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Piotr Zaniewski; Warsaw University of Life Sciences, Warsaw, Poland; https://orcid.org/0000-0002-0792-9854

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CHECKLIST

New and noteworthy lichen species in Poland

Rafał Szymczyk [1*], Emilia Anna Ossowska [2], Beata Guzow-Krzemińska [2], Anna Zalewska [3], Agnieszka Kowalewska [4], Martin Kukwa [2]

[1] Enviromental Survey Laboratory EKOPROJEKT, Nowica 24, 14-405 Wilczęta, Poland
[2] Department of Plant Taxonomy and Nature Conservation, University of Gdańsk, Faculty of Biology, Wita Stwosza 59, 80-308 Gdańsk, Poland
[3] Independent Researcher, Gruszowe Sady 12, 10-745 Olsztyn, Poland
[4] Pomeranian Landscape Parks Complex, Tricity Landscape Park Division, Polanki 51, 80-308 Gdańsk, Poland

[*] To whom correspondence should be addressed. Email: grapgis@gmail.com

Abstract

The paper presents the first records of *Ramalina europaea* in Poland and new sites of rarely recorded species, mostly microlichens. The occurrence of *Lecanora flavoleprosa* in northern Poland is confirmed by molecular data. The species descriptions include information on similar species, habitats, and distribution.

Keywords

lichenized fungi; rare species; species distribution; molecular barcoding

Dedicated to Professor Lucyna Śliwa

1. Introduction

Research on lichens in Poland has been carried out for more than two hundred years, and the oldest herbarium specimens found in Polish herbaria date back to the mid-seventeenth century (Fałtynowicz, 1983; Fałtynowicz & Śliwa, 2017; Köhler, 1999). More than half a century has passed since the publication of the first list of Polish lichens was published (Tobolewski, 1965), and during this time, the number of species known from Poland has increased by almost half a thousand, and currently, it includes 1,687 species (Fałtynowicz et al., 2024). This increase is the result of the intensification of research in many areas of the country (Cieśliński, 2003; Flakus, 2014; Kubiak et al., 2019; Szymczyk, 2020; Zalewska, 2012), the description of species new to science (Ertz et al., 2018; Guzow-Krzemińska et al., 2019; van den Boom et al., 2020) or a change in taxonomic approaches.

The aim of this paper is to present records of several noteworthy lichens from Poland. These include species previously not recorded from Poland, very rare and threatened in the country as well as recently described taxa as new to science or that form small, inconspicuous thalli and thus are often overlooked in many studies.

2. Materials and methods

The collected material was deposited in the lichen collection at the Department of Taxonomy of Plants and Nature Conservation of the University of Gdansk (UGDA) and National Biodiversity Collection, W. Szafer Institute of Botany PAS (KRAM), with few specimens in the private herbarium of R. Szymczyk. Lichens were determined by standard methods, using the spot test reactions. Thin layer chromatography (TLC) was used for the identification of lichen substances in the case of *Inoderma sorediatum*, *Lecanora flavoleprosa*, *Micarea czarnotae*, and *Ramalina europaea*. Methods follow Orange et al. (2001).

The presented list of species is in alphabetical order. The threat categories of lichens in Poland are presented according to Cieśliński et al. (2006). In addition to the list of sites, data on their diagnostic features, ecology, and distribution are provided for each species. GPS coordinates use the World Geodetic System (WGS84). Each locality is given in the ATPOL grid square system, modified for the Atlas of the Geographical Distribution of Lichens in Poland as presented by Cieśliński and Fałtynowicz (1993). Most of the specimens were determined by collectors, if not otherwise stated.

Two specimens of *Lecanora flavoleprosa* were subjected to DNA analysis. DNA was extracted directly from pieces of thalli using a modified CTAB method (Guzow-Krzemińska & Węgrzyn, 2000). DNA extracts were used for a PCR-amplification of nuITS rDNA marker using ITS1F (Gardes & Bruns, 1993) and ITS4 primers (White et al., 1990). For PCR amplifications, Start-Warm HS-PCR Mix (A&A Biotechnology, Poland) was used with the following parameters: initial denaturation at 94 °C for 3 min and 33 cycles of denaturation at 94 °C for 30 sec; annealing at 54 °C for 30 sec; and extension at 72 °C for 1 min followed with a final extension at 72 °C for 10 min. Subsequently, PCR products were purified using a Clean-Up Concentrator Kit (A&A Biotechnology, Poland) according to the manufacturer's instructions. Sequencing of each PCR product was performed using Macrogen sequencing service (The Netherlands). The newly generated nuITS rDNA sequences were edited using Chromas 2.6 (Technelysium Pty Ltd) and the sequences were analyzed using BLASTn search (Altschul et al., 1990) in order to assess their identity.

3. The species

3.1. *Absconditella sychnogonioides* (Nitschke) Suija & van den Boom [syn. *Geisleria sychnogonioides* Nitschke, *Strigula sychnogonoides* (Nitschke) R.C. Harris]

Characteristics – thallus crustose, endosubstratal or very thinly episubstratal, grey-white or grey-green, continuous to rimose. Ascomata 0.2–0.3 mm diam., mostly resembling perithecia, obpyriform to subglobose, almost completely immersed in thallus, with only a pale brown upper part visible, in older specimens sometimes apothecioid (gyalectoid), with an expanded, urceolate disc (but in the dry state the apothecia may shrink considerably, re-assuming a perithecioid appearance). Proper exciple colorless, of parallel hyphae. Hymenium colourless, K/I-. Paraphyses slender, <1 µm thick, simple or sparingly branched. Hypothecium thin, pale. Asci 8-spored, cylindrical to cylindrical-clavate, thin-walled, with a distinct, K/I- apical dome penetrated by a long, narrow tube extending from the endoascus, with 1–2-seriately arranged ascospores, 75–120 × 8.5–12.5 µm. Ascospores 3-septate, not constricted at septa, hyaline, ellipsoid to subfusiform, (15–)17–23(–28) × 6–8 µm. Photobiont chlorococcoid. Chemistry: without lichen substances (Nimis, 2024).

Habitat and distribution – a terricolous species found mainly on humus-free sandy or loamy soils, less often on dried peat and wood, exceptionally on stones and rotten wooden chipboards. A pioneer lichen in open habitats, such as clay pits, peat mines, and vegetation-free slopes. The species is typically observed on unstable substrates; however, it has also been reported to occur for several years, for example, on long-lying weathered wood (Fałtynowicz et al., 2024; Mayrhofer et al., 2001; Nowak & Tobolewski, 1975; Wirth et al., 2013). The species is known mostly from Europe, with single records from North and South America (Aptroot et al., 2014; Suija & van den Boom, 2023). In Europe, it seems to be much more frequently recorded, and it is known in Belgium, Czechia, France, Germany, the Netherlands, Poland, Switzerland, and Slovakia (Aptroot et al., 2014; Diederich et al., 2009; Fałtynowicz et al., 2024; Mayrhofer et al., 2001; Suija & van den Boom, 2023). In Poland, the species has been reported so far from a few localities in the southern part of the country (Fałtynowicz et al., 2024). The present record is the first observation of this species from northern Poland. The material is from Olesiński's 1975 collection deposited in KRAM and was determined as *Belonia incarnata* Th. Fr. & Graewe ex Th. Fr. It is probably relatively common but overlooked.

Absconditella sychnogonioides is regarded as vulnerable (category VU) in the Red List of lichens in Poland (Cieśliński et al., 2006).

Comments – the systematic position of *Absconditella sychnogonioides* was puzzling lichenologists for a very long time, but recently, the species (as *Geisleria sychnogonioides*) was placed, based on molecular data, in the family Stictidaceae close to the genus *Absconditella* Vězda (Aptroot et al., 2014). The species was formally transferred into *Absconditella* by Suija and van den Boom (2023) based in the broader species sampling and the similarities in the apothecial anatomy.

Absconditella sychnogonioides differs from other species of the genus predominantly in the closed apothecia, with the disc only narrowly exposed, leaving the impression of enclosed (angiocarpic) fruit bodies and thus resembling perithecia in the dry state (Suija & van den Boom, 2023).

Specimens examined: ATPOL grid square Be-46, Pojezierze Mrągowskie, near Dymer village, peat excavation site, on peat, 25 Oct. 1975, leg. L. Olesiński s.n., det. A. Zalewska (UGDA L-25274, KRAM-L-018783).

3.2. *Alyxoria ochrocheila* (Nyl.) Ertz & Tehler

Characteristics – thallus thin, continuous or immersed, white-grey. Ascomata numerous, sessile, 0.5–1.3 × 0.25–0.5 mm, simple or rarely branched, scattered, or contiguous. Exciple and sometimes the disc with distinctly a rusty-orange, K+ magenta-red pruina, or pruina invisible, but then the exciple in section K+ magenta-red. Disc slit-like, frequently widening. Excipulum relatively thick, elevated, black, continuous below the hypothecium, 20–30 µm thick laterally and 40–50 µm at the base. Hypothecium pale brown, 20–35 µm high. Hymenium 50–65 µm high, I+ partly blue-green. Asci club-shaped, 45–60 × 13–15 µm, (*Varia*-type). Ascospores hyaline, ellipsoid, 3-septate, 14–18 × 4–5 µm, with very narrow perispore of 0.4–0.7 µm thick. Pycnidia numerous, small, black. Conidia straight, 1–3-septate, 12–19 × 1–2 µm. Photobiont *Trentepohlia*. Spot tests: thallus C–, K–, P–; orange pruina on apothecia K+ magenta-red. Chemistry: thallus without lichen substances (Cannon et al., 2021; Smith et al., 2009; Wieczorek, 2018).

Habitat and distribution – *Alyxoria ochrochelia* has been recorded in Poland mainly from well-preserved deciduous forest communities. It prefers the smooth bark of deciduous trees, especially *Fagus sylvatica* and *Carpinus betulus*, and less often it grows on wood or rocks (Hachułka et al., 2024). The species is known from Africa, Asia, Europe, and North America (Wirth et al., 2013). In Europe, it has been reported from Austria, Denmark, Estonia, Germany, Great Britain, Greece, Ireland, Italy, the Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden and Switzerland (Wieczorek, 2018). In Poland, it has been observed until recently, mainly in the southern part of the country (Wieczorek, 2018). In 2024 the species was reported in northeastern Poland in the Las Warmiński nature reserve on the bark of *Quercus robur* in an old deciduous forest (Hachułka et al., 2024). In this paper, we present the first records of *Alyxoria ochrocheila* from the northwestern part of Poland (see Fałtynowicz et al., 2024).

The species is regarded as vulnerable (category VU) in the Red List of lichens in Poland (Cieśliński et al., 2006).

Comments – The characteristic feature of this species is rusty-orange, K+ magenta-red pruina on the ascomata; however sometimes the pruina is invisible. Such specimens may be confused with *A. culmigena* (Lib.) Ertz or some forms of *A. varia* (Pers.) Ertz & Tehler. However, both lack the K+ magenta-red reaction of exciple, and additionally, the first one has broader ascospores with a distinctly swollen second cell and shorter conidia, and the second has 4–6-septate ascospores (Smith et al., 2009).

Specimens examined: ATPOL grid square Ac-36, Wybrzeże Słowińskie, near Białogóra village, 54.8222°N, 17.9150°E, beech forest, on bark of *Fagus sylvatica*, 21 Oct. 2016, leg. R. Szymczyk s.n. (UGDA L-62907); ATPOL grid square Ac-38, Pobrzeże Kaszubskie, between Rozewie and Chłapowo, 54.8154°N, 18.3535°E, roadside trees, on *Populus balsamifera*, 11 July 2023, leg. M. Kukwa 24983 (UGDA L-62192).

3.3. *Gyalecta carneola* (Ach.) Hellb.

Characteristics – thallus crustose, thin, inconspicuous, pale grey to whitish. Apothecia numerous, urceolate, red- or orange-brown, gelatinous, and translucent when wet, at the beginning sunk in thallus, then erumpent with thalline exciple. Asci (8–)16–48-spored. Ascospores 38–80(–85) × 3–5(–6) µm, 9–15-septate, hyaline, acicular, straight to slightly curved. Chemistry: without lichen substances (Smith et al., 2009).

Habitat and distribution – It is an epiphytic species associated with deciduous forests with long ecological continuity. It prefers flat to cracked bark of mostly *Fagus sylvatica* and *Quercus robur* (Cieśliński, 2003; Wirth et al., 2013). *Gyalecta carneola* is known from Asia, Europe, North and South America, and New Zealand (Smith et al., 2009). In Europe it was reported from Albania, Austria, Czechia, Germany, Greece, Italy, Poland, Slovenia and Spain (Abbott, 2009; Fałtynowicz et al., 2024; Hafellner & Türk, 2016; Liška et al., 2008; Llimona & Hladun, 2001; Nimis, 2016; Suppan et al., 2000; Svoboda et al., 2012; Wirth et al., 2013). In Czechia, the species is considered to be extinct (Liška et al., 2008).

In Poland, the species has been reported from, e.g., Białowieża Forest, Karkonosze Mts, and Beskid Zachodni Mts (Fałtynowicz et al., 2024; Kossowska, 2006). Most reports date back to the middle of the last century (Fałtynowicz et al., 2024; Kossowska, 2006), and due to that, the species was considered critically endangered in Poland (Cieśliński et al., 2006). The only contemporary record has been known so far from Wybrzeże Słowińskie (Kukwa, 2006). The new records of the species are all from that region. Field observation conducted in 2023 confirmed the presence of the species in localities observed in 2014 and 2016. In one of the sites, we found the species together with *Lobaria pulmonaria* (L.) Hoffm., *Thelotrema lepadinum* (Ach.) Ach. and *Thelopsis rubella* Nyl.

Comments – *Gyalecta carneola* has multispored asci and can be confused with *G. fagicola* (Arnold) Kremp., however, these species differ in the size and septation of ascospores. *Gyalecta carneola* has longer ascospores (up to 85 µm) with 9–15 septa, whereas in *G. fagicola* ascospores are up to 35 µm long and 3–7-septate (Smith et al., 2009).

Specimens examined: ATPOL grid square Ac-36, Wybrzeże Słowińskie, Babnica nature reserve, 54.8195°N, 17.9396°E, pine forest with old oak trees, on dunes, on *Quercus* sp., 8 June 2013, leg. A. Kowalewska 704, M. Kukwa (UGDA L-24659); ATPOL grid square Ac-36, Babnica nature reserve, forest section No. 26, 54.8186°N, 17.9406°E, beech forest, on *Quercus* sp., 8 June 2012, leg. M. Kukwa 10885a (UGDA L-24547); ATPOL grid square Ac-35, E of Lubiatowo village, 54.7947°N, 17.8862°E, beech forest, on *Fagus sylvatica*, 15 Nov. 2020, leg. A. Kowalewska s.n. (UGDA L-40854); ATPOL grid square Ac-35, E of Lubiatowo village, 54.7954°N, 17.8855°E, beech forest, on *Fagus sylvatica*, 14 Nov. 2020, leg. A. Kowalewska s.n. (UGDA L-40848); ATPOL grid square Ac-35, E of Lubiatowo village, 54.7956°N, 17.8853°E, beech forest, on *Fagus sylvatica*, 14 Nov. 2020, leg. A. Kowalewska s.n. (UGDA L-40845); ATPOL grid square Ac-35, NE of Lubiatowo village, 54.8101°N, 17.8807°E, mixed forest, on *Quercus* sp., 5 July 2022, leg. A. Kowalewska s.n. (UGDA L-58075); ATPOL grid square Ac-35, near Lubiatowo village, 54.7952°N, 17.8852°E, beech forest, on bark of *Fagus sylvatica*, 24. Oct. 2016, leg. R. Szymczyk s.n. (UGDA L-26990); ATPOL grid square Ac-35, near Lubiatowo village, 54.8091°N, 17.8902°E, beech forest, on bark of *Fagus sylvatica*, 4 Sept. 2014, leg., det. R. Szymczyk s.n. (UGDA L-26989); ATPOL grid square Ac-35, Wybrzeże Słowińskie, near Lubiatowo village, 54.8116°N, 17.8961°E, beech forest, on the bark of *Fagus sylvatica*, 19 Oct. 2016, leg. R. Szymczyk s.n. (herb. Szymczyk).

3.4. *Inoderma sorediatum* Ertz, Łubek & Kukwa

Characteristics – thallus crustose, thick, pinkish or white, entirely sorediate, sometimes with free hyphae at the edge of the thallus. Soredia (18–)20–35(–40) µm diam., without projecting hyphae and crystals visible on the hyphae in polarized light. Ascomata unknown. Pycnidia rare, 170–280 µm, similar to those of *I. byssaceum*; pycnidial wall dark brown, K+ slightly olivaceous. Conidia bacilliform, 3.5–5.0 × 1.1–1.3 µm. Photobiont trentepohlioid. Spot tests: thallus K+ pale yellowish green, C–, PD–, UV+ cream to brownish (without fluorescence); hyphae I–, KI–. Chemistry: confluentic and 2′-O-methylperlatolic acids (Ertz et al., 2018); the same substance detected in the studied specimen.

Habitat and distribution – It is an epiphytic lichen growing on *Quercus robur* and *Fraxinus excelsior* and recorded only in well-preserved forest communities (Ertz et al., 2018). The species was only known from the Bialowieża National Park in north-eastern Poland (Ertz et al., 2018).

The new locality is the first found outside Białowieża Forest. The species was found on the bark of a more than 120-year-old *Ulmus laevis* in a fertile, moist oak-hornbeam forest. The species grew together with *Bacidia rubella* (Hoffm.) A. Massal., *Bellicidia incompta* (Borrer) Kistenich, Timdal, Bendiksby & S. Ekman, *Chaenotheca brachypoda* (Ach.) Tibell and *Lecanora thysanophora* R.C. Harris.

Comments – *Inoderma sorediatum* is very characteristic in the field due to the pale pinkish and sorediate thallus. However, especially when pycnidia are present, it may be confused with *I. byssaceum* (Weigel) Gray, which occurs in similar habitats but has esorediate thallus and different lichens substances (Ertz et al., 2018).

Specimen examined: ATPOL grid square Bd-08, Równina Warmińska, Młynary forest division, Książki forest district, forest section 57, 54.1854°N, 19.8775°E, oak-hornbeam forest, on bark of *Ulmus laevis*, 15 May 2020, leg. R. Szymczyk s.n., rev. M Kukwa (UGDA L-64487).

3.5. *Lecanora flavoleprosa* Tønsberg

Characteristics – thallus crustose, episubstratal, extensive, areolate, at least in young parts, sorediate. Prothallus not evident. Esorediate areolae sparse, soon dissolving into soredia and forming sorediate crust (all Polish specimens have leprarioid thallus). Soredia loosely arranged, fine to coarse, 30–65 µm in diam., with distinct walls. Apothecia not found in studied samples. Photobiont green, coccoid, up to 12 µm in diameter. Chemistry: usnic acid, flavoleprosa-unknown, zeorin, traces of unidentified terpenoids (Tønsberg, 1992); flavoleprosa-unknown was not detected by TLC in studied specimens from Poland.

Habitat and distribution – *Lecanora flavoleprosa* was usually recorded on bark of trees such as *Alnus incana*, *Picea abies*, *Ulmus* sp. and wood (Tønsberg, 1992), but also on humus and plant debris, and sometimes on shoots and twigs of dwarf shrubs in open, mostly well-lit areas (Czarnota et al., 2009; Tønsberg, 1992) and rocks as most specimens presented here. The species has so far been reported from a few sites in Austria, Czechia, Norway, Poland, Slovakia, Sweden, and Switzerland (Czarnota et al., 2009; Malíček et al., 2018; Nordin & Hermansson, 1999; Tønsberg, 1992).

The species was known in Poland only from the Tatra Mts and Gorce Mts (not stated in the paper, but specimen Kukwa A12922 was collected there) (Czarnota et al., 2009; Guzow-Krzemińska et al., 2017). The new sites are the first reports from northern Poland.

Comments – characteristic features of this species are the sorediate thallus and the chemistry, especially the xanthone 'flavoleprosa unknown', that occurs with usnic acid and zeorin, enabling it to be distinguished from other similar taxa (Czarnota et al., 2009; Tønsberg, 1992; Zduńczyk & Kukwa, 2014). However, in saxicolous and epixylic specimens presented here, we were not able to detect this substance as it probably occurred in too low concentration. As these samples were sterile, we performed sequencing of the nuITS rDNA marker. We were successful in the case of two specimens (Kukwa 20007 and Kukwa 25308), and BLASTn search of the newly obtained sequences showed 100% identity to sequences of *L. flavoleprosa* deposited in GenBank (accession numbers MW979430 and GU480101). Other specimens were assigned to *L. flavoleprosa* based on the identical morphology, secondary chemistry, and saxicolous habit.

Morphologically *Lecanora flavoleprosa* is similar to *L. expallens* Ach., which has sorediate thallus and produces similar substances (usnic acid, xanthones, and zeorin). However it always contains thiophanic acid, often with other xanthones (Tønsberg, 1992; Zduńczyk & Kukwa, 2014). Strongly sorediate forms of *L. flavoleprosa*, as presented here, can be mistaken for *Lithocalla ecorticata* (J.R. Laundon) Orange, but this species does not produce zeorin (Orange, 2020). It was reported from Poland (Fałtynowicz et al., 2024), but the identity of specimens assigned to *L. ecorticata* needs further studies.

Lecanora stanislai Guz.-Krzem. et al. shares very similar, almost entirely sorediate thallus and the presence of usnic acid and zeorin with saxicolous samples of *L. flavoleprosa*, however the species is corticolous and grows in deciduous forests (Guzow-Krzemińska et al., 2017). On the other hand, corticolous samples of *L. flavoleprosa* can be distinguished by having episubstratal, areolate, and esorediate parts of thallus (at least in young parts) (Tønsberg, 1992), whereas in *L. stanislai* esorediate part of thalli are in most cases completely endosubstratal, only rarely with small (up to 0.05 mm in diam.) areoles (Guzow-Krzemińska et al., 2017).

Specimens examined: ATPOL grid square Ad-51, Mierzeja Helska, Nadmorski Landscape Park, N of Hel, forest section no. 242, 54.6271°N, 18.8067°E, pine forest, on stone, 28 Sept. 2023, leg. M. Kukwa 25263 (UGDA L-63475); ATPOL grid square Ad-51, Mierzeja Helska, Nadmorski Landscape Park, NW of Hel, 54.6186°N, 18.7883°E, pine forest, on granitic stone, 30 Sept. 2023, leg. M. Kukwa 25308 (UGDA L-63520; GenBank Acc. No. for ITS rDNA: PP639260); ATPOL grid square Ac-98, Pojezierze Kaszubskie, Jar rzeki Raduni nature reserve, forest section no. 95, on granite, 27 Oct. 1996, leg. D. Królak s.n., det. M. Kukwa (UGDA L-50148); ATPOL grid square Ac-76, Pojezierze Kaszubskie, Kaszubski Landscape Park, Szczelina Lechicka nature reserve, 54.4225°N, 17.9567°E, beech forest, on stone, 30 Apr. 2013, leg. A. Kowalewska s.n., det. M. Kukwa (UGDA L-37536); ATPOL grid square Bc-06, Pojezierze Kaszubskie, Kaszubski Landscape Park, SW of Uniradze, forest section no. 49, 54.2174°N, 17.9990°E, oak-beech forest, on stone, 11 Aug. 2020, leg. M. Kukwa 21281 & 21282, A. Kowalewska (UGDA L-43552 & 43553); ATPOL grid square Ac-86, Pojezierze Kaszubskie, Kaszubski Landscape Park, W of Szopa, 54.3607°N, 17.9642°E, stones by the road, on stone, 20 Aug. 2020, leg. M. Kukwa 21408 (UGDA L-43679); ATPOL grid square Ac-86, Pojezierze Kaszubskie, Kurze Grzędy nature reserve, forest section No. 102j, *Vaccinio uliginosi-Pinetum* on drained peat bog, on stone, 26 May 2005, leg. M. Kukwa 4164a (UGDA L-39313); ATPOL grid square Ac-98, Pojezierze Kaszubskie, N of Babi Dół, Radunia river valley, 54.3165°N, 18.3122°E, by the railway close to forest, on wood of wooden pillar, 3 May 2023, leg. M. Kukwa 24752, det. M. Kukwa, E. Ossowska (UGDA L-61953); ATPOL grid

square Ac-99, Pojezierze Kaszubskie, NNE of Przyjaźń village, Skrzeszewo forest district, forest section no. 66, projected nature reserve Przyjaźń, S of railway, E part of stream valley, 54.3203°N, 18.4038°E, forest, saxicolous, 26 June 2000, leg. K. Jando, A. Kowalewska, M. Kukwa s.n., det. A. Kowalewska, M. Kukwa (UGDA L-36453); ATPOL grid square Bc-36, Bory Tucholskie, Kręgi Kamienne nature reserve, NW from Odry, 53.8997°N, 17.9944°E, erratic blocks in the circle, saxicolous, 3 July 2018, leg. M. Kukwa 20007 (UGDA L-25448; GenBank Acc. No. for ITS rDNA: PP639259); ATPOL grid square Be-61, Równina Olsztynka, Jagiełek forest division, forest section 43h, 53,6955°N, 20,3088°E, pine forest, on granite stone, 15 Oct. 2017, leg. R. Szymczyk s.n., det. M. Kukwa (UGDA L-36672).

3.6. *Megalaria laureri* (Th. Fr.) Hafellner

Characteristics – thallus whitish to grey-green, thin to thick, smooth or with a granular-warted surface, with a black prothallus. Apothecia lecideine 0.4–1.3 mm diam.; disc flat to slightly convex, black, or rarely brown-black. True exciple often paler than the disc, colorless, sometimes brownish at the upper outer edge, often concolorous with hypothecium at the base of apothecium; the hyphae radiating, branched, and anastomosing, c. 1.5–2 µm wide, without swollen ends. Epithecium dark purple-brown, K+ purplish, N+ red, sometimes with additional patches of greenish pigment reacting K+ green, N+ red. Hymenium 65–80 µm tall, colourless to pale purple brownish. Hypothecium purple-red, upper part K+ purple, lower part pale golden-brown, K negative. Paraphyses simple with clavate apices to 3 µm wide with adhering pigment between them. Asci *Bacidia*-type. Ascospores 1-septate, hyaline, ellipsoid to ovoid, 12–18(–20) × 5–8 µm. Pycnidia not found. Spot tests: thallus C–, K+ pale yellow, Pd–, UV–. Chemistry: thallus without lichen substances (Smith et al., 2009).

Habitat and distribution – *Megalaria laureri* is an epiphytic species growing on the bark of deciduous trees, mainly *Carpinus betulus* and *Fagus sylvatica*. It was primarily found in humid, old-growth forests (Fałtynowicz et al., 2024; Smith et al., 2009).

The species is widespread but more commonly observed in temperate areas of the Northern Hemisphere. It is known in United States and Kanada (Esslinger, 2016), Asia (Qing-Xia & Qiang, 2017) and in Europe from Austria (Hafellner & Türk, 2016), France (Roux et al., 2003) Germany (Wirth et al., 2013), Italy (Nimis, 2016), Poland (Fałtynowicz et al., 2024), Slovenia (Suppan et al., 2000), Spain (Llimona & Hladun, 2001), Ukraine (Dymytrova et al., 2013).

In Poland, *Megalaria laureri* was reported from the Sudety Mts., the Carpathians, and the Białowieża Forest. Almost all known records are from the middle of the last century (Fałtynowicz et al., 2024). According to Cieśliński et al. (2006), it is critically endangered in Poland (category CR).

In this paper, the first localities from Western Pomerania are reported. Field observations conducted in 2023 confirmed the presence of the species thallus observed in 2016. In one of the sites we found the species to grow together with *Thelotrema lepadinum*.

Comments – this species in the field may be confused with some forms of *Lecidella elaeochroma* (Ach.) M. Choisy, but after microscopic examination, *Megalaria laureri* can be distinguished by 1-septate ascospores (simple in *Lecidella elaeochroma*) and purple-pink pigments in the excipulum, hypothecium, and epihymenium that intensifies in K (different pigments in *Lecidella elaochroma*). In addition, *Megalaria* lacks xanthones, which are present in *Lecidella elaeochroma* (Smith et al., 2009).

Specimens examined: ATPOL grid square Ac-35, Wybrzeże Słowińskie, near Lubiatowo village, 54.7953°N, 17.8853°E, beech forest, on bark of *Fagus sylvatica*, 24 Oct. 2016, leg. R. Szymczyk s.n. (herb. Szymczyk); ATPOL grid square Ac-35, Wybrzeże Słowińskie near Lubiatowo village, 54.8095°N, 17.8894°E, beech forest, on bark of *Fagus sylvatica*, 18 Oct. 2016, leg. R. Szymczyk s.n. (UGDA L-23402 & 26996).

3.7. *Micarea czarnotae* Launis, van den Boom, Sérus. & Myllys

Characteristics – thallus effuse, olive green, granular, composed of goniocysts 20–35(–40) µm diam.; goniocysts usually forming a dense, almost continuous thallus or, if less developed, then warted-areolate. Apothecia 0.1–0.3 mm, usually plane or hemispherical, sometimes becoming tuberculate, cream-white or brownish, often with a greyish tinge. Hypothecium hyaline. Hymenium hyaline, c. 30–45 µm high. Epihymenium hyaline or pale grey, K+ violet, and C+ violet (Sedifolia-grey pigment present). Paraphyses numerous, branched, 1.0–1.5 µm wide, apices not widen. Ascospores oblong-ellipsoid or obovoid, 0–1 septate, 7–10 × 2.5–3.5 µm. Crystals (studied in polarized light) visible in hymenium, none detected in the thallus. Photobiont micareoid. Chemistry: methoxymicareic acid (Launis et al., 2019); all specimens presented here, tested by TLC, contained this substance.

Habitat and distribution – *Micarea czarnotae* was recently described (Launis et al., 2019). It was recorded on the bark of *Alnus glutinosa*, *Picea abies*, *Pinus sylvestris*, *Quercus* sp., *Sorbus aucuparia*, and on wood, mainly in humid forest habitat (Kantelinen et al., 2021; Launis et al., 2019). It is only known from Europe and has been reported from Finland, the Netherlands, Poland, Russia, and Sweden (Fałtynowicz et al., 2024; Kantelinen et al., 2021; Stepanchikova et al., 2020).

In Poland, it was found in Kotlina Sandomierska, Wzniesienia Łódzkie, Pojezierze Chełmińsko-Dobrzyńskie and Beskid Niski Mts (Fałtynowicz et al., 2024; Launis et al., 2019). Three new localities are reported here. It is probably relatively common but overlooked.

Comments – *Micarea czarnotae* belongs to the *M. micrococca* group. Morphologically it resembles its closest relatives, *M. micrococca* (Körb.) Gams ex Coppins and *M. pseudomicrococca* Launis & Myllys, however, it differs from the two species by having numerous apothecia that are often variously colored and contain Sedifolia-grey pigment (K+ violet, C+ violet) with crystals visible in polarized light only in hymenium (none detected in the thallus). *Micarea byssacea* (Th. Fr.) Czarnota, Guzow-Krzem. & Coppins, another member of the group, is similar in the presence of Sedifolia-grey pigment in apothecia, but its apothecia are wider (up to 0.6 mm) and often adnate (Kantelinen et al., 2021; Launis et al., 2019). *Micarea prasina* Fr. and *M. fallax* Launis & Myllys also contain Sedifolia-grey pigment in apothecia, but they produce micareic acid (Kantelinen et al., 2021).

Specimens examined: ATPOL grid square Bc-23, Równina Charzykowska, Bory Tucholskie, Zaborski Landscape Park, between Kruszyńskie and Somińskie lakes, Peplin, 54.0049°N, 17.6163°E, edge of a small forest, on *Sorbus aucuparia*, 1 July 2021, leg. M. Kukwa 22012 (UGDA L-45940); ATPOL grid square Bd-16, Wysoczyzna Elbląska, N of Weklice, valley of Kowalewka (Bierutówka) stream, 54.1228°N, 19.5739°E, black alder riparian forest by stream, on wood of log in the stream, 26 Aug. 2022, leg. M. Kukwa 23820 (UGDA L-57287); ATPOL grid square Ff-87, Pogórze Dynowskie, Broduszurki nature reserve, 49.8189°N, 22.3597°E, peat bog pine forest, twigs of *Vaccinium myrtillus*, 1 June 2020, leg. R. Szymczyk s.n. (UGDA L-46484).

3.8. *Ramalina europaea* Gasparyan, Sipman & Lücking

Characteristics – thallus fruticose, pale yellowish green to green, erect to subpendulous, 1(–4) cm long, flattened, solid, up to 3 mm wide, several times dichotomously to palmately branched, often developing numerous small, irregular (sometimes spine-like) proliferations with punctiform soralia on the top. Soralia lateral and terminal, in mature thalli terminal often on widened lobes, but never becoming large and labriform. Soredia granular, 50–70 µm diam., easily abraded and leaving a bare, whitish surface of the soralia. Spot tests: medulla and soralia C–, K–, KC–, Pd–, UV–. Chemistry: usnic and evernic acids (Gasparyan et al., 2017); these substances were also detected in specimens presented here.

Habitat and distribution – It is a recently described species, most likely widespread throughout Europe and Asia on a variety of substrates (rocks and bark of trees) and known from Armenia, Austria, Belgium, Czechia, Finland, France, Iran, Latvia, Lithuania, Norway, Romania, Russia, and Sweden (Gasparyan et al., 2017; Malíček et al., 2018; Motiejūnaitė, 2024; Sérusiaux et al., 2021). The species is new to Poland. It is probably a widespread species in Poland and the most frequently observed member of *Ramalina pollinaria* group.

Comments – typical specimens show the morphological differences rather clearly as *R. europaea* forms small, spine-like branchlets near the lobe tips on which the soralia start out as punctiform, granular structures, whereas in *R. pollinaria* (Westr.) Ach. the soralia are more irregular, larger, and farinose from the beginning. In addition, *R. europea* has granular soredia of more than 50 µm diam., and *R. pollinaria* has soredia that are farinose and smaller, less than 50 µm (Gasparyan et al., 2017; Sérusiaux et al., 2021).

Specimens deposited in Polish herbaria under the name *R. pollinaria* should be revised and compared with *R. europaea* material. It is probable that *R. pollinaria* s. str. is very rare in our country.

Specimens examined: ATPOL grid square Bd-19, Równina Warmińska, Spędy village, 54.1349°N, 19.9422°E, roadside trees, on the bark of *Quercus robur*., 12 Apr. 2019, leg. R. Szymczyk s.n. (UGDA L-26595, 26596, 26597); ATPOL grid square Gf-69, Bieszczady Zachodnie, Stuposiany forest division, Procisne forest district, forest section no. 89f, alt. 950 m, 49.1546°N, 22.6592°E, *Dentario glandulosae–Fagetum*, on bark of *Fagus sylvatica*, 9 May 2019, leg. R. Szymczyk s.n. (UGDA L-26598 & 26599); ATPOL grid square Ac-47, Wysoczyzna Żarnowiecka, Wejherowo forest division, 54.6982°N, 18.2772°E, oak-linden-hornbeam forest, on bark of *Quercus robur*, 23 October 2017, leg. R. Szymczyk, det. R. Szymczyk, E. A. Ossowska, M. Kukwa (UGDA L-25285); ATPOL grid square Bf-62, Pojezierze Ełckie, near Stare Guty village; 53.6145°N, 21.9452°E, railway bridge, on granite stones, 15 May 2016, leg. R. Szymczyk s.n., cum apothecia (UGDA L-25237).

3.9. *Thelopsis rubella* Nyl.

Characteristics – thallus crustose, thin, continuous to slightly cracked, grey-green to pale brown. Perithecia 0.4–0.6 mm diam., pale pink brown, red-brown to dark brown, becoming darker with age, half-immersed in thallus. Exciple hyphal, of intertwined hyphae with thick gelatinized walls, colorless within, brown in the outer part. Periphyses simple or sparingly branched, up to 65 µm long. Hymenial gel non-amyloid. Asci 100 to 150-spored, cylindrical, tapering towards the apex, the wall thin, I+ light blue, without a tholus. Ascospores (1–)3–septate, (10–)12–16(–18) × 4–8 µm, ellipsoid-oblong, ends rounded, without a distinct perispore. Photobiont trentepohlioid. Chemistry: No lichen substances detected by TLC (Smith et al., 2009).

Habitat and distribution – *Thelopsis rubella* is an epiphytic species, reported mainly from deciduous old-growth forests in mountainous areas, especially on the bark of *Fagus sylvatica*, *Fraxinus excelsior*, and *Quercus* sp. It is known from United States and Canada in North America (Esslinger, 2016), and in Europe from Austria (Hafellner & Türk, 2016), Bosnia and Herzegovina (Bilovitz & Mayrhofer, 2010), France (Roux et al., 2017), Germany (Wirth et al., 2013), Great Britain (Smith et al., 2009), Italy (Nimis, 2016), Poland (Fałtynowicz et al., 2024) and Spain (Llimona & Hladun, 2001).

The only known records of this species from Poland date back to the seventies of the last century. It was found on the bark of *Fagus sylvatica* in the forests of Beskid Niski Mts and Gorce Mts. (Bielczyk et al., 2016; Czarnota et al., 2005).

The new locality presented here is the first in the northern part of Poland and currently probably the only one known in the country. On the new locality, *Thelopsis rubella* grew on the trunk of a large *Fagus sylvatica* in a fragment of old beech forest in which *Lobaria pulmonaria* and *Gyalecta carneola* were also observed. Field observations conducted in 2023 confirmed the presence of the species thallus observed in 2016.

Comments – characteristic features of *Thelopsis rubella* are perithecioid ascomata in shades of brown and multi-spored asci. Superficially, the species may resemble *Porina leptalea* (Durieu & Mont.) A.L. Sm., which has smaller, more orange perithecia and 8-spored asci (Smith et al., 2009).

Specimen examined: ATPOL grid square Ac-35, Wybrzeże Słowińskie, near Lubiatowo village, 54.8095°N, 17.8894°E, beech forest, on the bark of *Fagus sylvatica*, 18 Oct. 2016, leg. R. Szymczyk (UGDA L-23366).

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