *fuscum* (H.Klinggr.) Szafran

SUBSTRATE: peatbog hummocks.

**Poland:** Kuc 1963; Grabarz 1969; Bloch 1990; Lorens *et al.* 1991 (tab. 1).

**Ukraine:** LWKS (*leg.* I.V. Rabyk, 24 Jul 2000).

***Sphagnum girgensohnii*** Russow

SUBSTRATE: damp peaty soil, humus.

**Poland:** Kuc 1963, 1964; Karczmarz 1965c, 1994; Izdebski *et al.* 1992a (tab. 5, 13, 14); Karczmarz & Bloch 2008; Lorens *et al.* 2013; Tracz 2014; Fudali *et al.* 2015; LBL.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Soroka 2002; LWKS & LWFU.

***Sphagnum imbricatum* var. *affine* → *Sphagnum affine******Sphagnum inundatum*** Russow

SUBSTRATE: water in peatbog hollows.

**Poland:** LBL (*leg.* U. Kogut 16 May 1993; *rev.* I. Melosik, 9 Sep 1999).

*Sphagnum medium* → *Sphagnum magellanicum**Sphagnum magellanicum* Brid.SYNONYMS: *Sphagnum medium* Limpr.

SUBSTRATE: peatbog hummocks.

**Poland:** Izdebski 1961 (tab. 11), 1962a (tab. 1), 1963a (tab. 4), 1963b (tab. 1, 2), 1966 (tab. 2); Szynal 1962 (tab. 7); Kuc 1963; Karczmarz 1965c; Grabarz 1969; Kimsa 1974 (tab. 1); Mamczarz 1974; Lorens *et al.* 1991 (tab. 1), 2013; Izdebski *et al.* 1992a (tab. 5, 6), 1992b (tab. 4); LBL.

**Ukraine:** Pyasets'kyy 1942; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Soroka 2008a; LWD & LWFU.

*Sphagnum molle* → see under the list of doubtful/excluded species

*Sphagnum nemoreum* → *Sphagnum capillifolium**Sphagnum obtusum* Warnst.

SUBSTRATE: peat.

**Ukraine:** Zerov 1964; Danylkiv *et al.* 2002; LWD.

*Sphagnum palustre* L.

SUBSTRATE: damp soil, humus, peat, decaying wood, peatbog hummocks.

**Poland:** Szafran 1952 (fossil material); Kuc 1955, 1963; Izdebski 1961 (tab. 7, 11), 1962a (tab. 1, 4), 1963a (tab. 1, 4), 1963b (tab. 2), 1966 (tab. 2), 1972 (tab. 2); Karczmarz 1965c, 1968b (as an exsiccate); Grabarz 1969; Mamczarz 1973, 1974; Bloch 1976, 1988 (tab. 38); Fijałkowski & Łuczycka-Popiel 1989 (tab. 4, 5); Lorens *et al.* 1991 (tab. 1), 2013; Izdebski *et al.* 1992a (tab. 5, 6, 8, 9, 11, 21, 23-25, 29, 33, 34, 38), 1992b (tab. 4); Tracz 2014; Fudali *et al.* 2015; LBL.

**Ukraine:** Zerov 1964; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; Soroka 2008a, 2008b; LWKS & LWD.

*Sphagnum papillosum* Lindb.

SUBSTRATE: peatbog hollows.

**Poland:** Lorens *et al.* 2013; LBL.

*Sphagnum platyphyllum* (Braithw.) Warnst.SYNONYMS: *Sphagnum contortum* var. *platyphyllum* Warnst.

SUBSTRATE: water in forest pond.

**Poland:** LBL (*leg.* K. Karczmarz, 26 Jun 1967).

***Sphagnum quinquefarium*** (Braithw.) Warnst.

SUBSTRATE: peatbog.

**Poland:** Izdebski 1961 (tab. 11), 1963b (tab. 2); Grabarz 1969; Bloch & Karczmarz 1973a.**Ukraine:** LWKS (*leg.* I.V. Rabyk, 24 Jul 2000).*Sphagnum recurvum* → ***Sphagnum fallax******Sphagnum rubellum*** Wilson

SUBSTRATE: peatbog hummocks.

**Poland:** Kuc 1963, 1964; Karczmarz 1965c; Grabarz 1969; Izdebski *et al.* 1992a (tab. 5, 6); Lorens *et al.* 2013.*Sphagnum rubellum* subsp. *fuscum* → ***Sphagnum fuscum******Sphagnum russowii*** Warnst.

SUBSTRATE: soil, humus.

**Poland:** Lorens *et al.* 2013; Fudali *et al.* 2015.**Ukraine:** Danylkiv & Soroka 1989; Karczmarz *et al.* 1997; Danylkiv *et al.* 2002; Soroka 2008a, 2008b; LWD & LWFU.***Sphagnum squarrosum*** CromeSYNONYMS: *Sphagnum squarrosum* Crome fo. *spectabile* (Russow) Szafran, *Sphagnum squarrosum* Crome fo. *subsquarrosum* Russow

SUBSTRATE: damp soil, soil, humus, occasionally decaying wood.

**Poland:** Kuc 1955, 1963; Izdebski 1962a (tab. 6), 1963a (tab. 1, 4), 1963b (tab. 2), 1964 (tab. 1), 1966 (tab. 3), 1972 (tab. 2); Karczmarz 1965c; Grabarz 1969 (also as fo. *spectabile* and fo. *subsquarrosum*); Mameczarz 1973, 1974; Bloch & Karczmarz 1973b; Bloch 1976, 1988 (tab. 19, 38); Fijałkowski & Łuczycka-Popiel 1989 (tab. 4-7); Lorens *et al.* 1991 (tab. 1); Izdebski *et al.* 1992a (tab. 11, 13, 25, 29); Fudali *et al.* 2015; LBL.**Ukraine:** Soroka 2008a, 2008b; LBL, LWD & LWFU.*Sphagnum squarrosum* fo. *spectabile* → ***Sphagnum squarrosum****Sphagnum squarrosum* fo. *subsquarrosum* → ***Sphagnum squarrosum******Sphagnum subsecundum*** Nees

SUBSTRATE: hollows in peatbogs, drainage ditches.

**Poland:** Kuc 1963; Grabarz 1969; Bloch & Karczmarz 1973b; Izdebski *et al.* 1992a; LBL.

***Sphagnum teres*** (Schimp.) Ångstr.

SUBSTRATE: peatbog hummocks.

**Poland:** Izdebski 1962a (tab. 6), 1963 (tab. 4); Kuc 1963, 1964; Grabarz 1969; Izdebski *et al.* 1992a (tab. 23-25); LBL.**Ukraine:** Pyasets'kyi 1942; Zerov 1964; Danylkiv *et al.* 2002; LWD.***Sphagnum warnstorffii*** Russow

SUBSTRATE: peatbog hummocks.

**Poland:** Izdebski 1961 (tab. 7), 1963b (tab. 2); Karczmarz 1968b (as an exsiccate); Grabarz 1969; Bloch & Karczmarz 1973a, 1973b; Kimsa 1974 (tab. 1); Mamczarz 1974; Lorens *et al.* 1991 (tab. 1); Izdebski *et al.* 1992a (tab. 8, 34); LBL.**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWD.***Splachnum ampullaceum*** Hedw.

SUBSTRATE: wet peat and animal faeces.

**Poland:** Lisowski 1958, Kuc 1963; Bloch 1990; Szmaida *et al.* 1991a.**Ukraine:** Danylkiv & Soroka 1989; LWKS & LWFU.***Straminergon stramineum*** (Dicks. ex Brid.) HedenäsSYNONYMS: *Calliergon stramineum* (Dicks. ex Brid.) Kindb.SUBSTRATE: damp soil, among *Sphagnum* stems.**Poland:** Kuc 1955, 1963; Lisowski 1958; Mamczarz 1974; Bloch 1990; Lorens *et al.* 1991 (tab. 1); Izdebski *et al.* 1992a (tab. 8, 9, 23, 33, 35, 36), 1992b (tab. 5); Fudali *et al.* 2015; LBL.**Ukraine:** Shcherbachenko & Rabyk 2004; LWKS.*Streblotrichum convolutum* → ***Barbula convoluta******Syntrichia calcicola*** J.J.AmannSYNONYMS: *Tortula ruralis* (Hedw.) P.Gaertn., B.Mey. & Scherb. subsp. *calcicola* (J.J.Amann) Giacom., *Tortula calcicola* (without species author), *Barbula ruralis* Hedw.

SUBSTRATE: Miocene limestone outcrops.

**Poland:** Kuc 1958 (as *Tortula calcicola* – see Note below), 1963.NOTE: The name given by Kuc in 1958 without the species authority. He cited this species again from the same locality in 1963 as *T. ruralis* subsp. *calcicola*.***Syntrichia montana*** NeesSYNONYMS: *Tortula montana* Mitt

SUBSTRATE: Miocene limestone outcrops.

**Poland:** Kuc 1958, 1963, 1964.

***Syntrichia papillosa*** (Wilson) Jur.SYNONYMS: *Tortula papillosa* Wilson, *Barbula papillosa* (Wilson) Müll.Hal.

SUBSTRATE: bark of deciduous trees, concrete elements.

**Poland:** Kuc 1963; Bloch 1976, 1988 (tab. 16), 1990; Fudali *et al.* 2015.**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002; LWKS.*Syntrichia pulvinata* → ***Syntrichia virescens******Syntrichia ruralis*** (Hedw.) F.Weber & D.MohrSYNONYMS: *Tortula ruralis* (Hedw.) P.Gaertn., B.Mey. & Scherb.

SUBSTRATE: Miocene limestone outcrops, concrete elements, sandy soil.

**Poland:** Kuc 1958, 1963; Lisowski 1958; Karczmarz 1960, 1968b (as an exsiccate); Bloch 1976, 1988 (tab. 5); Karczmarz *et al.* 1997; Fudali *et al.* 2015.**Ukraine:** Danylkiv *et al.* 2002; LWKS & LWFU.*Syntrichia subulata* → ***Tortula subulata******Syntrichia virescens*** (De Not.) OchyraSYNONYMS: *Tortula pulvinata* (Jur.) Limpr., *Syntrichia pulvinata* (Jur.) Jur., *Barbula pulvinata* Jur.

SUBSTRATE: bark of deciduous trees, occasionally concrete elements.

**Poland:** Lisowski 1958; Kuc 1963; Karczmarz 1966b (as an exsiccate); Bloch & Karczmarz 1973a; Bloch 1976, 1988 (tab. 16); Fudali *et al.* 2015.**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002; LWKS & LWFU.***Taxiphyllum wissgrillii*** (Garov.) Wijk & Margad.SYNONYMS: *Rhynchostegium depressum* (Brid.) Schimp.

SUBSTRATE: without data.

**Poland:** Bednarek-Ochyra *et al.* 1994a; Zubel 2015c.**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002.***Tetraphis pellucida*** Hedw.SYNONYMS: *Georgia pellucida* (Hedw.) Rabenh.

SUBSTRATE: humus, decaying wood, bark of trees.

**Poland:** Lisowski 1958; Kuc 1963; Karczmarz 1965b (as an exsiccate), 1967 (tab. 2); Mamczarz 1973, 1974; Bloch 1976, 1988 (tab. 17-20); Izdebski *et al.* 1992a (tab. 24); Maciejewski & Zubel 2009a; Fudali *et al.* 2015; LBL.**Ukraine:** Bachuryna & Mel'nychuk 1987; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Rabyk & Danylkiv 2008; LWKS & LWFU.

*Thamnum alopecurum* → *Thamnobryum alopecurum**Thamnobryum alopecurum* (Hedw.) GanguleeSYNONYMS: *Thamnum alopecurum* (Hedw.) Schimp.

SUBSTRATE: Miocene limestone outcrops.

**Poland:** Kuc 1958, 1963, 1964; Bednarek-Ochyra *et al.* 1994a; Lorens *et al.* 2013; Zubeł 2014d.**Ukraine:** Krupa 1885; Wiśniewski 1923; Danylkiv *et al.* 2002.*Thuidium abietinum* → *Abietinella abietina**Thuidium delicatulum* (Hedw.) Schimp.

SUBSTRATE: soil, humus, stones, occasionally bark of deciduous trees and decaying wood.

**Poland:** Lisowski 1958; Izdebski 1962b (tab. 1); Mamczarz 1973; Bloch 1976, 1988 (tab. 13, 14, 17, 20, 38); Izdebski *et al.* 1992a (tab. 21, 33); Fudali *et al.* 2015; LBL.**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.*Thuidium lanatum* → *Helodium blandowii**Thuidium minutulum* → *Cyrto-hypnum minutulum**Thuidium philibertii* Limpr.

SUBSTRATE: damp and moist soil, occasionally concrete elements.

**Poland:** Lisowski 1957 (as an exsiccate), 1958; Kuc 1963; Karczmarz 1965c; Mamczarz 1974; Fudali *et al.* 2015; LBL.**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWD.*Thuidium recognitum* (Hedw.) Lindb.

SUBSTRATE: soil, decaying wood.

**Poland:** Błoński 1890; Kuc 1963; Bloch & Karczmarz 1973a; Fijałkowski & Łuczycka-Popiel 1989 (tab. 4); Izdebski *et al.* 1992a (tab. 24); Fudali *et al.* 2015; LBL.**Ukraine:** Krupa 1885; Wiśniewski 1923; Danylkiv *et al.* 2002; LWD.*Thuidium tamariscifolium* → *Thuidium tamariscinum**Thuidium tamariscinum* (Hedw.) Schimp.SYNONYMS: *Thuidium tamariscifolium* Lindb.

SUBSTRATE: soil, humus, decaying wood, base of trees.

**Poland:** Błoński 1890; Lisowski 1958; Izdebska & Szynal 1961 (tab. 1); Izdebski 1962a (tab. 6), 1962b (tab. 8, 11), 1963a (tab. 1, 4, 7), 1963b (tab. 2), 1964 (tab. 1), 1965 (tab. 5), 1966 (tab. 2, 3); Szynal 1962 (tab. 9, 12); Kuc 1963; Karczmarz 1965c, 1966b (as an exsiccate); Mamczarz 1973, 1974; Kimsa 1974 (tab. 1); Bloch 1976, 1988 (tab. 20, 38); Izdebski *et al.* 1992a (tab. 11, 14, 21, 24, 25, 27, 29), 1992b (tab. 4); Maciejewski & Zubel 2009a-c; Zubel 2009b; Lorens *et al.* 2013; Tracz 2014; Fudali *et al.* 2015; LBL.

**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002.

***Timmia bavarica*** Hessel.

SUBSTRATE: wet soil.

**Ukraine:** Karczmarz *et al.* 1997; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

***Timmia megapolitana*** Hedw.

SUBSTRATE: wet soil.

**Ukraine:** Czerkawski 1867; Krupa 1885; Karczmarz *et al.* 1997; Danylkiv *et al.* 2002.

***Tomentypnum nitens*** (Hedw.) Loeske

SYNONYMS: *Camptothecium nitens* (Schreb.) Schimp., *Camptothecium trichodes* Lindb.

SUBSTRATE: damp soil, peat.

**Poland:** Lisowski 1958; Kuc 1963; Karczmarz 1965c; Bloch & Karczmarz 1973a, 1973b; Izdebski *et al.* 1992a (tab. 34); Ochryra *et al.* 1988f; Bloch 1990; LBL.

**Ukraine:** Krupa 1885; Tymrakiewicz 1928; Danylkiv *et al.* 2002; Bachuryna & Mel'nychuk 2003; LWD.

***Tortella inclinata*** (R. Hedw.) Limpr.

SYNONYMS: *Tortula inclinata* R. Hedw.

SUBSTRATE: limestone outcrops.

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS.

***Tortella tortuosa*** (Hedw.) Limpr.

SYNONYMS: *Barbula tortuosa* (Hedw.) F. Weber & D. Mohr

SUBSTRATE: Miocene limestone outcrops, eroded rock material.

**Poland:** Kuc 1963; 1964 (also as fig. 21, p. 88); Karczmarz 1965c; Bloch & Karczmarz 1973a; Mamczarz 1974; Bloch 1976, 1988 (tab. 4, 5); Karczmarz & Bloch 2008.

**Ukraine:** Krupa 1885; Lazarenko *et al.* 1971; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

***Tortula acaulon*** (With.) R.H.ZanderSYNONYMS: *Phascum acaulon* With., *Phascum cuspidatum* Hedw.

SUBSTRATE: soil, loess.

**Poland:** Lisowski 1958; Kuc 1963; Bloch 1976, 1988 (tab. 27); Karczmarz 1994.**Ukraine:** Krupa 1885; Ulychna 1978; Danylkiv *et al.* 2002; LWKS & LWD.*Tortula aestiva* → *Tortula muralis* var. *aestiva**Tortula calcicola* → *Syntrichia calcicola**Tortula inclinata* → *Tortella inclinata****Tortula lanceola*** R.H.ZanderSYNONYMS: *Pottia lanceolata* (Hedw.) Müll.Hal.

SUBSTRATE: calcareous soil, loess.

**Poland:** Lisowski 1957 (as an exsiccate – see *Note* below), 1958; Karczmarz 1965c.**Ukraine:** Krupa 1885; Lazarenko *et al.* 1971; Ulychna 1978; Danylkiv *et al.* 2002; LWKS & LWD.

NOTE: Locality given by Lisowski (1957) and cited by him in 1958, is situated beyond the Roztocze region (belongs to the Wyżyna Lubelska Upland).

***Tortula modica*** R.H.ZanderSYNONYMS: *Pottia intermedia* (Turner) Fürnr.

SUBSTRATE: loamy soil.

**Poland:** Lisowski 1958; Kuc 1963.**Ukraine:** Lazarenko *et al.* 1971; Ulychna 1978; Danylkiv *et al.* 2002; LWKS, LWD & LWFU.*Tortula montana* → *Syntrichia montana****Tortula muralis*** Hedw. var. *muralis*SYNONYMS: *Barbula muralis* (Hedw.) Crome

SUBSTRATE: calcareous rocks, concrete elements, damp calcareous soil.

**Poland:** Lisowski 1958; Kuc 1963; Fudali *et al.* 2015.**Ukraine:** Krupa 1885; Lazarenko *et al.* 1971; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Shcherbachenko & Rabyk 2004; LWKS, LWFU & LBL.



var. ***aestiva*** Brid. ex Hedw.

SYNONYMS: *Tortula aestiva* (without species author), *Tortula muralis* Hedw. subsp. *aestiva* (Brid. ex Hedw.) Meyl.

SUBSTRATE: Miocene limestone outcrops.

**Poland:** Kuc 1958; 1963 (see *Note* below).

**Ukraine:** Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

NOTE: The species name *Tortula aestiva* was given by Kuc in 1958 without the species author. He cited this species again from the same locality in 1963 as *T. muralis* subsp. *aestiva*.

*Tortula muralis* subsp. *aestiva* → ***Tortula muralis*** var. ***aestiva***

*Tortula papillosa* → ***Syntrichia papillosa***

*Tortula pulvinata* → ***Syntrichia virescens***

*Tortula ruralis* → ***Syntrichia ruralis***

*Tortula ruralis* subsp. *calcicola* → ***Syntrichia calcicola***

***Tortula subulata*** Hedw.

SYNONYMS: *Syntrichia subulata* (Hedw.) F.Weber & D.Mohr, *Barbula subulata* (Hedw.) P.Beauv.

SUBSTRATE: calcareous soil, loess, loamy soil.

**Poland:** Lisowski 1958; Kuc 1963; Karczmarz 1964a (as an exsiccate), 1965c, 1994; Mamczarz 1974; Bloch 1976, 1988 (tab. 22, 35, 36).

**Ukraine:** Krupa 1885; Lazarenko *et al.* 1971; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

***Tortula truncata*** (Hedw.) Mitt.

SYNONYMS: *Pottia truncatula* Lindb., *Pottia truncata* (Hedw.) Bruch & Schimp.

SUBSTRATE: soil.

**Poland:** Kuc 1963; Karczmarz 1967 (tab. 1); Fudali *et al.* 2015.

**Ukraine:** Krupa 1885; Lazarenko *et al.* 1971; Ulychna 1978; Danylkiv *et al.* 2002; LWKS & LWD.

*Tortula velenovskyi* → ***Hilpertia velenovskyi***

***Trichodon cylindricus*** (Hedw.) Schimp.

SYNONYMS: *Ditrichum cylindricum* (Hedw.) Schimp.

SUBSTRATE: sandy soil.

**Ukraine:** Krupa 1885; Lazarenko *et al.* 1971; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS & LWFU.

***Trichostomum tenuirostre*** (Hook. & Taylor) Lindb.SYNONYMS: *Oxystegus cylindricus* (Bruch ex Brid.) Hilp.

SUBSTRATE: loamy soil.

**Poland:** Lisowski 1958; Kuc 1964 (see *Note* below).**Ukraine:** LWKS (*leg.* I.V. Rabyk, 30 Aug 2002).NOTE: Kuc (1964) reported the occurrence of *T. tenuirostre*, but species unfortunately was not listed in his source work (1963). For this reason all proper species records derive from paper by Lisowski (1958) only.***Ulota coarctata*** (P.Beauv.) Hamm.SYNONYMS: *Ulota ludwigii* (Brid.) Brid.SUBSTRATE: bark of beech (*Fagus sylvatica*).**Poland:** Kuc 1963, 1964; Bloch 1990.**Ukraine:** Krupa 1885; Danylkiv *et al.* 2002.***Ulota crispa*** (Hedw.) Brid.SYNONYMS: *Ulota ulophylla* Broth., *Ulota crispula* Bruch

SUBSTRATE: bark of trees.

**Poland:** Lisowski 1957 (as an exsiccate), 1958; Kuc 1963; Karczmarz 1964a (as an exsiccate), 1965c, 1967 (tab. 3), 1994; Mameczarz 1973, 1974; Bloch 1976, 1988 (tab. 10); Łuczycka-Popiel 1992 (tab. 1); Fudali *et al.* 2015; LBL.**Ukraine:** Krupa 1885; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; LWKS, LWD & LWFU.*Ulota crispula* → ***Ulota crispa****Ulota ludwigii* → ***Ulota coarctata****Ulota ulophylla* → ***Ulota crispa******Warnstorfia exannulata*** (Schimp.) LoeskeSYNONYMS: *Drepanocladus exannulatus* (Schimp.) Warnst.

SUBSTRATE: water.

**Poland:** Lisowski 1957 (as an exsiccate), 1958; LBL.***Warnstorfia fluitans*** (Hedw.) LoeskeSYNONYMS: *Drepanocladus fluitans* (Hedw.) Warnst., *Drepanocladus fluitans* (Hedw.)Warnst. fo. *inundatus* Smirn.

SUBSTRATE: damp soil, water.

**Poland:** Szafran 1952 (fossil material); Lisowski 1958; Karczmarz 1968b (as an exsiccate – fo. *inundatus*); Bloch & Karczmarz 1973a; Mameczarz 1974; Izdebski *et al.* 1992a (tab. 33, 35); LBL.**Ukraine:** Rabyk & Danylkiv 2008; LWKS.

*Webera albicans* → *Pohlia wahlenbergii*

*Webera annotina* → *Pohlia annotina*

*Webera carnea* → *Pohlia melanodon*

*Webera cruda* → *Pohlia cruda*

*Webera elongata* → *Pohlia elongata*

*Webera nutans* → *Pohlia nutans*

***Weissia brachycarpa*** (Nees & Hornsch.) Jur.

SYNONYMS: *Hymenostomum microstomum* (Hedw.) Nees & Hornsch., *Weissia microstoma* Hornsch. ex Nees & Hornsch.

SUBSTRATE: loess.

**Poland:** Kuc 1963, 1964 as fig. 19 (p. 82).

**Ukraine:** Krupa 1885; Bachuryna & Mel'nychuk 1988.

***Weissia condensa*** (Voit) Lindb.

SUBSTRATE: calcareous soil.

**Ukraine:** Danylkiv *et al.* 2002.

***Weissia controversa*** Hedw.

SYNONYMS: *Weissia viridula* Brid.

SUBSTRATE: loamy soil.

**Poland:** Lisowski 1958; Bloch 1976, 1988 (tab. 27).

**Ukraine:** Krupa 1885; Lazarenko *et al.* 1971; Danylkiv *et al.* 2002.

*Weissia crispa* → *Weissia longifolia*

***Weissia longifolia*** Mitt.

SYNONYMS: *Weissia crispa* (Hedw.) P.Gaertn., B.Mey. & Scherb.

SUBSTRATE: loamy soil.

**Poland:** Bloch & Karczmarz 1973a.

*Weissia microstoma* → *Weissia brachycarpa*

*Weissia viridula* → *Weissia controversa*

## QUESTIONABLE, DOUBTFUL OR EXCLUDED SPECIES

The species listed below are erroneously reported as occurring in the Roztocze region or their occurrence in this area is questionable or doubtful. The alphabetical schedule contains 13 species (4 liverworts and 9 mosses). Each species is followed by original bibliographic resources, supplementary notes, explanations, results of the revision of the herbarium sample (if it was possible), and, finally, the reason for exclusion thereof from the bryoflora of the Roztocze region.

***Eurhynchium striatum*** (Schreb. ex Hedw.) Schimp. (doubtful species, see *Note* below)

SUBSTRATE: soil, base of trees.

**Ukraine:** Krupa 1885; Wiśniewski 1923; Danylkiv & Soroka 1989; Danylkiv *et al.* 2002; Soroka 2008a, 2008b; LWKS, LWD & LWFU.

NOTE: Probably all old data of this species cited nowadays belong to *E. angustirete*. Formerly (up to the 70s), this species was not separated from *E. striatum*. In this case, revision of the source material is necessary.

***Dicranum majus*** Sm. (questionable species, see *Note* below)

SUBSTRATE: decaying wood.

**Ukraine:** Rabyk & Danylkiv 2008; LWKS.

NOTE: Revision of the source material is necessary.

***Hypnum callichroum*** Brid. (questionable species, see *Note* below)

SUBSTRATE: wet soil, stones.

**Ukraine:** Rabyk & Danylkiv 2004; LWKS.

NOTE: Revision of the source material is necessary.

***Isoetium myosuroides*** Brid. (species excluded, see *Note* below)

**Poland:** Lorens *et al.* 2013.

NOTE: The species was erroneously (by a mistake) given by Lorens *et al.* 2013 (tab. 3, p. 121) instead of *I. alopecuroides*. This incorrect citation was not supported by a herbarium material.

***Mannia fragrans*** (Balbis) Frye & L.Clark (species excluded, see *Note* below)

SUBSTRATE: Miocene limestone outcrops.

**Poland:** Pałkowa & Kuc 1959; Bloch 1990.

NOTE: The annotation of Palkowa & Kuc: *Probably we observed M. fragrans on limestone rock in the Roztocze region near Stanisławów (Góra Kamień reserve), but herbarium material was not collected* suggest that the occurrence of *M. fragrans* in the region is undocumented by a sample and very questionable. The area of the mentioned reserve over the last 50 years has changed radically (Fig. 3) from an initially afforested place to a hornbeam-beech forest. Perhaps the species had appropriate conditions in the past, but presently the site conditions do not support the occurrence of *M. fragrans*. The locality was carefully checked by R. Zubel (10 Nov 2014), but the species was not found despite intensive searching.

***Polytrichastrum alpinum*** (Hedw.) G.L.Sm. (questionable species, see *Note* below)

SYNONYMS: *Polytrichum alpinum* Hedw.

SUBSTRATE: soil.

**Ukraine:** Ulychna 1978; LWD.

NOTE: Revision of the source material is necessary.

***Polytrichastrum pallidisetum*** (Funck) G.L.Sm. (questionable species, see *Note* below)

SYNONYMS: *Polytrichum pallidisetum* Funck

SUBSTRATE: soil.

**Ukraine:** Ulychna 1978; LWD.

NOTE: Revision of the source material is necessary.

***Riccia heubeneriana*** Lindenb. (doubtful species, see *Note* below)

SUBSTRATE: without data.

**Poland:** Bloch 1990.

NOTE: The species was mentioned only without the source paper, locality, and substratum data. Additionally no *R. heubeneriana* material from the Roztocze region was found in the LBL herbarium.

***Seligeria recurvata*** (Hedw.) Bruch & Schimp. (doubtful species, see *Note* below)

SYNONYMS: *Seligeria setacea* Lindb.

SUBSTRATE: Miocene limestone outcrops, calcareous stones.

**Poland:** Kuc 1963, 1964 (also as fig. 16, p.70); Bloch 1976, 1988 (tab. 6); Ochyra *et al.* 1985b.

NOTE: Ochyra *et al.* (1985b) clearly suggest that all localities of *S. recurvata* from the Roztocze region belong to *Seligeria campylopoda*. According to the author's note (p. 8): *S. recurvata* (*acidophilous species*) *avoids calcareous habitats and its occurrence on Miocene limestone outcrops (comp. Kuc 1963) is very questionable*. Additionally, the lack specimens of Kuc's (comp. Ochyra *et al.* 1985b) and Bloch's (checked in LBL by R. Zubel, 3 Nov 2014) collections of the species makes material revision impossible. In the Ukrainian part of the region *S. campylopoda* occurs in similar habitat conditions (comp. Ulychna 1978 and Danylkiv *et al.* 2002), whereas *S. recurvata* was not reported. For these reasons we attached all bibliographic records of *S. recurvata* to *S. campylopoda*.

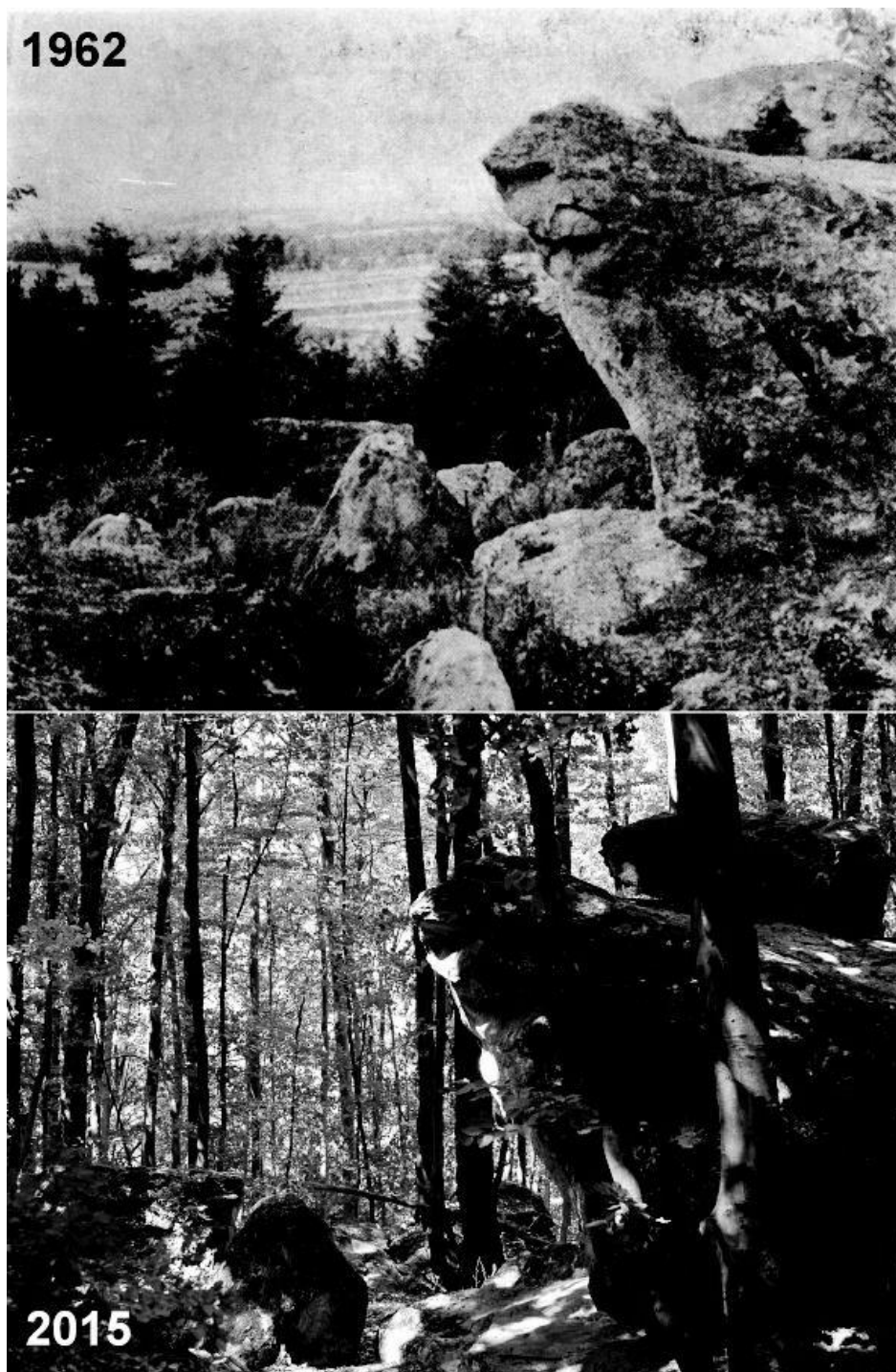


Fig. 3. The “Góra Kamień” reserve (near Stanisławów) in 1962 (fot. K. Izdebski) and 53 years later (fot. R. Zubel).

***Schistidium strictum*** (Turner) Loeske ex Martensson (species excluded, see *Note* below)

SUBSTRATE: stones.

**Ukraine:** Ulychna 1978; LWD.

NOTE: *S. strictum* is an oceanic species. Its occurrence in Europe is restricted to Iceland, Great Britain and Norway (Blom 1996). The presence of the species in the Roztocze region is not possible. Revision of the source material is necessary.

***Scapania scandica*** (Arnell et H.Buch) Macvicar fo. *parvifolia* (Warnst.) Schlakov (species excluded, see *Note* below)

SYNONYMS: *Scapania parvifolia* Warnst.

SUBSTRATE: loess.

**Poland:** Karczmarz 1966a (as an exsiccate), 1967; LBL.

NOTE: In Poland the species is restricted to the subalpine and alpine zones of the mountains. According to Szweykowski (2006) (...) *its occurrence in east Poland reported by Karczmarz 1966a, 1967 is doubtful and most probably based on misdetermination*. The revision of the species samples preserved in the LBL herbarium (rev. R. Zubel, Nov 2014) confirmed these assumptions. The voucher collection of the species belongs to *S. curta* and is joined with this species.

***Sphagnum molle*** Sull. (doubtful species, see *Note* below)

SUBSTRATE: damp soil, peat.

**Ukraine:** Rabyk & Danylkiv 2008; LWKS.

NOTE: The occurrence of *S. molle* in the Roztocze region is very questionable given the distribution range of this subatlantic species in Central Europe (Melosik 1992). Revision of the source material is necessary.

***Tritomaria exsecta*** (Schmidel) Loeske (species excluded, see *Note* below)

SUBSTRATE: soil.

**Poland:** Karczmarz 1994; Lorens *et al.* 2013.

NOTE: According to the label data and bag content, the specimen belongs to the *Trichocolea tomentella* (Ehrh.) Dumort. (*vide* R. Zubel, 21 Oct 2014, LBL). The sample described was erroneously preserved in a *Tritomaria exsecta* package.

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## STRESZCZENIE

Roztocze jest obszarem transgranicznym Polski i Ukrainy. Tworzy go pasmo wzniesień położone pomiędzy Kraśnikiem i Lwowem, a swoiste cechy klimatu, budowy geologicznej, rzeźby terenu, oraz warunków hydrologicznych i edaficznych wpływają na wysoką wartość przyrodniczą regionu (Fig. 1). W związku z tym był on eksplorowany od dawna przez badaczy z różnych dziedzin nauki, także briologów. Badania mszaków Roztocza prowadzone od XIX wieku po czasy obecne zaowocowały opublikowaniem ponad 130 opracowań naukowych o różnorodnej tematyce i walorach poznawczych (przyczynki, flory, monografie, syntetyczne prace briogeograficzne i ekologiczne oraz wydawnictwa zielnikowe i atlasy).

Na ich podstawie, dzięki twórczej współpracy specjalistów polskich i ukraińskich, przygotowano jednolity wykaz mchów i wątrobowców w postaci krytycznie opracowanej listy gatunków. Obecna praca jest pierwszym pełnym podsumowaniem danych o mszakach całego Roztocza, będących wynikiem ponad 160 lat badań briologicznych. Prezentowane zestawienie stanowi punkt wyjścia zarówno do analiz opartych o pełne wykazy stanowisk gatunków, ale także do planowania dalszych kierunków badań tych organizmów.

W oparciu o przeanalizowany materiał źródłowy stwierdzono, że brioflora Roztocza liczy łącznie 425 gatunków. Głównym jej komponentem są mchy (335 gatunków, 80% flory), a w znacznie mniejszym stopniu wątrobowce (90 gatunków, 20%). W polskiej części regionu stwierdzono 355 gatunków, natomiast w części ukraińskiej jest ich 377 (Tab. 1). Oba kraje współdzielią 72% brioflory (307 gatunków). Gatunki mszaków stwierdzone na Roztoczu należą do 2 gromad, 5 klas, 25 rzędów, 69 rodzin i 182 rodzajów. Najliczniejszymi w gatunki są rzędy: Hypnales (117 gatunki), Bryales (55) i Jungermanniales (54), natomiast spośród rodzin Pottiaceae (39), Bryaceae (32) i Brachytheciaceae (28). Do najbogatszych w gatunki należą rodzaje: *Sphagnum* (26), *Bryum* (21), *Orthotrichum* (10), *Riccia* (8), *Calypogeia* (6) i *Scapania* (5). Niemal  $\frac{1}{3}$  brioflory Roztocza stanowią gatunki chronione lub zagrożone. Wśród nich także mchy zagrożone w skali Europy (*Anomodon rostratus*, *Funaria microstoma*) i/lub priorytetowe dla Unii Europejskiej: *Dicranum viride*, *Buxbaumia viridis* i *Hamatocaulis vernicosus*.

Wyjątkowe walory i jednocześnie swoistość środowiska przyrodniczego Roztocza, wpływają na bogatą i urozmaiconą ofertę substratowo-siedliskową dla rozwoju mchów i wątrobowców. Składają się na nią różnorakie podłoża mineralne i substraty organiczne występujące w siedliskach zróżnicowanych zarówno pod względem trofizmu i pH, jak też roślinności, warunków wilgotnościowych, termicznych i świetlnych. Dodatkowo ze względu na specyficzne cechy klimatu, brioflora Roztocza posiada charakterystyczne cechy, do których należą udział ga-

tunków górskich, reliktowych oraz reprezentujących różne elementy geograficzne (atlantycki, pontyjski, śródziemnomorski, borealny).

Element górski reprezentuje 99 gatunków (ponad 20% brioflory regionu) (Tab. 2). Wśród nich dominują gatunki reglowe (64%) i ogólnogórskie (26%). Na podłożu lessowym i kredowym występują kserotermiczne mchy pontyjskie (*Tortula acaulon*, *Hilpertia velenovskyi*), a także gatunki śródziemnomorskie, np. *Didymodon insulanus*, *D. ferrugineus*, *Pterygoneurum ovatum* czy *P. subsessile*. Z kolei element subatlantycki reprezentują mszaki naziemne i epiksyliczne m.in.: *Aulacomnium androgynum*, *Campylopus pyriformis*, *Hypnum jutlandicum*, *Mnium hornum*, *Orthodicranum flagellare* i *Trichocolea tomentella*. Do elementu borealanego należą mchy torfowiskowe (relikty glacialne), takie jak *Bryum neodamense*, *Calliergon trifarium*, *Drepanocladus lycopodioides*, *Helodium blandowii*, *Hypnum pratense*, *Meesia triquetra*, *Pseudobryum cinclidioides*, *Scorpidium scorpioides* i *Tomentypnum nitens*. Jedną z cech brioflory Roztocza jest występowanie mchów i wątrobowców związanych z wapiennym podłożem skalnym. Są to m.in. *Pedinophyllum interruptum*, *Scapania calcicola*, *Apometzgeria pubescens*, *Reboulia hemisphaerica* oraz *Timmia bavarica*, *T. megapolitana*, *Tortella inclinata* i *Weissia condensata*.

Czynnikiem mającym znaczący wpływ na obecny kształt flory mszaków jest antropopresja. Pomimo szeroko zakrojonej ochrony (Fig. 2), brioflora Roztocza podlega postępującej synantropizacji, co przejawia się w postaci procesów:

1. Apofityzacji, czyli poszerzania zasięgów gatunków rodzimych o siedliska antropogeniczne (*Dryptodon pulvinatus*, *Orthotrichum diaphanum*, *Tortula muralis*) lub rozprzestrzeniania się gatunków (dawniej rzadkich) na naturalnych siedliskach zmienionych na skutek działania czynników zewnętrznych, np. kwaśnych deszczy lub globalnych zmian klimatycznych (*Platygyrium repens*, *Orthodicranum montanum*, *Hypnum pallescens*);
2. Neofityzacji, tzn. wnikania gatunków obcych (*Campylopus introflexus*).

Podsumowując wyniki badań briologicznych należy podkreślić, że największa część opublikowanych prac pochodzi z lat 50., 60. i 70. XX wieku. Obecne tempo i kierunki przemian środowiska przyrodniczego regionu sprawiają, że dostępne dane literaturowe wymagają weryfikacji i uaktualnienia. Obecną listę gatunków rozszerzono o kilka nowych gatunków, których stanowiska zostały odkryte w ostatnich latach lub pochodzą z niepublikowanych dotychczas zbiorów zielnikowych. Jednocześnie na etapie przygotowania obecnego wykazu poddano w wątpliwość lub wykluczono obecność na tym terenie niektórych gatunków mchów i wątrobowców.



## РЕЗЮМЕ

Розточчя є транскордонним регіоном Польщі і України. Він утворений горбистими пасмами, розташованими між Красником та Львовом, а специфічні риси клімату, геологічної будови, рельєфу, гідрологічних і ґрунтових умов впливають на високу природну цінність регіону (Фіг. 1). У зв'язку з тим, він активно досліджувався протягом тривалого часу вченими різних галузей науки, у тому числі бріологами. Результатом досліджень мохоподібних Розточчя, які ведуться тут з ХІХ століття, стали понад 130 наукових праць різноманітної тематики та пізнавальної цінності (додатки, флористичні опрацювання, монографії, синтетичні бріогеографічні і екологічні праці а також публікації з гербарних зборів та атласів).

На цій основі, завдяки творчій співпраці польських та українських фахівців, підготовлено критично опрацьований список мохів та печіночників. Ця праця є першим повним зведенням даних про бріофіти цілого регіону Розточчя, яка є результатом більш ніж 160 років бріологічних досліджень. Пропоноване зведення є відправним пунктом як для аналізів, що опираються на точні вказівки місцезростань видів, так і для планування подальших напрямків досліджень цих організмів.

На підставі проаналізованого матеріалу встановлено, що бріофлора Розточчя складена 425 видами. Її основним компонентом є мохи (335 вид, 80% флори), і значно меншою мірою печіночники (90 видів, 20%). У польській частині регіону було виявлено 355 видів, у той час як в українській частині – 377 (Таб. 1). Спільними для обох частин регіону є 307 видів (72% бріофлори). Виявлені на Розточчі види мохів належать до двох відділів, 5 класів, 25 порядків, 69 родин і 182 родів. Найбагатші видами є порядки Hurnales (117 види), Bryales (55) і Jungermanniales (54), серед родин найбільше видів мають Pottiaceae (39), Bryaceae (32) і Brachytheciaceae (28). Найбільше видів мають роди *Sphagnum* (26), *Bryum* (21), *Orthotrichum* (10), *Riccia* (8), *Calypogeia* (6) і *Scapania* (5). Майже  $\frac{1}{3}$  бріофлори Розточчя складають рідкісні та зникаючі види. Серед них є види мохів, які є зникаючими у масштабах цілої Європи (*Anomodon rostratus*, *Funaria microstoma*) та/або пріоритетні для Євросоюзу: *Dicranum viride*, *Buxbaumia viridis* і *Hamatocaulis vernicosus*.

Унікальне та водночас специфічне природне середовище Розточчя впливає на багатий і різноманітний спектр субстратів та біотопів для розвитку мохів та печіночників. Укладаються у нього різні мінеральні породи і органічні субстрати, які формуються в біотопах, диференційованих з точки зору трофізму, рН, типів рослинності, умов зволоженості, термічності і освітленості. Крім того, через специфічні особливості клімату бріофлора Розточчя має характерні риси, до яких належить участь видів гірських,

реліктових та представників різних географічних елементів (атлантичний, понтійський, середземноморський, бореальний).

Монтанний елемент представлений 99 видами (більше 20% бріофлори регіону) (Таб. 2). Серед них домінують передгірні (64%) і загальногірські (26%). На лесах і крейді ростуть ксеротермні понтійські види мохів (*Tortula acaulon*, *Hilpertia velenovskyi*), а також середземноморські види, наприклад, *Didymodon insulanus*, *D. ferrugineus*, *Pterygoneurum ovatum* та *P. subsessile*. У свою чергу, субатлантичний елемент представляють наземні і епіксильні мохи, наприклад, *Aulacomnium androgynum*, *Campylopus pyriformis*, *Hypnum jutlandicum*, *Mnium hornum*, *Orthodicranum flagellare* і *Trichocolea tomentella*. До бореального елемента належать болотні мохи (льодовикові релікти), такі як *Bryum neodamense*, *Calliergon trifarium*, *Drepanocladus lycopodioides*, *Helodium blandowii*, *Hypnum pratense*, *Meesia triquetra*, *Pseudobryum cinclidioides*, *Scorpidium scorpioides* і *Tomentypnum nitens*. Однією з особливостей бріофлори Розточчя є наявність мохів та печіночників, пов'язаних з вапняковими скелями. Це *Pedinophyllum interruptum*, *Scapania calcicola*, *Apometzgeria pubescens*, *Reboulia hemisphaerica* і *Timmia bavarica*, *T. megapolitana*, *Tortella inclinata* і *Weissia condensata*.

Чинником, який має суттєвий вплив на сучасну флору мохоподібних, є антропопресинг. Незважаючи на заходи охорони (Фіг. 2), бріофлора Розточчя піддалася поступовій синантропізації, яка проявляється у декількох процесах:

1. Апофітизації, тобто розширення ареалів місцевих видів антропогенних місцезростань (*Dryptodon pulvinatus*, *Orthotrichum diaphanum*, *Tortula muralis*) або розповсюдження раніше рідкісних видів у природних середовищах існування, змінених впливом зовнішніх чинників, наприклад, кислотних дощів або глобальних змін клімату (*Platygyrium repens*, *Orthodicranum montanum*, *Hypnum pallescens*).
2. Неофітизації, тобто проникнення чужерідних видів (*Campylopus introflexus*).

Підводячи підсумки бріологічних досліджень, слід підкреслити, що більшість опублікованих праць вийшли в 50-ті, 60-ті і 70-ті роки ХХ ст. У даний час темпи та напрямок змін природного середовища в регіоні вимагають перевірки та оновлення наявних літературних даних. Представлений список був доповнений декількома новими видами, місцезростання яких виявлені в останні роки, або отримані з раніше не опублікованих гербарних колекцій. У той же час при підготовці цього зведення було поставлено під сумнів або виключено зі списку деякі види мохів і печіночників.

