

NEW DISTRIBUTIONAL DATA ON BRYOPHYTES
OF POLAND AND SLOVAKIA, 3

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1. *Buckiella undulata* (Hedw.) Ireland

Authors: R. ZUBEL, J. TRACZ

ATMOS Eg-91: SE Poland, Roztocze region, Lublin Province, Zamość County, Zwierzyniec commune, Roztocze National Park, Obroczy-Grele pro-

tective district, forest section 216, on humus and soil in the *Quercus-Piceetum* association, 50.58745°N, 22.98869°E, *leg.*, *det.* R. Zubel, 25.06.2007 (LBL); ATMOS Fg-02: SE Poland, Roztocze region, Lublin Province, Zamość County, Krasnobród commune, eastern part of the “Święty Roch” nature reserve,

50.54200°N, 23.18342°E, leg. J. Tracz, 14.07.2009, det. R. Zubel (LBL).

Buckiella undulata is an acidophilus, relatively common mountain species widespread in the Carpathian and Sudety Mountains associated with coniferous forests of *Plagiothecio-Piceetum tatricum* or *Abieti-Piceetum montanum* associations (OCHYRA et al. 1990, STEBEL 2006b). This species has a few scattered stations in the central and northern parts of the country (OCHYRA et al. 1990, HAJEK 2005, GÓRSKI 2013), whereas in south-eastern Poland it was found only in Roztocze National Park (FUDALI et al. 2015). Above-presented records are also situated in the Roztocze region; moreover, the second one is the eastern-most locality in the Polish Uplands belt. In this area, *B. undulata* is associated with forest communities of *Quercus-Piceetum* and *Abietetum albae (polonicum)*.

2. *Buxbaumia viridis* (Moug. ex Lam. & DC.) Brid. ex Moug. & Nestl.

Authors: B. PIWOWARSKI, A. ANIOŁ

ATMOS Ge-21: S Poland, Gorce Mountains, Małopolska Province, Gorce National Park, forest section 5b, upper part of the Ścisły Potok valley, 49.57916667°N, 20.1825°E, alt. 945 m above sea level (a.s.l.), decaying fir log (15 cm diameter), leg., det. B. Piwowarski, A. Anioł, 22.07.2014 (POZG).

Buxbaumia viridis is a montane species that grows mainly on rotten wood, especially on fir, spruce and beech. It is mostly known from beech forests on the Carpathian and Sudety Mts., in the southern highlands belt, and in western and northern Poland (SZMAJDA et al. 1991, VONČINA 2012). There were known five localities in Gorce National Park until now (LISOWSKI & KORNAŚ 1966, VONČINA et al. 2011), concentrated near the Kamienica valley, in the eastern part of the park. A new locality was found on the northern slope of Mount Gorc Troszacki, in a Carpathian beech forest, by the Ścisły Potok stream. The population consists of two individuals (one with a capsule). It is ca 2.5 km from other populations by the Kamienica River. The species has been placed in an endangered category (E) on the red list of threatened moss in Poland (ŻARNOWIEC et al. 2004).

3. *Campylopus introflexus* (Hedw.) Brid.

Author: B. PIWOWARSKI

ATMOS Ee-44: Central Poland, Suchedniów Plateau (Płaskowyż Suchedniowski), Świętokrzyskie Province, 500 m north-west of the Zbrojów village in the direction of Płaczków-Piechotne, Suchedniów Forest Inspectorate, forest section 11h, 51.11366667°N, 20.71305556°E, pine forest with spruce near road, leg., det. B. Piwowarski, 29.03.2015 (POZG).

Campylopus introflexus is a neophytic moss in the bryoflora of Poland (OCHYRA 1983). It is known from

numerous localities, mostly in the western part of country (FUDALI et al. 2009). Still, there are new ones that have been found (GÓRSKI 2014, STANIASZEK-KIK 2014, SMOCZYK 2015). The first record of this species in the Małopolska Upland were from the Nida valley (PACIOREK 2012). The next locality from this area was found recently in the “Gagaty Sołtykowskie” nature reserve (PIWOWARSKI 2013). *Campylopus introflexus* from the Suchedniów Plateau is the third record from the Małopolska Upland. This species was found near paved road connecting the Płaczków-Piechotne and Zbrojów villages. It grows on loamy soil with a large share of gravel in patches of *Leucobryo-Pinetum* plant associations (form with high participation of *Picea abies*). The population of *C. introflexus* was relatively small (ca 25 cm²), and plants did not form sporophytes.

4. *Campylopus pyriformis* (Schultz) Brid.

Author: M. WILHELM

ATMOS Bb-47: NW Poland, West Pomerania (Pomorze Zachodnie), Drawskie Lakeland (Pojezierze Drawskie), West Pomerania Province, Szczecinek County, “Bagno Kusowo” nature reserve, on bare peat in a *Vaccinio uliginosi-Pinetum* plant association growing on the dams in the southern part of the peat bog, leg., det. M. Wilhelm, 15.07.2005 (SZUB); ATMOS Bb-56: NW Poland, West Pomerania, Drawskie Lakeland, West Pomerania Province, Borne Sulinowo County, Wielkie Bagno peat bog near Radacz, 53.69612°N, 16.57393°E, former excavations with overgrown *Vaccinio uliginosi-Pinetum* plant associations in the southern part of the peat bog; abundant on walls of a draining ditch in a community with *Eriophorum vaginatum* in the northern area where peat digging ceased; between tussocks of *Molinia caerulea* and *E. vaginatum* in a shallow draining ditch in a community with *M. caerulea* in the north-eastern part of the peat bog, leg., det. M. Wilhelm, 9.07.2005, 11.07.2005 (SZUB).

Campylopus pyriformis is a rare peat bog moss in Poland (category E; ŻARNOWIEC et al. 2004). Thus far, this suboceanic species (DÜLL 1984) was not often recorded from the country. In southern Poland, records are given from Bieszczady National Park (ARMATA 2006, STEBEL & ŻARNOWIEC 2010). In the northern part of Poland, the moss is known from the following: the Bory Kujawskie forest (KOPPE 1926, KOPPE & KOPPE 1940); Bory Tucholskie National Park (LISOWSKI et al. 2000, STEBEL 2002); and Wolin island from Korzęcin village and the Przytór peninsula (LISOWSKI 1961). *Campylopus pyriformis* was observed for the first time in Drawskie Lakeland.

5. *Cephalozia ambigua* C. Massal.

Author: P. GÓRSKI

ATMOS Ge-60: S Poland, High Tatra Mountains, MGRS 34UDV3148, below Mount Kazalnica, rock crevices with northern exposure near the route to the Mięgoszowiecka Przełęcz pod Chłopkiem pass, 49.18713°N, 20.06647°E, alt. 1870 m a.s.l., *leg.*, *det.* P. Górski, 2.09.2014 (POZNB 1973).

Cephalozia ambigua is an alpine liverwort in Poland known only from the High Tatra Mts and 17 localities within an altitude range of 1570–2195 m a.s.l. (SZWEYKOWSKI 1960, BALCERKIEWICZ 1984, GÓRSKI & VÁŇA 2014). In the presented locality, the plant covers moist rock crevices together with other liverworts (i.e., *Eremonotus myriocarpus* [Carrington] Pearson, *Saccobasis polita* [Nees] H. Buch, *Nardia geoscyphus* [De Not.] Lindb., and *Lophozia wenzelii* [Nees] Steph). The highest number of *C. ambigua* localities (53) is known from the Slovakian High Tatra Mts (KRAJINA 1933, ŠMARDÁ 1938, 1940, 1961, DUDA 1955, 1962, BOROS et al. 1960, DUDA & VÁŇA 1987, GÓRSKI & VÁŇA 2014).

6. *Conocephalum salebrosum* Szweykowski, Buczkowska & Odrzykoski

Author: R. ZUBEL

ATMOS Fg-12: SE Poland, Roztocze region, Lublin Province, Biłgoraj County, Józefów commune, Sopot River valley in the “Czartowe Pole” nature reserve, on Miocene limestone outcrops near a river in a *Fraxino-Alnetum* association, 50.44127°N, 23.11127°E, *leg.*, *det.* R. Zubel, 10.11.2014 (LBL).

Conocephalum salebrosum is a rather frequent liverwort in Poland (SZWEYKOWSKI et al. 2005, Klama in SZWEYKOWSKI 2006, page 16), but almost all data are based on revised herbarium materials, with the exception of a few papers that present current collected data (e.g., GÓRSKI 2007, KLAMA 2008, 2013, RUSIŃSKA et al. 2010, STEBEL et al. 2011, GÓRSKI & VÁŇA 2014, FUDALI et al. 2015). Right now, it is the eastern-most locality of the species in the Polish Uplands belt and the second-most in the Roztocze region (FUDALI et al. 2015).

7. *Conostomum tetragonum* (Hedw.) Lindb.

Author: P. GÓRSKI

SLOVAKIA: High Tatra Mts, MGRS 34UDV3545, western slope on Mount Končistá, rocky ledge below the summit, 49.15712°N, 20.11262°E, alt. 2460 m a.s.l. (maximum of the species in the Tatra Mts), *leg.*, *det.* P. Górski, 28.08.2014 (POZNB); High Tatra Mts, MGRS 34UDV2746, Nefcerka valley, below the Nižné Terianske pleso lake, 49.16978°N, 20.0019°E, alt. 1795 m a.s.l., rocky ledge with *Racomitrium lanuginosum*, *leg.*, *det.* P. Górski, 2.08.2012 (POZNB);

High Tatra Mts, MGRS 34UDV2846, Nefcerka valley, blocks of rock south of the Vyšné Terianské pleso lake, 49.1658°N, 20.0198°E, alt. 2125 m a.s.l., mossy pillows with *R. lanuginosum*, *leg.*, *det.* P. Górski, 2.08.2012 (POZNB); High Tatra Mts, MGRS 34UDV4250, Veľká Zmrzlá dolina valley, below the Barania kotlina basin, 49.2039°N, 20.20773°E, *Oreochloa-Juncetum trifidi* alpine grassland, alt. 1985 m a.s.l., *leg.*, *det.* P. Górski, 27.09.2011 (POZNB); High Tatra Mts, Veľká Zmrzlá dolina valley, blocks of rock in lower part of the valley, 49.20437°N, 20.20968°E, alt. 1900 m a.s.l., *leg.*, *det.* P. Górski, 27.09.2011 (POZNB); High Tatra Mts, MGRS 34UDV3848, Rovienky valley, Zadné Rovienky, 49.18745°N, 20.15342°E, blocks of rock, alt. 1950 m a.s.l., *leg.*, *det.* P. Górski, 25.09.2011 (POZNB); POLAND: ATMOS Ge-60, High Tatra Mts, MGRS 34UDV3148, below the Mięgoszowiecka Przełęcz pod Chłopkiem pass, 49.18395°N, 20.06592°E, rock crevices, alt. 2305 m a.s.l., *leg.*, *det.* P. Górski, 2.09.2014 (POZNB).

Conostomum tetragonum is a glacial relict in the moss flora of the Tatra Mts (ŠOLTĚS 2004). Both in Poland and Slovakia, this moss occurs only in the Tatra Mts. In the Slovakian part of the massif, *C. tetragonum* has many well-documented localities in the altitude range of 1676–2427 m a.s.l. (ŠOLTĚS 2004 and the references cited therein). In Slovakian flora, this species has an EN endangerment category (KUBIŇSKÁ et al. 2001), whereas in Poland it is not considered endangered (ŽARNOWIEC et al. 2004). From the Polish Tatra Mts, *C. tetragonum* has been recorded amongst others, by LISOWSKI (1956b, 1959), BALCERKIEWICZ (1984), and CYKOWSKA (2008).

The present paper shows the highest locality of this species in the Tatra Mts, below Mt Končistá (Kończysta), at 2460 m a.s.l. Thus far, its maximum altitude was localised at 2427 m, below Mount Satan (*leg.* V. Krajina, 1931 sub *Philonotis tomentella*, rev. Z. Pilous, 1976, herbarium PRC; see ŠOLTĚS 2004).

8. *Fossombronía foveolata* Lindb.

Author: P. GÓRSKI

ATMOS Ba-88: NW Poland, West Pomerania, West Pomerania Province, Stargard Szczeciński County, Marianowo commune, ca 2.5 km north of Wiechowo village, edge of transitional bog, on peat, *leg.*, *det.* P. Górski, 22.08.2003, c. spor. (POZNB).

Fossombronía foveolata is a rare liverwort endangered of extinction in Poland (category E; KLAMA 2006). Most of the localities known from the second half of the nineteenth century and first half of the twentieth century are localised in the western part of Poland (SZWEYKOWSKI 1967, 2006). In the twenty-first century, *F. foveolata* has been recorded only once, from Dolne Łużyce (western Poland; ROSADZIŃSKI & RUSIŃSKA 2010).

9. *Hamatocaulis vernicosus* (Mitt.) Hedenäs

Author: P. PAWLIKOWSKI

ATMOS Cf-39: NE Poland, Podlasie Province, Białystok County, Łapy commune, Narew National Park, Rynki mire, 52.99257°N, 22.93853°E, tall sedge-brown moss vegetation in a rich fen developed in the Narew River valley, scattered patches among extensive carpets of *Calliergonella cuspidata*, not. P. Pawlikowski, 24.04.2015; ATMOS Cg-05: NE Poland, Podlasie Province, Sokółka County, Krynki commune, 0.5 km north-east of the Łosiniany village, 53.18481°N, 23.86667°E, small sedge-brown moss vegetation in a sloping spring fen developed at the margin of the Świsłocz River valley, scattered shoots and small patches among extensive carpets of *Limprichtia cossonii* and *Campylium stellatum*, leg., det. P. Pawlikowski, 24.04.2015 (KRAM).

Hamatocaulis vernicosus is a species occurring primarily in waterlogged rich fens, listed in Annex II of the European Union Habitat Directive (COUNCIL DIRECTIVE 92/43/EEC... 1992). It occurs throughout the territory of Poland and, apart from the young post-glacial landscape of northern Poland, the species is threatened with extinction (STEBEL 2012). In the Podlasie Province, numerous localities hosting sometimes very abundant populations of the species are known from the young post-glacial landscape of the Lithuanian Lake district (KARCZMARZ & SOKOŁOWSKI 1985, PAWLIKOWSKI 2010, WOŁEJKO et al. 2012), while in the denudated landscape of the North Podlasie Lowland, where the two newly discovered localities are situated, the species has been reported only from various parts of the Biebrza valley (BLOCH & BLOCH 1975, PAŁCZYŃSKI 1975, PAWLIKOWSKI 2010, WOŁEJKO et al. 2012), two localities in the Knyszyn forest (MATOWICKA et al. 2000, WOŁEJKO et al. 2012), and a spring cuppola in the village of Makowlany, near Sidra (BITNER 1959; P. Pawlikowski unpubl. from 2011 and 2013). Moreover, there is also a nineteenth-century record from the Białowieża forest (BŁOŃSKI & DRYMMER 1889), without specification of a precise locality; therefore, it is possible that the species was recorded in the present Belarussian part of the forest (where it still occurs in the Boloto Dikoe mire, Narew River spring area [P. Pawlikowski unpubl. from 2009 and 2015]).

10. *Helodium blandowii* (F. Weber & D. Mohr) Warnst.

Authors: D. WOŁKOWYCKI, P. PAWLIKOWSKI

ATMOS Cf-39: NE Poland, Podlasie Province, Białystok County, Łapy commune, Narew National Park, Rynki mire, 52.99215°N, 22.93865°E, tall sedge-brown moss vegetation in a rich fen developed in the Narew River valley, few clumps, mainly on *Carex appropinquata* tussocks, not. D. Wołkowycki, P. Pawlikowski, 23.10.2013, 24.04.2015.

Helodium blandowii is considered vulnerable in Poland (category V; ŻARNOWIEC et al. 2004). The species is restricted to minerotrophic fens, especially in the post-glacial landscape of northern and north-western Poland (OCHYRA et al. 1988a). In the southern, denudated part of Podlasie Province, where the newly discovered locality is situated, *H. blandowii* is increasingly rare and decreasing (PAWLIKOWSKI 2015a).

11. *Hypnum pratense* W.D.J. Koch ex Spruce

Authors: A. RUSIŃSKA, W. PISAREK, S. LISOWSKI†

ATMOS Cb-72: W Poland, Wielkopolska region, Sierakowskie Lakeland (Pojezierze Sierakowskie), Wielkopolska Province, close to the eastern shore of the Mnisze Lake, swampy alder forest, leg., det. W. Pisarek, 3.05.2008, teste A. Rusińska (POZG); ATMOS Db-08: W Poland, Wielkopolska region, Poznań-Wola, Wielkopolska Province, swampy meadow, leg., det. S. Lisowski 95536, 29.06.1954, teste A. Rusińska (POZG); ATMOS Dc-86: W Poland, southern part of the Wielkopolska region, Wielkopolska Province, vicinity of the village of Lis near Kalisz, fen, leg., det. S. Lisowski 65443, 21.11.1957, teste A. Rusińska (POZG).

This boreal-subcontinental species (DÜLL 1985) was formerly scattered throughout the whole country, from the lowlands to uplands and lower parts of the mountains (SZAFRAN 1961). Nowadays, it has become very rare everywhere and therefore has been placed on the Polish red list as category E (ŻARNOWIEC et al. 2004). Many of known localities have historical character (RUSIŃSKA 1981, STEBEL 2006b, FOJCIK 2011a). *Hypnum pratense* used to grow on swampy meadows, fens, and shores of streams and springs. It has been recorded from five localities in the Wielkopolska region: Wolsztyńskie Lake, Wielichowo by Kościan, Ostrzeszów, Zgorzelec, and Trzcinica Wielkopolska, near Kępno (LISOWSKI 1955, 1956a). Two unpublished samples mentioned above from Poznań-Wola and Lis near Kalisz have been found in the POZG herbarium. The specimen from Mnisze Lake was collected during the field workshop of the Bryological Section of the Polish Botanical Society.

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

Author: B. PIWOWARSKI

ATMOS Ee-54: Central Poland, Suchedniów Plateau, Świętokrzyskie Province, "Świnia Góra" nature reserve, Suchedniów Forest Inspectorate, forest section 137n, 50.05566111°N, 20.70203056°E, alt. 357 m a.s.l., on a decaying fir log in the beech-fir forest, leg., det. B. Piwowarski, 31.05.2014 (POZNB).

Nowellia curvifolia is an epixylic liverwort associated with coniferous wood. This species has been placed into a vulnerable category (V) on the red list of threatened liverworts and hornworts in Poland

(KLAMA 2006). Its localities are concentrated mainly in northern and north-eastern Poland (KLAMA 2002, SZWEYKOWSKI 2006, GÓRSKI 2010, 2013). It is rare in the central part of the country and in the mountains (SZWEYKOWSKI 1969, GÓRSKI & VÁŇA 2014). Data from the Małopolska Upland are old and unconfirmed. The species was recorded from Mount Łysica and the Tumlin and Gruchawka villages in the Sufraganiec valley (BŁOŃSKI 1890, SZWEYKOWSKI 1958). Recently, *N. curvifolia* was found on Mount Agata and in the Czarny Las forest in Świętokrzyski National Park (STEBEL et al. 2013). The new locality of this liverwort from the “Świnia Góra” nature reserve is the second that currently exists in Świętokrzyskie Province. It is probably more common in well-preserved forests in this region, due to the large quantity of deadwood resources.

13. *Orthodicranum tauricum* (Sapjegin) Smirnova

Author: B. PIWOWARSKI

ATMOS Ee-73: Central Poland, Góry Świętokrzyskie Mountains, Świętokrzyskie Province, ca 650 m north of the Szczukowskie Górkę village near the town of Kielce, Kielce Forest Inspectorate, forest section 138b, top of hill, alt. 254 m a.s.l., 50.88780556°N, 20.53455556°E, bark of oak in a *Peucedano-Pinetum* plant association, leg., det. B. Piwowarski, 23.06.2014 (POZG).

Orthodicranum tauricum is a very expansive moss. Since the past 80 years of the twentieth century, an increase of the number of localities has been observed (STEBEL et al. 2012c). Currently, it is known from more than 200 localities distributed throughout Poland (STEBEL et al. 2012b). In the Małopolska Upland, the first time this moss was recorded in 2009 in Świętokrzyski National Park (STEBEL et al. 2012b, 2013). In 2013, the second locality was found in Iłża Foreland, near Wąchock (PIWOWARSKI 2013). The next new locality of this species is in a pine forest with a small amount of oaks. *Orthodicranum tauricum* occupies ca 4-cm² patches that grow in the bark of young oaks (ca 25 cm diameter).

14. *Orthodontium lineare* Schwägr.

Author: B. FOJCIK

ATMOS Ed-94: S Poland, Upper Warta Depression (Obniżenie Górnej Warty), Silesia Province, Poraj, near Częstochowa (forest south of Poraj, Choroń road), 50.68004°N, 19.23860°E, decaying bark of pine (at the base of the trunk) in wet mixed forest, leg., det. B. Fojcik, 10.10.2014 (KTU).

Orthodontium lineare is an alien species currently widespread in western and central Poland (FUDALI et al. 2009). It usually grows on decaying wood or on the bark of trees, rarely on peat, and mainly in deciduous or mixed forests of rather natural character

(FUDALI et al. 2009). Thus far, the species has been reported from the Upper Warta Depression (and the whole Woźnicko-Wieluńska Upland) only twice (STEBEL 2010a).

15. *Pohlia ludwigii* (Spreng. ex Schwägr.) Broth.

Author: P. GÓRSKI

SLOVAKIA: Western Tatra Mts, MGRS 34UDV1649, upper part of the Kamenistá dolina valley, glacial cirque below Mount Blyšť, close to the Pyšné sedlo pass, alt. 1820 m a.s.l., leg., det. P. Górski, 27.07.2002 (POZG); POLAND: S Poland, Western Tatra Mts, MGRS 34UDV1550, ATMOS Gd-69: upper part of the Pyszniańska dolina valley, Liliowy Uplaz, alt. 1800 m a.s.l., leg., det. P. Górski, 28.07.2002 (POZG); Western Tatra Mts, MGRS 34UDV1251, ATMOS Gd-68: Dolina Jarząbcza valley, north-western slope of Mount Kończysty Wierch (Jarząbczy Kopieniec), alt. 1700 m a.s.l., leg., det. P. Górski, 24.08.2002 (POZG); Western Tatra Mts, MGRS 34UDV1250, ATMOS Gd-68: Dolina Jarząbcza valley, below rocky walls descending from Niskie Turnie, alt. 1700 m a.s.l., leg., det. P. Górski, 24.08.2002 (POZG); Western Tatra Mts, MGRS 34UDV1450, ATMOS Gd-69: Dolina Starorobociańska valley, Zadnie Zagony, Szeroki Zagon, alt. 1700 m a.s.l., 1750 m a.s.l., leg., det. P. Górski, 12.07.2003 (POZG); Western Tatra Mts, MGRS 34UDV1450, ATMOS Gd-69: Dolina Starorobociańska valley, Zadnie Zagony, Krzywy Żleb gully, alt. 1780 m a.s.l., leg., det. P. Górski, 12.07.2003 (POZG); S Poland, High Tatra Mts, MGRS 34UDV2852, ATMOS Ge-50: Dolina Gąsienicowa valley, south-west of Zmarzły Staw Lake, below the Zawratowy Żleb gully, alt. 1825 m a.s.l., leg., det. P. Górski, 1.08.2003 (POZG); High Tatra Mts, MGRS 34UDV2952, ATMOS Ge-50: Dolinka Kozia valley, lower part of the Żleb Kulczyńskiego gully, alt. 2015 m a.s.l., leg., det. P. Górski, 2.08.2003 (POZG).

Pohlia ludwigii is an arctic-alpine species occurring on wet and sandy soils (DIERSSEN 2001). In Poland, it is known from the Tatra and Karkonosze Mountains (KRAJINA 1933, LISOWSKI 1956b, 1959, BALCERKIEWICZ 1984, ŠOLTĚS 1989, FUDALI & KUČERA 2003, FUDALI 2010). In the Tatra Mts, *P. ludwigii* is most often found in late snow fields, both on the High and Western Tatra Mts. Upon personal studies carried out in 2002–2014, it could be noted that this is a common species in the Polish and Slovakian Tatra Mts (in Slovakia, it carries an NT endangerment category; KUBINSKÁ et al. 2001). *Pohlia ludwigii* grows on wet, small gravelly, or sandy covered slopes, mostly directly below rock walls. It creates scanty-species *Pohlietum ludwigii* phytocoenoses (BALCERKIEWICZ 1984, GÓRSKI 2015) that can be floristically divided (depending on habitat type) to forms with *Polytrichastrum sexangulare* and *Oligotrichum hercynicum* (GÓRSKI 2015). Besides the phytocoenoses, *P. ludwigii* has been observed in

the Tatra Mts also on wet rock walls, in patches of a snowbed-type community predominantly with *Andreea nivalis* (KRAJINA 1933, ŠOLTĚS 1989). It has been also noted, with small quantitative participation, in snow-beds with *Pohlia drummondii* (KRAJINA 1933). It is worth mentioning that outside the Tatra Mts, *P. ludwigii* creates communities of well-head character (GEISSLER 1976).

16. *Pseudotaxiphyllum elegans* (Brid.) Z. Iwats.

Author: M. STANIASZEK-KIK

ATMOS Dd-82: Central Poland, Łaska Height (Wysoczyzna Łaska), Łódź Province, Zduńska Wola County, Szadek commune, Uroczysko Prusinowice forest, Poddebice Forest Inspectorate, forest sections 191g and 192a, 51.72629°N, 18.88511°E, on mineral soil in a fresh mixed forest, leg. E. Gądzia, 9.07.2013, det. M. Staniaszek-Kik (LOD).

Pseudotaxiphyllum elegans is a suboceanic species, widespread in Europe, that is also present in West Asia, North Africa, the Azores, North America, and New Zealand (NYHOLM 1979, SMITH 2004). It is a boreal-mountain taxon; hence, a considerable part of the localities come from southern Poland (WILCZYŃSKA 1996, STEBEL et al. 2004, STEBEL 2006b, ŻARNOWIEC & STEBEL 2014). Beyond the mountains, *P. elegans* is widespread but scattered in north-west Poland. It is known from many localities in the Puszcza Bukowa forest and in Kartuskie Lakeland (RUSIŃSKA 1981, FUDALI 1999). Less often it is observed in the north-western and central parts of Poland (SZAFRAN 1961, FOJCIK 2011b). The species grows on mineral soil and rocks in beech and oak-hornbeam forests frequently on roadside slopes and pits and occasionally inhabits the bases of tree trunks (SMITH 2004, STEBEL 2006b, ŻARNOWIEC & STEBEL 2014). In central Poland, *P. elegans* was found for the first time in only one locality (the Uroczysko Paprotnia forest in Landscape Park of Łódź Hills) (ŁUCZAK & ŁUCZAK 2000), and this is the second station of the species in this area.

17. *Ricciocarpos natans* (L.) Corda

Author: R. ZUBEL

ATMOS Eg-91: SE Poland, Roztocze region (Roztocze Środkowe), Lublin Province, Zamość County, Zwierzyniec commune, Roztocze National Park, Bukowa Góra protective district, forest section 205, on the south-eastern shore of Stawy Echo ponds, in water, 50.59475°N, 22.98095°E, leg., det. R. Zubel, 15.08.2012 (LBL); ATMOS Dg-92: E Poland, Polesie Zachodnie region (Równina Łęczyńsko-Włodawska), Lublin Province, Włodawa County, Stary Brus commune, Polesie National Park (north border), the Miełucha River (artificial channel), in water and on wet soil, over 15 locations along the 2-km fragment of

river, from 51.46297°N, 23.23078°E to 51.47163°N, 23.20590°E, leg., det. R. Zubel, 8.08.2013 (LBL).

Ricciocarpos natans occurs throughout Poland except in the mountains but is more scattered in the north-eastern and south-eastern parts of the country (SZWEYKOWSKI 1968, 2006, OCHYRA & TOMASZEWICZ 1979 and lit. cited, KARCZMARZ & SOKOŁOWSKI 1979, 1981, KŁOSOWSKI et al. 1999, PEŁECHATY & GĄBKA 2003, AFRANOWICZ 2005, GÓRSKI 2006, 2010, 2013). The species prefers wet habitats and predominantly occurs directly in water of small ponds, lakes, and channels. At present, the above-listed data are the eastern-most localities of the species in Lublin Province, and it is new to the Roztocze and Polesie National Parks. With the exception of new records, the species has only a few localities in the region (KARCZMARZ 1970, 1973).

18. *Seligeria calcarea* (Hedw.) Bruch & Schimp.

Author: B. FOJCIK

ATMOS Fd-05: S Poland, Upper Warta Depression (Obniżenie Górnej Warty), Silesia Province, Bory Dolne (district of the town of Myszków), 50.57194°N, 19.38982°E, limestone boulder on the edge of mixed forest, leg., det. B. Fojcik, 24.04.2014 (KTU).

Seligeria calcarea is a very rare species in the moss flora of Poland. Only a few records have been published from the southern uplands of the country (OCHYRA 1984, OCHYRA et al. 1985, 1999, FOJCIK 1995, 2011a). It grows on limestone rocks, especially on the walls of caves and stone pits.

19. *Sphagnum balticum* (Russow) C.E.O. Jensen

Author: S. ROSADZIŃSKI

ATMOS Ad-63: W Poland, Sasko-Łużyckie Lowlands (Niziny Sasko-Łużyckie), Lubuskie Province, Żary County, Brody commune, Zasięcka basin, 1 km north-west of the Proszów village, 51.751°N, 14.818°E, in the poor fens of *Sphagno tenelli-Rhynchosporium albae* associations in peat bogs of limnological origin, very abundant population in the form of floating ground with *Sphagnum cuspidatum* and *Odontoschisma* (= *Cladopodiella*) *fluitans* (pH 4.0, conductivity 190 μ S cm⁻¹), leg., det. S. Rosadziński, 18.09.2012 (POZG).

Sphagnum balticum has a boreal geographical range (DÜLL & MEINUNGER 1989) and is vulnerable in Poland (ŻARNOWIEC et al. 2004). In northern Poland, *S. balticum* is a scattered species (JASNOWSKI 1962, 1990, JASNOWSKA & JASNOWSKI 1983c). In peat bogs of the Iżera Mountains (POTOCKA 1996) as well as in all of the Sudety Mts (WOJTUŃ 2006), it has been recognised as a frequent species. In terms of habitats, *S. balticum* occurs mostly on Baltic raised bogs, where it is a component of submerged hollows in brown peat moss (*Sphagnetum fuscii*) complexes. It is also recognised as a distinctive subassociation of *Sphagno tenelli-*

Rhynchosporium albae with *Sphagnum majus* (JASNOWSKA & JASNOWSKI 1983). It is a new species for the Sako-Łużyckie Lowlands. It was not found in this region by WARNSTORF (1903).

19. *Sphagnum balticum* (Russow) C.E.O. Jensen

Author: M. WILHELM

ATMOS Bb-47: NW Poland, West Pomerania, Drawskie Lakeland, West Pomerania Province, Szczecinek County, "Bagno Kusowo" nature reserve, *Sphagnetum magellanicum* associations in the northern part of the bog, as small cushions or small patches between hollows and hummocks, growing mostly accompanied by *Sphagnum rubellum*, *S. magellanicum*, and sometimes with *S. fallax*, *leg.*, *det.* M. Wilhelm, 3.07.2005, 16.07.2005 (SZUB).

Sphagnum balticum is a circumpolar, slightly continental species (SMITH 2004) also with northern tendencies (LAINE et al. 2011). In Poland, it is considered vulnerable (category V; ŻARNOWIEC et al. 2004). This peat moss grows on ombrotrophic to minerotrophic habitats (e.g., in the Sudety Mts it occurs on raised bogs and transitional mires; WOJTUŃ 2006). *Sphagnum balticum* has been recorded mainly in the northern part of the country: in 19 bogs in the Bytowskie Lakeland (JASNOWSKA & JASNOWSKI 1983b); Jezioro Czarne Lake near Strzekęcín (15 km north-east of Białogard; JASNOWSKA et al. 1996); the "Jezioro Cęgi Małe" nature reserve in the Charzykowska Plain (Równina Charzykowska); the "Mszar koło Starej Dobrzycy" nature reserve (JASNOWSKA & JASNOWSKI 1983a, not confirmed by WILHELM & WIĘCŁAW 2011); the Wilcze Uroczysko peat bog (JASNOWSKI 1962); and the "Żurawie Chrusty" nature reserve in the Kaszubskie Lakeland (ŻUREK 2006). It is worth noting that *S. balticum* has not been listed in the literature from Drawskie Lakeland.

20. *Sphagnum molle* Sull.

Author: S. ROSADZIŃSKI

ATMOS Bb-06: NW Poland, West Pomerania, Polanowska Height (Wysoczyzna Polanowska), Zachodniopomorskie Province, Koszalin County, Polanów commune, Promotional Forest Complex "Łasy Środkowopomorskie", 1.8 km north-west (54.150°N, 16.501°E) and 1.7 km west (54.141°N, 16.498°E) of Naclaw village, in the patches of humid heaths represented by the *Ericetum tetralicis* plant association, average numbers of populations in three forest subdivisions in the forms of cushions on humid oligotrophic haplic gleyic podzol soil (642l) and histic gleysols (636h) and rigosols (636c), *leg.*, *det.* S. Rosadziński, 17.09.2014 (POZG); ATMOS Ae-05: W Poland, Dolnośląskie forest, Lubuskie Province, Żary County, Przewóz commune, "Żurawie Bagno" nature reserve, 2.4 km north-east of Lipna village, 51.451°N, 15.042°E, in patches of humid heaths of *Ericetum te-*

tralicis association, small population on degraded, raised peat deposit with advanced muck-forming process surrounded by the peat post excavation pits (water table 40 cm below the ground level, pH 4.4, conductivity 120 $\mu\text{S cm}^{-1}$), *leg.*, *det.* S. Rosadziński, 25.08.2012 (POZG).

Sphagnum molle has a suboceanic geographical range (DÜLL & MEINUNGER 1989, DIERSSEN 2001) and is vulnerable in Poland (ŻARNOWIEC et al. 2004). In Poland, this is one of the rarest representative genera of *Sphagnum*; until now, it has been detected at 40 locations, of which 22 come from West Pomerania (MELOSIK 1992). From western Poland, it was given in the pre-war literature from 11 locations (MELOSIK 1992); however, the given locations of Dolne Łużyce by WARNSTORF (1903) was not confirmed during the research. In southern Poland, *S. molle* occurs in peat bogs of the Orawsko-Nowatarska basin (MELOSIK 1992, KOCZUR 2006). *Sphagnum molle* is a characteristic species of the *Ericion tetralicis* alliance, grouped into assemblages of humid heaths in oceanic areas of moderate Europe; in western Poland, it occurs on the eastern border of the range. In the Dolnośląskie forest region and in Pomerania group of *Ericetum tetralicis*, it forms on semihydrogenic soils, such as histic gleysol and poor organo-mineral gleysol types. In such habitats, *S. molle* finds the optimal conditions for development due to lack or small participation of peat mosses typical of ombrotrophic bogs, with which this species is not able to compete due to its low competitive ability (DANIELS & EDDY 1990, LAINE et al. 2011). In terms of habitat requirements, they are similar to species such as *Sphagnum compactum*, *S. denticulatum* (land forms), and partly *S. tenellum* and *S. subnitens*, with which the species is often associated (HERBICHOWA 1979, DIERSSEN 1982, ZICKERMANN 1996). In Poland as well as in north-western Europe, *Ericetum tetralicis* develops in secondary habitats, such as drained, decomposed ombrogenic peat (JASNOWSKI et al. 1968, HERBICHOWA 1979) and rigosols. Inhibition of the peat-forming process and then disappearance of ombrotrophic bogs and the muck-forming process of upper layers of peat create gainful conditions for minerotrophic *S. molle*, which is tolerant to fluctuations in the ground water table and resistant to short-duration shortages.

21. *Taxiphyllum wissgrillii* (Garov.) Wijk & Margad.

Author: R. ZUBEL

ATMOS Fg-12: SE Poland, Roztocze region, Lublin Province, Biłgoraj County, Józefów commune, Sopot River valley in the "Czartowe Pole" nature reserve, on Miocene limestone rocks near a river in a *Fraxino-Alnetum* association, 50.44122°N, 23.11084°E, *leg.*, *det.* R. Zubel, 29.05.2014 (LBL).

Distribution of *Taxiphyllum wissgrillii*, strictly a calcicole species, has a bicentric character in Poland. The majority of its localities are situated in the southern

part of the country, whereas in West Pomerania and Masuria, the species has scattered relict stations (BEDNAREK-OCHYRA et al. 1994 and lit. cited, STEBEL & OCHYRA 2000, ARMATA 2005, 2008, STEBEL 2006b, FOJCIK 2011b). Until now, it was collected once in south-east Poland in the Roztocze Escarpment Zone (BEDNAREK-OCHYRA et al. 1994). The new finding of *T. wissgrillii* suggests that the species can be more frequent in this area, where local suitable habitats and substrata, such as Miocene limestone outcrops along rivers and streams, occur in abundance.

22. *Tomentypnum nitens* (Hedw.) Loeske

Authors: P. PAWLIKOWSKI, D. WOŁKOWYCKI

ATMOS Cf-39: NE Poland, Podlasie Province, Białystok County, Łapy commune, Narew National Park, Rynki mire, 52.99215°N, 22.93865°E, tall sedge-brown moss vegetation in a rich fen developed in the Narew River valley, single clump on a *Carex appropinquata* tussock, *not.* P. Pawlikowski, D. Wołkowycki 24.04.2015.

Tomentypnum nitens is considered vulnerable in Poland (category V; ŻARNOWIEC et al. 2004). The species is restricted to minerotrophic fens, especially in the post-glacial landscape of northern and north-western Poland (OCHYRA et al. 1988b). In the southern, denuded part of the Podlasie Province, where the newly discovered locality is situated, *T. nitens* is increasingly rare and is decreasing (PAWLIKOWSKI 2015b).

22. *Tomentypnum nitens* (Hedw.) Loeske

Authors: A. RUSIŃSKA, S. ROSADZIŃSKI

ATMOS Cc-80: W Poland, Wielkopolska region, Wielkopolska Province, Natura 2000 protection area “Puszcza Zielonka”, east of Murowana Goślina, ca 500 m north of Zielonka, valley of the Trojanka stream, 52.55979°N, 17.10862°E, fen with *Carex flava* and *Epipactis palustris*, patch overgrown with reeds, *leg.* A. Rusińska 8529, 10.07.2003 (POZG); ATMOS Db-52: W Poland, southern part of the Wielkopolska region, Sławskie Lakeland (Pojezierze Sławskie), Wielkopolska Province, western shore of Sławskie Lake, Natura 2000 protection area “Żurawie Bagno Sławskie”, 51.92556°N, 15.98842°E, over-dried patch of *Caricetum lasiocarpae campylietosum stellati*, *leg.* A. Rusińska, S. Rosadziński, 6.08.2012 (POZG).

Glacial relict, one of the most common species of this group in Poland, with a quite wide ecological amplitude, from fens to transitional bogs. In the Wielkopolska region, it has been recorded several times (OCHYRA et al. 1988b, RUSIŃSKA & BOCHEŃSKI 1993, WOJTERSKA et al. 2001, WOŁEJKO & PIOTROWSKA 2011). Three historical localities of this species are known from the “Puszcza Zielonka” area: Bolechowskie Lake, Czarne Lake, and Zielonka Lake (NOWACZYK 1959). The locality from the Trojanka valley is situated 1 km north

of the last one. *Tomentypnum nitens* was recorded by Radzyń (Rädchen), 1 km west of Sława, by LIMPRICHT (1871). In “Żurawie Bagno Sławskie”, small tussocks of this moss were accompanied by such species as *Sphagnum teres*, *Fissidens adianthoides*, and *Campylium stellatum*.

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

Author: B. FOJCIK

ATMOS Ed-98: S Poland, Włoszczowa Trough (Niec-ka Włoszczowska), Silesia Province, Nakło, near Szczekociny, 50.68772°N, 19.72535°E, wet soil in an alder forest, *leg., det.* B. Fojcik, 1.10.2002 (KTU).

Trichocolea tomentella is a rare liverwort occurring mainly in wet and boggy forests (REJMENT-GROCHOWSKA 1971, GÓRSKI 2013). The species has scattered localities throughout the country, mainly in the northern part and in the lower parts of the mountain areas (SZWEYKOWSKI 1966, 2006, REJMENT-GROCHOWSKA 1971). In Silesia Province, it grows mainly in the Beskidy Mountains (STEBEL 2006a) and is known only from several lowland localities. Moreover, it belongs to regionally threatened species (included in category VU; STEBEL et al. 2012a).

24. *Tritomaria exsecta* (Schmidel) Schiffn. ex Loeske

Author: P. GÓRSKI

SLOVAKIA: High Tatra Mts, MGRS 34UDV2846, Nefcerka valley, blocks of rock south of the Vyšné Terianske pleso lake, mossy pillows, 49.1658°N, 20.0198°E, alt. 2125 m a.s.l., *leg., det.* P. Górski (POZNB 1970).

Tritomaria exsecta is a common species in the Tatra Mts, occurring mostly in montane forests on dead wood. Altogether, it has 155 documented localities in the Tatra Mts (GÓRSKI & VÁŇA 2014). The presented locality is localised to higher altitudes, where the plant is noted rarely. Only 12 localities of this liverwort have been found at altitudes above 2000 m a.s.l. (BOROS et al. 1960, ŠMARDÁ 1961, DUDA & VÁŇA 1982, ŠOLTÉS 1990, CYKOWSKA 2008, GÓRSKI & VÁŇA 2014).

25. *Ulota bruchii* Hornsch ex Brid.

Author: M. STANIASZEK-KIK

ATMOS Dd-73: Central Poland, Łaska Height, Łódź Province, Pabianice district, Lutomiernsk County, Małyń range, Poddębice Forest Inspectorate, forest section 93j, 51.78211°N, 19.0465°E, on red oak (*Quercus rubra*) in pine forest, *leg.* R. Turek, 8.07.2013, *det.* M. Staniaszek-Kik (LOD).

Ulota bruchii is an epiphytic moss occurring on the trunks of deciduous trees, mainly of the genera *Salix*, *Populus*, and *Quercus* (STEBEL 2006b, FOJCIK 2011b). This species is under partial species protection and is on the red list of threatened taxa in Poland (catego-

ry V; ŻARNOWIEC et al. 2004). In central Poland, this species has not yet been recorded (STANIASZEK-KIK & WOLSKI 2009). During the past several years, the numbers of localities of this taxon, as well as many other epiphytic species, have increased in Poland (STEBEL 2010b). During the course of bryological research conducted in 2013, *U. bruchii* occurrence was found in the Poddebice forest district, in managed forest. Small turfs (ca 1 cm²) were recorded on the bark of invasive species (i.e., *Quercus rubra*).

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