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First Ukrainian records of lichens and lichenicolous fungi from Carpathian primeval forests

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Thirty-four species of lichens and two species of lichenicolous fungi are reported for the first time from Ukraine, specifically from primeval Carpathian forests. Six genera, *Absconditonia*, *Andreiomyces*, *Chicitaea*, *Elixia*, *Puttea*, and *Sporodophoron*, are new to Ukraine. The identification of the species *Absconditonia sublignicola*, *Buellia dives*, *Cliostomum haematommatis*, *Lecidella albida*, *Micarea flavoleprosa*, *M. isidioprasina*, *Mycoporum antecellens*, *Puttea exsequens*, *Rinodina willeyi*, and *Sporodophoron cretaceum* was confirmed by DNA barcoding. The species *Andreiomyces obtusaticus*, *Chicitaea cristinae*, *Cliostomum haematommatis*, *Lecidella albida*, *Lepra multipuncta*, *Micarea fallax*, *M. flavoleprosa*, and *Ochrolechia bahusiensis* were identified using TLC. Additionally, *Sporodophoron cretaceum* is for the first time reported including fruitbodies. The globally rare epibryophytic species *Gyalidea cylindrica* is reported from the third locality in the world.

Key words: *Absconditonia*, *Andreiomyces*, *Chicitaea*, *Elixia*, *Puttea*, *Sporodophoron*, beech, cedar pine, fir, spruce.

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Třicet čtyři druhů lišejníků a dva druhy lichenikolních hub byly nově nalezeny na Ukrajině, konkrétně ve východokarpatských pralesích. Šest rodů je pro Ukrajinu nových: *Absconditonia*, *Andreiomyces*, *Chicitaea*, *Elixia*, *Puttea* a *Sporodophoron*. DNA barkódy byly získány pro druhy *Absconditonia sublignicola*, *Buellia dives*, *Cliostomum haematommatis*, *Lecidella albida*, *Micarea flavoleprosa*, *M. isidioprasina*, *Mycoporum antecellens*, *Puttea exsequens*, *Rinodina willeyi* a *Sporodophoron cretaceum*. Sekundární metabolity byly zjištěny pomocí TLC u druhů *Andreiomyces obtusaticus*, *Chicitaea cristinae*, *Cliostomum haematommatis*, *Lecidella albida*, *Lepra multipuncta*, *Micarea fallax*, *M. flavoleprosa* a *Ochrolechia bahusiensis*. Rod *Sporodophoron* dosud nebyl znám s plodnicemi, ovšem námi uváděný *S. cretaceum* je plodný. Celosvětově vzácný epibryofytní druh *Gyalidea cylindrica* je nově udáván ze třetí lokality na světě.

INTRODUCTION

Along with Romania, Ukraine is one of the few countries in Europe with large areas of primeval forest. This exceptional extent of primeval beech forests in the Carpathian Mts, including the large stands of Uholka, Shyrokyi Luh, Stuzhytsia, Pop Ivan, Popadya, Gorgany, and Tytsa, was discovered by Czech researchers in the first half of the last century (Zlatník 1936). The most famous are the primeval beech forests of the Carpathian Biosphere Reserve (Commarmot et al. 2013). They are, together with other Carpathian primeval beech forests, included into the UNESCO World Heritage List (https://whc.unesco.org/en/list/1133/). Additional mixed old-growth beech, fir and cedar pine (*Pinus cembra*) forests are situated in the Gorgany Mts. Remnants of old-growth mountain spruce forests are rare in the Ukrainian Carpathians, but are still present e.g. in the Chyvchyn Mts.

The primeval forests of the Ukrainian Carpathians provide an unparalleled source of information on the diversity of lichens and lichenicolous fungi. A number of recently described epiphytic lichen species from European forests are also based on the relevant type/paratype material originating from the Ukrainian Carpathians, i.e. *Bacidia albogranulosa* (Malíček et al. 2018c), *Bacidina acerina* (Vondrák et al. 2023), *Biatora amylacea* (Palice et al. 2023), *Biatora radicicola* (Printzen et al. 2016), *Japewia aliphatica* (Malíček et al. 2020), *Lecanora arachnoidea* (Vondrák et al. 2023), *Lecanora stanislai* (Guzow-Krzemińska et al. 2017), *Lecanora substerilis* (Malíček et al. 2017), *Micarea substipitata* (Vondrák et al. 2022), *Monilibrachium splendens* (Vondrák et al. 2024) and *Toniniopsis pruinosa* (Vondrák et al. 2024). In recent years, a number of species new to Ukraine have been reported from these forests (e.g. Vondrák et al. 2010, Dymytrova et al. 2013, Khodosovtsev et al. 2015, 2016a, 2016b, Vondrák et al. 2018, Malíček et al. 2018a, Darmostuk et al. 2020).

The research conducted in 2019 on lichens and lichenicolous fungi in two Carpathian protected areas, the Gorgany Nature Reserve and the Carpathian Biosphere Reserve (Uholka-Shyrokyi Luh), revealed a number of species new to Ukraine, which are listed and commented below.

MATERIAL AND METHODS

Lichens and lichenicolous fungi were studied in the Carpathian Biosphere Reserve (Shyrokyi Luh massive) and Gorgany Nature Reserve during two Ukrainian-Czech expeditions in May and August 2019. We performed a multi-expert field survey (Vondrák et al. 2016) and concentrated our research on local biodiversity hot-spots (Vondrák et al. 2018) to obtain more complete species lists. Our field research consisted of: (1) an overall floristic survey and (2) a detailed survey of 12 one-hectare sites in patches with increased lichen diversity. According to the EUNIS habitat classification (Chytrý et al. 2020), our four sites, SL1, SL2, SL4, and SL5, belong to the habitat of *Fagus* forest on non-acid soils (T17; dominant tree *Fagus sylvatica*, additional trees *Acer pseudoplatanus*, *Carpinus betulus*, and *Corylus avellana*). The sites G1, G2, G7, and SL3 belong to the habitat of Temperate mountain forest of *Abies* (T32; dominant trees *Abies alba* and *Fagus sylvatica*, additional tree *Picea abies*). The sites G3, G4, G5, and G6 are classified as Temperate subalpine *Larix*, *Pinus cembra* and *Pinus uncinata* forest (T34; dominant trees *Pinus cembra* and *Picea abies*, additional tree *Sorbus aucuparia*).

Material from earlier expeditions to the primeval forests of the Carpathians was included. Lichens and lichenicolous fungi were collected and subsequently subjected to morphological examination with an OPTICA microscope (Ponteranica, Italy) and Zeiss Axioscope (Oberkochen, Germany). Microscopic examinations were carried out on material mounted in water and 10% KOH (K) (Smith et al. 2009). Measurements were made in water with a precision of 0.5 µm for microscopical structures and 5 µm for anatomical layers of thalli. Secondary metabolites were primarily identified with chemical spot tests (K, C, Pd). The abbreviations follow Smith et al. (2009). Thin-layer chromatography, TLC, was used for a more precise identification of secondary metabolites (Orange et al. 2001). DNA barcoding was employed to confirm the identification of taxonomically difficult species (Vondrák et al. 2023). Nomenclature of lichens follows Nimis (2024) or if the name is absent, recent taxonomic studies. All specimens collected during our field trips (Gorgany, Shyrokyi Luh) are deposited in KHER, PRA or PRM (see Index Herbariorum), or the personal herbarium of J. Malíček.

RESULTS AND DISCUSSION

Thirty-four species of lichens and two species of lichenicolous fungi are reported for the first time from Ukraine, specifically from primeval Carpathian forests. The species presented in the list are crustose lichens which are (a) rare and inhabit specific habitats in old-growth forests, (b) hardly recognisable from other ones or extremely small and hence overlooked by lichenologists, or (c) sterile and sorediate.

(a) The rare species are predominantly confined to old-growth forests and can be used as potential indicators of the ecological integrity of the forest communities. Typical examples are *Cheiromycina flabelliformis*, *Elixia flexella*, *Japewia tornoënsis*, and *Puttea* spp. This group also includes oceanic species, very rare in Central Europe and bound to specific habitats with sufficient humidity. They may serve as useful indicators of climatic changes, in our list e.g. *Eopyrenula grandicula*, *Gyalidea cylindrica*, *Rinodina willeyi*, and *Sporodophoron cretaceum*.

(b) Tiny microlichens and difficult-to-recognise species are an increasingly large group which is growing as taxonomic research on individual lichen groups

continues. They are usually represented by newly described or newly distinguished species, e.g. *Absconditonia sublignicola* (Suija et van den Boom 2023) and *Micarea* spp. (Coppins 1983, Guzow-Krzemińska et al. 2019, Launis et al. 2019).

(c) Hard-to-identify sterile sorediate crusts represent the most important part of the included species. Most of these species can be distinguished from similar crusts after shorter or longer training and with the help of TLC. These crusts often have specific secondary metabolites. Here we list e.g. *Cliostomum haematommatis*, *Chicitaea cristinae*, *Inoderma sorediatum*, and *Lecidella albida*. Only a few of these crusts are not known with fruitbodies, e.g. *Andreiomyces obtusaticus*, the majority of them produce fruitbodies at least rarely, and some of them are even frequently fertile, e.g. *Lecidea leprarioides*.

Groups a–c may intersect. For example, the species *Cliostomum leprosum* and *Lepra multipuncta* have properties of all three groups.

Absconditella celata Döbbeler et Poelt

An inconspicuous wood-dwelling lichen with an inapparent immersed thallus below the apothecia which occurs in free-living algae-rich communities, forming gelatinose coverings on wet wood. The randomly dispersed, tiny, deeply urn-shaped, orange apothecia with a narrow disc, 60–100 µm in width, and the 3-septate, fusiform, hyaline ascospores tapering at the ends are characteristic of this species. It appears to be a subcosmopolitan taxon known from Europe, Asia, North America as well as Tasmania (Czarnota et Tanona 2020).

Specimen examined: Ivano-Frankivsk Region, Nadvirna District, c. 4 km E of the village of Bystrytsa, Gorgany Nature Reserve, alt. 1490 m, 48°27'33.5" N, 24°19'00.1" E, plot G6, on wood of log, 28 August 2019, leg. J. Vondrák 22175 (PRA).

Absconditonia sublignicola Suija et van den Boom

A common species which used to be identified as *Absconditella lignicola* until Suija et van den Boom (2023) recognised it on the basis of substantial differences in three-loci DNA sequences and slight differences in morphology (smaller apothecia and ascospores, different anatomy of the exciple). These two species have asimilar ecology, but according to environmental DNA data (Vondrák et al. 2024), *Absconditonia sublignicola* is notably more frequent in Central Europe. The genus *Absconditonia* is reported for the first time from Ukraine.

Specimen examined: Ivano-Frankivsk Region, Nadvirna District, village of Bystrytsa, Gorgany Nature Reserve, alt. 1490 m, 48°27'33.5" N, 24°19'00.1" E, plot G6, on wood of conifer log, 28 August 2019, leg. J. Vondrák 22174a in specimen of *Gyalidea minuta* (PRA), ITS: OQ717663, mtSSU: OQ682842.

Andreiomyces obtusaticus (Tønsberg) B.P. Hodk. et Lendemer

A European leprarioid lichen of humid microsites forming a very delicate, greenish-greyish leprose thallus with soredia 25–35 µm in diam. and without a medulla. The lichen is distinguished from other leprarioid lichens by the production

of obtusatic acid as the major metabolite (Hodkinson et Lendemer 2013), but may also produce anthraquinones in variable amounts (Vondrák et al. 2023), a feature originally only attributed to the North American taxon *A. morozianus* (Hodkinson et Lendemer 2013). The lichen may be confused with finely sorediate taxa of *Lepraria* and is potentially misidentifiable for chemically similar, sterile sorediate specimens of several species of *Lepraria*, *Leprocaulon*, or even sterile *Chaenotheca stemonea* (which however has a stichococcoid photobiont and never produces anthraquinones). The genus *Andreiomyces* is reported for the first time from Ukraine.

Specimens examined: Zakarpattia Region, Tiachiv District, Carpathian Biosphere Reserve, Shyrokyi Luh massive, valley of Luzhanka river, alt. 535–570 m, 48°18'27" N, 23°43'53" E, plot SL1, ravine forest with dominating beech, on bark of *Acer pseudoplatanus*, 24 May 2019, leg. Z. Palice 27000 (PRA), TLC: obtusatic acid, baeomycesic acid, ?barbatic acid, ?isousnic acid, unknown substance; W-SW-facing slope above Luzhanka river, alt. 810 m, 48°21'19.2" N, 23°44'13.5" E, plot SL3, on bark of *Abies alba* in places protected from rain, 26 May 2019, leg. J. Vondrák 21414 (PRA); ibid., on bark of *Picea abies*, 26 May 2019, leg. J. Vondrák 21374 (PRA). – Ivano-Frankivsk Region, Nadvirna District, c. 3.5 km NE of the village of Bystrytsa, in valley of Dzhurdzinets stream, Gorgany Nature Reserve, alt. 1005 m, 48°28'29.8" N, 24°18'23.3" E, plot G1, on bark of *Picea abies*, 22 August 2019, leg. J. Vondrák 21859 (PRA); ibid., on bark of *Abies alba*, 22 August 2019, leg. J. Vondrák 21858 (PRA).

Brianaria lutulata (Nyl.) S. Ekman et M. Svenss.

The genus *Brianaria* has recently been separated from *Micarea* s. lat. on the basis of both molecular and morphological features (Ekman et Svensson 2014). It differs from *Micarea* s. str. mainly in the absence of micareoid algae and in its dimorphic paraphyses. *Brianaria lutulata* is similar to *B. sylvicola*, but differs in having a dark fuscous or reddish brown hypothecium, while *B. sylvicola* has a blackish green hypothecium. The species has records from Europe, Asia, and North America (Smith et al. 2009). It should however be noted that the species was previously reported from the Carpathian part of Ukraine by Czarnota (2007, as *Micarea lutulata*) based on a specimen by Z. Palice kept in PRA, but was omitted from subsequent Ukrainian checklists. The epiphytic occurrence reported here (on exposed roots with presumably inorganic incrustation) is rather exceptional for this predominantly saxicolous lichen.

Specimen examined: Zakarpattia Region, Tiachiv District, village of Pryhid, Carpathian Biosphere Reserve, Shyrokyi Luh massive, valley of Luzhanka river, alt. 580 m, 48°19'32.0" N, 23°44'09.4" E, plot SL5, on exposed root of *Fagus sylvatica*, 29 May 2019, leg. J. Vondrák 21694 (PRA).

Brianaria tuberculata (Sommerf.) S. Ekman et M. Svenss.

A taxon very similar to the much commoner *B. sylvicola*, but usually with smaller apothecia and ascospores, and with a shallower hymenium. The species is best distinguishable from *B. sylvicola* by its shorter conidia and higher proportion of septate ascospores (Coppins 1983, Czarnota 2007, both as *Micarea tuberculata*). This species is usually saxicolous; as an epiphyte, it occurs on exposed roots protected from rain (and presumably with inorganic incrustation).

Specimen examined: Zakarpattia Region, Tiachiv District, 5.5 km NW-NNW of the village of Pryhid, Carpathian Biosphere Reserve, Shyrokyi Luh massive, 1.5 km E-ESE of Mt Menchul, alt. 1250 m, 48°18'40" N, 23°41'59" E, plot SL4, on exposed, rain-sheltered roots at the foot of old *Fagus*, 27 May 2019, leg. Z. Palice 28859 (PRA).

Buellia dives Th. Fr.

Easily identifiable as the only *Buellia* known to occurring in Europe and having 12–16 ascospores in the asci. It is rarely recorded, known from the Iberian Peninsula (Spain) and Fennoscandia (Norway) (Giralt et al. 2002). Recently it was also reported from the Pacific part of North America (Haldeman 2018).

Specimen examined: Zakarpattia Region, Tiachiv District, village of Pryhid, Carpathian Biosphere Reserve, Shyrokyi Luh massive, valley of Luzhanka river, alt. 580 m, 48°19'32.0" N, 23°44'09.4" E, plot SL5, on bark of *Salix* shrub, 29 May 2019, leg. J. Vondrák 21389 (PRA), ITS: OQ717756, mtSSU: OQ646141.

Chaenotheca sphaerocephala Nádv.

This lichen is similar to *Chaenotheca brunneola*, but differs in having a granular thallus, grey, pruinose apothecial stalks, algal cells of more than 10 µm in diameter, and the production of both barbatic and obtusatic acids (Nimis 2024). It is known from Europe, and North and South America (Selva et Tibell 1999, Nimis et al. 2018, Westberg et al. 2021).

Specimens examined: Ivano-Frankivsk Region, Nadvirna District, c. 3.5 km NE of the village of Bystrytsa, Gorgany Nature Reserve, valley of Dzhurdzinets stream, alt. 1005 m, 48°28'29.8" N, 24°18'22.1" E, plot G1, on *Abies alba*, 21 August 2019, leg. O. Khodosovtsev (KHER 12934); ibid., leg. J. Vondrák 21915 (PRA); c. 3 km N of the village of Polianytsia, alt. 1192 m, 48°24'14.6" N, 24°23'58.2" E, plot G3, on *Pinus cembra*, 24 August 2019, leg. V. Darmostuk (herb. V. Darmostuk 509); c. 3 km NE of the village of Bystrytsa, alt. 1318 m, 48°27'48.9" N, 24°18'35.4" E, plot G5, on *Pinus cembra*, 27 August 2019, leg. V. Darmostuk (herb. V. Darmostuk 508); c. 4 km NE of the village of Bystrytsa, alt. 1030 m, 48°28'23.5" N, 24°18'33.7" E, plot G7, on *Picea abies*, 29 August 2019, leg. J. Vondrák 21954 (PRA); c. 4.5 km E of the village of Bystrytsa, alt. 1230 m, 48°27'48.5" N, 24°18'35.5" E, 27 August 2019, leg. F. Bouda 954507 (PRM).

Chaenothecopsis retinens (Nyl.) Tibell

A rare lichenicolous fungus which has been observed growing on *Inoderma byssaceum* and *Bactrospora dryina* to date. The species has also been reported from Great Britain, Germany, Switzerland (Groner 2006), and Fennoscandia (Westberg et al. 2022).

Specimen examined: Ivano-Frankivsk Region, Nadvirna District, Gorgany Nature Reserve, alt. 1005 m, 48°28'29.1" N, 24°18'22.3" E, plot G1, lichenicolous on *Inoderma sorediatum*, on *Acer pseudoplatanus*, 21 August 2019, leg. O. Khodosovtsev (KHER 12907); ibid., leg. J. Vondrák 22269 (PRA).

Chaenothecopsis savonica (Räsänen) Tibell

This species is characterised by 0.5–1.3 mm high epruinose stalks, 1-celled ascospores and K– spot reaction in all parts of the apothecia (in section). It is similar to *Chaenothecopsis viridialba*, but the latter species has a white pruina on its stalks and a K+ green exciple (in section). It is known from the Northern and Southern Hemisphere (Titov et Tibell 1993).

Specimens examined: Ivano-Frankivsk Region, Nadvirna District, c. 5 km SE of the village of Bystrytsa, Gorgany Nature Reserve, alt. 1080 m, 48°25'51.7" N, 24°19'25.1" E, plot G2, on *Acer pseudoplatanus*, 26 August 2019, leg. O. Khodosovtsev (KHER 13771); c. 3.5 km NE of the village of Bystrytsa, valley of Dzhurdzinets stream, alt. 1005 m, 48°28'29.8" N, 24°18'23.3" E, plot G1, on bark of *Abies alba*, 22 August 2019, leg. J. Vondrák 22295 (PRA). – Zakarpattia Region, Tiachiv District, village of Pryhid, Carpathian Biosphere Reserve, Shyrokyi Luh massive, 1.5 km E-ESE of Mt Menchul, alt. 1260 m, 48°18'40.0" N, 23°41'59.0" E, plot SL4, on snag, 27 May 2019, leg. J. Vondrák 21570 (PRA).

Cheiromycina flabelliformis B. Sutton

This lichenised hyphomycete is the second member of the genus *Cheiromycina* reported from Ukraine. It is similar to *C. petri*, but differs in the more branched and more-celled terminal parts of the conidia originating from a globose cell (Printzen 2007). The species is known from Europe (Austria, Czech Republic, Finland, Germany, Great Britain, Italy, Norway, Russia, Slovakia, Switzerland, Sweden), Asia (Turkey) and North America (Canada, USA) (Tønsberg 2002, Printzen et al. 2002, Nimis et al. 2018, Vondrák et al. 2023).

Specimen examined: Ivano-Frankivsk Region, Nadvirna District, c. 5 km SE of the village of Bystrytsa, Gorgany Nature Reserve, alt. 1050 m, 48°25'50.6" N, 24°19'25.7" E, plot G2, on bark of *Fagus sylvatica*, 23 August 2019, leg. J. Vondrák 21861 (PRA), mtSSU: OQ682915.

Chicitaea cristinae **(**Guzow-Krzem., Łubek, Kubiak et Kukwa) Guzow-Krzem., Kukwa et Lendemer

This sorediate species was recently described from old-growth forests in Poland (Guzow-Krzemińska et al. 2018). It has a habitus morphologically similar to *Loxospora elatina*, but differs in the K– thallus (thamnolic acid absent), Pd–, UV+ (white) and production of 2'-O-methylperlatolic acid. Shortly after its description it was reported from other Central European countries (Austria, Germany, Switzerland, Czech Republic) as well as from the Caucasus Mts (Berger et al. 2018, Wirth et al. 2018, Dietrich et Malíček 2019, Urbanavichus et al. 2020, Šoun 2022).

The species was previously published from Ukraine as *Loxospora* aff. *confusa*. Three chemically analysed voucher specimens from the Ukrainian Carpathians (Berger 29222, 29239, Malíček 8179) were listed in the Supplementary material of the paper by Vondrák et al. (2018) referring to the research of 1-ha plots 1 and 2 in the Uholka massive. The genus *Chicitaea* is reported here from Ukraine for the first time with certainty.

Specimens examined (all with 2'-O-methylperlatolic acid detected with TLC): Ivano-Frankivsk Region, Nadvirna District, c. 5 km SE of the village of Bystrytsa, alt. 1050 m, 48°25'50.6 "N, 24°19'25.7" E, plot G2, on bark of *Fagus sylvatica*, 23 August 2015, leg. J. Vondrák 21810, 21811 (PRA). – Zakarpattia Region, Tiachiv District, village of Pryhid, Carpathian Biosphere Reserve, Shyrokyi Luh massive, valley of Luzhanka river, alt. 540 m, 48°18'26.6" N, 23°43'52.7" E, plot SL1, on bark of *Acer pseudoplatanus*, 24 May 2019, leg. J. Vondrák 21365 (PRA); alt. 580 m, 48°19'32.0" N, 23°44'09.4" E, plot SL5, on bark of *Alnus incana*, 29 May 2019, leg. J. Vondrák 21391 (PRA); ibid., on bark of *Salix* shrub, 29 May 2019, leg. J. Vondrák 21400 (PRA); ibid., on bark of *Fagus sylvatica* in canopy, 29 May 2019, leg. J. Vondrák 21402 (PRA); valley of Luzhanka river, alt. 640–650 m, 48°20'20" N, 23°43'37" E, plot SL2, on bark of *Carpinus betulus*, 25 May 2019, leg. Z. Palice 26909, 26948 (PRA). – Khust District, village of Pidgirne, Zacharovaniy Kray National Nature Park, valley of Irshavka river, alt. 770 m,

48°27'04.3" N, 23°05'06.3" E, on bark of *Fagus sylvatica*, 6 September 2023, leg. J. Vondrák 28100, 28102 (PRA).

Cliostomum haematommatis (Keissler) D. Hawksw., Earl.-Benn. et Coppins

A poorly known sorediate lichen originally described from the Austrian Alps as a lichenicolous fungus forming pycnidia ('*Phoma*') on a sterile lichen, which were later recognised as pycnidia of an undesribed lichen (Hawksworth et al. 2006). The species has recently only been reported from the Alps and the Caucasus (Dietrich et Malíček 2019, Urbanavichus et al. 2020, Berger et al. 2021). The pycnidia do not always seem to develop, at least not so frequent as in other species of *Cliostomum*, and were not observed in the recently collected material. The species may be misidentified as the recently described *Chicitaea cristinae*, another sterile greyish sorediate species of smooth bark, which also contains 2'-O-methylperlatolic acid. However the latter taxon does not contain atranorin unlike all known taxa of *Cliostomum*.

Specimens examined (all with atranorin and 2'-O-methylperlatolic acid detected with TLC): Zakarpattia Region, Tiachiv District, Carpathian Biosphere Reserve, Shyrokyi Luh massive, valley of Luzhanka river, alt. 640–650 m, 48°20'20" N, 23°43'37" E, plot SL2, on bark of *Acer pseudoplatanus*, 25 May 2019, leg. Z. Palice 37308 (PRA). – Khust District, village of Pidgirne, Zacharovaniy Kray National Nature Park, valley of Irshavka river, alt. 770 m, 48°27'04.5" N, 23°05'06.1" E, on bark of *Fagus sylvatica*, 6 September 2023, leg. J. Vondrák 28115 (PRA), ITS: PQ409177, mtSSU: PQ417135.

Cliostomum leprosum (Räsänen) Holien et Tønsberg

A rarely collected but widespread sorediate lichen on bark of conifers sheltered from rain. The species forms sterile crusts (K+ yellow, C–, Pd–) with abundant black pycnidia (K–, N+ reddish violet in section) and subglobose to teardrop-shaped conidia, (2)2.5–3 × 1.5–2 µm in size. The species is known from Europe (Belarus, Finland, Estonia, Czech Republic, Great Britain, Italy, Poland, Norway, Switzerland, Russia, Sweden), North America (USA, Canada) (Ekman 1997, Golubkov et Kukwa 2006, Smith et al. 2009, Malíček et Palice 2013, Nimis et al. 2018, Westberg et al. 2021).

Specimen examined: Ivano-Frankivsk Region, Nadvirna District, c. 3.5 km NE of the village of Bystrytsa, Gorgany Nature Reserve, in valley of Dzhurdzinets stream, alt. 1030 m, 48°28'23.5" N, 24°18'33.6" E, plot G7, on bark of *Picea abies*, 29 August 2019, leg. J. Vondrák 21946 (PRA).

Elixia flexella (Ach.) Lumbsch

Morphologically, the genus *Elixia* is similar to *Xylographa*, but differs in the dark brown exciple and hypothecium (e.g. Nimis 2024). *Elixia flexella* forms mainly endoxylic thallus composed of dispersed brownish granules, lirellate apothecia with an irregularly gyrose disc and broadly ellipsoid, 1-celled, hyaline ascospores, 5–8 × 3–4(4.5) µm in size (Smith et al. 2009). The lichen is known from Europe, Asia, and North America. The genus *Elixia* is reported from Ukraine for the first time.

Specimens examined: Ivano-Frankivsk Region, Nadvirna District, c. 3.5 km NE of the village of Bystrytsa, Gorgany Nature Reserve, valley of Dzhurdzinets stream, alt. 1005 m, 48°28'29.8" N,

24°18'23.3" E, plot G1, on snag, 22 August 2018, leg. O. Khodosovtsev (KHER 13070); c. 4.5 km E of the village of Bystrytsa, alt. 1230 m, 48°27'48.5" N, 24°18'35.5" E, plot G5, 27 August 2019, leg. F. Bouda 954506 (PRM); Gorgany Nature Reserve, above valley of Zubrynka river, alt. 1300 m, 48°24'35.7" N, 24°23'41.6" E, plot G4, 25 August 2019, leg. J. Vondrák 22035 (PRA). – Zakarpattia Region, Tiachiv District, village of Pryhid, Carpathian Biosphere Reserve, Shyrokyi Luh massive, W-SW-facing slope above Luzhanka river, alt. 810 m, 48°21'19.2" N, 23°44'13.5" E, plot SL3, on snag, 26 May 2019, leg. J. Vondrák 21517 (PRA).

Eopyrenula grandicula Coppins Fig. 1a

A rare species growing on the smooth bark of *Corylus avellana*. The specimen was collected in the anamorphic stage, but is easily recognised by the 3-septate, brown, (13)14–19(21) µm long conidia. The lichen has been described from Great Britain (Coppins et al. 1992) and found in Austria, Belgium, France, and Norway (Sérusiaux et al. 2006, Nimis et al. 2018, Westberg et al. 2021). At the Carpathian localities, it occurred together with *E. avellanae*.

Specimen examined: Zakarpattia Region, Tiachiv District, village of Pryhid, Carpathian Biosphere Reserve, Shyrokyi Luh massive, valley of Luzhanka river, alt. 570 m, 48°18'26.8" N, 23°43'55.2" E, plot SL1, on bark and root of *Corylus avellana*, 24 May 2019, O. Khodosovtsev (KHER 12973); ibid., leg. J. Vondrák 21507, 21511 (PRA).

Epigloea urosperma Döbbeler

A lichenicolous fungus on *Placynthiella* species (Döbbeler 1994). It is easily recognisable by its lichenicolous growth, 32-spored asci, and small ellipsoid 6–8 × 2.5–3.5 µm large ascospores with filamentous appendages. The species is known from Europe (Austria, Germany, Great Britain, Poland, Sweden, Switzerland) and North (USA) and South America (Bolivia) (Czarnota et Hernik 2013a, Malíček et al. 2018b, Spribille et al. 2020).

Specimen examined: Ivano-Frankivsk Region, Nadvirna District, c. 5 km SE of the village of Bystrytsa, Gorgany Nature Reserve, alt. 1050 m, 48°25'50.6" N, 24°19'25.7" E, plot G2, on *Placynthiella icmalea*, on log, 23 August 2019, leg. J. Vondrák 21844 (PRA).

Gyalidea cylindrica Etayo et Vězda Fig. 1b

A poorly known but distinctive species of the epibryophytic genus *Gyalidea* s. lat., until recently known only from its type locality in the foothills of the Atlantic French Pyrenees (Etayo et Vězda 1994). In continental Europe, the species seems to share, at least partially, the microhabitat of *Gyalideopsis muscicola*, *Vezdaea aestivalis*, or *V. stipitata*, occurring in wooded, constantly humid microsites near streams. Like the above taxa, it forms a glossy (filmy) thallus on the surface of living bryophytes, but is characterised by tiny (up to about 0.2 mm), relatively high, basally constricted, bright yolk-yellow apothecia (only when fresh, fading in the herbarium) and transversely septate ascospores. For further details, see description in Etayo et Vězda (1994). Apart from the type locality, it has recently been reported from the Austrian Alps (Berger et Türk 2024). From the same locality, the ITS barcode was previously obtained (Vondrák et al. 2023). A morphologically very similar taxon, differing in (sub-)muriform ascospores

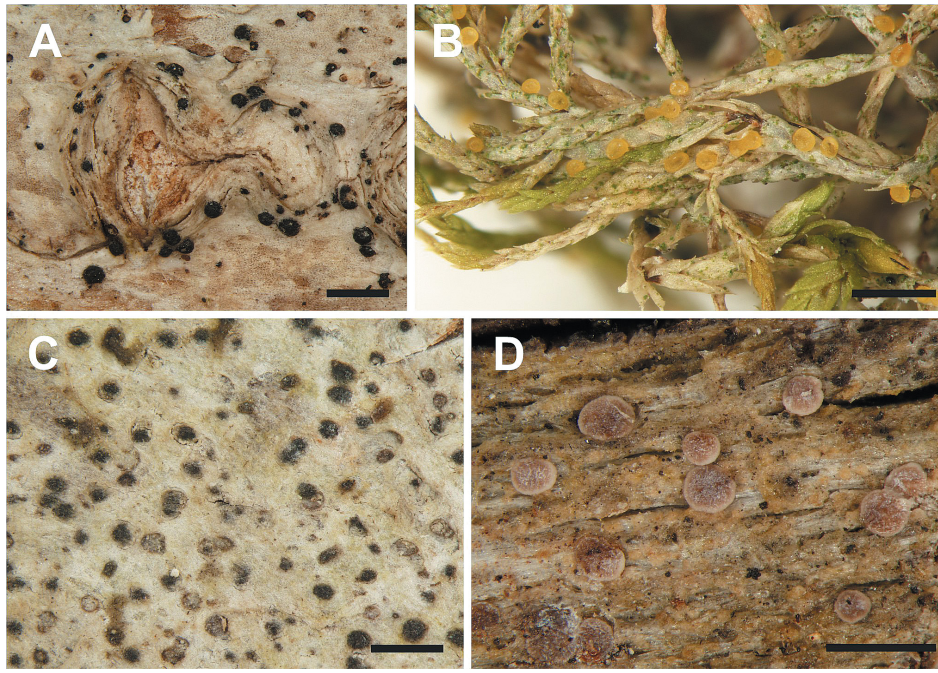

Fig. 1. Selected lichen species new to Ukraine. **A** – *Eopyrenula grandicula* (Vondrák 21507, PRA), anamorph, poorly lichenised thallus with pycnidia (small dots, young pycnidia); **B** – *Gyalidea cylindrica* (Berger 37051, from Austria; for details, see Berger et Türk 2024); **C** – *Mycoporum antecellens* (Vondrák 21878, PRA), lichenised thallus and perithecia; **D** – *Puttea exsequens* (Vondrák 28346, PRA), pruinose apothecia on weakly developed thallus. Bars = 0.5 mm. Photo J. Machač & J. Vondrák (A, C, D), J. Machač & Z. Palice (B).

and substrate ecology (bark), has recently been described from the Czech Republic (Vondrák et al. 2024).

Specimen examined: Zakarpattia Region, Tiachiv District, Carpathian Biosphere Reserve, Shyrokyi Luh massive, valley of Luzhanka river, alt. 640 m, 48°20'19.5" N, 23°43'37.5" E, plot SL2, on bryophytes on bark of old *Fagus*, 25 May 2019, leg. Z. Palice 26950 (PRA).

Gyalidea minuta van den Boom et Vězda

In wet conditions, *G. minuta* resembles *Coenogonium pineti* in the field, but the muriform ascospores with 3–5 transverse septa and 1–3(4) longitudinal septa, (9.5)10–17(20) × 4.5–7.5(9) µm in size, are diagnostic. Richly fertile, elderly specimens of the common species *Jamesiella anastomosans* may easily be confused with this species when vegetative thlasidia are missing. *Jamesiella anastomosans*, however, should have larger ascospores and a richly anastomosing hamathecium. The lichen is known from Western and Central Europe (Kubiak et Malíček 2012) as well as the Caucasus (Urbanavichus et al. 2020).

Specimen examined: Ivano-Frankivsk Region, Nadvirna District, village of Bystrytsa, c. 600 m E of Skali verkhni hill, Gorgany Nature Reserve, alt. 1490 m, 48°27'33.5" N, 24°19'00.1" E, plot G6, on wood of conifer log, 28 August 2019, leg. J. Vondrák 22174a (PRA).

Inoderma sorediatum Ertz, Łubek et Kukwa

A recently described species which differs from *Inoderma byssaceum* in the sorediate thallus and the production of confluentic acid (Ertz et al. 2018). The species was previously known from Poland (Ertz et al. 2018) and the Czech Republic (Vondrák et al. 2022), but is certainly partly overlooked and locally common. One specimen kept in KHER and identified originally as *Schismatomma cretaceum* (Khodosovtsev et al. 2016a) has been revised as *Inoderma sorediatum*.

Specimens examined: Ivano-Frankivsk Region, Nadvirna District, Gorgany Nature Reserve, alt. 1005 m, 48°28'29.1" N, 24°18'22.3" E, plot G1, on *Acer pseudoplatanus*, 21 August 2019, leg. O. Khodosovtsev (KHER 12907); ibid., 5 May 2015, leg. O. Khodosovtsev, A. Gromakova et V. Darmostuk (KHER 9087, as *Schismatomma cretaceum*); ibid., leg. J. Vondrák 22269 (PRA). – Zakarpattia Region, village of Nyzhni Remety, Otok Reserve, c. 4 km SW of the village, alt. 190 m, floodplain oak forest, 48°14'00.0" N, 22°48'20.0" E, on *Quercus robur*, 21 May 2011, leg. J. Vondrák 9102, 9073, 9079 & R. Kish (PRA).

Japewia tornoënsis (Nyl.) Tønsberg

This species is easily recognised by the reddish brown, biatorine, convex apothecia, hyaline ellipsoid ascospores, 15–24 × 8–15 µm in size, with layered walls. It is known from Europe, Asia, North and South America, and Antarctica (Czarnota 2009).

Specimen examined: Ivano-Frankivsk Region, Nadvirna District, c. 4 km N of the village of Polianytsia, alt. 1305 m, 48°24'34.7" N, 24°23'42.0" E, plot G4, on *Betula obscura*, 25 August 2019, leg. O. Khodosovtsev (KHER 13076); ibid., leg. J. Vondrák 22017 (PRA); ibid., on twigs of *Pinus cembra*, leg. J. Vondrák 22028 (PRA).

Lecidea leprarioides Tønsberg

This species is often sterile and hardly distinguishable from *Lecidea nylanderi*, but differs by the indistinct prothallus and yellowish grey soredia (K–, C–, KC–, P–, UV–). The lichen is known from Europe and North America (Smith et al. 2009).

Specimens examined: Ivano-Frankivsk Region, Nadvirna District, near the village of Bystrytsa, Gorgany Nature Reserve, alt. 1005 m, 48°28'29.7" N, 24°18'22.1" E, plot G1, on bark of *Picea abies*, 21 August 2019, leg. V. Darmostuk et O. Khodosovtsev (KHER 14346); alt. 1050 m, 48°25'50.6" N, 24°19'25.7" E, plot G2, on bark of *Picea abies*, 23 August 2019, leg. J. Vondrák (PRA 22065); alt. 1080 m, 48°25'51.7" N, 24°19'25.1" E, plot G2, on bark of *Picea abies*, 26 August 2019, leg. O. Khodosovtsev et V. Darmostuk (KHER 13751); alt. 1192 m, 48°24'14.6" N, 24°23'58.2" E, plot G3, on bark of *Picea abies*, 24 August 2019, leg. V. Darmostuk et O. Khodosovtsev (KHER 13784); alt. 1310 m, 48°27'47.8" N, 24°18'36.4" E, plot G5, on *Pinus cembra*, 27 August 2019, leg. V. Darmostuk et O. Khodosovtsev (KHER 13532); alt. 1334 m, 48°27'48.6" N, 24°18'35.5" E, plot G5, on bark of *Pinus cembra*, 27 August 2019, leg. O. Khodosovtsev (KHER 13544); alt. 1490 m, 48°27'33.5" N, 24°19'00.1" E, plot G6, on snag, 28 August 2019, leg. J. Vondrák 21802 (PRA); alt. 1503 m, 48°27'31.4" N, 24°19'00.8" E, plot G6, on *Picea* trunk, 28 August 2019, leg. V. Darmostuk et O. Khodosovtsev (KHER 13428).

Lecidella albida Hafellner

This species is locally common in Central Europe, but is sorediate and infrequently fertile, and thus probably largely overlooked. All three specimens listed here were previously sequenced and published in Malíček et al. (2018a) and Vondrák et al. (2018) as *Lecidella subviridis* s. lat. Additional comparative TLC with typical fertile specimens from the Czech Republic revealed the characteristic higher Rf xanthone – capistratone concentrations in the Ukrainian samples.

Specimens examined (all with higher Rf xanthone – capistratone detected with TLC): Zakarpattia Region, Khust District, village of Uglya, Carpathian Biosphere Reserve, Uholka massive, alt. 420–440 m, 48°14'41.6" N, 23°41'40.7" E, on bark of *Fagus sylvatica*, 19 May 2015, leg. J. Vondrák 13940 (PRA), mtSSU: MG773684; ibid., alt. 500 m, 48°15'03" N, 23°41'47" E, on bark of young *Fagus*, 13 May 2015, leg. Z. Palice 19309 (PRA), mtSSU: MG773683; ibid., alt. 460 m, 48°14'43" N, 23°41'39" E, on bark of *Carpinus betulus*, 19 May 2015, leg. Z. Palice 19343 (PRA), mtSSU: MG773682.

Lepra multipuncta (Turner) Hafellner

Although this suboceanic lichen was listed in all previous Ukrainian lichen checklists (either as *Pertusaria multipuncta* or *Lepra multipuncta*), its presence on the territory of Ukraine had been uncertain until recently, since in the period when the species was published from Ukraine, the epithet *multipuncta* was incorrectly applied to a lichen currently known as *Lepra ophthalmiza* (see comments under *Pertusaria ophthalmiza* in Vondrák et al. 2010). TLC of the specimen below revealed the presence of fumarprotocetraric and physodalic acids. This is the first confirmed record of the species for Ukraine.

Specimen examined: Zakarpattia Region, Tiachiv District, Carpathian Biosphere Reserve, Shyrokyi Luh massive, valley of Luzhanka river, alt. 640–650 m, 48°20'20.0" N, 23°43'37.0" E, plot SL2, on bark of *Carpinus betulus*, 25 May 2019, leg. Z. Palice 26913 (PRA).

Micarea fallax Launis et Myllys

This is a recently described species from the *Micarea prasina* group (Launis et al. 2019). The lichen differs from *Micarea prasina* s. str. by producing crystalline granules (observed in polarised light) in the hymenium only, whereas *M. prasina* produces crystalline granules in the epihymenium. A morphologically similar species to *M. fallax* is *M. laeta*, but the latter species differs in the production of a different secondary metabolite (methoxymicareic acid vs micareic acid in *M. fallax*) and shape and colour of the apothecia (adnate, cream-white vs hemispherical, brownish and/or greyish in *M. fallax*). The species is known from Belarus, Czech Republic, Finland, Norway, the north-west of Russia, Scotland, and Sweden (Kantelinen et al. 2021).

Specimens examined (all with micareic acid detected with TLC): Ivano-Frankivsk Region, Nadvirna District, near the village of Bystrytsa, Gorgany Nature Reserve, in valley of Dzhurdzinets stream, alt. 1005 m, 48°28'29.8" N, 24°18'23.3" E, plot G1, on snag, 22 August 2019, leg. J. Vondrák 21940 (PRA); alt. 1050 m, 48°25'50.6" N, 24°19'25.7" E, plot G2, on log, 23 August 2019, leg. J. Vondrák 22105 (PRA); alt. 1233 m, 48°27'48.5" N, 24°18'35.5" E, plot G5, on root plate, 27 August 2019, leg. J. Vondrák 22206 (PRA). – Zakarpattia Region, Tiachiv District, village of Pryhid, Carpathian Biosphere Reserve, Shyrokyi Luh massive, W-SW-facing slope above Luzhanka river, alt. 810 m, 48°21'19.2" N, 23°44'13.5" E, plot SL3, on snag, 26 May 2019, leg. J. Vondrák 21519 (PRA).

Micarea flavoleprosa Launis, Malíček et Myllys

Recently described species from the *Micarea prasina* group, characteristic by its sparsely fertile, largely farinose and wide-spreading yellowish green thalli overgrowing decaying wood (Launis et al. 2019). It is known from Austria, the Czech Republic, and France (Berger 2019, Launis et al. 2019).

Specimens examined (all with micareic acid detected with TLC): Zakarpattia Region, Tiachiv District, Carpathian Biosphere Reserve, Shyrokyi Luh massive, W-SW-facing slope above Luzhanka river, alt. 800–840 m, 48°21'20.0" N, 23°44'14.0" E, plot SL3, on wood of *Abies* log, 26 May 2019, leg. Z. Palice 28263 (PRA); ibid., valley of Luzhanka river, alt. 540 m, 48°18'26.6" N, 23°43'52.7" E, plot SL1, on wood of stump, 23 May 2019, leg. J. Malíček (herb. J. Malíček 12976), mtSSU: PQ417136.

Micarea isidioprasina van den Boom, Guzow-Krzem., Sérus. et Kukwa

This isidiate species is a member of the *Micarea prasina* complex (Guzow-Krzemińska et al. 2019). The species is characterised by its sparse, white to beige apothecia, abundantly branched or coralloid isidia up to 250 µm in height and 25 µm in width, with Sedifolia-grey pigment (K+ violet). The recently described *Micarea aeruginoprasina* and *M. nigra* differ in their light cream to light brown or aeruginose apothecia and dark grey to black apothecia, respectively. Unfortunately, sterile specimens of the three species cannot be distinguished from each other. Morphologically, *Micarea isidioprasina* is similar to a shaded form of *Placynthiella icmalea*, but the latter species contains gyrophoric acid (C+ red). The species is known from Belgium, Germany, France, Poland, Romania, Russia, and Sweden (Guzow-Krzemińska et al. 2019, Urbanavichene et Urbanavichus 2023, Svensson et al. 2024).

Specimens examined: Ivano-Frankivsk Region, Nadvirna District, village of Bystrytsa, Gorgany Nature Reserve, c. 3 km NE of the village of Bystrytsa, in valley of Dzhurdzinets stream, alt. 1005 m, 48°28'29.8" N, 24°18'23.3" E, plot G1, on log, 22 August 2019, leg. J. Vondrák 21941 (PRA), ITS: OQ717504. – Zakarpattia Region, Tiachiv District, Carpathian Biosphere Reserve, Shyrokyi Luh massive, W-SW-facing slope above Luzhanka river, alt. 810 m, 48°21'19.0" N, 23°44'13.0" E, plot SL3, on snag of *Abies alba*, 25 May 2019, leg. J. Malíček (herb. J. Malíček 12973), mtSSU: PQ417137.

Micarea myriocarpa V. Wirth et Vězda ex Coppins

A widespread but easily overlooked lichen for its being an inhabitant of species-poor niches not usually studied by lichenologists. As a narrow niche-specialist it is confined to shaded and sheltered niches protected from rain (e.g. dry roots at the tree base). It is morphologically similar to and shares a similar ecology with *Psilolechia clavulifera*, likewise containing the *Stichococcus*-like photobiont. *Micarea myriocarpa* also differs in the dark reddish brown hypothecium and is best distinguishable by the frequent presence of sessile pycnidia, which are completely missing in *Psilolechia* species.

Specimen examined: Zakarpattia Region, Tiachiv District, Carpathian Biosphere Reserve, Shyrokyi Luh massive, W-SW-facing slope above Luzhanka river, alt. 640 m, 48°20'20.0" N, 23°43'37.0" E, plot SL2, on dry roots of old *Fagus* by the stream, 25 May 2019, leg. Z. Palice 27041 (PRA).

Micarea pusilla Launis, Malíček et Myllys

A recently described pioneer species of the broadly conceived *Micarea prasina* group containing methoxymicareic acid (Launis et al. 2019), but phylogenetically only distantly related to the *Micarea micrococca* aggregate typically producing this substance. Its apothecia are purely white (lacking pigments), extremely small, up to 0.2 mm, with no crystals visible in polarised light, and the thalli are usually badly developed, thinly granular or membranaceous (Launis et al. 2019), usually overgrown by non-symbiotic green algae. This is an overlooked species formerly possibly held for poorly developed specimens of *Micarea micrococca*, which is a complex of species containing crystals in apothecia visible in polarised light. The first specimen in the list below was collected in the Uholka massive before formal description of the species.

Specimens examined: Zakarpattia Region, Tiachiv District, village of Velyka Uholka, Carpathian Biosphere Reserve, Uholka massive, E-ESE descending limestone ridge, steep SSW-S-facing slope 0.9 km WNW of Molochnyi Kamin rock, alt. 820 m, 48°15'22.0" N, 23°39'40.0" E, mixed deciduous forest, on decaying wood of *Fagus* log, 16 May 2015, leg. Z. Palice 31246 (PRA); 5.5 km NW-NNW of the village of Pryhid, Shyrokyi Luh massive, ridge 1.5 km E-ESE of Mt Menchul, alt. 1250 m, 48°18'40.0" N, 23°41'59.0" E, plot SL4, on wood of *Fagus* snag, 27 May 2019, leg. Z. Palice 28361 (PRA).

Mycoporum antecellens (Nyl.) R.C. Harris Fig. 1c

Species characterised by non-stromatic perithecial fruitbodies with a brown, K+ olive perithecial wall, and large 1(–3)-septate '*Arthopyrenia*-like' ascospores, 27–40 × 8–13 µm in size (Sanderson et Coppins 2009). While *M. antecellens* is allegedly non-lichenised, our Ukrainian specimen was clearly lichenised with a trentepohlioid photobiont and also had smaller ascospores: 25–30 × 6–8.5 µm in our specimen. The mtSSU sequence of the Ukrainian specimen (OQ683094) was for 92% identical with the sequence from England (OQ646345; Vondrák et al. 2023). English and Ukrainian specimens may thus belong to two related species.

Specimen examined: Ivano-Frankivsk Region, Nadvirna District, village of Bystrytsa, c. 5 km SE of the village, alt. 1050 m, 48°25'50.6" N, 24°19'25.7" E, plot G2, on bark of *Fagus sylvatica*, 23 August 2019, leg. J. Vondrák 21878 (PRA), mtSSU: OQ683094); ibid., leg. F. Bouda 954475 (PRM).

Ochrolechia bahusiensis H. Magn.

This species is a member of the *Ochrolechia androgyna* complex (Kukwa 2009). It is characterised by small (5–10 mm) and thin (50–150 µm) thalli, mainly dispersed, convex soralia, C+ (pink) and UV–. It has been reported from many European countries (Croatia, Czech Republic, Denmark, Estonia, Finland, France, Great Britain, Lithuania, Luxembourg, Norway, Russia, Sweden) (Kukwa 2009, Motiejūnaitė 2017) and has recently also been found in North America (USA) (McCune et al. 2020).

Specimens examined: Zakarpattia Region, Tiachiv District, village of Pryhid, Carpathian Biosphere Reserve, Shyrokyi Luh massive, valley of Luzhanka river, alt. 580 m, 48°19'32.0" N, 23°44'09.4" E, plot SL5, on bark of *Fagus sylvatica* in canopy, 25 May 2019, leg. J. Vondrák 21404 (PRA), TLC: gyrophoric and lecanoric acids, murolic acid complex; 5.5 km NW-NNW of the village of Pryhid, ridge

1.5 km E-ESE of Mt Menchul, alt. 1250 m, 48°18'40.0" N, 23°41'59.0" E, plot SL4, on bark of old *Fagus sylvatica*, 27 May 2019, leg. Z. Palice 28708 (PRA), TLC: gyrophoric acid, murolic acid complex.

Puttea caesia (Fr.) M. Svenss. et T. Sprib.

Based on phylogeny and ecology, Stenroos et al. (2009) described the new genus *Puttea* for a single, apparently specialised species, *Lecidea margaritella*, predominantly overgrowing the leafy liverwort *Ptilidium pulcherrimum*. Later, three additional similar taxa occurring either on epiphytic/epixylic bryophytes or on wood were accommodated in the genus (Davydov et Printzen 2012, Dillman et al. 2012, Svensson et al. 2017). All currently distinguished members of the genus share pale convex, finely pruinose apothecia, a colourless hypothecium, and inapparent immersed thallus. The apothecial pruina is formed of fine psammoid granules in the epihymenium and/or exciple, glowing in polarised light and soluble in KOH. The genus *Puttea* is reported for Ukraine for the first time.

Puttea caesia is distinguished from other species in the genus by its darkened (blackish) outer exciple. Some superficially similar species of *Biatora* and *Micarea* with psammoid granules usually have, at least in part, larger septate ascospores. *Puttea caesia* is similar to the type species of the genus, *P. margaritella*, but (except the darkened outer margin of the apothecia) differs in having apically thickened (up to 4 µm) excipular hyphae, sometimes with brown pigment caps, narrower ascospores (3–7 × 1–2.5 µm vs 5.3–7.3 × 2.3–3.0 in *P. margaritella*), and its lignicolous habitat (Dillman et al. 2012). The species is known from Europe (Austria, Czech Republic, Finland, France, Germany, Great Britain, Italy, Norway, Sweden) and North America (USA) (Liška et al. 2008, Dillman et al. 2012, Nimis et al. 2018, Spribille et al. 2020, Westberg et al. 2021). Our Ukrainian specimen is scanty, consisting of a few young apothecia without internal pigmentation. However, the crystals of the epithecium visible in polarised light are strongly developed. Moreover, the ascospores are tiny, 5–7 × 1.5–2 µm in size, in a number of 8 per ascus.

Specimen examined: Ivano-Frankivsk Region, Nadvirna District, c. 5 km SE of the village of Bystrytsa, Gorgany Nature Reserve, alt. 1050 m, 48°25'50.6" N, 24°19'25.7" E, plot G2, on wood of *Fagus sylvatica* log, 23 August 2019, leg. J. Vondrák 21928, 28346 together with *P. exsequens* (PRA).

Puttea exsequens (Nyl.) Printzen et Davydov Fig.1d

A rare epixylic species known from Europe and Asia, distinct from other members of *Puttea* by an ochre pigment in the epihymenium besides the colourless epipsamma and larger ascospores, 8–11 × 3–4.5 µm in size, in a number of 8 per ascus (Davydov et Printzen 2012). Our Ukrainian specimen almost fully corresponds with the description in Davydov et Printzen (2012), but the ascospore dimensions (7–9 × 3–4 µm) slightly differ.

Specimen examined: Ivano-Frankivsk Region, Nadvirna District, c. 5 km SE of the village of Bystrytsa, Gorgany Nature Reserve, alt. 1050 m, 48°25'50.6" N, 24°19'25.7" E, plot G2, on log, 23 August 2019, leg. J. Vondrák 28346 (PRA), mtSSU: OQ683201.

Puttea margaritella (Hulting) S. Stenroos et Huhtinen

A predominantly hepaticolous lichen typically overgrowing *Ptilidium pulcherrimum* with small, white, unpigmented, convex, finely pruinose apothecia, usually constricted at the base, up to 0.4 mm in diam., and with hyaline, simple ascospores, 5.3–7.3 × 2.3–3.0 µm in size (Stenroos et al. 2009). It has been collected in Europe (Austria, Czech Republic, Finland, Poland, Norway, Slovakia, Sweden, Switzerland) and Alaska (Stenroos et al. 2009, Czarnota et Hernik 2013b). Although the species may also grow directly (not only secondarily) on wood or bark, as was recently confirmed by sequencing (Vondrák et al. 2023).

Specimen examined: Ivano-Frankivsk Region, Nadvirna District, c. 3 km NE of the village of Bystrytsa, Gorgany Nature Reserve, alt. 1233 m, 48°27'48.5" N, 24°18'35.5" E, plot G5, on mossy log, overgrowing liverworts (not *Ptilidium pulcherrimum*), 27 August 2019, leg. J. Vondrák 21799 (PRA).

Rinodina willeyi Sheard et Giralt

Characterised by small areolate to squamulate young areoles with soralia on the edges, rarely a completely sorediate thallus and *Pachysporaria*-type ascospores (Sheard et al. 2017). It was described from the USA (Sheard 1995), but was later also found in Asia (Sheard et al. 2017) and Europe (Urbanavichus et al. 2020). The Ukrainian specimens are sterile and morphologically resemble *Rinodina subpariata*. The present taxon however contains pannarin instead of atranorin, and therefore shows a Pd+ orange-red spot reaction.

Specimens examined: Zakarpattia Region, Tiachiv District, Carpathian Biosphere Reserve, Shyrokyi Luh massive, valley of Luzhanka river, alt. 535–570 m, 48°18'27.0" N, 23°43'53.0" E, plot SL1, on bark of *Fagus sylvatica*, 24 May 2019, leg. Z. Palice ZP26970 (PRA), sterile, Pd+ orange spot reaction; ibid., alt. 580 m, 48°19'32.0" N, 23°44'09.4" E, plot SL5, on bark of *Fagus sylvatica*, 29 May 2019, leg. J. Vondrák 21554 (PRA), ITS: OQ718075, mtSSU: OQ646440.

Sporodophoron cretaceum (Hue) Ertz et Frisch Fig. 2

This lichen was found at the bottom of the limestone valley of Velyka Uholka, where it grew at the base of a hornbeam trunk in permanently humid conditions. It was a fertile crust with apothecia (in both specimens) at first identified as *Arthonia* sp., but did not match any description in Redinger (1937). The morphology of the apothecia and ascospores roughly resembled representatives of the genus *Arthonia*, section *Pachnolepia* (Redinger 1937). Our identification with *Sporodophoron cretaceum* is based on its mtSSU barcode sequence, which showed 97–99% identity. This is the first known record of a fertile individual in the genus *Sporodophoron*, which had previously not been known to possess apothecia (Frisch et al. 2015). The apothecia had a dark grey epihymenium, but were strongly obscured by a white pruina (Fig. 2A, C). The hypothecium was low and colourless. Ascospores, 15–25 × 7–9 µm in size, were 3–4-septate, with a distinctly enlarged upper cell (Fig. 2H–J). Sporodochia, typical of the genus, were also observed in our specimen (Fig. 2B), producing filamentous conidia (Fig. 2M). The thallus was lichenised by *Trentepohlia* (Fig. 2K, L).

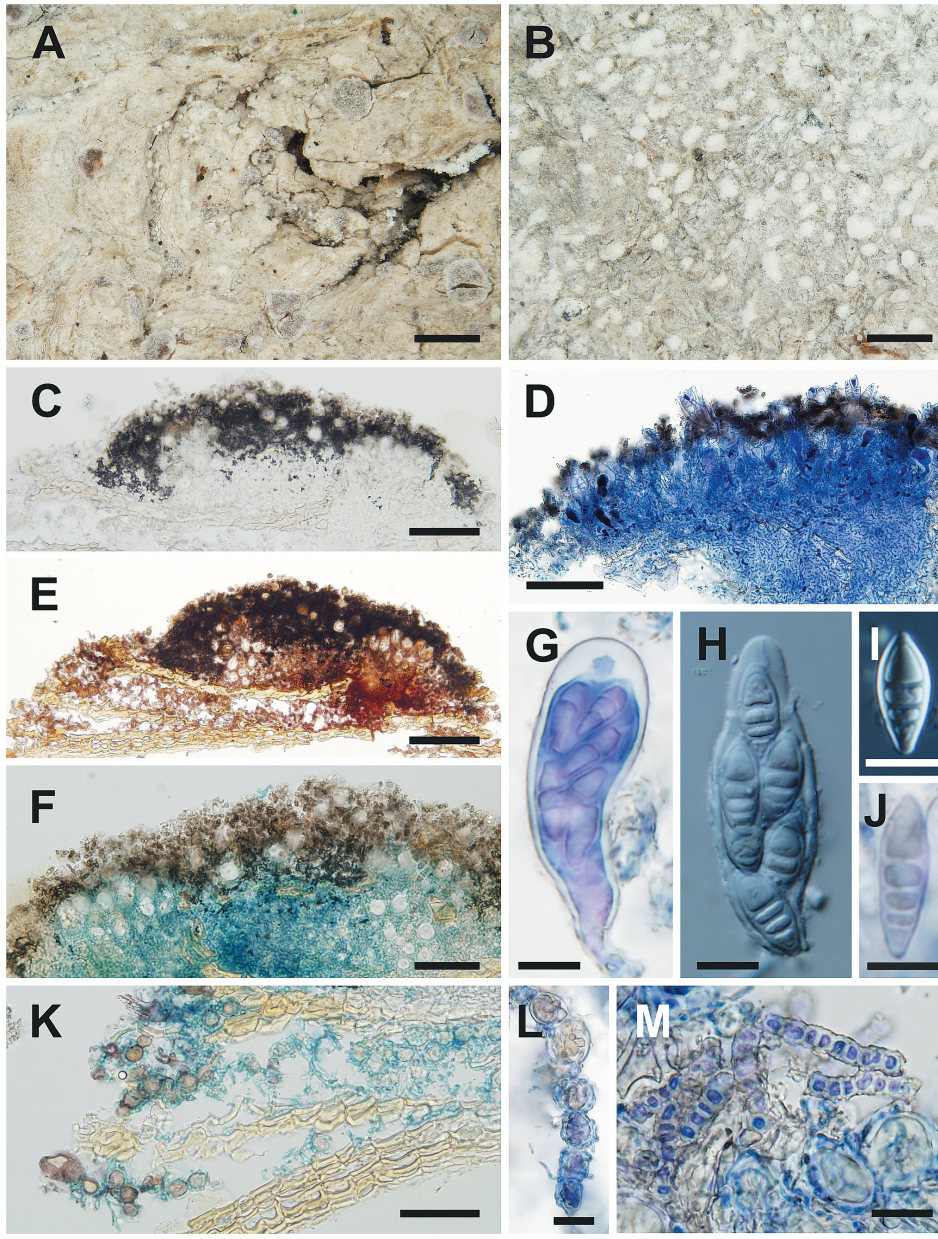

Fig. 2. *Sporodophoron cretaceum*. Specimens with apothecia (Vondrák 13947, PRA; but B, M, Vondrák 13949, PRA). **A** – thallus with white-pruinose apothecia; **B** – thallus with white punctiform sporodochia; **C** – vertical section through apothecium, with melanised epihymenium; **D** – hyphal structure in hymenium and subhymenium; **E** – I+ red hymenium and subhymenium; **F** – KI+ blue hymenium and subhymenium; **G** – young ascus; **H** – mature ascus with six ascospores; **I** – 3-septate ascospore; **J** – 4-septate ascospore; **K** – KI+ blue thallus; **L** – chain of *Trentepohlia* cells enveloped by hyphal network of the mycobiont; **M** – conidia-like structures in sporodochia. Medium: C – observed in water; D, G, J, L, M – stained with cotton blue; E – after Lugol's treatment; F, K – after KOH and Lugol's treatment; H, I – with differential interference contrast. Bars: A, B = 0.5 mm; C–E = 50 µm; F, K = 20 µm; G–J, L, M = 10 µm. Photo J. Machač & J. Vondrák.

The species is known from numerous localities in Europe under the influence of an oceanic climate (Italy, Great Britain, Denmark, Sweden, France). The lichen was erroneously reported from the Gorgany Nature Reserve, Ukraine (Khodosovtsev et al. 2016a, 2016b), based on a specimen later reidentified as *Inoderma sorediatum*. The genus *Sporodophoron* is reported from Ukraine here for the first time.

Specimens examined: Zakarpattia Region, Tiachiv District, village of Velyka Uholka, Carpathian Biosphere Reserve, Uholka massive, alt. 420–440 m, 48°14'41.6" N, 23°41'40.7" E, on bark of *Carpinus betulus*, 19 May 2015, leg. J. Vondrák 13947 (PRA), ITS: OQ717615, mtSSU: OQ646469; ibid., leg. J. Vondrák 13949 (PRA).

Xylographa pallens (Nyl.) Harm.

This wood-dwelling lichen is very similar to the widespread *X. parallela*, but mature ascomata of *X. pallens* differ in containing a pale 'dead zone' in the middle, where only remnants of previous ascomatal shells remain (Spribille et al. 2014). The species is known from Europe, Asia, and North America (Spribille et al. 2014).

Specimens examined: Ivano-Frankivsk Region, Nadvirna District, near the village of Bystrytsa, Gorgany Nature Reserve, alt. 1050 m, 48°25'50.6" N, 24°19'25.7" E, plot G2, on log, 23 August 2019, leg. J. Vondrák 22051, 21841 (PRA); c. 7.5 km NW of the village of Polianytsa, above valley of Zubrinka river, alt. 1300 m, 48°24'35.7" N, 24°23'41.6" E, plot G4, on snag, 25 August 2019, leg. J. Vondrák 21876 (PRA).

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