Preslia 94: 143–181, 2022
doi: 10.23855/preslia.2022.143

Preslia

From Cinderella to Princess: an exceptional hotspot of lichen diversity in a long-inhabited central-European landscape

Jan Vondrák[1,2*], Stanislav Svoboda[1,2], Jiří Malíček[1], Zdeněk Palice[1], Jana Kocourková[3], Kerry Knudsen[3], Helmut Mayrhofer[4], Holger Thüs[5], Matthias Schultz[6], Jiří Košnar[1,2] & Jeňýk Hofmeister[7,8]

[1]Institute of Botany of the Czech Academy of Sciences, CZ-252 43 Průhonice, Czech Republic; [2]Department of Botany, Faculty of Science, University of South Bohemia, CZ-370 05 České Budějovice, Czech Republic; [3]Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Department of Ecology, Kamýcká 129, CZ-165 00 Prague, Czech Republic; [4]Institute of Biology, University of Graz, Holteigasse 6, A-8010 Graz, Austria; [5]Botany Department, State Museum of Natural History, Rosenstein 1, D-70191 Stuttgart, Germany; [6]Biocentre Klein Flottbek, University of Hamburg, Ohnhorststrasse 18, D-22609 Hamburg, Germany; [7]Department of Forest Ecology, Faculty of Forestry and Wood Sciences, Czech University of Life Sciences Prague, Kamýcká 129, CZ-165 00 Prague, Czech Republic; [8]Global Change Research Institute of the Czech Academy of Sciences, Bělidla 986/4a, CZ-603 00 Brno, Czech Republic. *corresponding author: j.vondrak@seznam.cz

Abstract: Biodiversity is a key criterion in nature protection and often indicates habitats and localities rich in endangered species. Our research, using 48 one-man one-day field trips, located an exceptional lichen diversity hotspot and refugium for rare species, the Týřov National Nature Reserve (Czech Republic, central Bohemia). Within its 410 hectares, we detected 787 species of lichens and related taxa (675 lichens, 35 semilichens, 58 lichenicolous fungi and 19 bark microfungi). This is more species of these organisms than has ever been recorded from such a small area, up to 10 km^2, anywhere in Europe (and probably anywhere in the world). The species richness is positively correlated with the habitat heterogeneity within Týřov, which is very far from uniform. In most of the reserve, the species richness is fairly typical for the broader region, and only three sites, with an overall area of a mere 80 hectares, have distinctly higher species richnesses. The most species-rich site, with 502 species, is only about 25 hectares and is distinctly more diverse in habitats than other sites. The enormous importance of Týřov for biodiversity protection is emphasized by the nine species described as new to science: *Acarospora fissa*, *Bacidia hyalina*, *Buellia microcarpa*, *Micarea substipitata*, *Microcalicium minutum*, *Rufoplaca griseomarginata*, *Verrucaria substerilis*, *V. tenuispora* and *V. teyrzowensis*. Three species are new to Europe, 55 to the Czech Republic and 191 species are included in the national Red-list.

Keywords: biodiversity hotspot, DNA barcoding, lichenized fungi, *Verrucaria*

Received: 24 Jun 2021, Revised: 7 Sep 2021, Accepted: 26 Oct 2021, Published: 24 Mar 2022

Introduction

Biodiversity inventories contain unique data on a diversity of various types of organisms and consequently can be used to identify and so help in the conservation of biodiversity hotspots (Zechmeister et al. 2003) and protection of rare species (Jetz et al. 2019). In the Czech Republic, hundreds of small nature reserves are being surveyed for various organisms including bryophytes, fungi and lichens, with the aim to record in detail the diversity of particular groups of organisms. A common practice is to visit a reserve a few times within a year or two, but this superficial approach easily overlooks any areas rich in small organisms with a sparse distribution and peculiar niches, such as lichens (Lõhmus et al. 2018, Vondrák et al. 2018).

In most central-European landscapes north of the Alps, superficial surveys are unlikely to distinguish between areas rich in species of lichens and impoverished ones, because in rich localities the additional species are often scarce. Only a small proportion of these additional species will be detected by a perfunctory survey. One may ask why localities in central Europe tend to have a higher ratio of sparsely occurring species than some other European areas. The main reason is that specific niches preferred by lichens, e.g. various types of rock or tree-related microhabitats, are rare and sparsely distributed in ancient central European landscapes that have been transformed to agricultural land, woodland plantations or urbanized sites. As a result, most habitats rich in lichens have only a limited number of microsites suitable for a great diversity of lichens (Fritz & Heilmann-Clausen 2010, Boch et al. 2016, Hofmeister et al. 2016). Another reason is that high air pollution in the past greatly reduced the populations of many species, especially epiphytic lichens, and any survivors became restricted to especially favourable microsites (Hauck et al. 2013, Pescott et al. 2015, Malíček et al. 2019). Also, small-sized localities of epilithic lichens became, due to an absence of traditional extensive farming, overgrown by shrub and forest vegetation (Nascimbene et al. 2013, Kubiak & Osyczka 2020). These processes resulted in lichen communities in these ancient landscapes being impoverished. Only a few sites, largely untouched by humans and mostly in the mountains, are known to have distinctly more species (Malíček & Palice 2013, Malíček et al. 2019). However, it is now apparent that hotspots of lichen diversity can still be found, even at low altitudes, within landscapes with a long tradition of human exploitation, but only if they are thoroughly searched. In this study, we report the lichen diversity in one such unexpectedly species-rich area and its linkage with habitat heterogeneity.

Materials and methods

Study area

We studied the Týřov National Nature Reserve (Czech Republic, about 40 km south-west of Prague), a 420-hectare spot of natural habitats, protected since 1933 to conserve rich biodiversity occurring there in streams, forests and on rocks. It is located in the Protected Landscape Area Křivokátsko (Fig. 1), which consists mainly of agricultural land and woodland plantations. Natural forests and rocky habitats are limited to the surroundings of solitary peaks and to steep slopes above deeply incised rivers and streams. Křivoklátsko is one of the warmer and drier parts in the Czech Republic, with annual precipitation about 530 mm and mean annual temperature 7–8 °C.

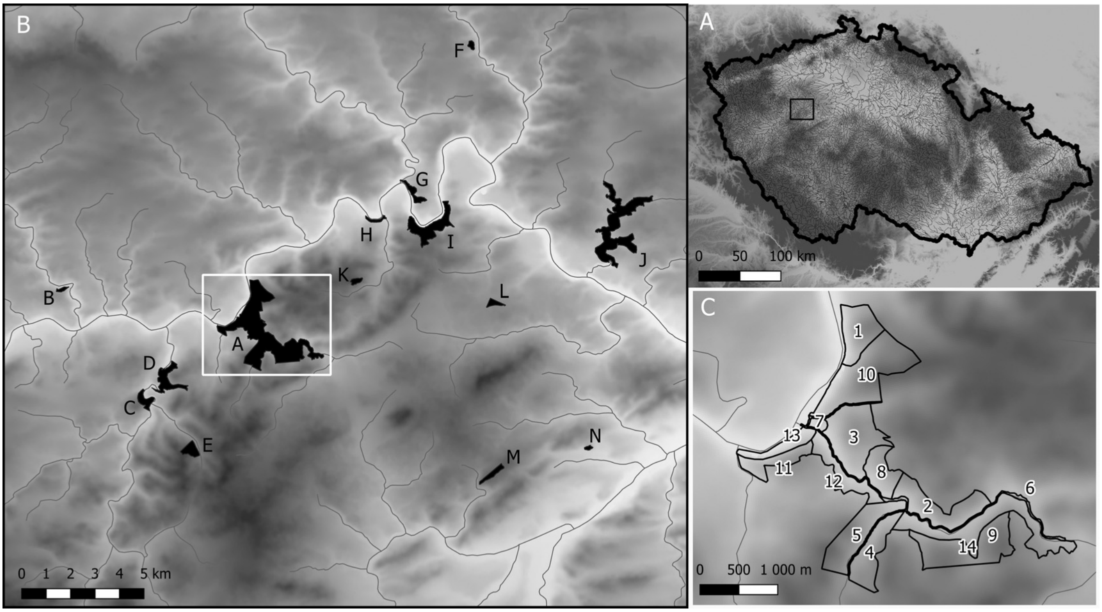

Fig. 1. Study area, the Týřov National Nature Reserve. (A) Location in the Czech Republic. (B) Locations of the study area (in white frame) and reference localities B–N in the region. (C) Division of the study area into 14 sampling units.

Predominant habitats in the study area are forests (~410 hectares), with patches of rocks and steppes (~10 hectares) in valleys of the streams Úpořský potok and Prostřední potok, and in an adjacent valley of the river Berounka, altitudes range from 250–520 m. Woodland vegetation is predominantly oak-hornbeam forests (of *Acer campestre*, *Carpinus betulus* and *Quercus petraea*, with less frequent *Sorbus torminalis*) but there are also scree forests rich in tree species (dominated by *Tilia cordata* / *T. platyphyllos* and *Fraxinus excelsior*, and with less frequent *Acer platanoides*, *A. pseudoplatanus*, *Fagus sylvatica,* and *Ulmus glabra*; *Taxus baccata* is locally frequent). Forest-steppes, frequently coverring upper parts of sun-exposed slopes, consist of sparse *Pinus sylvestris*, *Quercus petraea* or *Fraxinus excelsior* with an admixture of various shrub and tree species (e.g. *Crataegus* spp., *Prunus spinosa* and *Sorbus collina*). *Alnus glutinosa* stands are frequent in the bottoms of valleys. The bedrock is volcanic, formed of andesites, rhyolites and dacites (Mašek et al. 1997). Andesites, which form the major part of the local bedrock, are generally base-rich, occasionally with calcareous inclusions, but exposed surfaces are often base-poor. They weather easily and crumble into small pebbles. Rhyolites, restricted to the southernmost part, are always base-poor, without calcareous inclusions and weather slowly into large boulders. Dacites, forming rocks in the eastern part, have an intermediate character between andesites and rhyolites.

The landscape of Týřov is currently almost entirely forested, but was not so in the past. According to forest maps, the present age of most stands in the area ranges between 100 and 150 years, though some trees are undoubtedly much older. In some places, current stands are a first generation of forest after a period of deforestation, but not a tree-less landscape used for extensive grazing. The picture from 1822 shows only solitary trees and

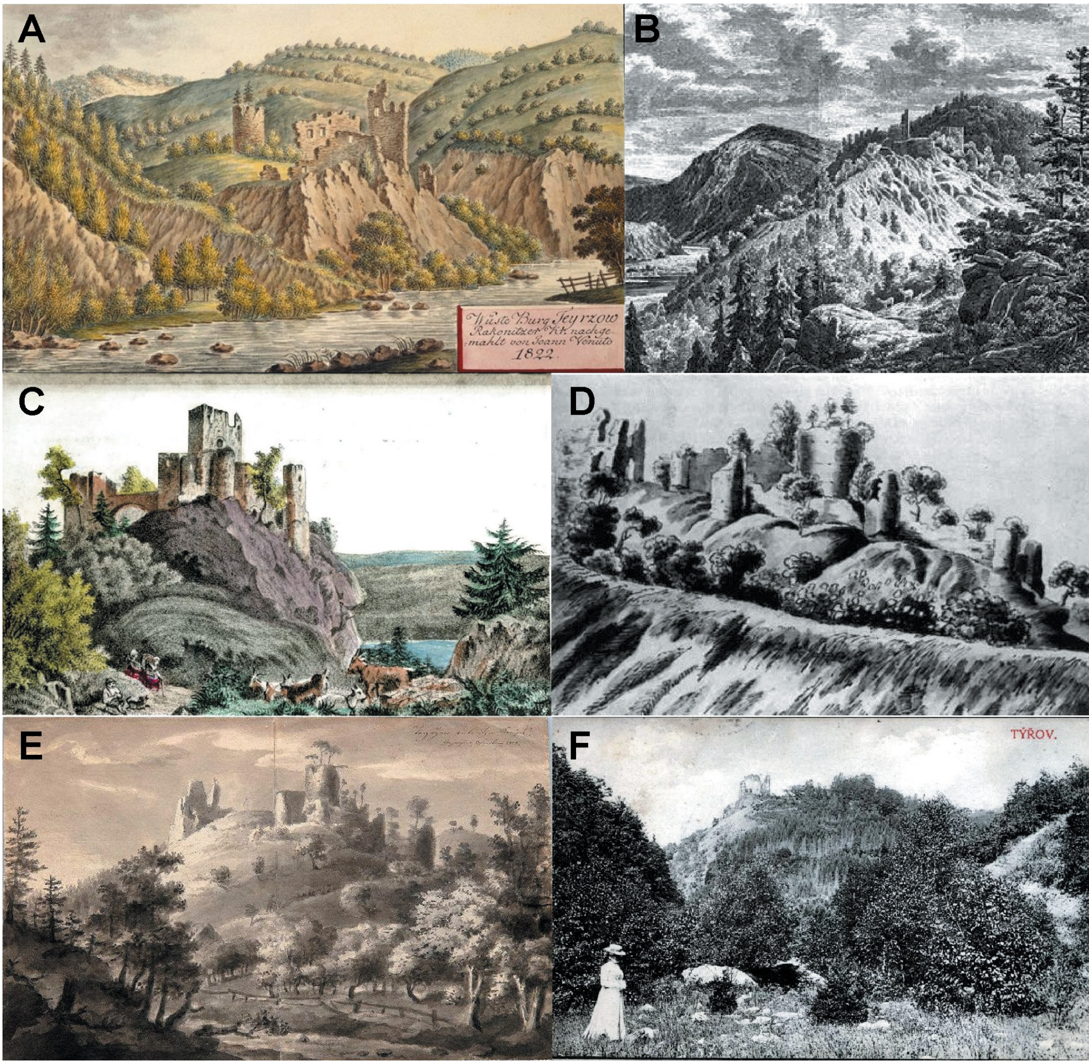

Fig. 2. Forestless landscapes at the ruin of Týřov in 18th, 19th and early 20th century. Most of these landscapes are covered by forest nowadays. (A) Forestless hills from the left: Na Budkách, Vápenný vrch, Vosník, painted by Johann Venuto, 1822. (B) The ruin viewed from the hill Vosník, anonymous author, 18th century. (C) Goats and herdsman on a pasture at ruin, postcard, 1901. (D) Almost treeless surroundings of the ruin, anonymous author, early 19th century. (E) Valley of the Úpořský potok stream, Josef Šembera, 1824. (F) An early stage of forest expansion in the valley of the Úpořský potok stream; postcard, 1914.

shrubs on the hills Vosník and Vápenný vrch, which are now covered by forest (Fig. 2A). The valley of Úpořský potok is similar; in the 19th century it was pasture with groups of shrubs and trees (Fig. 2E). The hill with the ruin of the castle of Týřov was still largely uncovered by forest at the beginning of the 20th century and served as goat pasture (Figs 2B–D). Initial phases of forest invasion in the valley and a young conifer plantation on the south-east slope of the castle hill are depicted on a postcard dated 1914 (Fig. 2F).

Division into sampling sites

Týřov was divided into fourteen sampling sites distributed fairly uniformly over the whole area (Fig. 1). The time spent surveying each locality was 20 hours on average, with some variation from site to site based on their lichenological interest. The sites and notes on their habitats are listed below. The areas cited are all approximate. The number of well-developed habitats (as well as the total number of habitats) is given for each site.

(1) Týřovické skály rocks (area: 25 ha; altitudes 250–450 m; available habitats: 14 (22); survey: 79 man-hours; species detected: 502). It has the best developed rocky habitats uncovered by forest within Týřov (Supplementary Fig. S1A). Rocky slopes, mainly facing west, formed of andesites with variable attributes. Some exposed rocks, obviously unweathered, are hard and acidic, without traces of base enrichment. In other places, andesites (or their tuffs) are soft, weathered and crumbling into gravel; such rocks are usually base-rich. Calcareous inclusions are frequent in lower parts of rocky outcrops and seepage water from these inclusions has sometimes calcified large surfaces of the volcanic rocks (Supplementary Fig. S1B). Less exposed rocky surfaces are covered by forest-steppe with predominant oak and ash trees. Decorticated logs of oaks are rather frequent in forest-steppes and their wood resists rotting and persists in a hard state for a long time. Oak-hornbeam and scree forests only occur at the margins of this locality.

(2) Southern rocky slopes above the stream Úpořský potok, below the hill Průhonek (area: 25 ha; altitudes 300–400 m; available habitats: 12 (21); survey: 40 man-hours; species detected: 337). The area is mainly covered by oak-hornbeam and scree forests along a strong gradient of humidity, from damp forests at the base of the slope to dry stands of shrubs or forest-steppes with mainly oak, ash and pine on the upper parts of the slopes and in rocky stands. Sun-exposed rocks and tree-less steppes are present in a few places. Rocks are formed of andesite, which is partly base-rich, with a few calcareous inclusions.

(3) South-western rocky slopes above the stream Úpořský potok, below the hill Vápenný vrch (area: 30 ha; altitudes 270–420 m; available habitats: 13 (18); survey: 31 man-hours; species detected: 340). Largely covered by forest-steppe with oak, ash and pine. Damp scree forests occur on the lower parts of the slopes, and drier oak-hornbeam forests occur localy, mostly at the margins. Rocky outcrops are frequent and well developed, formed of andesite with numerous base-rich microhabitats and some calcareous inclusions.

(4) Western slope above Prostřední potok (area: 20 ha; altitudes 280–430 m; available habitats: 8 (11); survey: 18 man-hours; species detected: 202). The area has a colder and more humid mesoclimate than other sites and harbours a distinct lichen flora, not observed elsewhere in Týřov. Rhyolite screes and rocky outcrops are partly covered by sparse pine forest or by solitary pine trees. Fir used to be a common tree on this slope, but currently only rather young trees remain, with a lot of decaying fir wood (stumps and logs) with a locally unique lichen biota.

(5) Eastern slope above Prostřední potok (area: 30 ha; altitudes 280–500 m; available habitats: 4 (8); survey: 10 man-hours; species detected: 188). Mostly covered by oak-hornbeam and scree forests, partly by forest-steppes and tree-less rocky habitats; screes occur in a few places. Bedrock is an acid rhyolite.

(6) Valley bottoms of the streams Úpořský potok and Prostřední potok (area: 25 ha; altitudes 250–370 m; available habitats: 4 (9); survey: 23 man-hours; species detected:

198). Damp stones in and around streams are a characteristic habitat, together with damp forests dominated by *Alnus glutinosa* and locally by *Carpinus betulus*, *Acer* spp. and *Fagus sylvatica*.

(7) The hill with the ruin of the castle of Týřov (area: 2 ha; altitudes 260–320 m; available habitats: 2 (10); survey: 12 man-hours; species detected: 211). A single area with an anthropogenic habitat represented by the ruined walls of the castle. Tree-less andesite rocky slopes on the south slope of the hill are the most xerothermic site in the whole area and have some thermophilous lichens. The andesite rocks are locally enriched by lime from concrete in the ruined walls. The northern and eastern slopes are covered by scree forest.

(8) South-western rocky slopes above Úpořský potok, below Průhonek (area: 17 ha; altitudes 280–400 m; available habitats: 7 (16); survey: 10 man-hours; species detected: 207). Covered by oak-hornbeam forest, or by shrubs or forest-steppe in more sun-exposed rocky sites. Rocky steppes occur in places. Andesite outcrops are locally base-rich, but calcareous inclusions are very rare.

(9) The rocky hills U Tří skalek and Tok (area: 40 ha; altitudes 380–490 m; available habitats: 3 (8); survey: 14 man-hours; species detected: 161). Mostly covered by woodlands including conifer plantations, oak-hornbeam and beech forests. Tree-less sites with rhyolite outcrops are well developed in two places. The north slope of Tok has a few open rhyolite screes with unique communities of montane lichens.

(10) Rocky ridge and slopes of the hill Vysoký vrch (area: 60 ha; altitudes 250–520 m; available habitats: 2 (10); survey: 7 man-hours; species detected: 219). The area includes slopes on both sides of the SW–NE oriented ridge. The north-west slope is covered mainly by scree forests, but forest plantations predominate in the south-east. Forest steppes with oak, pine and ash trees are present in places on the ridge and the south-east slopes. Tree-less rocky steppes occur on a few small andesite outcrops, which are locally base-rich to calcareous.

(11) Upper part of the north-western slope of the hill Vosník (area: 14 ha; altitudes 300–420 m; available habitats: 2 (9); survey: 7 man-hours; species detected: 147). Covered by oak-hornbeam and scree forests with frequent *Taxus baccata*. Andesitic, partly lime-enriched rocky outcrops are mostly shaded by trees. Only a few acidic outcrops at the top of the hill are more directly exposed to sun.

(12) North-eastern slope above Úpořský potok (area: 15 ha; altitudes 270–350 m; available habitats: 4 (8); survey: 9 man-hours; species detected: 129). Mostly covered by damp scree forest. Andesitic outcrops are largely in shade, below trees, but two rocks rise above the tree canopy. Base-rich and lime enriched rocks are restricted to a few spots.

(13) Lower part of the north-western slope of Vosník (area: 7 ha; altitudes 250–300 m; available habitats: 2 (6); survey: 10 man-hours; species detected: 135). Currently covered by scree forest with yew more than 100 years old (Supplementary Fig. S1C), but in the past largely deforested and much eroded (Fig. 2A). The frequent andesite outcrops are usually base-rich and locally calcareous. They are mostly shaded, but some sites by the river Berounka are partly directly exposed to sun light and have distinct lichen communities.

(14) Northern slope above Úpořský potok (area: 47 ha; altitudes 270–350 m; available habitats: 3 (7); survey: 10 man-hours; species detected: 122). Mostly covered by damp scree forest. Only small rocky outcrops, shaded by trees, are present.

Lichen biodiversity survey

Most of the fieldwork, which consisted of 48 one-man one-day visits, was done in the years 2018–2021 (Vondrák 33 visits, Malíček 8 and Palice 7). A total of 318 hours was spent in the field. Supplementary Table S1 lists the details. Important additional floristic data, especially of lichenicolous fungi, was provided by J. Kocourková based on visits in the years 1996–2005. Further additional data come from visits by Palice and Vondrák in 2005, Šoun in 2020 and Thüs in 2021.

We aimed to cover all microhabitats and substrates, to maximize detection of species. We recorded species that are clearly lichenized, and also fungi that appear to have a loose association with algae, though they lack a typical algal layer (we call these fungi "semi-lichens"). Genera with semilichens include: *Anisomeridium*, *Arthonia*, *Arthopyrenia*, *Chaenothecopsis*, *Cyrtidula*, *Eopyrenula*, *Epigloea*, *Julella*, *Leptorhaphis*, *Lichenothelia*, *Melaspilea*, *Microcalicium*, *Mycocalicium*, *Stenocybe*, *Strigula* and *Thelocarpon*. We also recorded bark microfungi that are clearly not lichenized, such as *Amphisphaeria*, *Kirschsteiniothelia*, *Peridiothelia*, *Rebentischia*, *Requienella* and *Strickeria*, and lichenicolous fungi. The catalogue of all the species recorded is attached in Supplementary Data S1 and data for all 6526 records are in Supplementary Table S2.

Some species were identified based only on their morphology. Numerous others were identified, or their identification was confirmed using data from thin layer chromatography (henceforth abbreviated to TLC; done for 81 species) or DNA sequences. Voucher specimens for records of Palice and Vondrák are deposited in PRA (herbarium of the Institute of Botany of the The Czech Academy of Sciences). Specimens recorded by Kocourková, Malíček and Šoun are in their personal herbaria; a few specimens are in the public herbaria PRM and STU. Detailed data for all records of lichens and semilichens are deposited in the national database of lichens and bryophytes (dalibor.ibot.cas.cz) and are publicly available online in the Atlas of Czech lichens (https://dalib.cz; Malíček et al. 2021). Lichen nomenclature used here follows the current version of that Atlas. (The records in the Atlas are indexed by today's names, but in the future, they may also be indexed under other names.)

Sequencing for barcoding purposes

DNA was extracted using a cetyltrimethylammonium bromide (CTAB)-based protocol (Aras & Cansaran 2006). Two DNA loci were amplified: mitochondrial small subunit ribosomal DNA (mtSSU in further text), and internal transcribed spacer (ITS) region of nuclear ribosomal DNA (ITS in further text). For DNA barcoding purposes, we generated the 297 ITS and 262 mtSSU sequences listed in Supplementary Table S3.

Polymerase chain reactions were performed in a reaction mixture containing 2.5 mmol/l $MgCl_2$, 0.2 mmol/l of each dNTP, 0.3 µmol/l of each primer, 0.5 U Taq polymerase (Top-Bio, Praha, Czech Republic) in the manufacturer's reaction buffer, and sterile water to make up a final volume of 10 µl. The primers and the cycling conditions are summarized in Supplementary Table S4. Successful amplifications were sent for Sanger sequencing (GATC Biotech, Konstanz, Germany). Sequences were edited using BioEdit v.7.0.9.0 (Hall 1999).

ITS trees in Verrucariaceae

ITS sequences of two poorly known groups of *Verrucariaceae* were aligned by MAFFT v.7 (Katoh & Standley 2013; available online at http://mafft.cbrc.jp/alignment/server) using the Q-INS-i algorithm with the gap opening penalty set to 1. Ambiguously aligned positions at the beginning of ITS1 region were excluded and gaps coded as missing data. The best-fit model of sequence evolution was selected using the Akaike information criterion calculated in jModelTest v.0.1.1 (Posada 2008). Phylogenetic relationships were assessed using Bayesian inference as implemented in MrBayes v.3.1.2 (Huelsenbeck & Ronquist 2001). Two runs starting with a random tree and employing four simultaneous chains each (one hot, three cold) were executed. The temperature of a hot chain was set empirically to 0.05, and every 100th tree was saved. The analysis was considered to be completed when the average standard deviation of split frequencies dropped below 0.01. The first 25% of trees were discarded as the burn-in phase and the remaining trees were used for construction of a 50% majority consensus tree.

Catalogue of habitats and habitat heterogeneity

We put together a catalogue of regionally available habitats for lichens (Supplementary Data S2). It consists of four sections reflecting substrate preferences: habitats for (i) saxicolous, (ii) terricolous, (iii) epiphytic and (iv) lignicolous lichens.

The classification of habitats for saxicolous lichens is based on the availability of carbonates and other minerals (acidic siliceous, base-rich siliceous, calcareous), availability of light (exposed to sun light, shaded), availability of water (e.g. seapage rocks, stones in streams, river side rocks, vs. overhanging rocks or air-dried rocks), extrinsic nutrient enrichment (bird perches) and size (rocks, stones, pebbles).

Habitats for terricolous lichens are classified according to the predominant lichen growth form (*Cladonia* carpets vs. other types) and according to presumed availability of carbonates and light. Habitats for epiphytic and lignicolous lichens are classified according to the light and humidity conditions and predominant tree species. Habitats with a negligible contribution to lichen biodiversity in the area studied, such as conifer plantations, are not included.

Based on the catalogue of regionally available habitats, we calculated a value of habitat heterogeneity for the sites sampled in order to compare them with reference localities (Fig. 2B). Our measure of habitat heterogeneity is based on pooling the numbers of well developed habitats and poorly developed (or poorly inhabited) habitats divided by two. The spatial aspect and grain size of habitat heterogeneity are not included in this measure.

Regional context of lichen species richness

The relationship between numbers of species present and the area and heterogeneity of the habitats at Týřov were compared with that at 13 other reserves within 20 kilometers of Týřov (Fig. 2B). For this, we used lichen biodiversity inventories that were compiled in 2010–2020 using similar methods to our study. The results of these other inventories are either published or held, as manuscripts, by the Nature Conservation Agency of the Czech Republic.

Results

Lichen biodiversity survey

We detected a total of 787 species in the 48 one-day, one-man field trips (Supplementary Data S1 – Catalogue of all recognized taxa). The maximum number of species recorded in a single day was 235; on another three days we recorded more than 200 species. About one third of the total richness (280 species) was detected in the first three visits. Visits 4–25 produced an average increase of 15.4 species per field trip and visits 26–48 produced an average of seven species (Fig. 3).

The species list includes 675 lichens (88% of total), 35 semilichens (see above definition), 58 non-lichenized lichenicolous fungi and 19 non-lichenized bark microfungi occurring in lichen microhabitats. Nine species are described as new to science: *Acarospora fissa*, *Bacidia hyalina*, *Buellia microcarpa*, *Micarea substipitata*, *Microcalicium minutum*, *Rufoplaca griseomarginata*, *Verrucaria substerilis*, *V. tenuispora* and *V. teyrzowensis*.

Three species are new to Europe: *Lecidea fuscoatrina*, *Leprocaulon nicholsiae* and *Lichenothelia papilliformis*. Fifty-five are new to the Czech Republic: *Arthonia thoriana*,

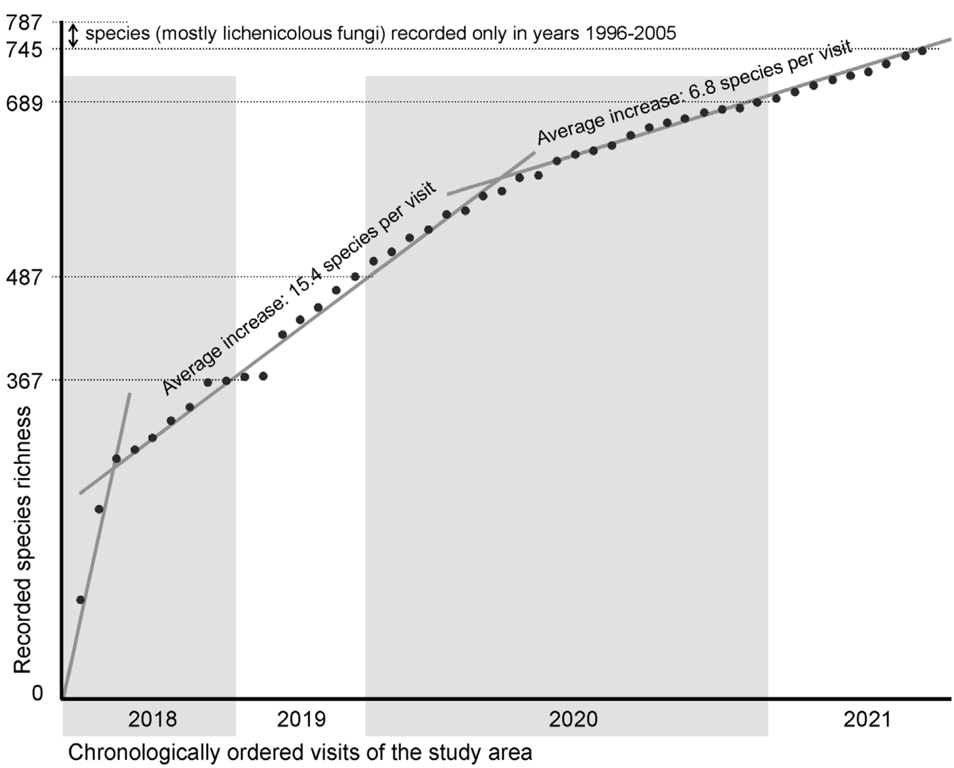

Fig. 3. Cumulative counts of detected species during the 48 visits of the study area.

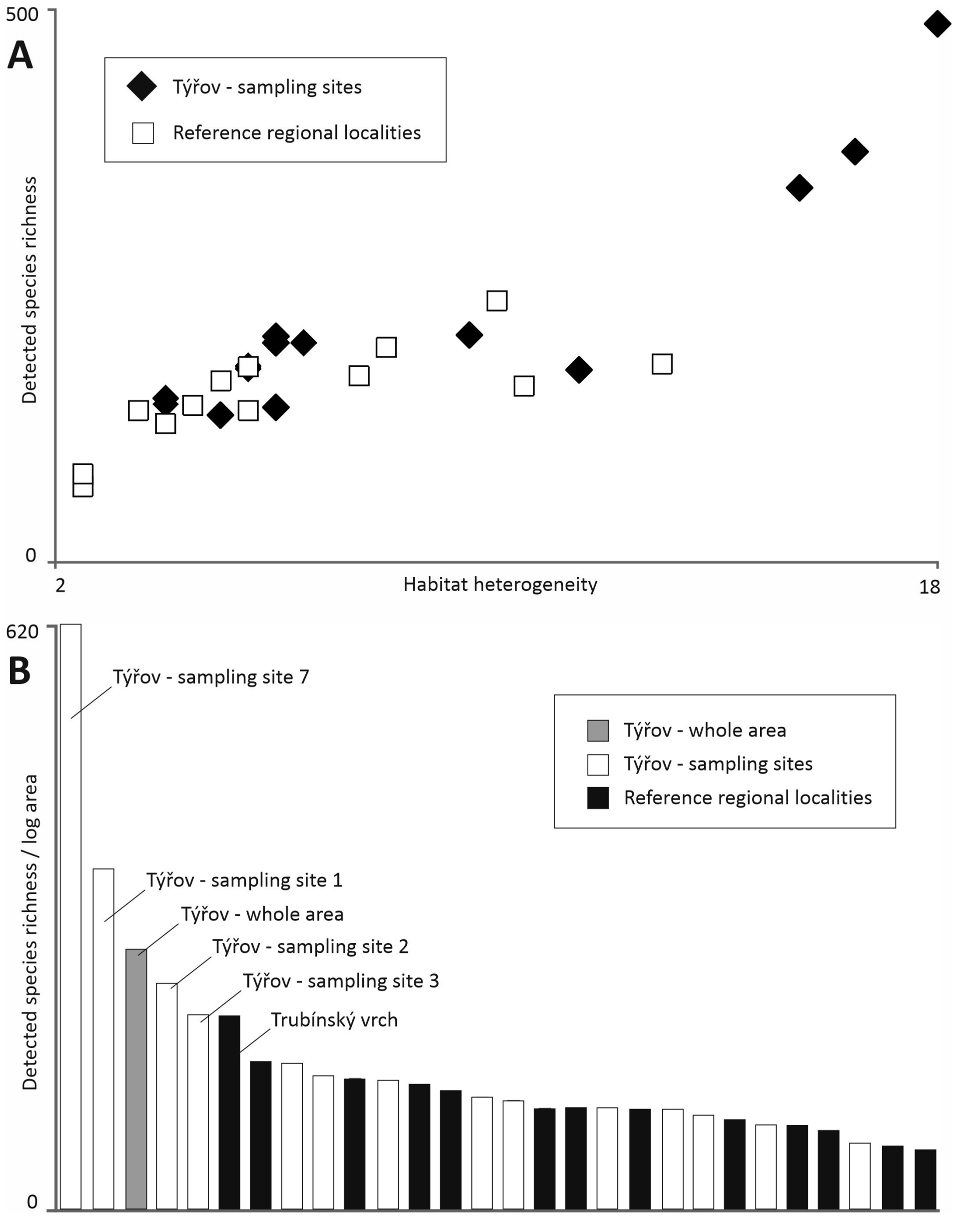

Fig. 4. Species richness in the study area and its sampling sites in context of regional reference localities (see Fig. 1B and Tables 1, 2 for details). (A) Relationship between species richness and habitat heterogeneity, calculated as a count of well developed habitats, plus a count of poorly developed habitats divided by two (half-weighted). (B) Species richness per area (log) in the study area and its sites and in reference localities.

Table 1. Habitats detected in sampling units of the study area and in reference localities. * well developed; (*) poorly developed habitats. Habitats are described in the Supplementary Data S2.

Habitats	Sampling units of the study area (A on Fig. 1B)														Reference localities (B–N on Fig. 1B)												
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	B	C	D	E	F	G	H	I	J	K	L	M	N
For epilithic lichens:																											
1. Pebbles and stones in forest	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)		(*)	(*)	(*)	(*)		(*)	(*)	(*)			
2. Acidic rock outcrops in shade	*	*	*	*	*	*	*	(*)	(*)	(*)	(*)	*	(*)			*	*			*	*	*	*	(*)		*	
3. Sun-exposed acidic rocks	*	*	*	*	(*)		(*)	*	*	*	(*)	*				*	*			*	*	*	*	*		*	*
4. Base-rich outcrops in shade	*	(*)	(*)			(*)		(*)		(*)	(*)	(*)	(*)							*	*	(*)	(*)				(*)
5. Sun-lit base-rich rocks	*	(*)	*				*			(*)										*			(*)				*
6. Pebbles and stones in rocky steppes and dry screes	*	*	*				(*)	(*)								*	*			*	(*)	*	(*)				*
7. Calcareous inclusions in andesite outcrops	*	(*)	*					(*)			(*)									(*)							
8. Lime enriched seapage rocks with cyanolichens	*	(*)	(*)																								
9. Boulders in damp screes	(*)			*	(*)				*								*			(*)							
10. Extremely exposed hard rocks	*		(*)																			(*)				(*)	
11. Nutrient-rich outcrops at river bank	*												*														
12. Stones and concrete in ruin wall								*															(*)				
13. Stones in streams						*											(*)						*				
For terricolous lichens:																											
1. Bryophytes and plant debris in lime enriched sites	*	(*)	*				(*)	(*)		(*)										(*)							
2. Soil and bryophytes on rocky steppes	*	*	*					(*)								*	*			*		*	(*)				*
3. *Cladonia* carpets on acid soils	(*)	*		*					(*)								(*)			(*)	(*)		(*)	(*)		(*)	
4. Soil patches in damp sites	(*)			(*)					(*)									(*)	(*)	(*)							
For epiphytic lichens:																											
1. Hornbeam stands	(*)	*	*		*	*	(*)	*				(*)		(*)	(*)	(*)	(*)		*	(*)		(*)	*	(*)	(*)		
2. Damp scree forests	(*)	*	*			(*)	(*)			(*)	(*)	(*)	(*)	*	(*)	*	(*)	*	*	(*)	(*)	(*)	(*)				
3. Sparse oak forests and forest-steppes	*	*	*	(*)	*			*		(*)	(*)				(*)	(*)	*	(*)				(*)	*	*	*	(*)	
4. Haw and blackthorn shrubs		*					(*)	*				*		*		(*)	(*)			*		(*)					*
5. Hazel stands		(*)	*			(*)		(*)						(*)			(*)			(*)							
6. Pine stands	(*)	(*)		*						(*)	(*)									(*)							
7. Sparse ash stands on nutrient-rich sites on rocky slopes	*	*	*					*																			
8. Beech stands		(*)				(*)								(*)				*									
For lignicolous lichens:																											
1. Rapidly decaying dead wood	(*)	*	(*)	*	(*)	*	(*)	(*)	*			*	*	*	(*)			*	(*)						(*)		
2. Wood resisting decay in dry and lit sites	*	*	*	*	*			*	(*)	*	*					*	*	*	(*)	*		(*)	*	*	(*)		
3. Dead wood in remnants of fir-pine stands				*																							
Number of well developed habitatas	8	9	5	3	4	5	8	9	5	8	8	4	4	4	5	3	7	3	4	10	3	8	8	4	3	3	1
Number of poorly developed habitatas	14	12	13	8	4	4	2	7	3	2	1	4	2	3	0	6	7	4	2	8	3	4	6	3	1	2	5
Total number of available habitats	22	21	18	11	8	9	10	16	8	10	9	8	6	7	5	9	14	7	6	18	6	12	14	7	4	5	6

Arthopyrenia fallaciosa, *Arthopyrenia inconspicua* auct., *Aspicilia brucei*, *Bertia gigantospora*, *Buellia ocellata*, *B. sandstedei*, *Byssoloma diederichii*, *Cheiromycella microscopica*, *Cyrtidula quercus*, *Endococcus brachysporus*, *E. karlstadtensis*, *Eopyrenula avellanae*, *Gonohymenia schleicheri*, *Hyalotrochophora lignatilis*, *Immersaria cupreoatra*, *Inoderma sorediatum*, *Ionaspis obtecta*, *Lecanora subravida*, *Lecidea plebeja*, *Lepraria humida*, *Lichenostigma chlaroterae*, *Lichinella myriospora*, *Lithothelium septemseptatum*, *Micarea coppinsii*, *M. herbarum*, *M. microsorediata*, *Muellerella polyspora*, *Nectriopsis micareae*, *Paranectria oropensis*, *Peltigera neocanina* ined., *Pertusaria stalactiza*, *Placopyrenium cinereoatratum*, *Porocyphus rehmicus*, *Porpidia contraponenda*, *Protoparmelia oleagina*, *Reichlingia zwackhii*, *Requienella fraxini*, *Rhizocarpon fratricida*, *R. geminatum* var. *citrinum*, *R. rubescens*, *Rinodina obnascens*, *R. poeltiana*, *Sarea coeloplata*, *Spirographa ciliata*, *Stigmidium lichenum*, *Strigula taylori*, *Tremella candelariellae*, *T. diploschistina*, *T. wirthii*, *Verrucaria devensis*, *V. elaeina*, *V. tabacina*, *Waynea giraltiae* and *Xanthoparmelia plittii*. Five species are rediscovered in the Czech Republic after more than 80 years: *Arthopyrenia fraxini*, *Callome multipartita*, *Dermatocarpon meiophyllizum*, *Ramalina obtusata* and *Rinodina archaea*. 44 tentative taxa are classified as “known unknowns”, i.e. taxa that are well defined but did not match any species known to us. Three of the "known unknowns" belong in *Bacidina* and 22 in *Verrucaria*.

Other remarkable records are e.g. *Caloplaca ulcerosa*, *Calicium abietinum*, *C. montanum*, *Gyalecta* (five species), *Gyalideopsis helvetica*, *Hertelidea botryosa*, *Lecania suavis*, *Lecanora impudens*, *Micarea tomentosa*, *Miriquidica intrudens*, *Pleopsidium flavum*, *Pterygiopsis neglecta*, *P. umbilicata*, *Rinodina moziana*, *R. fimbriata*, *Rostania occultata*, *Stigmidium rivulorum* and *Xanthoria sorediata*.

An astonishing number of red-list lichen species (cf. Liška et al. 2008) was recorded: six regionally extinct, 25 critically endangered, 56 endangered and 104 vulnerable. Species classified as data deficient are also numerous (185 species).

Epiphytic (including lignicolous) and saxicolous species were about equally frequent; 362 and 386 species, respectively. Fewer species were recorded on soil and humus (72). We obtained the high total number of epiphytic lichens even though most trees are poor in epiphytes. It is a result of (i) the affinity of rare species for some exceptional trees, with specific microhabitats and microclimate, sparsely scattered in the area studied and (ii) the high species turnover among these trees.

Macrolichens, with foliose (91 species) and fruticose (54) thalli, represent ~20% of the local species richness; microlichens (i.e. crustose lichens and semilichens) predominate.

Species richness at the sites sampled

The numbers of species detected at each of the above 14 sites varied considerably, which indicates that lichen diversity is not spatially uniform at Týřov. The richest site (Týřovické skály rocks, with 502 species in 25 hectares) has more than four times as many species as the poorest, site 14 with 122 species. Note, however, that even the richest site includes fewer than two thirds of all the species detected.

All the sites sampled, even the least species rich, contributed to the total biodiversity with at least one species that was not detected elsewhere in the reserve. About one third of species (250) were recorded at only a single site, and each site sampled had from 1 to 104 species recorded only at that site. At each site the number of species not recorded elsewhere is correlated with the total number of species at that site. The richest site, with 104 species found only at that site, stands out. None of the others had more than 27 such species.

Species richness correlates with habitat heterogeneity

Lichen species richness increased with habitat heterogeneity at the sites sampled (Fig. 4A). The three most species rich sites also have distinctly more habitats than the others. Moreover, some habitats, e.g. lime enriched seepage rocks, only occur at these sites (Table 1). The three most species-rich sites sampled, covering 20% of the reserve and with 337–502 species, are outstanding hotspots in a regional context and on average have distinctly more habitats. At the other 11 sites, both species richness (122–219 species) and habitat heterogeneity are comparable with those recorded in thirteen nearby reserves (with 62–213 species) (Fig. 4A).

Above-average species richness per area in a regional context

Four of the sites sampled have distinctly higher species richness per area than the protected areas surveyed in the same region (Fig. 4B). Site 7, the ruin of castle Týřov and surrounding slopes, with its 211 species on a mere 2 hectares, is the most species rich site per area, but its position in first place may be an artefact arising from its very small area. It is followed by the three most species-rich but larger sites and by the whole area of Týřov (Fig. 4B). The remaining sites with fewer species have species richness per area comparable with protected areas surveyed in the same region (reference localities B–N in Fig. 1B and Table 2).

Record frequencies in the area studied

The 787 species detected were from a total of 6526 records. More than a quarter of the species, i.e. 225, have only a single record. About half, i.e. 384 species, have up to three records and most of them are considered exceptionally rare in the area, though in a few cases this may be an artefact of under-recording (e.g. the most inconspicuous lichens and lichenicolous fungi). 233 species have between four and 10 records and only 170 have more than 10 records.

Epiphytic cyanolichens

Cyanolichens are uncommon in most Czech landscapes, and Týřov, with 42 species, is undoubtedly the richest locality known in the Czech Republic. The richness of epiphytic cyanolichens is even more outstanding because, with the exception of *Peltigera praetextata*, they have not been detected in the vast majority of the localities surveyed within Czechia. In Týřov, we recorded four predominantly epiphytic cyanolichens (*Scytinium lichenoides*, *S. subtile*, *S. teretiusculum* and *Rostania occultata*) and a few generally saxicolous or terricolous species on bark (e.g. *Collema flaccidum*, *Scytinium magnussonii*, *S. pulvinatum* and *Peltigera* spp.). They form communities especially on trunk bases and exposed roots of ash trees, where several cyanolichens occur together.

Table 2. List of reference localities, ordered according to decreased detected species richness. Some data are not published, but deposited in the archive of the Nature Conservation Agency of the Czech Republic (AOPK).

Locality	Number of species	Area (km^2)	Reference
Regional level (indexed according to Fig. 1B)			
(G) Stříbrný luh	213	1.50	Vondrák 2020 (AOPK)
(I) Na Babě	175	0.24	Malíček & Kocourková (2014)
(J) Vůznice	162	2.31	Halda 2012 (AOPK)
(E) Kohoutov	159	0.29	Malíček (2020)
(C) Lípa	152	0.26	Šoun 2020 (AOPK)
(K) Vysoký tok	148	0.09	Kocourková 2018 (AOPK)
(D) Jezírka	144	0.59	Šoun 2019 (AOPK)
(H) U Eremita	128	0.08	Kocourková 2018 (AOPK)
(M) Vraní skála	124	0.21	Malíček & Kocourková (2014)
(N) Trubínský vrch	124	0.04	Lenzová & Svoboda (2015)
(F) Svatá Alžběta	113	0.07	Kocourková 2018 (AOPK)
(L) Červený kříž	72	0.13	Kocourková 2018 (AOPK)
(B) Dubensko	62	0.05	Šoun 2018 (AOPK)
Country-wide level (inventories including >200 species)			
Černé a Čertovo jezero	450	2.80	Palice (unpublished estimation)
Kar Plešného jezera	400	0.78	Palice (unpublished estimation)
Boubín	356	6.86	Vondrák et al. 2020 (AOPK)
Cigánka (Slovakia)	338	44.00	Guttová & Palice (2005)
Ralsko & Vranovské skály	298	0.36	Malíček & Vondrák (2018b)
Mohelenská hadcová step	272	1.90	Malíček et al. (2017)
Čertova stráň	250	0.47	Vondrák et al. 2020 (AOPK)
Bílá strž	250	0.76	Palice 2021 (AOPK)
Karlštejn	246	15.47	Svoboda 2013 (AOPK)
Děvín-Kotel-Soutěska & Tabulová	245	4.90	Malíček & Vondrák (2018a)
Vývěry Punkvy	242	5.50	Kocourková 2006 (AOPK)
Velká kotlina	236	28.00	Halda (2017)
Vyšenské kopce	207	0.55	Vondrák (2006)
Kleť	204	0.65	Vondrák et al. 2019 (AOPK)
European level (inventories including >500 species)			
Mercantour - Roya-Bévéra (France)	1018	>100	Roux C. et al. (2012)
Bödmeren Forest-Silberen (Switzerland)	1000	24	Groner (2016, 2020)
Koralpe (Austria)	910	>100	Hafellner (2008)
Mercantour - Haut-Var (France)	815	312	Roux C. et al. (2013)
Mercantour - Haute-Ubaye (France)	805	>100	Roux C. et al. (2011a)
Stubalpe (Austria)	739	445	Hafellner & Obermayer (2007)
Mercantour - Haute-Vésubie (France)	720	>100	Roux C. et al. (2015)
Mercantour - Haute- et de Moyenne-Tinée (France)	709	>100	Roux C. et al. (2014)
Mercantour - Haut-Verdon (France)	661	>100	Roux C. et al. (2011b)
Hochschwab-Massiv (Austria)	640	750	Hafellner et al. (2005)
Cévennes (France)	540	937	Roux C. et al. (2007)
Venezia Giulia (Italy)	527	212	Nimis & Martellos (2020)
Muniellos Preserve (Spain)	502	59.7	Pérez-Ortega (2004)

Atypical substrates

Numerous species were recorded on atypical substrates. Some usually saxicolous species were occasionally recorded on tree bark, e.g. on roots and trunk bases of old trees, e.g. *Aquacidia trachona*, *Chrysothrix chlorina*, *Lecanora orosthea*, *Lepraria borealis*, *L. caesio-alba*, *Leprocaulon nicholsiae*, *Physcia dimidiata*, *Rinodina oxydata* and *Xanthoparmelia* spp. Some usually epiphytic species were occasionally recorded on rock, e.g. *Aniso-meridium polypori*, *Bacidia rubella*, *Catillaria nigroclavata*, *Fellhanera bouteillei*, *F. subtilis*, *F. viridisorediata*, *Fuscidea pusilla*, *Halecania viridescens*, *Hyperphyscia adglutinata*, *Hypotrachyna revoluta*, *Imshaugia aleurites*, *Lecania cyrtella*, *L. naegelii*, *Micarea coppinsii*, *Opegrapha niveoatra*, *Phlyctis argena*, *Physconia perisidiosa*, *Strigula jamesii* and *S. taylori*. The rich, but strictly saxicolous *Caloplaca ulcerosa* is perhaps the most remarkable; this species is locally a common epiphytic lichen in coastal areas of Europe, with previously only a single known saxicolous occurrence inland in Europe (Vondrák et al. 2009).

Beneficial effect of DNA-barcoding (particularly for Verrucaria species)

A substantial part of the species richness would have remained undiscovered if DNA-barcoding had not been used. For example, the sterile sorediate crust, *Leprocaulon nicholsiae*, previously known only from North America, would have been identified as one of the European crusts with the same secondary metabolites, e.g. *Lecanora orosthea*. The same is true for numerous sterile crusts, some of them new to the Czech Republic (*Aspicilia brucei* and *Lepraria humida*).

We found DNA-barcoding especially beneficial in taxon identification within *Verrucaria*, a species-rich genus, which contains many species with poorly understood delimitations. ITS (and partly mtSSU) sequences supported delimitation of three *Verrucaria* species new to science and 22 taxa for which no published name could be found (known unknowns) in addition to 24 named species. These numbers are remarkably high for a central European site not in the Alps, which indicates that numbers of known species in *Verrucaria* are likely to continue to rise substantially, even in lichenologically well surveyed areas.

Discussion

Common and rare species: distinct components of biodiversity

Most lichen inventories include all the common species, but rather few of the rare ones (Lõhmus et al. 2018, Vondrák et al. 2018). However, detection of regionally common species has little significance, because they are expected, with a probability close to 100%, to be present at a site even before the survey starts. For example, the same 100 epiphytic species known to be common in the Šumava mountains, Czech Republic (Vondrák & Kubásek 2019) would certainly be recorded in most sites in the region. Similarly, 160 species are present on the species lists of all the sites sampled with suitable habitats at Týřov. Moreover, these species will probably be present and easily recorded at numerous suitable sites in a broad surrounding area (Křivoklátsko in this case).

Rare species carry much more information, and differences in their number determine which sites are valuable biodiversity hotspots and refuges for endangered and specialized lichens. Unfortunately, most inventories reported in the Czech Republic, and perhaps elsewhere, have been compiled too quickly and not thorough enough for a reasonable assessment. They usually involve few visits and are terminated long before species saturation. The previous survey at Týřov is an example (Bouda 2012). The species list, based on three one-day visits, contained 150 species, mostly common ones. On the basis of this result, the assessment of Týřov as a lichenological locality would be “species-poor”. Our survey increased the number of species by more than a factor of five, which makes Týřov exceptionally species-rich. Such large and rather alarming differences in the assessments of a single locality warn us against drawing conclusions from hasty surveys and their often very incomplete species lists.

Recognition of species-rich localities

The number of species detected is thus a misleading indicator for the recognition of biodiversity hotspots, owing to the incomplete detection of rare species. Complete species lists of lichens are achievable for only very small sites, such as a part of a tree branch or plots of 0.01–0.1 m^2 on tree bark (McCune & Lesica 1992). Even lists for such small areas may not be complete, as diaspores and initial stages of thalli will be overlooked (Keepers et al. 2019). The problem increases with increasing area: it would be very difficult to obtain a complete species list even from a single tree or a single rock outcrop and almost impossible at larger scales (Vondrák et al. 2016).

When comparing species lists from two areas, we must be aware that both lists are incomplete and that the extent of imperfect detection probably differs, perhaps greatly. The quality of a species list is strongly influenced by the abilities of the surveyors and lists prepared by several experts working in parallel are distinctly longer than those made by a single researcher (Vondrák et al. 2016, 2018). Species lists are important and are often all that is available for a site, but we conclude that they may be a misleading tool for appraising local species richness unless supported by further information. The most important additional information is a cumulative species curve, and habitat heterogeneity assessment. This additional information, together with a good survey, will usually permit the reliable identification of biodiversity hotspots.

(i) Cumulative species curves: The idea is that common species are recorded during the first few visits, but rare species randomly during initial and later visits. The number of species recorded during the first visit to a site will be high and will gradually decrease with subsequent visits. Eventually each visit reveals few or no new species, i.e. the cumulative species curve reaches a plateau. The number of visits required to reach the plateau depends on the number of rare species present, which in turn depends on whether the locality is exceptionally species rich (i.e. a biodiversity hotspot) or not. The curve for Týřov has not reached a plateau after 48 one-man one-day visits, or come even close to doing so (Fig. 3). An exhaustive survey of such a locality might take years and then the final results might be influenced by temporal species turnover. We presume that accumulation curves from less diverse central-European areas of comparable size (1–10 km^2) would reach a plateau at much lower numbers of species and after far fewer visits.

(ii) Habitat heterogeneity: (See the Methods for our measure of habitat heterogeneity) Lichen biodiversity increases with habitat (microhabitat) heterogeneity (Lesica et al. 1991, Gignac & Dale 2005, Vondrák et al. 2019). Although this correlation is challenged by some researchers (e.g. Bässler et al. 2016), it is generally supported by the unpublished experience of most lichenologists working in Europe. For that reason, we encourage specialists involved in lichen biodiversity surveys to supplement their species lists with a catalogue of local habitats plus notes on their size, frequency and the estimated value for local biodiversity (i.e. saturation by species). This information is useful when the expected general pattern is not recorded (i.e. species richness does not increase with habitat heterogeneity), because potentially suitable habitats are not saturated by species (e.g. impoverished by air pollution). Field research aimed at revealing all (or almost all) of the local habitats is time consuming, especially in large and diverse areas, but it requires far less time than an attempt to obtain a complete list of species.

As an example, the catalogue of habitats for Týřov is attached below (Supplementary Data S2). It was prepared from data gathered during just a few visits, although some of the listed habitats have very limited distributions in the area studied (Table 1) and might take longer to find. At the sites sampled, species richness is positively correlated with the number of available habitats, which demonstrates the value of a catalogue of habitats. This relationship works well at the regional level too (Fig. 4A).

Is this Czech locality outstanding?

Is 787 species recorded in an area of 410 hectares an exceptional count? We suggest that it is, on the basis of the high heterogeneity of habitats and the very high numbers of: (i) red-list species, (ii) species new to the Czech Republic and Europe, (iii) species new to science, (iv) known unknowns, and (v) other remarkable records.

However, we cannot conclude that Týřov is an outstanding locality merely on the basis of the high numbers of habitats and species recorded. To claim Týřov is a biodiversity hotspot we need reliable species lists for areas of comparable size. For this reason, we summarize below the lichen biodiversity data at three levels: (i) regional, (ii) country-wide and (iii) European (Table 2). We are aware that the efforts employed in the reference surveys are likely to have differed and as a consequence our conclusions may be biased to some extent.

Týřov is exceptionally species-rich at the regional scale. We were able to compare our data with thirteen inventories of lichen biodiversity recently compiled by various authors in nearby natural reserves from 5 to 231 hectares in area. Most of the sites sampled at Týřov had species richness comparable to these reference inventories, but species richness at three sites was distinctly higher and it occurred together with higher habitat heterogeneity (Fig. 4A, Table 1). However, a considerable part of the species list for Týřov comes from lichen communities at sites with lower habitat heterogeneity, which indicates that the above-average size of this nature reserve contributes quite significantly to the exceptional species richness (Johansson & Ehrlén 2003, Johansson et al. 2012).

Týřov is exceptional at a national level. Numerous lichen surveys have been carried out in the Czech Republic at various nature reserves from a few hectares to a few square kilometres in area. Most resulted in lists of fewer than 200 species. The few that reported more species are listed in Table 2, but the maximum is 450 species, which is still about 300 fewer than at Týřov.

Týřov match the best in Europe. We have searched for lichenological surveys in Europe that report more than 500 species. Our search of the literature was supplemented by obtaining the views of experienced European lichenologists. We were unable to find any species list with more than 500 species from an area of less than 10 km^2. This makes Týřov by far the most species rich locality in Europe at a scale up to 10 km^2. We doubt that it would retain that position if some other areas were surveyed with equal thoroughness. Localities with far higher habitat heterogeneity and longer climatic gradients than at Týřov occur elsewhere and are probably at least as rich. Perhaps the most comparable work is from the Swiss Alps and reports on 1000 species recorded from an area of 24 km^2 over a period of several decades (Groner 2016, 2020). A few other studies from Europe also report more than 500 species, especially those from the French Alps (Roux et al. 2011a, 2012, 2013), but these refer to distinctly larger areas, all exceeding 100 km^2 (Table 2).

Conclusions

Lichen diversity hotspots probably occur on all continents, and a detailed survey of each of them would result in very large numbers of species. Our seemingly "ordinary" central-European locality in a long-inhabited landscape is an example. On the basis of existing data, our locality is by far the most species rich in Europe, at a scale up to 10 km^2. Three factors led to this result: (i) exceptional habitat heterogeneity, (ii) variable but favourable natural conditions on steep slopes of several valleys, and (iii) the substantial effort put into the survey and species identification. We hope that our conclusion will motivate other lichenologists to seek hotspots comparable with or even richer than that at Týřov.

Descriptions of new species

Acarospora fissa K. Knudsen et Vondrák, spec. nova

MycoBank: MB#841124; Fig. 5A–C

Etymology: The epithet refers to the process of it splitting apart to replicate by division.

Type: Czech Republic. Central Bohemia: district Rakovník, protected area Týřov, Týřovické skály rocks, alt. 370 m, 49.98412N, 13.79375E. On sun-exposed andesite rock, 28 April 2020, coll. J. Vondrák (PRA-JV23503, holotype).

Type sequences: ITS (MW989377), mtSSU (MW989378), nLSU (MW989379).

Diagnosis: Similar to the areolate *A. scrobiculata* but differing in having squamules, which are wider (1.0–3.5 mm vs. 1.0–2.0 mm) and taller (1.0–2.0 mm vs. 0.5–0.8 mm).

Morphology and anatomy: Thallus variable in size, consisting of few squamules, covering tens of cm^2. Squamules up to 3.5 mm wide, convex, up to 2 mm tall, developing from areoles 0.5–1.0 mm wide, flat, angular. Upper surface light brown, crosshatched with fissures, replicates by division. Lower surface brown or becoming blackened. Epicortex uneven, 10 µm or less thick. Cortex ~50 µm thick, upper layer light brown, thickness variable, lower layer colourless, cells 2–5 µm wide, round to irregular. Algal layer 100–150 µm thick, dense, uninterrupted, algal cells 7–12 µm wide. Medulla obscure,

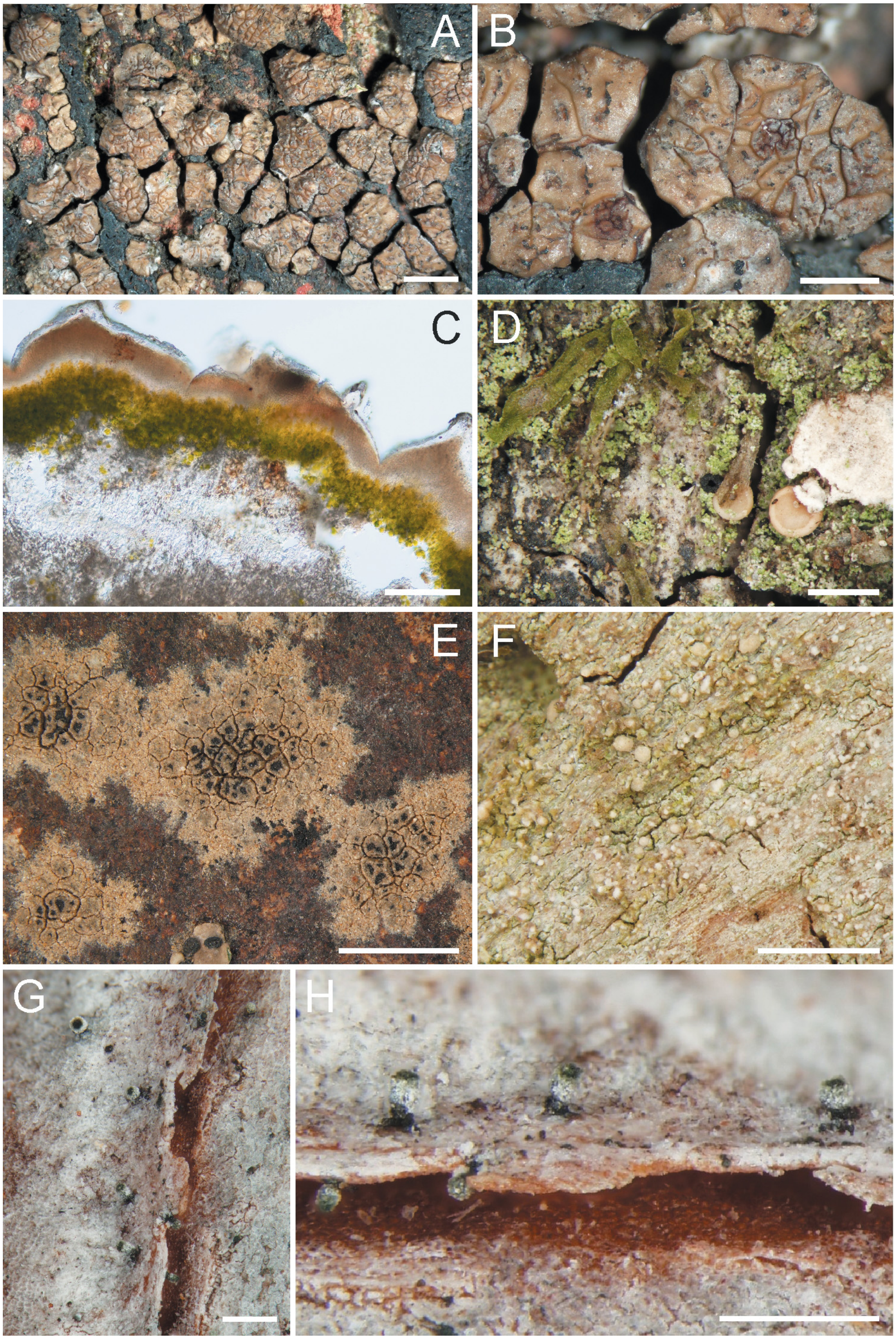

Fig. 5. New species: (A-C) *Acarospora fissa*, holotype; A, B, outer appearance; C, vertical section in thallus. (D) *Bacidia hyalina*, holotype. (E) *Buellia microcarpa*, holotype. (F) *Micarea substipitata*, PRA-ZP27411. (G, H) *Microcalicium minutum*, holotype. Scales: A, B, E, F – 1 mm, D, G, H – 0.5 mm, C – 100 µm.

200 µm thick in young areoles, but up to 850 µm tall in biggest squamules. Stipe less than half the width of squamule, up to 1 mm tall. Most squamules and areoles sterile, apothecia usually on about half or fewer areoles, 1 or 2 each per areole. Apothecia punctiform, immersed, disc reddish, epruinose. 0.1–0.2 mm wide, best seen when wet. Parathecium IKI-, expanding around disc, 10–20 µm wide. Hymenium 110–120 µm tall, epihymenium narrow and light brown, paraphyses mostly 2 µm wide, hymenial gel IKI+ blue (not dark blue), asci 50–70 × 17–20 µm, ascospores 3–4 × 2 µm. Subhymenium 20–30 µm thick, IKI+ blue. Hypothecium ~10 µm thick, golden in water, IKI-. Pycnidia rare, conidia 0.5 × 0.5–1.0 µm.

Chemistry: Gyrophoric acid. Spot tests: cortex C+, KC+ red.

Similar species: *Acarospora scrobiculata* H. Magn., known from Greenland and Norway, has a thallus surface similarly cross-hatched with fissures but has areoles instead of squamules (Magnusson 1935). Both replicate by division as their primary mode of reproducing. *Acarospora applanata* H. Magn., common in the Organ Mountains in southern New Mexico, is similar in being rarely fertile, having fissures and reproducing primarily by division. It differs from *A. fissa* in being a facultative lichenicolous lichen and in having smaller areoles or squamules, not exceeding 1.5 mm in width and 0.5 mm in height (Knudsen, unpublished).

Ecology and distribution: Known from andesitic rocks completely exposed to sunlight at its single locality.

DNA data: This species belongs to the *Acarospora* s.str. clade, but is distinct from all other species for which there is sequence data. Details are published by Knudsen et al. (2021).

Paratypes: Two additional specimens sampled at the type locality: PRA-JV21129 (19 September 2019), PRA-JV21144 (13 October 2019).

Bacidia hyalina **Vondrák, spec. nova**

MycoBank: MB#841125; Fig. 5D

Etymology: Named after its colourless (hyaline) apothecia.

Type: Czech Republic. Central Bohemia: district Rakovník, Týřov National Nature Reserve, southern slope above valley of 'Úpořský potok' stream, alt. 300–340 m, 49.96482N, 13.81124E, on bark of *Acer platanoides*, 21 August 2020, coll. J. Vondrák (PRA-JV24084-holotype).

Type sequences: ITS (MZ968995), mtSSU (OK019727).

Diagnostic characters: Thallus formed of dispersed green soralia. Soredia fine, 20–30 µm in diam., consoredia up to 50 µm in diam. Apothecia rare, without pigmentation, with distinct margin. Ascospores 35–80 × 2.5–3.5 µm.

Morphology-anatomy: Green sorediate crust, hardly distinguishable from thalli of sorediate *Bacidina* spp. or *Lecania croatica*. Thallus formed of an inconspicuous, thin green crust, densely covered by pale green soralia. Soralia usually discrete, punctiform, ~0.2–0.5 mm diam., sometimes confluent into more extensive sorediate spots. Soredia fine, 20–30 µm in diam., consoredia up to 50 µm in diam. Photobiont *Trebouxia*-like. Apothecia usually absent; when present, then only few detected; colourless or pale beige, without internal and superficial pigmentation or with a yellowish tinge in outer excipular tissue. Discs flat; margin distinct, ~50–80 µm wide, slightly raised above disc. Exciple of radially arranged anastomosing hyphae with thick, conglutinated walls; lumina ~1–2 µm thick in KOH. Hymenium ~50–80 µm tall. Paraphyses sparsely branched, ~1–2 µm thick, with slightly thickened uppermost cell, ~2.5 µm thick. Asci clavate, ~50–70 µm tall. Ascospores 4–10-septate, 35–80 × 2.5–3.5 µm; the length varied among specimens: 40–70 µm (holotype), 40–70 µm (JV24092), 35–50 µm (JV24158).

Chemistry: No secondary substances detected by TLC of the type specimen.

Ecology and distribution: Known from a few sites in the Týřov National Nature Reserve (Czech Republic). Occurring on nutrient-rich bark of *Acer platanoides*, *A. pseudoplatanus* and *Quercus petraea* in scree forests, often together with *Bacidia rubella*.

Similar species: *Bacidia hyalina* presumably occurs predominantly in a sterile state, without apothecia. Unfortunately, these occurrences are hardly distinguishable from other sorediate crusts with discrete green soralia, e.g. *Bacidina* spp. and *Lecania croatica*. Apothecia are similar to those of various species of *Bacidia* s. lat., especially the pale morphs of *B. rubella* or pallidomorphs of a common *B. subincompta* s. lat. The combination of the green sorediate thallus and the colourless apothecia producing long ascospores is diagnostic.

DNA data: Sequence data: ITS (24084, 24092, 24210), mtSSU (24084, 24158, 24274). Closest NCBI Blast records in ITS include various *Ramalinaceae* (*Bacidina* spp. and *Toniniopsis* spp.; idnetities ~85%), in mtSSU *Toniniopsis coelestina* and *T. subincompta* (94%). On the basis of our data, *Bacidia hyalina* belongs to *Ramalinaceae*, but its generic position is tentative, as it is probably outside the genera currently known for *Bacidia* s.lat.

Paratypes: Czech Republic. Central Bohemia: district Rakovník, Týřov National Nature Reserve, south-western slope with scree forest adjacent to the nature reserve above stream 'Úpořský potok', alt. 340 m, 49.96985N, 13.82595E, on bark of *Quercus petraea*, 5 Sept. 2020, coll. J. Vondrák (PRA-JV24092, 24210); Ibid.: in valley of the Úpořský potok stream, alt. 320 m, 49.96794N, 13.82400E, on bark of *Acer platanoides*, 5 Sept. 2020, coll. J. Vondrák (PRA-JV24158); Ibid.: on bark of *Acer platanoides*, 6 Oct. 2020, coll. J. Vondrák 49.96399N, 13.80945E (PRA-JV24274); Ibid.: rocks Týřovické skály, alt. 300–400 m, 49.98412N, 13.79375E, on bark of *Acer pseudoplatanus*, 28 Apr. 2020, coll. J. Vondrák (PRA-JV23489).

Buellia microcarpa Vondrák et Malíček, spec. nova

MycoBank: MB#841126; Fig. 5E

Etymology: Named after its minute apothecia, which are exceptionally small for *Buellia*.

Type: Czech Republic. Central Bohemia: district Rakovník, Týřov National Nature Reserve, Týřovické skály rocks, alt. 350 m, 49.98387N, 13.79361E. On andesitic stones in rocky steppes, 13 Oct. 2019, coll. J. Vondrák (PRA-JV21161, holotype).

Type sequence: ITS (MZ968996).

Diagnostic characters: Tiny ochre-brown to grey thalli, rimose in centre, diffuse at margins; minute, immersed apothecia; no secondary substances.

Morphology-anatomy: Thallus orbicular, a few mm diam., rimose-areolate in inner part, with diffuse margin. Thallus pale ochre-brown to grey, approximately 100 µm thick (but up to 200 μm around apothecia), gradually thinning to thallus margin. Cortex and medulla absent. Epinecral layer present, up to 30 μm thick. Areoles flat, angular, 0.2–0.6 mm diam. Apothecia immersed in thallus (*Buellia aethalea*-type), 0.05–0.2 mm in diam., round to angular. Ascospores melanized, 11–13 × 6–7.5 μm; superficial ornamentation absent (light microscopy).

Chemistry: No secondary substances detected by TLC of the type specimen.

Ecology and distribution: A pioneer species on stones and pebbles at xerothermic sites (e.g. on rocky steppes) accompanying nitrophilous and acidophilous lichen species (e.g. *Acarospora* spp., *Amandinea punctata*, *Rinodina aspersa*). So far known from five localities in central Bohemia where the species is abundant at suitable sites.

Similar species: Several *Buellia* species have apothecia immersed in the thallus, but these taxa are distinct and have different ecologies: (i) *B. aethalea* differs e.g. in grey thallus surface, larger apothecia (0.2–0.4 mm diam.) and the presence (usually) of stictic/norstictic acid. (ii) *B. jugorum* and *B. ocellata* have yellow thalli and contain xanthones. (iii) *B. miriquidica* and *B. uberior* are lichenicolous on *Schaereria fuscocinerea* and contain gyrophoric acid and miriquidic acid, respectively. (iv) *B. spuria* has large apothecia and contains atranorin and norstictic acid. (v) *B. stellulata* contains atranorin, confluentic acid and 2'-O-methylperlatolic acid.

DNA data: We sequenced ITS (PRA JV20925, 21161, JM13917; sequences identical) and mtSSU (JM13917). Available data indicate that *Buellia microcarpa* is related to *B. aethalea*. Closest NCBI Blast relative is *B. aethalea* with 98.5% identity in mtSSU and 92.5% in ITS.

Paratypes: Czech Republic. Central Bohemia: district Rakovník, nature reserve Stříbrný luh, alt. 375 m, 50.02108N, 13.89817E, on andesitic stone, 19 Aug. 2020, coll. J. Vondrák (PRA-JV24599); Ibid., Týřov National Nature Reserve, SW slope of hill Vápenný vrch, alt. 300–400 m, 49.97114N, 13.79466E, on andesitic stone, 12 Sept. 2019, coll. J. Vondrák (PRA-JV20923); Ibid. (PRA-JV20925, 20965); district Příbram, Dubenec, uranium heap 11A W of Bytíz settlement, ~49°40'57"N, 14°04'11"E, alt. 520–540 m, on siliceous stone, 18 Sept. 2020, coll. J. Malíček et al. (JM13917); Ibid. Lešetice, S side of uranium heap no. 15 between Lešetice and Brod, 49°39'07"N, 14°00'55"E, alt. 530 m, on siliceous stone, 19 Oct. 2020, coll. J. Malíček (JM13963).

Micarea substipitata **Palice et Vondrák, spec. nova**

MycoBank: MB#841127; Fig. 5F

Etymology: Named after its sessile pycnidia that are similar to those of *Micarea stipitata*, but shorter.

Type: Russia. Krasnodar Territory, Sochi, Estosadok, Mt. Tabunnaya [2351], fir-beech primeval forest on WSW descending crest of 'Psekhano' along a tourist trail E of the Olympic-games ski-complex 'Pichtovaya polyana', 43°41'50"N, 40°21'25"E, on dry decaying wood of a moribund snag of *Abies nordmanniana*, alt. 1670–1700 m, 27 June 2019, coll. Z. Palice (PRA-ZP27411, holotype).

Type sequences: ITS (MZ968997), mtSSU (OK019728).

Diagnostic characters: Apothecia infrequent, small, 0.15–0.3 mm diam., pallid to whitish, occasionally with beige to pale ochre tint, translucent when wet, initially ± flat, later becoming distinctly convex to subglobose, matt, finely roughened on the upper surface, internally without psammoid granules and pigmentation; pycnidia numerous, sessile to shortly stipitate, white, translucent when wet, becoming confluent with age, covered by a gelatinous mass (blobs) with released conidia; conidia 2.5–3.5 × 1.0–1.5 µm; thallus immersed to semiimmersed, effuse, pale green-grey, not forming distinct continuous crust, photobiont cells small, globose to (more-usually) broadly ellipsoid, 3–6 (7) µm in diam., tightly arranged in colonies, *Stichococcus*-like. No substances detectable by TLC.

Morphology-anatomy: Thallus immersed in substrate or rarely exposed as a thin roughened undifferentiated greenish crust, partly farinose. Sometimes forming patches of a few mm in diam., but more often recorded as an extensive crust covering larger areas. Thallus less than 50 µm thick, cortex indistinct. Photobiont *Stichococcus*-like. Apothecia pallid, with pale rose, beige to ochre tint in herbarium, translucent when wet, almost flat to distinctly convex, emarginate, not tuberculate, 0.15–0.3 mm diam., infrequent but present in approximately half of examined specimens. Hymenium not pigmented, 30–40 µm high, without differentiated epihymenium but older apothecia often with amorphous, uneven epinecral layer up to 5 µm with embedded extraneous material. Asci ±clavate, about 25 × 8–12 µm, *Micarea*-type. Excipulum reduced, eventually limited to a narrow zone consisting of narrow paraphyses-like hyphae. Hamathecium of narrow, branched, and in part anastomosing paraphyses, 0.9–1.3 µm wide; rarely less branched broader paraphyses present (1.5–2.0 µm wide). Ascospores (0-)1-septate, cylindrical, narrowly ellipsoid, ovoid, or almost pyriform, apically rounded, often tapering to one end, (6–) 7–10 (–11) × (2.0–) 2.2–3.5 (–3.8) µm. Pycnidia abundant, sessile to shortly stipitate, up to 0.2 mm wide and 0.25 mm tall (but initial conical pycnidia only 15–35 µm in diam); with broad ostiole when mature; ocassionally merged into "conpycnidia"; white, translucent when wet, smooth; often with a shiny drop of released conidia on the top. Conidia shortly cylindrical, (2.8–) 3.0–3.5 (–4.0) × 1–1.6 µm.

Chemistry: No secondary substances detected by TLC (holotype and two paratypes tested).

Ecology and distribution: On wood that is externally hard and dry but internally rotten and wet, in sites sheltered from rain, but with higher air humidity. Usually recorded in overhanging sides and shallow cavities on vertical surfaces of stumps and snags in old-growth forests. Recorded in many forest habitats in central and eastern Europe from low altitudes to upper mountains (e.g. beech forests at timber line in Carpathians). It inhabits wood of various trees, e.g. beech and fir. Only a few records are from outside old-growth forests, such as in old parklands or on decaying veteran trees left in managed forests. So far known from the Czech Republic (Šumava Mts, Český les Mts, Krkonoše Mts, Českomoravská vrchovina Mts, Beskydy Mts, Jeseníky Mts, Křivoklátsko), Slovakia (W Carpathians), Russia (Caucasus) and Ukraine (Eastern Carpathians).

Similar species: Most likely to be confused with the unrelated *Biatora veteranorum*, which may occur in similar micro-habitats, and which also usually form extensive coverings, and produce numerous and distinctive pale pycnidia. *Biatora veteranorum* also has quite similar asci, similarly sized ascospores and conidia. It differs from *M. substipitata* by its pruinose, cylindrical to barel-shaped (usually not conical) pycnidia and pruinose apothecia. The pruina of *Biatora veteranorum* may diminish with age or due to environmental conditions, but is still detectable microscopically as psammoid granules soluble in KOH in apothecial or pycnidial sections. Epruinose elderly apothecia of *B. veteranorum* are more convex, basally constricted and tend to become tuberculate apothecia that are not recorded in *Micarea substipitata*. The lignicolous populations of *B. veteranorum* seem to prefer more decayed, softer and drier wood than *M. substipitata*.

Micarea stipitata and *M. pycnidiophora* are similar but usually corticolous species of more oceanic woodlands (the former often overgrowing bryophytes), not occurring on rotten wood sheltered from rain. Both mentioned taxa have distinctly longer conidia. Moreover *M. stipitata* usually has taller pycnidia and *M. pycnidiophora* contains gyrophoric acid (Coppins 2009). The above species also differ from *M. substipitata* in their photobiont, which is never *Stichococcus*-like. *Micarea myriocarpa* also occupies sheltered niches and contains *Stichococcus*-like photobiont (Czarnota 2007). However, pycnidia of *M. myriocarpa* are usually smaller and pigmented. In addition, *M. myriocarpa* has a pigmented hypothecium and usually forms distinctly episubstratal thalli.

DNA data: DNA sequences were obtained from the holotype (Caucasus), one Ukrainian (Eastern Carpathians) and three Czech paratypes (from Šumava Mts, Český les Mts and Týřov). The four ITS sequences are variable only in a single nucleotide position. The five mtSSU sequences are identical. The closest Blast record is *Micarea myriocarpa* in ITS (92% identity) and *Micarea contexta* and *M. doliiformis* in mtSSU (93–94% identity).

Paratypes: Czech Republic. Central Bohemia: Týřov, 49.95624N, 13.80047E, on rotten wood of *Abies alba* stump, alt. 400 m, 24 Apr. 2021, coll. J. Vondrák (PRA-JV24847; ITS-MZ968998; mtSSU-OK019729); Western Bohemia: Český les Mts, Domažlice, Vranov, old ash-maple forest on hill with ruin of Starý Herštýn, SE-S-SW slope, alt. 830–870 m, 49°28'17"N, 12°42'50"E, on wodd of stump of tree, 13 Apr. 2016, coll. J. Vondrák (PRA-JV14631); Přimda, nature reserve Diana, old-growth mixed forest with predominant beech, 49°37'55"N, 12°34'46"E, on dry decaying wood of *Picea* stump, alt. 515 m, 12 Apr. 2016, coll. Z. Palice (PRA-ZP21040); Šumava Mts, Lenora: Mt Zátoňská hora – old-growth mixed forest on S facing slope, 48°56'25.2"N, 13°49'47.4"E, on wood of snag of *Abies alba*, alt. 892 m, 20 Sept. 2018, coll. J. Malíček & Z. Palice (PRA-ZP26038); Volary, Zátoň, Mt Boubín, southern slope between ways "Knížecí" and "Lukenská", alt. 1070 m, 48.98021N, 13.81854E, on wood of snag in old-growth beech forest, 6 May 2020, coll. J. Vondrák (PRA-JV23523; ITS-MZ968999; mtSSU-OK019730); Volary, Stožec: Mt. Stožec, locality 'Medvědice', old-growth scree forest on NE-facing slope, 48°52'48.9"N, 13°50'18.9"E, on decaying wood of a conifer, alt. 900 m, 17 Oct. 2016, coll. Z. Palice (PRA-ZP24611); Nová Pec, Mt. Hraničník – NNE slope, a fragment of climax spruce forest surrounded by large clearings, 130m NNE from the top, N48°45'03", E013°54'19", on wood of *Picea* snag, alt. 1233 m, 28 Oct. 2014, coll. Z. Palice (PRA-ZP18480); Ibid.: northern slope of Mt Hraničník, old-growth beech-dominated forest, alt. 1170 m, 48.75364N, 13.90472E, on wood of snag in old-growth beech forest, 15 June 2017, coll. J. Vondrák (PRA-JV18769); Ibid.: alt. 1165 m, N48°45'14", E013°54'16.5", on wood of snag of *Picea abies*, 12 Aug. 2017, coll. Z. Palice (PRA-ZP24423); Novohradské hory Mts, Pohorská Ves: nature reserve Pivonické skály, old managed beech forest on N facing slope of Mt Stříbrný vrch [936], 48°39'35"N, 14°41'50"E, on dry bark/wood of *Fagus* stump, alt. 835 m, 17 Aug. 2016, coll. Z. Palice (PRA-ZP22240). N Bohemia, Krkonoše Mts, distr. Semily, E-facing slope above Jizerka brook, 1.2 km N of Vítkovice settlement (church), 50°41'42.5"N, 15°31'36.6"E, on slowly decaying wood of stump of conifer along road-side in a chalet area, on forest margin, alt. 660 m, 1 May 2015, coll. Z. Palice (PRA-ZP19035); S Moravia, distr. Jihlava, Třešť: close-to-primeval forest (*Fagus sylvatica*, *Abies alba*, *Picea abies*, *Acer platanoides*) on W-facing slope of Mt. Velký Špičák [734], just 0.2 km WNW of the top, 2.6 km NE of Třešť, 49°18'43.58"N 15°30'31.51"E, on wood of *Abies* stump, alt. 690–700 m, 8 Sept. 2010, coll. I. Černajová, J. Malíček & Z. Palice (PRA-ZP13993); N Moravia: Jeseníky Mts, NR Praděd, Mt. Vysoká hole, old-growth spruce forest on E-facing slope above the chalet 'Eustaška', 50°03'35.1"N, 17°15'12.7"E, on dry wood of big *Picea* stump, alt. 1220 m, 21 Aug. 2015, coll. Z. Palice (PRA-ZP20247); Moravsko-Slezské Beskydy Mts, distr. Frýdek-Místek: Mt. Lysá hora, old-growth climatic spruce forest, WSW facing slope, 49°32'42"N, 18°26'45"E, on dry hard wood of *Picea* snag, alt. 1230 m, 30 Aug. 2016, coll. J. Malíček & Z. Palice (PRA-ZP21707). Mt. Kněhyně, fragment of old-growth spruce forest with some beech and sycamore, E facing slope, 49°29'47.8"N, 18°18'56.1"E, on dry hard wood of *Picea* snag, alt. 1190 m, 31 Aug. 2016, coll. J. Malíček & Z. Palice (PRA-ZP21707, 21773); Vysočina Region: Černovice, park of town, alt. 580 m, 49.3668153N, 14.9585858E, on wood of *Tilia* stump, 9 February 2018, coll. J. Vondrák (PRA-JV19311). **Russia**. Republic of Adigea: Maykop, Guzeripl, protected area Kavkazskiy zapovednik, on wood of snag in virgin forest, alt. 1465 m, 43.96475N, 40.13073E, 11 June 2016, coll. J. Vondrák (PRA-JV15383); Ibid.: alt. 1724 m, 43.93632N, 40.14730E, 10 June 2016, coll. J. Vondrák (PRA-JV16149); Ibid.: alt. 1911 m, 43.92619N, 40.15161E, 9 June 2016, on log, coll. J. Vondrák (PRA-JV15403). Lago-Naki plateau, just SW of the pass Azishiskiy pereval, a hill ~300 m E of the Hotel Oshten, a montane mixed forest dominated by *Abies nordmanniana*, 44°04'40"N, 40°00'50.5"E, on dry decaying wood of snag of *Abies nordmanniana*, alt. 1830 m, 18 June 2016, coll. Z. Palice (PRA-ZP23223, 23429). **Slovakia**. W-Carpathians, distr. Revúca, Stolické vrchy Mts, Mt Stolica [1476], W-facing slope, a mountain spruce forest, margin of a clearing, N48°46'20.9" E020°11'57.1", on hard wood of *Picea* stump, alt. 1285 m, 30 May 2017, coll. D. Blanár, A. Guttová & Z. Palice (PRA-ZP23853). **Ukraine**: Zakarpatska Oblast Region, Eastern Carpathians, Khust, Velyka Uhol'ka, old-growth beech forest on a ridge 2 km SSW-SW of Mt Menchul [1501], 6.5 km E of Zabrid', 48°17'52"N 23°39'59"E, on dry wood of a very large *Fagus* log in a glade, alt. 1210 m, 17 May 2015, coll. Z. Palice (PRA-ZP19376; ITS-MG773659, mtSSU-MG773688).

Microcalicium minutum **Vondrák et Svoboda, spec. nova**

MycoBank: MB#841128; Fig. 5G, H

Etymology: Named after the small size of the apothecia.

Type: Czech Republic. Central Bohemia: district Rakovník, Týřov National Nature Reserve, on west slope above 'Prostřední potok' stream, in open rhyolite scree with solitary pines, alt. 380 m, 49.95901N, 13.80149E, on sun-exposed bark of *Pinus sylvestris*, 7 Aug. 2020, coll. J. Vondrák (PRA-JV24173, holotype).

Type sequences: ITS (MZ969000), mtSSU (OK019731).

Diagnostic characters: Apothecia 0.1–0.15 mm diam., sessile to shortly stipitate; ratio of height to width less than two. Ascospores simple (rarely 1–2-septate), 7–18 × 3–4.5 µm. Pycnidia frequent. Pycnidia and apothecia with olive green pigment.

Morphology-anatomy: Thallus inconspicuous, apparently not lichenized, forming bleached to white spots on sun-lit squamules of conifer bark. (It is plausible that the bark bleaching is caused by the *Microcalicium*.) Apothecia sessile to shortly stipitate, 0.10–0.15 mm wide and 0.1–0.2 mm tall. Stipe, if present, about 0.1 mm wide, with smooth surface, without sclerotized hyphae. Mazaedium dark green, stipe and exciple black, but exciple sometimes white pruinose (frequently pruinose in the type specimen). Pigment in stipe, exciple and ascospores olive green, KOH+ orange-brown, HNO^{3+} bright green. (Lower content of pigment in ascospores causes a less obvious colour change after KOH into yellow-brown.) Mazaedium not higher than the width of the capitulum. Paraphyses dissolving at an early stage, absent from upper mazaedium. Ascospores usually remaining non-septate, even in the latest stages of development; 1 or 2 septa observed in only a few ascospores. Ascospore size usually 7.5–12 × 3.0–3.5 µm; a few ascospores up to 18 × 4.5 µm. The secondary ascospore wall ornamentated by spirally arranged ridges. Pycnidia numerous, sessile, black, 0.05–0.10 mm diam. Pycnidial wall olive green, with same pigment as apothecia. Conidia colourless, broadly ellipsoid, non-septate, 2.0–3.5 × 1.5–2.0 µm.

Ecology and distribution: Known from two localities of old and sparse conifer forest on steep sun-lit slopes. *Microcalicium minutum* was detected on several trees in both localities. It occurs on insolated bark of *Picea abies* and *Pinus sylvestris*, on bare bark, too dry for lichens; the only observed co-occuring species was *Chaenothecopsis pusilla*. *Microcalicium disseminatum*, co-occurring in these localities, avoids such extreme microsites.

Similar species: Only four species were previously known in *Microcalicium* (Tibell 1978) and they are distinct from *M. minutum*: (i) *M. disseminatum* is similar in the frequent pycnidia, the sizes of conidia and the sessile to shortly stipitate apothecia, but differs in its larger apothecia and typically 1–3-septate ascospores; (ii) *M. ahlneri* has similarly small apothecia, but usually with longer stipes. It has no pycnidia, thinner 1-septate ascospores and is predominantly lignicolous. (iii) *M. arenarium* has tall, stipitate apothecia, and is lichenicolous on *Psilolechia*. (iv) *M. conversum*, not known from Europe, has a different, reddish-brown pigment in pycnidia and apothecia.

DNA data: ITS and mtSSU sequenced from the holotype and from PRA-JV24396. Both obtained mtSSU sequences are variable in six nucleotide positions, ITS in thirty positions. The closest relative in mtSSU is *Microcalicium ahlneri,* which is distinct in eight nucleotide positions. *Microcalicium disseminatum* is distinctly less related and *M. arenarium* is most distant. ITS sequences of *M. disseminatum* and *M. arenarium* are very distinct from *M. minutum* (with differences in more than 60 nucleotide positions).

Paratype: **Czech Republic**. Southern Bohemia: district Prachatice, nature reserve Čertova stráň, south slope of 'Boubínský potok' stream with old and sparse fir-pine-spruce forest, alt. 760 m, 49.00791N, 13.88405E, on sun-lit bark of *Picea abies*, 9 Oct. 2020, coll. J. Vondrák (PRA-JV24396; ITS and mtSSU sequenced); type locality, 7 Aug. 2020, coll. J. Vondrák (PRA-JV24127).

***Rufoplaca griseomarginata* Vondrák et Svoboda, spec. nova**

MycoBank: MB#841129; Fig. 6A

Etymology: Named after the diagnostic grey margin of apothecia, uncommon in *Rufoplaca*.

Type: Czech Republic. Central Bohemia: district Rakovník, Týřov National Nature Reserve, Berounka river bank below Týřovické skály rocks, alt. 250 m, 49.98227N, 13.79289E. On base-rich siliceous rock at riverside, 28 April 2020 coll. J. Vondrák (PRA-JV23413, holotype).

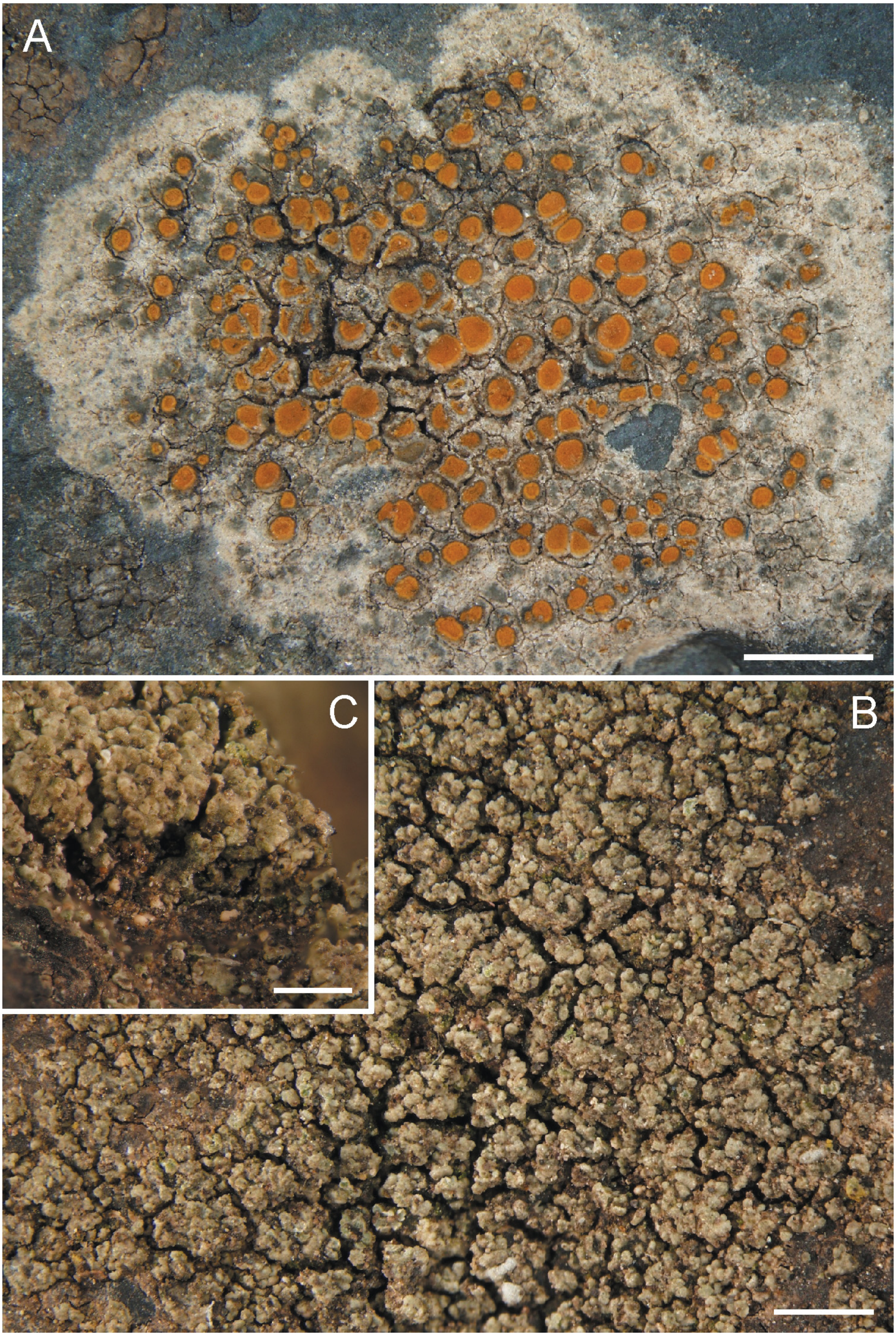

Fig. 6. New species: (A) *Rufoplaca griseomarginata*, holotype. (B, C) *Verrucaria substerilis*, holotype; C, Vertical structure of thallus. Scales: A, B – 1 mm, C – 0.5 mm.

Type sequences: ITS (MZ969001), mtSSU (OK019732).

Diagnostic characters: Apothecia typically adnate, only slightly raised above thallus surface, 0.1–0.3 mm in diam., with outer exciple visible as a grey ring.

Morphology-anatomy: Thallus rimose-areolate, up to 100 µm thick, pale to dark grey (with *Sedifolia*-grey pigment). Initially lichenicolous on *Rinodina oxydata*, later forming independent patches of up to ~1 cm diam. Apothecia 0.1–0.3 mm diam., orange, usually immersed in thallus or adnate and only slightly raised above thallus surface; rarely sessile with constricted base. True exciple orange in the part adjacent to disc, but grey, with *Sedifolia*-grey in the outer part. Thalline exciple present but thin or indistinct. Ascospores 11.0–14.0 × 4.5–6.5 µm; septum 2.5–3.0 µm wide.

Chemistry: Non-chlorinated anthraquinones in apothecia. TLC (apothecia): Parietin (major), 2 unidentified anthraquinones (Rf5, 6 in solvent C). *Sedifolia*-grey in outer exciple and in the thallus.

Ecology and distribution: Occurring on base-rich siliceous outcrops and stones accompanied by e.g. *Caloplaca atroflava*, *C. chlorina* and *C. subpallida*. So far known from central and south-eastern Europe, Iran and Turkey.

Similar species: Morphotypes of *Caloplaca conversa* with orange apothecial discs are probably the most similar lichens in their outward appearance, though not closely related. They differ in their broader ascospores (~6–9 µm) with thicker septa (4.0–8.5 µm). The known species of *Rufoplaca* generally lack the distinct grey ring surrounding the orange true exciple. Mature apothecia of other *Rufoplaca* species differ in their larger size, commonly exceeding 0.5 mm in diam. Apothecia of most *Rufoplaca* species are typically sessile, not immersed to adnate.

DNA data: ITS sequenced from four specimens, mtSSU sequenced from the type. The ITS sequences form a distinct clade close to *Caloplaca subpallida*, *Rufoplaca oxfordensis* and *R. tristiuscula*. mtSSU sequence supports the placement in *Rufoplaca*.

Paratypes: Czech Republic. Sedlčany, Nalžovické Podhájí, nature reserve Drbákov-Albertovy skály in valley of river Vltava, alt. ~300–400 m, 49°43'33"N, 14°22'5"E, on schist stones, 18 April 2008, coll. J. Malíček (JM1309); Ibid.: coll. J. Vondrák (PRA-JV6318); Greece. Methana, Agioi Theodori, volcanic outcrops on E-coast of Methana peninsula, alt. 0–30 m, 37°36'47"N, 23°24'53"E, on volcanic stone, 29 Oct. 2010, coll. J. Vondrák (PRA-JV8748); Iran. Hashtpar (Talesh), stones above road near Khotbeh Sara, alt. 30 m, 38°02'43.61"N, 48°53'33.81"E, on coastal base-rich siliceous outcrops, 5 May 2007, coll. J. Vondrák (PRA-JV5848); Turkey. Ordu, coastal rocks near Mersin, 41°07'08.59"N, 37°45'27.06"E, on siliceous coastal rocks, 22 April 2007, coll. J. Vondrák (PRA-JV5624).

Verrucaria substerilis **Vondrák et Thüs, spec. nova**

MycoBank: MB#841130; Figs 6B, C, 7A

Etymology: Named after its predominantly sterile occurrences. Perithecia, if present, inconspicuous, immersed in thallus.

Type: Czech Republic. Central Bohemia: district Rakovník, Týřov National Nature Reserve, Berounka river bank below Týřovické skály rocks, alt. 250 m, 49.98227N, 13.79289E. On base-rich andesitic stone, 25 October 2019, coll. J. Vondrák (PRA-JV21184, holotype; STU, isotype).

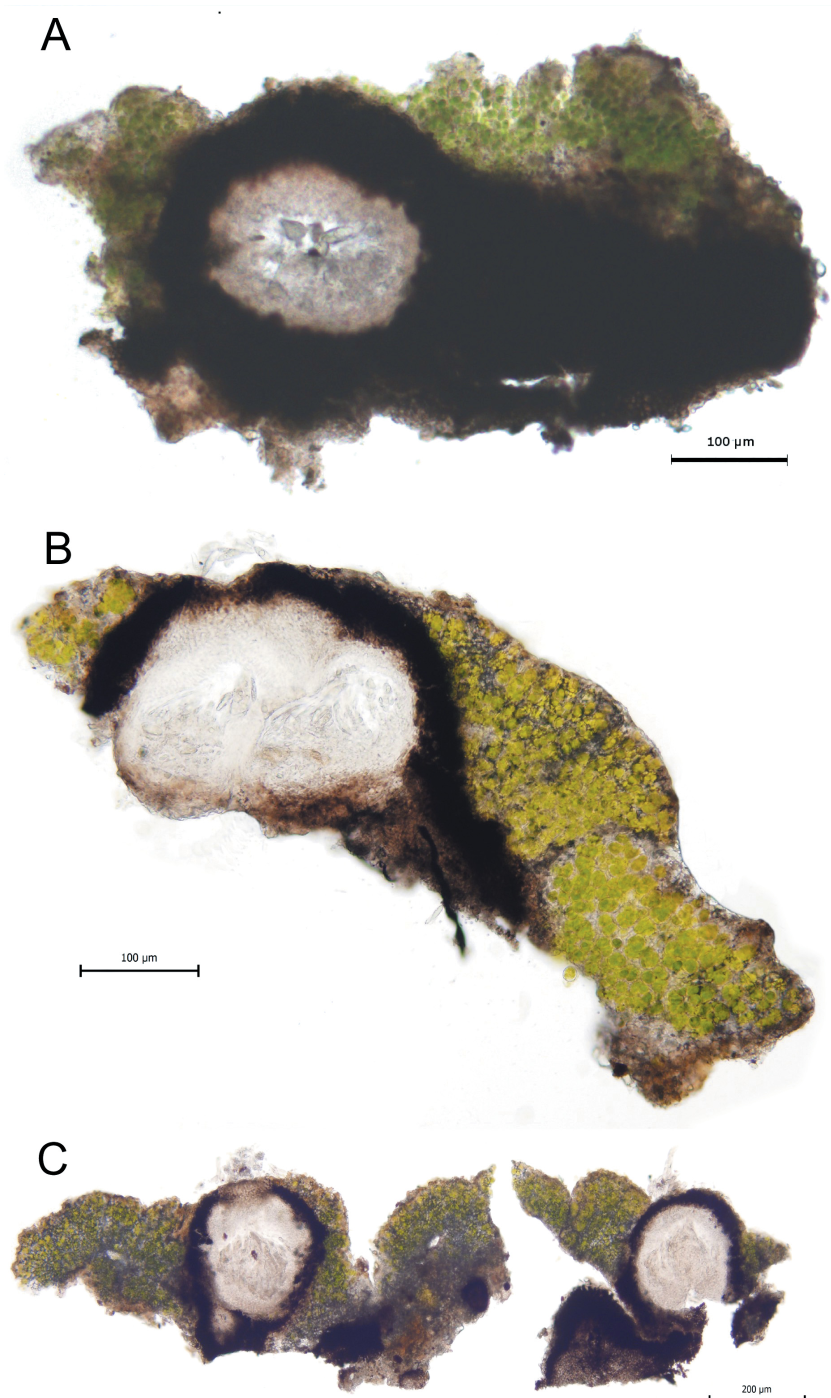

Fig. 7. Anatomical features of new species: (A) *Verrucaria substerilis*, isotype. (B, C) *Verrucaria tenuispora*, holotype. Scales: A, B – 0.1 mm; C – 0.2 mm.

Type sequences: ITS (MZ969002; holotype); mtSSU (OK019734; PRA-JV23705, paratype).

Diagnostic characters: Thallus pale grey-green, granular to squamulose. The squamules typically divided into secondary granules. Perithecia rare, immersed in thallus. Involucrellum laterally spreading in basal part, merging between neighbouring perithecia and forming a local carbonized basal layer. Ascospores ellipsoid (length/width ratio 1.8–2.7), 18.0–26.0 × 7.5–10.5 µm.

Morphology-anatomy: Thallus pale grey-green, forming a granular crust or a multilayer complex of squamules and secondary granules. Thalli start as scattered granules, 50–200 µm in diam., later merging and forming squamules, 0.2–1.0 mm in diam. Secondary granules are formed on the squamules, first along margins and later on the entire surface. Mature thalli are formed by a mixture of primary granules and squamules covered by few to numerous secondary granules with a total thallus height of up to 245 µm. Thin pseudocortex formed by colourless to weakly yellowish brown pigmented, more or less isodiametric fungal cells. Algal cells dispersed throughout the thallus from top to bottom except for areas with basal layer. Algal cells in tightly packed clusters, not in vertical stacks; mature cells in the direct vicinity of the perithecia, mostly 7–12 µm, in thallus squamules also 15–20 µm in diam, the largest dividing into several (3–6 in optical view) daughter cells of 5–10 µm in diam. Perithecia immersed in the thallus, involucrellum 0.2–0.3 mm in diam., apical part of exciple and involucrellum poorly separated and 30–50 µm thick, exciple transparent to partly dark brown, 15–25 µm thick, in young perithecia the pigmented parts of the exciple are surrounded by a thin (10–15 µm), weakly pigmented inner layer of involucrellum followed by its fully carbonized outer parts. In the basal part, the involucrellum is laterally spreading and can form a local black basal layer between neighbouring perithecia. Periphyses ~24–30 µm long, cytoplasm filled lumen ~1,6–2 µm wide. Only a few asci with well developed ascospores were observed; ascospores 18–26 × 7.5–10.5 µm, ellipsoid with a length/width ratio 1.8–2.7 (n=20).

Chemistry: No acetone-soluble secondary substances detected by TLC in the thallus of the type specimen. Internal pigments (other than melanines) not detected in the thallus.

Ecology and distribution: Known from several sites in the Týřov National Nature Reserve (Czech Republic). Occurring on andesitic rocks and stones along banks of river/stream, occasionally inundated. Co-occurring species: *Caloplaca atroflava*, *C. chlorina*, *Circinaria hoffmanniana*, *Rinodina moziana*, *R. oxydata*, *Protoparmeliopsis muralis*, *Rufoplaca griseomarginata*, *Staurothele fissa*, *Verrucaria tenuispora* and *V. teyrzowensis*.

Similar species: The conspicuous granular-squamulose thallus and the perithecia can be similar to some forms of *V. nodosa* and *V. rosula* (Orange 2013), but in these two species, the photobiont cells are smaller (only up to 10 µm) than those in the sequenced thalli of *V. substerilis*. In *V. rosula* the thallus margins are typically more continuous, although much variation is known to occur in this species. Sterile specimens may be very difficult to separate if the variation in the size of the photobiont cells overlap more regularly with those found in *V. rosula* and *V. nodos*a when more collections of *V. substerilis* become available. Young thalli of *V. hunsrueckensis* (Thüs et al. 2018) can look similar, but this species never develops a truly squamulose thallus, fruiting bodies are formed from an early stage on and the spores have a much higher length/width ratio compared to those of *V. substerilis*. Another granular to squamulose species, *Verrucaria glaucovirens*, could be similar when young, but it has a black prothallus and the thallus becomes much thicker (up to 400 µm) with a distinct medulla, and differs in the perithecia developing in different levels of the thallus simultaneously. Squamulose forms are also known from the *V. macrostoma* complex, but these do not start their development as scattered granules and form much thicker thalli.

DNA data: ITS sequences (PRA JV21184, 23418, 23501, 23563, 23705, 23952, 23988, 25147) are variable in only ~2% of nucleotide positions and form a distinct clade in the ITS tree with unresolved relationships to related *Verrucariaceae*: *Verrucaria maculiformis*, *V. tenuispora*, *V. teyrzowensis* and *Verrucaria* spp. 7–10 (Fig. 8). mtSSU sequences obtained only for specimens JV23705 and JV25147. Both sequences are identical and have 98.5% identity with the sequence of *V. tenuispora*.

Paratypes: Czech Republic. Central Bohemia: district Rakovník, Týřov National Nature Reserve, Berounka river bank below Týřovické skály rocks, alt. 250 m, 49.98227N, 13.79289E. On base-rich andesitic rock at riverside, 22 October 2019, coll. J. Vondrák (PRA-JV23563, 24693), Ibid.: 23 Apr. 2020 (PRA-JV23418); Ibid.: base-rich seepage rock, alt. 340 m, 49.98355N, 13.79380E, 16 Aug. 2021, coll. S. Svoboda & J. Vondrák (PRA-JV25147); Ibid.: andesitic rocks above right side of stream Úpořský potok, alt. 320 m, 49.96573N, 13.80936E, 9 June 2020, coll. J. Vondrák (PRA-JV23705); Ibid.: rock at Berounka riverside, SW of ruin Týřov, alt. 250 m, 49.9697467N, 13.7828344E, 14 July 2020, coll. J. Vondrák (PRA-JV23986).

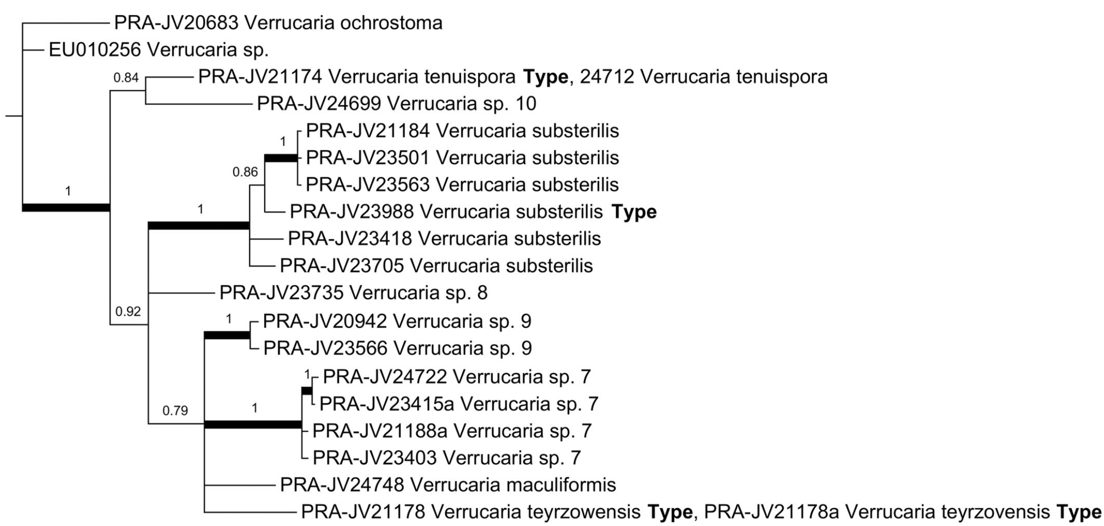

Fig. 8. Phylogenetic tree of the *Verrucaria tenuispora* / *V. substerilis* complex and related taxa based on ITS sequence data. SYM model with gamma distribution and proportion of invariable sites was used as a model of sequence evolution. The tree was constructed using Bayesian inference run for 151000 generations, and was rooted with *Verrucaria ochrostoma* (PRA-JV20683) and *Verrucaria* sp. (EU010256). Numbers on branches indicate posterior probabilities. Bold lines indicate branches with posterior probabilities > 0.95.

Verrucaria tenuispora **Vondrák et Thüs, spec. nova**

MycoBank: MB#841131; Figs 7B, C, 9A

Etymology: Named after its slender ascospores, unusually elongated compared to most other crustose *Verrucariaceae*.

Type: Czech Republic. Central Bohemia: district Rakovník, Týřov National Nature Reserve, Berounka river bank below Týřovické skály rocks, alt. 250 m, 49.98227N, 13.79289E. On base-rich siliceous rock at riverside, 22 Oct. 2019, coll. J. Vondrák (PRA-JV21174, holotype).

Type sequences: ITS (MZ969004), mtSSU (OK019733; PRA-JV24712, paratype).

Diagnostic characters: Thallus brown (or olive-brown), of thick areoles to squamules. Perithecia largely immersed in thallus, 0.3–0.4 mm in diam. Involucrellum present and often laterally spreading. Ascospores long and slender (length/width ratio mostly between 4.1–4.9), 16–28 × 4–8 µm.

Morphology-anatomy: Thallus brown with olive-green tinge, epilithic, areolate to squamulose. Areoles/squamules ~100–240 µm thick, 0.2–1.2 mm in diam., of variable irregular shape. Margin of older squamules divided into large granular structures. Pseudocortex weakly developed, with dull greyish brown pigment, patchy or entirely absent in some parts. Algal cells dispersed throughout most of the thallus, spherical to slightly elongated (length/width ratio up to 1.6), arranged in clusters, not in vertical stacks; mature cells 12–21 µm in diam, each dividing into several (3–6 in optical view) daughter cells of 6–12 µm in diam. Perithecia from 3/4 to fully immersed in thallus, ~200–300 µm in diam. Melanized perithecial wall in upper third of the fruiting body 30–55 µm wide. Involcurellum indistinguishable from exciple in the upper half, but sometimes distinctly separated in the basal part and spreading laterally to a diameter of up to 450 µm. Exciple brown-orange from top to bottom, turning olive-brown after application of ~10% KOH. Ascospores uniformly slender, (16.0–) 23.6–26.6 (–28.0) × (4.0–) 5.8–6.6 (–8.0) µm in water, only a single spore with an extreme length of 40 µm was seen; length/width ratio (2.9–) 4.1–4.4 (– 5.6); n=40.

Chemistry: No acetone-soluble secondary substances detected by TLC in the thallus of the type specimen. Internal pigments (other than melanins) not detected in thallus.

Ecology and distribution: Known from the type locality only. Occurring on andesitic rocks and stones at river/stream bank, occasionally inundated by water. Co-occurring species: same as for *V. substerilis*.

Similar species: The thallus morphology and the perithecia are very similar to *V. rosula* and *V. nodosa* (Orange 2013), but the spores in these species are wider (7.5–11.5 µm) and of a far less elongated shape (length/width ratio 2.0–3.1). A colour change of the brown exciple pigmentation upon application of KOH is not known from these species. Sterile thalli may be distinguished by the size of mature photobiont cells (just before division) which in *V. rosula* and *V. nodosa* have never been reported larger than 10 µm, only half the maximum size of the algal cells predominantly found in some of the thalli of *V. tenuispora*.

DNA data: ITS sequences of the holotype and PRA JV24712 are identical and form a lineage with unresolved relationships to related species: *Verrucaria maculiformis*, *V. substerilis*, *V. teyrzowensis*, and *Verrucaria* spp. 7–10 (Fig. 8). The mtSSU sequences of both above mentioned specimens are identical and do not have any closer NCBI relatives (identities < 97%), but they are close to the sequence of *V. substerilis* (98.5% identity).

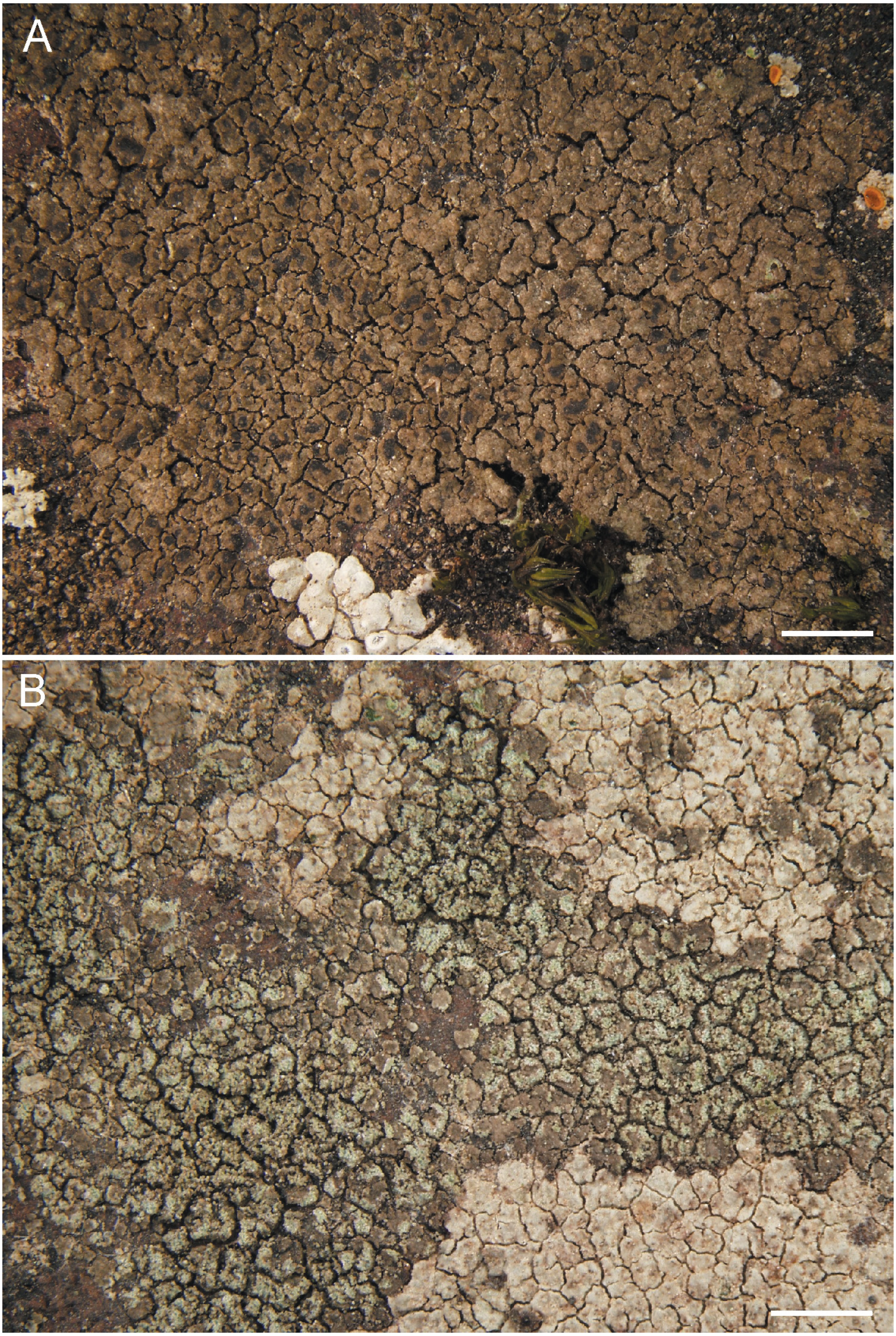

Fig. 9. New species: (A) *Verrucaria tenuispora*, holotype. (B) *Verrucaria teyrzowensis*, holotype, in mosaic with *Rinodina* cf. *oxydata* (pale thallus). Scales: A, B – 1 mm.

Paratypes: Type locality, on periodically inundated andesitic rock, 22 Oct. 2019, coll. J. Vondrák (PRA JV24692); Ibid.: 25 Febr. 2021, coll. J. Vondrák (PRA JV24712).

***Verrucaria teyrzowensis* Vondrák et Thüs, spec. nova**

MycoBank: MB#841132; Fig. 9B

Etymology: Named after the important type locality of this species and the others described here. Teyrzow is the transcription of the locality name (Týřov, Tejřov) used in the 18–19th century.

Type: Czech Republic. Central Bohemia: district Rakovník, Týřov National Nature Reserve, Berounka river bank below Týřovické skály rocks, alt. 250 m, 49.98227N, 13.79289E. On base-rich siliceous rock at riverside, 22 Oct. 2019, coll. J. Vondrák (PRA-JV21178, holotype).

Type sequences: ITS (MZ969005).

Diagnostic characters: Thallus areolate to squamulose, sorediate. Pale grey-green soredia formed in soralia at the margins of squamules. Soredia finely granular, 15–25 µm diam. No other *Verrucariaceae* with vegetative propagules share the above combination of characters.

Morphology-anatomy: Thallus forming extensive crusts of pale grey areoles and squamules. Squamules 0.2–1.0 mm diam., 80–150 µm thick, dispersed (at thallus margin), or densely aggregated in the thallus centre. Soralia pale grey-green, on areole/squamule margins, in some cases extending over the entire upper surface. Soredia fine, 15–25 µm diam., occasionally merged into consoredia, up to 50 µm diam. True cortex or pseudocortex locally developed, up to 20 µm thick, of few layers of isodiametric cells, ~5–7 µm diam. Algal layer of densely arranged clusters of algal cells (not arranged in vertical stacks). Mature algal cells 8–12 (–18) µm diam, each dividing into several (3–6 in optical view) daughter cells of 5–10 µm diam. Epinecral layer and medulla not developed, but black carbonized basal layer present in spots. Perithecia absent in the type material.

Chemistry: No acetone-soluble secondary substances detected by TLC. Internal pigments not detected in thallus.

Ecology and distribution: Known from the type locality only. Occurring on andesitic rocks and stones at river/stream bank, occasionally inundated by water. Co-occurring species: same as for *V. substerilis*.

Similar species: Three *Verrucaria* species with vegetative diaspores are present in the type locality of *V. teyrzowensis* (Týřov), which allows a direct comparison of these taxa under near identical environmental conditions. Based on data from sequenced specimens they show clear morphological differences to the new species: (i) *V. furfuracea* is perhaps the most similar, but differs in the brown colour of aroles and blastidia/soredia, the better developed cortex, containing a brown pigment, and the algal layer arranged into vertical stacks of small algal cells (< 10 µm diam.). (ii) *V. procopii* has a thicker thallus (200–600 µm), consistently well-developed cortex, ~25 µm thick, and an epinecral layer, ~10 µm thick. Its algal layer is formed of small algal cells (< 10 µm diam.) arranged in vertical stacks. Its medulla is well developed, more than 100 µm thick, of loose hyphae. (iii) *V. tectorum* has a thallus of dark brown, smaller areoles (not squamules), ~0.2–0.4 mm diam. and produces brown-black blastidia. In addition to these three formally described species, occasional occurrences of sorediate/blastidiate thalli have also been reported from lichens which otherwise resemble *V. macrostoma* and *V. nigrescens.* Although the formal status of such forms requires further study, none of them has similarly fine and grey coloured soredia as *V. teyrzowensis*.

Another crustose-sorediate taxon in *Verrucariaceae*, which is known to occur occasionally in a sterile state only, is *Thelidium rimosulum* (Ceynowa-Giełdon 2007). This species occurs on calcareous substrata and differs by more or less rounded, punctiform (not coalescing) cream-coloured soralia developing from the centre of the areoles and a thinner and strictly crustose thallus, which never develops squamules.

Mechanical hybrids of crustose *Verrucariaceae* with sorediate and blastidiate species of *Bacidina* are known and can look like a sorediate *Verrucaria*, but in these forms, the soredia are of a much brighter green colour.

Morphologically the new species resembles sorediate/blastidiate members of *Caloplaca* s.str. (e.g. *C. chlorina*), but these taxa are recognizable by the absence of the black basal layer (melanized medulla) and usualy by the presence of *Sedifolia*-grey pigment (KOH+ sordid violet in section) in the tissues at the thallus surface and in soredia/blastidia.

DNA data: ITS sequences (two isolates of PRA JV21178) are identical in nucleotide positions and are unresolved within related *Verrucariaceae*: *Verrucaria maculiformis*, *V. substerilis*, *V. tenuispora*, and *Verrucaria* spp. 7–10 (Fig. 8). Sequencing of mtSSU failed.

Supplementary materials

Fig. S1. – Recent views of the area studied.
Table S1. – Dates of visits and man-hours spent sampling the fourteen sites.
Table S2. – Data for all the records for the area studied.
Table S3. – NCBI accession numbers for sequences of specimens included in this study.
Table S4. – Details of sequenced loci.
Data S1. – Catalogue of all the recognized taxa with comments on noteworthy records.
Data S2. – Catalogue of habitats.

Supplementary materials are available at www.preslia.cz

Acknowledgements

Linda in Arcadia and Tony Dixon generously revised the manuscript. Claude Roux, Pier Luigi Nimis, Sergio Pérez-Ortega and Aleš Tenčík provided valuable reference data. Jaroslav Šoun kindly provided his lichen records for the area studied. Stefan Ekman, Alan Orange and Einar Timdal kindly hepled with lichen identifications. Leena Myllys is thanked for the loan of type material from Nylander's collection and H. Lichen images were made by Jiří Machač. Ilona Sommerová provided valuable technical support in herbarium PRA. Nature Conservation Agency of the Czech Republic generously provided reference biodiversity data. This research was supported by a long-term research development grant RVO 67985939 and by Technology Agency of the Czech Republic; grants SS01010270 and TH03030469. The work of K. Knudsen and J. Kocourková, was financially supported by a grant from the Ministry of Education, Youth and Sports of the Czech Republic – INTER-EXCELLENCE, INTER-ACTION, no. LTAUSA18188.

References

Aras S. & Cansaran D. (2006) Isolation of DNA for sequence analysis from herbarium material of some lichen specimens. – Turkish Journal of Botany 30: 449–453.

Bässler C., Cadotte M. W., Beudert B., Heibl C., Blaschke M., Bradtka J. H., Langbehn T., Werth S. & Müller J. (2016) Contrasting patterns of lichen functional diversity and species richness across an elevation gradient. – Ecography 39: 689–698.

Boch S., Prati D., Schöning I. & Fischer M. (2016) Lichen species richness is highest in non-intensively used grasslands promoting suitable microhabitats and low vascular plant competition. – Biodiversity and Conservation 25: 225–238.

Bouda F. (2012) Inventarizační průzkum NPR Týřov, lišejníky [Lichen diversity survey of the Týřov National Nature Reserve]. – MS, depon in: Agentura ochrany přírody a krajiny ČR, Praha.

Ceynowa-Giełdon M. (2007) *Thelidium rimosulum* (*Verrucariaceae*, lichenized *Ascomycota*), a new lichen species from Poland. – Lichenologist 39: 217–220.

Coppins B. J. (2009) *Micarea* Fr. (1825). – In: Smith C. W., Aptroot A., Coppins B. J., Fletcher A., Gilbert O. L., James P. W. & Wolseley P. A. (eds), The lichens of Great Britain and Ireland, p. 583–606, The British Lichen Society, London.

Czarnota P. (2007) The lichen genus *Micarea* (*Lecanorales*, *Ascomycota*) in Poland. – Polish Botanical Studies 23: 1–199.

Fritz Ö. & Heilmann-Clausen J. (2010) Rot holes create key microhabitats for epiphytic lichens and bryophytes on beech (*Fagus sylvatica*). – Biological Conservation 143: 1008–1016.

Gignac L. D. & Dale M. R. T. (2005) Effects of fragment size and habitat heterogeneity on cryptogam diversity in the low-boreal forest of western Canada. – Bryologist 108: 50–66.

Groner U. (2016) Flechten und assoziierte nicht lichenisierte Pilze des Bödmerenwald-Silberen-Gebiets im Muotatal, Kanton Schwyz (Schweiz). – Cryptogamica Helvetica 22: 1–156.

Groner U. (2020) Eintausend Taxa auf 24 Quadratkilometer - Ergänzungen und Korrekturen zur Flechtenflora des Bödmerenwald-Silberengebietes, Kanton Schwyz. – Meylania 66: 22–28.

Guttová A. & Palice Z. (2005) Lišajníky Národného parku Muránska planina III - Cigánka [Lichens of the Muránska Planina National Park III - Cigánka]. – Reussia 1, Suppl. 1 [2004]: 11–47.

Hafellner J. (2008) Zur Diversität lichenisierter und lichenicoler Pilze im Gebiet der Koralpe (Österreich: Kärnten und Steiermark, Slowenien). – Mitteilungen des Naturwissenschaftlichen Vereins für Steiermark 138: 29–112.

Hafellner J. & Obermayer W. (2007) Flechten und lichenicole Pilze im Gebiet der Stubalpe (Österreich: Steiermark und Kärnten). – Mitteilungen des Naturwissenschaftlichen Vereines für Steiermark 136: 5–59.

Hafellner J., Obermayer S. & Obermayer W. (2005) Zur Diversität der Flechten und lichenicolen Pilze im Hochschwab-Massiv (Nordalpen, Steiermark). – Mitteilungen der Naturwissenschaftlichen Vereines für Steiermark 134: 57–103.

Halda J. P. (2017) Lišejníky ledovcového karu Velká kotlina v Hrubém Jeseníku [Lichens of the Velká kotlina glacial cirque in the Hrubý Jeseník Mts (Grossen Kessel, Hohe Gesenke)]. – Acta Musei Richnoviensis (sect. natur.) 24: 7–52.

Hall T. A. (1999) BioEdit: a user-friendly biological sequence alignment editor and analysis program for Windows 95/98/NT. – Nucleic Acids Symposium Series 41: 95–98.

Hauck M., de Bruyn U. & Leuschner C. (2013) Dramatic diversity losses in epiphytic lichens in temperate broad-leaved forests during the last 150 years. – Biological Conservation 157: 136–145.

Hofmeister J., Hošek J., Malíček J., Palice Z., Syrovátková L., Steinová J. & Černajová I. (2016) Large beech (*Fagus sylvatica*) trees as 'lifeboats' for lichen diversity in central European forests. – Biodiversity and Conservation 25: 1073–1090.

Huelsenbeck J. P. & Ronquist F. (2001) MRBAYES: Bayesian inference of phylogenetic trees. – Bioinformatics 17: 754–755.

Jetz W., McGeoch M. A., Guralnick R., Ferrier S., Beck J., Costello M. J., Fernandez M., Geller G. N., Keil P., Merow C., Meyer C., Muller-Karger F. E., Pereira H. M., Regan E. C., Schmeller D. S. & Turak E. (2019) Essential biodiversity variables for mapping and monitoring species populations. – Nature Ecology and Evolution 3: 539–551.

Johansson P. & Ehrlén J. (2003) Influence of habitat quantity, quality and isolation on the distribution and abundance of two epiphytic lichens. – Journal of Ecology 91: 213–221.

Johansson V., Ranius T. & Snäll T. (2012) Epiphyte metapopulation dynamics are explained by species traits, connectivity, and patch dynamics. – Ecology 93: 235–241.

Katoh K. & Standley D. M. (2013) MAFFT multiple sequence alignment software version 7: improvements in performance and usability. – Molecular Biology and Evolution 30: 772–780.

Keepers K. G., Pogoda C. S., White K. H., Anderson-Stewart C. R., Hoffman J. R., Ruiz A. M., McCain C. M., Lendemer J. C., Kane N. C. & Tripp E. A. (2019) Whole genome shotgun sequencing detects greater lichen fungal diversity than amplicon-based methods in environmental samples. – Frontiers in Ecology and Evolution 7: 484.

Knudsen K., Kocourková J., Hodková E., Malíček J. & Wang Y. (2021) *Acarosporaceae* of the Chihuahuan Desert: four Magnusson species saved from synonymy and a new yellow species. – Bryologist 124: 533–551.

Kubiak D. & Osyczka P. (2020) Non-forested vs forest environments: the effect of habitat conditions on host tree parameters and the occurrence of associated epiphytic lichens. – Fungal Ecology 47: 100957.

Lenzová V. & Svoboda D. (2015) Lišejníky Trubínského vrchu u Berouna [Lichens of the Trubínský vrch hill near Beroun]. – Bryonora 56: 72–80.

Lesica P., McCune B., Cooper S. V. & Hong W. S. (1991) Differences in lichen and bryophyte communities between old-growth and managed second-growth forests in the Swan Valley, Montana. – Canadian Jounal of Botany 69: 1745–1755.

Liška J., Palice Z. & Slavíková Š. (2008) Checklist and Red List of lichens of the Czech Republic. – Preslia 80: 151–182.

Lõhmus A., Lõhmus P. & Runnel K. (2018) A simple survey protocol for assessing terrestrial biodiversity in a broad range of ecosystems. – PLoS ONE 13: e0208535.

Magnusson A. H. (1935) The lichen-genus *Acarospora* in Greenland and Spitsbergen. – Nyt Magazin for Naturvidenskaberne 75: 221–241.

Malíček J. (2020) Lišejníky NPR Kohoutov na Křivoklátsku [Lichens of the Kohoutov National Nature Reserve in the Křivoklát region]. – Bryonora 66: 25–33.

Malíček J., Berger F., Bouda F., Cezanne R., Eichler M., Halda J. P., Langbehn T., Palice Z., Šoun J., Uhlík P. & Vondrák J. (2017) Lišejníky zaznamenané během bryologicko-lichenologického setkání v Mohelně na Třebíčsku na jaře 2016 [Lichens recorded during the bryological and lichenological meeting in Mohelno (Třebíč region, southwestern Moravia) in spring 2016]. – Bryonora 60: 24–45.

Malíček J. & Kocourková J. (2014) Lišejníky chráněných území Na Babě a Vraní skála na Křivoklátsku [Lichens of protected areas Na Babě and Vraní skála in the Křivoklát region. (Central Bohemia)]. – Bryonora 53: 1–15.

Malíček J. & Palice Z. (2013) Lichens of the virgin forest reserve Žofínský prales (Czech Republic) and surrounding woodlands. – Herzogia 26: 253–292.

Malíček J., Palice Z., Knudsen K., Šoun J., Vondrák J. & Novotný P. (2021) Atlas českých lišejníků [Atlas of Czech lichens]. – https://dalib.cz (accessed 29 March 2021).

Malíček J., Palice Z., Vondrák J., Kostovčík M., Lenzová V. & Hofmeister J. (2019) Lichens in old-growth and managed mountain spruce forests in the Czech Republic: assessment of biodiversity, functional traits and bioindicators. – Biodiversity and Conservation 28: 3497–3528.

Malíček J. & Vondrák J. (2018a) Příspěvek k diverzitě lišejníků NPR Děvín a Tabulová v CHKO Pálava [Contribution to the lichen diversity of the Děvín and Tabulová National Nature Reserves in the Pálava Hills]. – Bryonora 61: 1–17.

Malíček J. & Vondrák J. (2018b) Lišejníky chráněných území Ralsko a Vranovské skály (severní Čechy) [Lichens of the protected areas Ralsko and Vranovské skály (North Bohemia)]. – Bryonora 62: 1–23.

Mašek J., Straka J., Hrazdíra P., Pálenský P., Štěpánek P. & Hůla P. (1997) Geologická a přírodovědná mapa Chráněné krajinné oblasti a biosférické rezervace Křivoklátsko [Geological and nature conservation map. Protected landscape area and biosphere reserve Křivoklátsko]. – Český geologický ústav, Praha.

McCune B. & Lesica P. (1992) The trade-off between species capture and quantitative accuracy in ecological inventory of lichens and bryophytes in forests in Montana. – Bryologist 95: 296–304.

Nascimbene J., Thor G. & Nimis P. L. (2013) Effects of forest management on epiphytic lichens in temperate deciduous forests of Europe: a review. – Forest Ecology and Management 298: 27–38.

Nimis P. L. & Martellos S. (2020) Towards a digital key to the lichens of Italy. – Symbiosis 82: 149–155.

Orange A. (2013) Four new species of *Verrucaria* (*Verrucariaceae*, lichenized *Ascomycota*) from freshwater habitats in Europe. – Lichenologist 45: 305–322.

Pérez-Ortega S. (2004) Biodiversidad liquénica de la Reserva Integral de Muniellos (Asturias). – PhD thesis. University of Valencia. 628 pp.

Pescott O. L., Simkin J. M., August T. A., Randle Z., Dore A. J. & Botham M. S. (2015) Air pollution and its effects on lichens, bryophytes, and lichen-feeding *Lepidoptera*: review and evidence from biological records. – Biological Journal of the Linnean Society 115: 611–635.

Posada D. (2008) jModelTest: phylogenetic model averaging. – Molecular Biology and Evolution 25: 1253–1256.

Roux C., Bauvet C., Bertrand M. & Bricaud O. (2012) Inventaire des lichens et des champignons lichénicoles du parc national du Mercantour. 3 – Secteur de Roya-Bévéra. – Rapport d'étude de l'Association française de lichénologie.

Roux C., Bauvet C., Bertrand M. & Bricaud O. (2013) Inventaire des lichens et des champignons lichénicoles du parc national du Mercantour. 4 – Secteur du Haut-Var. – Rapport d'étude de l'Association française de lichénologie.

Roux C., Bauvet C., Bertrand M. & Bricaud O. (2014) Inventaire des lichens et des champignons lichénicoles du parc national du Mercantour. 5 – Secteurs de Haute- et de Moyenne-Tinée. – Rapport d'étude de l'Association française de lichénologie.

Roux C., Bauvet C., Bertrand M. & Bricaud O. (2015) Inventaire des lichens et des champignons lichénicoles du parc national du Mercantour. 6 – Secteur de Haute-Vésubie. – Rapport d'étude de l'Association française de lichénologie.

Roux C., Bauvet C., Bertrand M., Bricaud O. & Masson M. (2011a) Inventaire des lichens et des champignons lichénicoles du parc national du Mercantour. 1 – Secteur de Haute-Ubaye. – Rapport d'étude de l'Association française de lichénologie.

Roux C., Bauvet C., Bertrand M., Bricaud O. & Masson D. (2011b) Inventaire des lichens et des champignons lichénicoles du parc national du Mercantour. 2 – Secteur du Haut-Verdon. – Rapport d'étude de l'Association française de lichénologie.

Roux C., Coste C., Bricaud O. & Masson D. (2007) Lichens et champignons lichénicoles du parc national des Cévennes (France). 4 – Le massif de l'Aigoual. – Bulletin de la Société linnéenne de Provence 58: 103–125.

Thüs H., Killmann D., Leh B. & Fischer E. (2018) *Verrucaria hunsrueckensis* (*Verrucariaceae*, lichenized *Ascomycota*), a new rare species with exceptionally slender ascospores from Germany. – Phytotaxa 345: 26–34.

Tibell L. (1978) The genus *Microcalicium*. – Botaniska Notiser 131: 229–246.

Vondrák J. (2006) Lišejníky chráněného území Vyšenské kopce u Českého Krumlova [Lichens of the protected area Vyšenské kopce by Český Krumlov]. – Bryonora 37: 9–18.

Vondrák J. & Kubásek J. (2019) Epiphytic and epixylic lichens in forests of the Šumava mountains in the Czech Republic; abundance and frequency assessments. – Biologia 74: 405–418.

Vondrák J., Malíček J., Palice Z., Bouda F., Berger F., Sanderson N., Acton A., Pouska V. & Kish R. (2018) Exploiting hot-spots; effective determination of lichen diversity in a Carpathian virgin forest. – PLoS ONE 13: e0203540.

Vondrák J., Malíček J., Palice Z., Coppins B. J., Kukwa M., Czarnota P., Sanderson N. & Acton A. (2016) Methods for obtaining more complete species lists in surveys of lichen biodiversity. – Nordic Journal of Botany 34: 619–626.

Vondrák J., Šoun J., Arup U., Aptroot A. & Redchenko O. (2009) *Caloplaca ulcerosa*, a maritime species in Europe with a remarkable occurrence in the Czech Republic. – Bryonora 44: 1–7.

Vondrák J., Urbanavichus G., Palice Z., Malíček J., Urbanavichene I., Kubásek J. & Ellis C. (2019) The epiphytic lichen biota of Caucasian virgin forests: a comparator for European conservation. – Biodiversity and Conservation 28: 3257–3276.

Zechmeister H. G., Tribsch A., Moser D., Peterseil J. & Wrbka T. (2003) Biodiversity "hot spots" for bryophytes in landscapes dominated by agriculture in Austria. – Agriculture, Ecosystems and Environment 94: 159–167.

Popelka princeznou – lokalita výjimečné druhové bohatosti lišejníků v dlouhodobě osídlené středoevropské krajině

Lokality s velmi vysokou druhovou bohatostí lišejníků jsou rozptýlené v mnoha oblastech světa, avšak publikované seznamy druhů z takových míst jsou zpravidla jen povrchní. Toto tvrzení podporuje náš detailní průzkum národní přírodní rezervace Týřov na Křivoklátsku. Na zhruba čtyřech čtverečních kilometrech jsme nalezli více druhů, než kdy bylo nalezeno na jiných lokalitách o velikostech do 10 km^2, a to v celosvětovém měřítku. Naše data prokazují, že Týřov je skutečně jedinečným hotspotem biodiverzity lišejníků v regionálním měřítku, především díky mimořádně bohaté škále vhodných substrátů, stanovišť a mikrostanovišť. Zároveň předpokládáme, že ve světě existuje celá řada druhově srovnatelných či dokonce mnohem bohatších lokalit, což patrně ukáže budoucí výzkum. Celkem 43 jednodenních návštěv studovaného území vyústilo v seznam 787 druhů (675 lišejníků, 35 pololišejníků, 58 lichenikolních hub, and 19 lišejníkům podobných hub). Území bylo rozčleněno na 14 dílčích lokalit s odlišnou stanovištní rozrůzněností. Druhová bohatost prokazatelně vzrůstala s množstvím dostupných stanovišť. Počet druhů na většině lokalit nijak výrazně nepřevyšoval regionální průměr, který ovšem výrazně převyšovaly tři stanovištně mimořádně bohaté lokality (s celkovou rozlohou kolem 80 hektarů). Zdaleka nejbohatší lokalitou jsou Týřovické skály, kde bylo nalezeno 502 druhů na rozloze pouhých 25 hektarů. Významnost Týřova je podtržena výskytem devíti druhů nových pro vědu (*Acarospora fissa*, *Bacidia hyalina*, *Buellia microcarpa*, *Micarea substipitata*, *Microcalicium minutum*, *Rufoplaca griseomarginata*, *Verrucaria substerilis*, *V. tenuispora* a *V. teyrzowensis*). Tři druhy jsou nové pro Evropu a 55 pro Českou republiku. Další čtyři byly v ČR znovu objeveny po více než osmdesáti letech. Zaznamenali jsme také velké množství druhů červeného seznamu: RE-6, CR-25, EN-56, VU-104. K řadě nalezených lišejníků jsme nenalezli existující jméno a mnohé z těchto takzvaných “known-unknowns” patrně představují nepopsané druhy.

How to cite: Vondrák J., Svoboda S., Malíček J., Palice Z., Kocourková J., Knudsen K., Mayrhofer H., Thüs H., Schultz M., Košnar J. & Hofmeister J. (2022) From Cinderella to Princess: an exceptional hotspot of lichen diversity in a long-inhabited central-European landscape. – Preslia 94: 143–181.

Preslia, a journal of the Czech Botanical Society

www.preslia.cz

Vondrák J., Svoboda S., Malíček J., Palice Z., Kocourková J., Knudsen K., Mayrhofer H., Thüs H., Schultz M., Košnar J. & Hofmeister J. (2022) From Cinderella to Princess: an exceptional hotspot of lichen diversity in a long-inhabited central-European landscape. – Preslia 94: 143–181.

Supplementary Data S1. – Catalogue of all the recognized taxa with comments on noteworthy records.

Taxa recognized as species and at infraspecific levels are listed. Lichenicolous fungi and non-lichenized bark fungi are included and indicated by "**α**" and "**β**" respectively before names. Species that do not form distinctly lichenized thalli, but perhaps have a loose association with algae, i.e. **semilichens** (e.g. *Lichenothelia* spp. or *Naetrocymbe* spp.) are indicated by "**γ**". Names are followed by red list categories (only for lichens and semilichens), records in the sampling sites, substrate abbreviations and voucher data. Sampling sites are numbered according to Fig. 1C and are described in the Methods. Abbreviations of the red list categories, vouchers and substrates are explained below. TLC data and information about generated DNA sequences are included in comments below examined taxa.

Red list categories according to Liška & Palice (2010): **CR** – critically endangered, **DD** – data deficient (or not included), **EN** – endangered, **LC** – least concern, **NT** – near threatened, **RE** – regionally extinct, **VU** – vulnerable. **NEW** – species new to the Czech Republic. Vouchers: JK, JM, JŠ, JV, ZP – initials of collectors: Jana Kocourková, Jiří Malíček, Jaroslav Šoun, Jan Vondrák, Zdeněk Palice. Specimens by JK and JM are deposited in personal herbaria, by JV and ZP in **PRA** – herbarium of the Institute of Botany of the The Czech Academy of Sciences. Few specimens by JK are deposited in **PRM** – herbarium of the Czech National Museum.

Substrate abbreviations: **Abi** – *Abies alba*, **Acam** – *Acer campestre*, **Aglu** – *Alnus glutinosa*, **Ainc** – *Alnus incana*, **Apl** – *Acer platanoides*, **Aps** – *Acer pseudoplatanus*, **as** – acid soil, **base** – base of trunk, **Bet** – *Betula pendula*, **bryo** – on bryophytes, **ca** – calcareous rock, **Car** – *Carpinus betulus*, **Cor** – *Corylus avellana*, **Cra** – *Crataegus*, **cs** – calcareous soil, **dw** – dead wood, **esr** – base enriched siliceous rock, **Fag** – *Fagus sylvatica*, **Fra** – *Fraxinus excelsior*, **Pavi** – *Prunus avium*, **Pic** – *Picea abies*, **Pin** – *Pinus sylvestris*, **Pspi** – *Prunus spinosa*, **Qpe** – *Quercus petraea*, **Sal** – *Salix*, **Sam** – *Sambucus nigra*, **Sari** – *Sorbus collina*, **sil** – acid siliceous rock, **Sor** – *Sorbus aucuparia*, **Stor** – *Sorbus torminalis*, **Til** – *Tilia cordata/platyphyllos*, **Ulm** – *Ulmus glabra* and *U. laevis*, **tw** – twig. Epiphytic species followed by abbreviation(s) of tree/shrub occured on **bark of stem** if not otherwise stated.

Known unknowns

Following Spribille et al. (2020) we treat here species for which we have no name. They may be new to science, but more data are necessary to determine whether they merit formal description.

***Bacidina* sp. 1** – 1, 2, 6, 7: Acam, Apl, Fra, Qpe, Til, Ulm; Vouchers: PRA-JV20656, 24163, 24353, 24355, 24493, 24842, 24968, ZP30104, 31371. Green sorediate crust of diffused soralia, soon merged into extensive patches, up to several cm diam. Soredia 15–25 µm diam., occassionally joint into consoredia, up to 40 µm diam. Apothecia and pycnidia not observed. Probably very common throughout the study area on bark of various deciduous trees, but neglected because sterile. **TLC**: no secondary substances (JV24355, 24493, 24842, ZP30104). **ITS** sequenced (20656, 24163, 24355, 24493, ZP30104), **mtSSU** sequenced (JV20656, 24353, 24355, 24493, 24968, ZP30104). Closest NCBI Blast record in ITS is *Bacidina varia* (92.5% identity), in mtSSU *Bacidina medialis* (95%). **Fig. 10A**

***Bacidina* sp. 2** – 1, 6, 7, 14: sil (andesitic pebbles), Til; Vouchers: PRA-JV21138, 24247, 24915, 24921, 24944. Sorediate crust of shining green, discrete soralia, punctiform, 0.1–0.3 mm diam. Thallus among soralia indistinct, green in patches. Soredia 15–20 µm diam., occassionally joint into consoredia, up to 50 µm diam. Apothecia and pycnidia present only in one specimen (24921) in which soralia were substantially reduced: apothecia numerous, pale creme, without pigmentation in section, 0.1–0.3 mm diam. Exciple slightly raised above disc, 50–70 µm wide, formed of convoluted and anastomosed hyphae with gelatinised walls (but some sphaerical cells present in lower part, c. 3–5 µm diam.). Hymenium 30–40 µm tall; ascospores acicular, curved at one end, c. 30–40 × 1.5 µm. Pycnidia numerous, pale creme, immersed in thallus, up to 0.1 mm diam. Conidia straight, c. 30–50 × 1 µm. **TLC**: no secondary substances (JV24247). **ITS** sequenced (24247, 24915, 24921), **mtSSU** sequenced (all specimens). Closest NCBI Blast record in ITS is *Bacidina arnoldiana* (94% identity), in mtSSU *Bacidina inundata* (97%).

***Bacidina* sp. 3** – 1: sil (andesitic stone in damp scree); Voucher: PRA-JV24573. Sorediate crust somewhat similar to *Bacidina* sp. 2, but soralia are less bright and only slightly paler than the thallus. Whereas soralia are rather regularly rounded (punctiform) in *Bacidina* sp. 2, they have an “untidy” irregular shape in *B.* sp. 3. A few young, unpigmented apothecia were present in the single specimen; ascospores not observed. **ITS** and **mtSSU** sequenced. Closest NCBI Blast results are *Bacidina neosquamulosa* in both loci (96–97% identity in ITS and 99% in mtSSU), but this species occurs on organic substrata and has a minutely squamulose thallus. Other *Bacidina* species available in NCBI had identities up to 95% in ITS and 93% in mtSSU. *Bacidina* sp. 2 (see above) differs in 8.4% of nucleotide positions in ITS and in 4% in mtSSU.

[y]***Chaenothecopsis* sp.** – 4: sil; Voucher: PRA-JV24136. Apothecia with 0.8–1.5 mm long stalk and c. 0.1–0.2 mm wide capitulum. Excipular and stalk tissue brown, KOH-, HNO^{3}+ slowly red. Ascospores 1-septate, 5–7 × 2–2.5 µm; septum pale. Apothecia associated with *Stichococcus* crust.

***Circinaria* sp.** – 1: esr-periodically inundated; Voucher: PRA-JV24719. Thallus forming extensive pale grey crust similar to *C. hoffmanniana*, but areoles, present in marginal thalline parts, turn into imbricate squamules in thallus centre (somewhat similar to *Endocarpon psorodeum*). Apothecia immersed, with the thalline margin hardly raised above thallus surface. Epithecium olive. Ascospores 4–6 in asci; 25–30 × 15–20 µm. Pycnidia present; conidia c. 7–10 × 0.5 µm. Thallus K-, C-, P-, UV-. Occurring on base-rich, periodically inundated, andesitic rock at river bank together with *Caloplaca atroflava*. **ITS** seqenced; closest NCBI Blast results are *C. mansourii* (identities 94–95%), the terricolous species with very different ecology and morphology. Other *Circinaria* species available in NCBI have identities below 91%. **mtSSU** sequenced; closest NCBI Blast result is *C. caesiocinerea* (identity <95%). **Fig. 10B**

$^{\alpha}$***Endococcus* sp.** – 1: sil-on *Rinodina* cf. *moziana*; Voucher: JK10393. Ascomata immersed or half-immersed in the host thallus, about 140 x 120 µm, asci 8-spored, 30–40 x 12–17 µm, ascospores dark brown, thick-walled, wall and septum of the same thickness, with thin perispore, wall non-verruculose, (8.1–)9.3–10.4–11.5 (–12.3) × (4.8–)5.0–5.5-5.9 (–6.6) µm, l/b=(1.5)-1.7–1.9-2.0(–2.1).

Record outside the study area: Central Bohemia: distr. Rakovník, 1 km northeast of Nezabudice, Nezabudické skály Nature Reserve, alt. 270 m, MTB 5949 C 11, above road, on rhyolite rock, lichenicolous on *Rinodina oxydata*, 3 Sept. 1997, coll. J. Horáková & P. Kocourek (PRM900036).

$^{\gamma}$***Eopyrenula* sp.** – 14: Apl; Voucher: PRA-JV24273. Thallus indistinct, pale green, with patches of *Trentepohlia*. Perithecia 0.1–0.2 mm diam.; periphyses up to 10 µm long, numerous; paraphysoids absent; asci 30–40 × 11–13 µm; ascospores grey, 15−17 × 4 µm, 3-septate. Pycnidia 0.1–0.15 mm diam.; conidia brown, c. 15 × 4 µm, 3–5-septate. Identification as *Eopyrenula* is tentative; absence of paraphysoids is unusual in this genus.

$^{\beta}$***Karstenia* sp.** – 2, 5, 14: Qpe; Vouchers: PRA-JV24227, 24323, ZP29691. Thallus indistinct, probably saprophytic on the weathered bark of oaks. Apothecia up to 1 mm diam., urceolate, immersed in oak bark to sessile, with thick, white pruinose exciple. Disc, grey or white pruinose, exposed in older apothecia; in young apothecia, disc punctiform, hidden below raised exciple and below periphyses, which form a ring at the inner edge of exciple. Exciple formed of isodiametric cells, c. 3–3.5 µm diam., carbonised to dark brown at the surface, pale grey-brown (KOH+ orange-brown) to colourless inside. Periphyses of up to 30 µm long hyphae, tightly arranged to form a palisade tissue (forming a ring structure observable by magnification >10×). Epihymenium olive-grey, KOH+ orange-brown. Ascospores 30–80 × 4–8 µm, with 6–20 transverse septa (rarely with 1 longitudinal septum in largest cells); perispore absent in KOH; lower spore end slowly tapering to an obtuse tip, upper end rounded. Frequently recorded in the study area on weathered bark of old oaks. **mtSSU** sequenced (JV24227); closest NCBI relatives: various Ostropales with identities <87%.

Lecanorales sp. – 6: Car; Voucher: PRA-JV24028. Thallus crustose, pale grey to white, epiphloedal, up to 100 µm thick, sorediate. Soredia green-grey, pustulate (like in *Loxospora elatina*), 0.2–0.5 mm diam. Soredia c. 20–40 µm diam. White prothallus distinct, sometimes fimbriate (like in e.g. *Haematomma ochroleucum*). Fruiting bodies and pycnidia absent. Occurring on smooth *Carpinus* bark with *Lecanora argentata* and *Lecidella elaeochroma*. **TLC**: atranorin, perlatolic acid (UV+ white). **ITS** sequenced; closest NCBI Blast results: various Lecanorales with identities up to 86%. **mtSSU** sequenced; closest NCBI Blast results: various Lecanoraceae, Parmeliaceae, Ramalinaceae and Tephromelataceae with identities up to 94%. *Cliostomum haematommatis* and *Mycoblastus caesius*, with similar secondary metabolites, are proved to be distinct on the basis of mtSSU sequences (unpublished).

***Myriolecis* sp.** – 1: esr; Voucher: PRA-JV23493. Thallus formed of a conspicuous, rimose-areolate crust, up to c. 1 cm diam. Surface of areoles is pale grey, uneven to distinctly granular. White-grey prothallus locally present at thallus edge. Thallus up to 250 µm thick; cortex and medulla indistinct; epinecral layer locally developed, thin. Apothecia lecanorine, with pale grey margin and dark brown disc. Exciple without internal crystals, covered in some places by up to 30 µm thick cortex, of isodiametric cells, 3–4 µm diam. Hymenium 70–80 µm tall. Epihymenium covered by brown granules, dissolving in KOH and HNO_3. Ascospores 11–13 × 5–6 µm. Occurring on riverside andesitic outcrops together with *Caloplaca atroflava*, *Dermatocarpon meiophyllizum*, *Protoparmeliopsis muralis*, *Placopyrenium cinereoatratum*, *Rinodina moziana*, *Staurothele fissa*, *Verrucaria substerilis* and *V. tenuispora*. **TLC**: unidentified xanthone. **ITS** and **mtSSU** sequenced. **Fig. 10E**

$^{\beta}$**Ostropales sp.** – 2: Cor; Voucher: PRA-JV24067. Thallus inapparent on bark of thin *Coryllus* twigs, not lichenized (algal cells not detected around fruiting bodies). Fruiting bodies only 70–80 µm diam., pycnidia-like, forming low cups, open below. The wall only 7–10 µm thick, wit blue-green pigment (unchanged after HNO_3 treatment). Conidiophores colourless, c. 10 µm long and 2 µm wide, arising from the blue-green wall downwards. Conidia colourless, ellipsoid to bacilliform, 3–5 × 1–2 µm. **ITS** sequenced; closest NCBI sequences had *Dendroseptoria mucilaginosa* (90% identity) and *Cyanodermella* spp. (85–87% identities). Both fungi are also anamorphs and share the blue-green pigment in fruiting bodies. The former has also similar ecology – growing on twigs of *Buddleja*. However, both fungi have different morphology of conidia, conidiophores and fruiting bodies (van Nieuwenhuijzen et al. 2016, Koukol et al. 2017).

$^{\alpha}$***Phaeospora* sp.** – 7: sil-on *Rinodina aspersa;* Vourcher: JK4970. Only one record in the study area. The species is most similar to *Phaeospora lecanorae* (lichenicolous on *Myriolecis*) in ascospore size (11.5–16 × 5–6 µm) and immersed to half-immersed perithecia. However, our *Phaeospora* (on *Rinodina*) differs in the smaller size of perithecia (about 50–100 µm vs. 120–200 µm), the different shape and colour of ascospores (fusiform, not constricted at septa and reddish-brown vs. narrowly ellipsoid with round ends, constricted at septa and pale greyish-brown colour). So far, the species was collected in three nearby localities within the area of 10 km^2. We suggest this species is narrowly host-specific, such as the majority of 14 *Phaeospora* species (except for *Phaeospora rimosicola* and *P. parasitica*).

$^{\alpha}$***Requienella* sp.** – 6: Fra; Voucher: PRA-JV24556. Perithecia 0.4–0.6 mm diam., fully immerced in the ash bark, surrounded by carbonised wall. In the upper part, perithecia ellongated into a 0.2–0.3 mm wide beak, raised above bark surface. Hamathecium of anastomosing hyphae. Ascospores brown, 50–70 × 12–16 µm, predominantly 9-septate, spore cells with round lumina.

***Rhizocarpon* sp.** – 1, 3, 10: sil; Vouchers: PRA-JV24544, 24733, 25098, ZP31659a (admixture in sample of *Rhizocarpon postumum*). Thallus grey (partly red by ferric oxide), areolate, without stictic acid and without gyrophoric acid (C-, P-, K-). Apothecia with rough, sometimes rusty red discs (perhaps by ferric oxide) and black margin. Umbonate discs are frequent in most specimens. Ascospores long and narrow, colourless, c. 30–40 × 9–13 µm, usually with more than 20 cells in optical view. Pigment *Atra*-red (K+ purple) in hypothecium, exciple and partly in epihymenium. Additional green pigment sometimes present in outer exciple and epihymenium. Asci 8-spored. Occurring on andesitic stones and rocks in dry or somewhat humid habitats, but not observed on permanently wet rocks. **ITS** sequenced (JV24544, 24733, ZP31659a); closest NCBI relatives: three Turkish lichens called "*Rhizocarpon lavatum*" (identity c. 95%). **mtSSU** sequenced (24733); closest NCBI entry: *R. lavatum* (identity 99%). *Rhizocarpon lavatum* is genuinely closely related and morphologically similar, but has different ecology, i.e. occurs on permanently wet or inundated rocks. **Fig. 10G, H**

***Rufoplaca* sp.** – 1: sil-on *Circinaria caesiocinerea*; Voucher: PRA-JV23393. Thallus lichenicolous on *Circinaria caesiocinerea* areoles, restricted to spots below apothecia. Apothecia up to 0.5 mm diam, rusty orange, with somewhat reduced true exciple of orange or greyish colour (grey by *Sedifolia*-grey pigment). Thalline exciple apparent in old apothecia, grey. Ascospores 12–15 × 5–7 µm; septum in dead spores 2–2.5 µm wide. On sun-lit vertical side of acidic andesitic outcrop. **ITS** sequenced.

$^{\alpha}$***Stigmidium* sp.** – 1, 3: ca-on *Porocyphus rehmicus* and unidentified crustose *Lichinaceae*; Vouchers: PRA-JV20913, 20985, 21227, 21273, 23481. Perithecia black, c. 0.1–0.2 mm diam., entirely immersed in the host tissue, only an area surrounding ostiole visible as a black dot (well observable when wet). Perithecial wall black; centrum occasionally with a purple (K+ violet) pigment, reaction with Lugol's solution negative. Hamathecium of branched and anastomosed, c. 2.5 µm thick paraphysoids. Asci 50–70 × 15–25 µm. Ascospores smooth, colourless, *Arthopyrenia*-like, with upper cell distinctly larger, 20–25 × 6.5–10 µm. Occurring in communities of cyanolichens on lime enriched seepage rocks. **Fig. 10C, D**

$^{\gamma}$***Strigula* sp. 1** – 6: Sor-young; Voucher: PRA-JV23970. Teleomorph. Thallus inconspicuous, apparently not lichenized. Black perithecia 0.1–0.2 mm diam.; perithecial wall brown, KOH+ dark brown, locally with olive tinge. Hamathecium of anastomosed hyphae; asci c. 50 × 15–20 µm. Ascospores 18–20 × 3–5 µm, 1-septate, *Arthopyrenia*-like, with upper cell distinctly larger than the lower; with c. 0.1 µm thick perispore in KOH. Ascospores, when released from asci, frequently disintegrating into single cell fragments; 10–11 × 5–6 µm (from upper cell) and 8–10 × 3–5 µm (from lower cell). Occurring on smooth bark of *Corylus* or *Sorbus* together with *Arthopyrenia analepta* and *Strigula* sp. 2.

Record outside the study area: Czech Republic. Central Bohemia: Křivoklát, nature reserve Stříbrný luh, alt. 340 m, 50.02325N, 13.89800E, on smooth bark of *Corylus avellana*, 19 August 2020, coll. Jan Vondrák (PRA-JV24620).

[γ]***Strigula* sp. 2** – 6: Sor-young; Voucher: PRA-JV23985. Anamorph. Thallus inconspicuous, apparently not lichenized. Black pycnidia up to 0.1 mm diam. Conidia 7–11 septate, 32–40 × 3.5–4.5 µm, without apical gelatinous appendages. Occurring on smooth bark of *Corylus* or *Sorbus*. The lichenized *Strigula tagananae* has very similar conidia, but with distinct appendages (Roux et al. 2004). This anamorph may possibly belong to the teleomorph, *Strigula* sp. 1 (see above), as both were twice recorded on the same phorophyte (but not intermixed).

Record outside the study area: Czech Republic. Central Bohemia: Křivoklát, nature reserve Stříbrný luh, alt. 340 m, 50.02325N, 13.89800E, on smooth bark of *Corylus avellana*, 19 August 2020, coll. Jan Vondrák (PRA-JV24619).

[α]***Taeniolella* sp. –** 6, 12: sil-on *Baeomyces rufus*; Vouchers: JK3497, 10373. It forms galls on the host thallus, similarly to *Taeniolella atricerebrina*, *T. rolfii* and *T. diploschistina*. Young galls discoloured, later blackened, eventually leaving dark brown irregular, partly glossy, convex structures of necral tissue, 0.4–1 mm diam. Mycelium immersed; hyphae brown, flexuous, contorted, smooth on surface, 3–6.5 µm wide. Conidiophores semi-macronematous, mononematous, solitary to dense, erect, strait, sometimes flexuous, arising from internal hyphae, occasionally branched near base up to lower third, slightly or conspicuously constricted at the septa, wall of conidiophores cracked or ridged, 24–45 µm long, 4–6.5 µm wide. Conidia most often only 0–1(–2)-septate, ellipsoid, 2-layered, upper wall with irregular cracks. Conidia 6–8 × 4.5–7 µm when 0-septate; up to 16–19 × 4.5–7 µm when 2-septate. When septate not distinctly constricted at the septa. Both collections from the study area are rather poor and not suitable for designation as a type specimen.

Trapeliaceae sp. – 1: esr; Voucher: PRA-JV21130. Sterile thallus formed of tiny granules to bullate areoles, 0.1–0.3 mm diam. Surface pale grey, but usually white pruinose. Spot tests: K-, P-, C+ red. Recorded on soft, base-rich, andesitic tuff on sun-lit rock. ITS sequence is closest to genera *Trapelia*, *Trapeliopsis* and *Xylographa* (90–92% identity); mtSSU is closest to *Trapelia* spp. (92–96%). **TLC:** gyrophoric acid; **ITS**, **mtSSU** sequenced. **Fig. 10F**

***Verrucaria* sp. 1** – 1: esr; Voucher: PRA-JV23414. Thallus areolate to subsquamulose, about 100 µm thick, variable in colour (pale grey-green to dark brown). Algal layer thick (along whole vertical thallus section); photobiont cells 5–7.5 µm diam, appear to divide predominantly in vertical direction (forming indistinct stacks). Cortex indistinct, of a single layer or two layers of isodiametric cells (faintly brown pigmented); medulla not developed. Perithecia c. 0.2–0.3 mm diam. (when well developed), partly immersed in thallus. Involucrellum dimidiate, but not much spreading. Exciple brown in upper part. Ascospores slender and some tapering to one end (i.e. elongated tear), 22–37 × 8–10 µm. On andesitic rock at river side, but at a rather dry site with *Circinaria contorta*. **ITS** sequenced; closest NCBI Blast match is *Verrucaria funckii* (94% identitiy in ITS).

***Verrucaria* sp. 2** – 1: esr; Vouchers: PRA-JV21053, 21188, 23402, 23415. Thallus thin, green-grey to grey (sometimes with pink tint), rimose, appressed to substrate. Polygonal areoles c. 0.1–0.2 mm (–0.4 mm, when with perithecium). Cortex and medulla not developed. Mature photobiont cells 9–15 µm diam. Perithecia in centres of areoles, about half-immersed in the thallus, c. 0.2–0.3 mm diam. Involucrellum thin, fully attached to exciple, reaching lower side of perithecia, but not enclosing them. Ascospores c. 17–20 × 6–10 µm. On base-rich vertical andesitic rocks in sun-lit sites. Sequences: **ITS** (21053, 21188, 23415), **mtSSU** (21188). Closest NCBI Blast matches based on ITS data are *Verrucaria* spp. (max. 90% identitiy); based on mtSSU data a sequence of *Verrucaria cernaensis* (98% identity with EF105149 = Thüs W1414, on Genbank this specimen is still catalogued under an earlier incorrect identification as *V. aethiobola* s.lat. sensu Thüs 2002). In the ITS tree, it forms a group with *Verrucaria* sp. 3 and *V.* sp. 11 (Fig. 11) and *V.* sp. 15.

***Verrucaria* sp. 3** – 1: sil; Voucher: PRA-JV23411. Thallus conspicuous, rimose to areolate, (brown) grey, 50–150 µm thick. Areoles flat, 0.2–0.5 mm diam. Algal layer of vertically arranged algal cells, 5–10 µm diam. Cortex well developed, 10–20 µm thick, of tiny isodiametric cells, 3–4 µm diam. Epinecral layer absent. Perithecia, cca 0.2 mm diam, immersed in thallus, only uppermost area surrounding ostiole is exposed. Involucrelum thin, apical, carbonised. Exciple pale brown, K+ green. Ascospores 17–22 × 7–8 µm. On andesitic pebbles in rocky steppe, in nitrophilous communities with *Amandinea punctata* and *Protoparmeliopsis muralis*. **ITS** sequenced; closest NCBI Blast results are *Verrucaria* spp. (max. 90% identitiy). In the ITS tree, it forms a group with *Verrucaria* sp. 2 and *V.* sp. 11 (Fig. 11), and *V.* sp. 15.

***Verrucaria* sp. 4** – 9, 11, 13: sil; Vouchers: PRA-JV20693, 20853, 23952a. Thallus very thin, membranaceous, sometimes forming only patches around perithecia, sometimes indistinctly rimose, in moist state subgelatinous. Photobiont cells 5–11 µm diam. Perithecia tiny, 0.1–0.2 mm diam, with conical involucrellum that reaches the substrate. Transparent tissue sometimes present between the brown exciple and the carbonised involucrellum at perithecial base. Ascospores 15–17 × 5–6 µm. On shaded siliceous stones in rather dry forest stands. Closest Blast relatives to its ITS are *Verrucaria* spp. (max. 90% identitiy); to its mtSSU *Verrucariaceae* spp. (max 94% identity). Our specimens could be identified as *V. memnonia*, but that species usually has a thicker thallus formed of irregular swollen structures. *Verrucaria maculiformis* has a subgelatinous thallus but larger perithecia (0.2–0.3 mm diam.). Sequences: **ITS**

(20693, 20853, 23952a), **mtSSU** (20853). Closest NCBI Blast results are *Verrucaria* spp. (max. 91% identitiy in ITS and 94% in mtSSU).

***Verrucaria* sp. 5** – 1, 2, 13, 14: sil; Vouchers: PRA-JV23971, 23987, 24250. **ITS** sequenced (JV23987, ZP29726), **mtSSU** sequenced (JV23971, 23987, 24250, ZP29726). The species is known as "*Verrucaria* sp. 1" from Wales and Germany (Thüs et al. 2018), which has some similarity with *Verrucaria umbrinula* Nyl., but differs in the shape of the involucrellum, which is laterally slightly spreading in *Verrucaria* sp. 5 from Týřov and hardly visible to incurved under the exciple in *V. umbrinula*. ITS data are similar to those of *Verrucaria hegetschweileri* from bark, but in that species the exciple is more or less dark from top to bottom and a visibly separated involucrellum is entirely absent. The taxon is related to *V. hunsrueckensis*, with which it shares a thallus of tiny green to greenish-brown granules, the spores are of similar size but the shape is less elongated (14–20 × 5–6 µm). Photobiont cells 5–8 µm diam. in our specimens.

***Verrucaria* sp. 6** – 1: esr/ca; Voucher: JM12612. Thallus rimose areolate, very thin (<50 µm), green-brown, but covered by white crystalline pruina. Photobiont cells 4–8 µm diam. Perithecia c. 0.3–0.4 mm diam., from ½ to ¾ immersed in thallus. Involucrellum enclosing the exciple. Ascospores broadly ellipsoid, 15–25 × 12–14 µm. **ITS** and **mtSSU** sequenced. Closest NCBI Blast results in ITS are *Verrucaria vitikainenii* (c. 96% identity) and *V. ahtii* (c. 95%); see the position on Fig. 11.

***Verrucaria* sp. 7** – 1: sil/esr; Vouchers: PRA-JV21188a, 23403, 23415, 23566, 24722. Thallus rimose, areolate to squamulose, of brown-green flat areoles/squamules appressed to substrate; up to 100 µm thick. Cortex and medulla not developed. Algal cells dispersed across the entire thallus height, not arranged in stacks; mature photobiont cells 10–13 µm diam. Perithecia 0.2–0.3 mm diam., usually from c. 2/3 immersed in the thallus. Involucrellum indistinct from the exciple, widened in the basal part into a black basal layer, which is developed only in spots between perithecia. Ascospores c. 17–25 × 9–11 µm. Occurring on base-rich andesite rocks. Occasionally lichenicolous on *Verrucaria* sp. 2, especially in initial stages. **ITS** sequenced (all speciemens). In the ITS tree, it has unresolved relationships to related species: *Verrucaria maculiformis*, *V. substerilis*, *V. tenuispora*, *V. teyrzowensis*, and *Verrucaria* spp. 8–10 (Fig. 8).

***Verrucaria* sp. 8** – 2: sil; Voucher: PRA-JV23735. Thallus brown-green, granular; granules 0.1–0.25 mm diam. Cortex and medulla not developed. Algal cells dispersed over the entire thallus height, not arranged in stacks; mature photobiont cells 13–17 µm diam. Perithecia small, 0.1–0.2 mm diam., not immersed. Involucrellum indistinctly separated from the exciple, widened in the basal part and merging between perithecia to form spots of a black basal layer. Ascospores 18–24 × 6.5–8 µm. Occurring on siliceous stone with accompanying *Trapelia* spp. **ITS** sequenced. In the ITS tree, it has unresolved relationships to related species: *Verrucaria maculiformis*, *V. substerilis*, *V. tenuispora*, *V. teyrzowensis*, and *Verrucaria* spp. 7, 9 and 10 (Fig. 8).

***Verrucaria* sp. 9** – 1, 3: sil; Vouchers: PRA-JV20942, 23566, SMNS-STU-F-0001988. Thallus of brown areoles/squamules, c. 0.2–0.4 mm diam., loosely or tightly dispersed on the carbonised black basal layer. Margin of squamules occasionally raised and granular, of granules 0.05–0.1 mm diam. Squamules up to 150 µm thick. Cortex and medulla not developed. Algal cells dispersed over the entire thallus height, not arranged in stacks; mature photobiont cells 12–17 µm diam. Perithecia developed between squamules, with involucrellum connected with the hypothallus. Ascospores 15–18 × 5–6 µm (only a few observed). Occurring on andesitic pebbles with *Amandinea punctata*, *Candelariella vitellina* and *Rinodina aspersa*. **ITS** sequenced (all specimens). In the ITS tree, it is placed in the same group as *Verrucaria maculiformis*, *V. substerilis*, *V. tenuispora*, *V. teyrzowensis*, and *Verrucaria* spp. 7, 8 and 10 (Fig. 8).

***Verrucaria* sp. 10** – 1: sil; Voucher: PRA-JV24699. Thallus dark brown to black, orbicular (up to 1 cm diam), rimose areolate, up to 100 µm thick. Areoles up to 0.2 mm diam. Cortex and medulla not developed. Algal cells dispersed over the entire thallus height, not arranged in stacks; mature photobiont cells 11–17 µm diam. Perithecia, c. 0.2 mm diam, immersed in thalline warts. Ascospores 20–25 × 7–8 µm. On andesitic stone in shady scree. **ITS** sequenced; it has unresolved relationships to related species: *Verrucaria maculiformis*, *V. substerilis*, *V. tenuispora*, *V. teyrzowensis*, and *Verrucaria* spp. 7–9 (Fig. 8); **mtSSU** sequenced.

***Verrucaria* sp. 11** – 1, 2: sil, esr; Vouchers: PRA-JV23420, 23728, ZP29002. Usually a sterile crust of brown granules or strongly bullate areoles, 0.05–0.2 mm diam. Cortex not developed. Photobiont cells 5–10 µm diam. Perithecia-like structures are frequently formed in the thallus, c. 0.1–0.2 mm diam., but without any traces of hymenium inside. The fertile specimen ZP29002 is the only exception; involucrellum thick, connected to the black basal layer (which is developed in spots); ascospores 14–25 × 12–14 µm. A pioneer species on andesitic or spilite pebbles in rocky steppes or well-lit oak forests on steep S-facing slopes, in communities with *Amandinea punctata*, *Trapelia obtegens* and *Protoparmeliopsis muralis*. **ITS** sequenced (all specimens); **mtSSU** sequenced (ZP29002). In the ITS tree, it is placed in the same group as *Verrucaria* sp. 2, *V.* sp. 3 (Fig. 11) and *V.* sp. 15.

***Verrucaria* sp. 12** – 1: esr; Vouchers: PRA-JV21173, 25030, 25045. Thallus brown-green, squamulose. Squamules 0.3–1.2 mm diam, often with raised and isidiate/blastidiate margins. Isidia c. 30–100 µm wide. Thallus c. 80–180 µm thick. Algal layer 50–120 µm thick; photobiont cells 3.5–7 × 3.5–5.5 µm diam., arranged in clusters, not in stacks. Upper cortex 40–60 µm thick, of paraplectenchymatous cells of 3–6 µm diam. Medulla indistinct and lower cortex not developed. Perithecia not developed. Morphologically similar to *V. macrostoma* (which also has a well developed cortex), but differs by raised and isidiate margins of squamules. Occurring on base rich or even lime enriched volcanic rocks. **ITS** sequenced (JV21173, 25030); forming a clade related to *Verrucaria macrostoma* and *V. nigrescens* - group 1 (Fig. 11). **mtSSU** sequenced (JV25030, 25045).

Other Czech record: Central Bohemia: Křivoklát, protected area Stříbrný luh, alt. 290 m, 50.02335N, 13.89577E, on lime enriched spilite rock in rocky steppe, 19 August 2020, coll. Jan Vondrák (PRA-JV24633; **ITS** and **mtSSU** sequenced).

***Verrucaria* sp. 13** – 1: esr, sil; Vouchers: PRA-JV24725, 24973. Thallus brown, rimose areolate, c. 100 µm thick. Areoles sharply polygonal, 0.1–0.4 mm diam. Cortex and medulla absent. Photobiont cells 4.5–7.5 µm diam. The black basal layer developed in spots and connected with involucrellum below perithecia. Perithecia immersed in thallus, c. 0.3–0.4 mm diam. Involucrellum conical, 50–100 µm thick in upper part, widened to c. 0.5 mm in basal part, with dark brown pigmentation mainly in the cell walls (net-like appearance). Periphyses remarkably long (up to 55 µm), cytoplasm filled parts c. 1.8 µm thick, but cell walls of neighbouring periphyses merging to form a more or less continuos gelatinous matrix. Ascospores 18–26 × 7–10 µm; length/width ratio from app. 2.0 in short spores, increasing to 3.4 in larger ones. **ITS** sequenced (both specimens) and **mtSSU** sequenced (24973). Closest NCBI Blast matches are Verrucariaceae spp. (identities up to 91% in ITS, up to 97.5% in mtSSU).

***Verrucaria* sp. 14** – 6: sil; Vouchers: PRA-JV24839, 25041.Thallus green granular. Granules c. 30–50 µm diam. (Granules poorly developed in JV25041.) Photobiont cells sphaerical to ellipsoid, 4–13 × 4–8 µm. Perithecia pale to dark brown, occasionally black, sessile, c. 0.1–0.2 mm diam. Perithecial wall smooth, colourless to carbonised in upper part, c. 20–30 µm thick. Involucrellum absent. Periphyses 23 × 2 µm. Ascospores 15–24 × 6–9 µm. Occurring on damp and shady rhyolitic and andesitic stones, together with *Verrucaria* spp*.* **ITS** and **mtSSU** sequenced; closest NCBI Blast matches are *Verrucariaceae* spp. for ITS (91% identitiy) and *V. dolosa* EF105148 for mtSSU (97% identity).

***Verrucaria* sp. 15** – 1: esr; Vouchers: PRA-JV24742, 25144. Thallus olive-green, epilithic, areolate to subsquamulose. Areoles flat, up to 150 µm thick. Cortex not developed, algal cells (c. 4-10 µm diam.) present in whole thallus section, not arranged in stacks. Black basal layer restricted to spots surrounding bases of perithecia. Perithecia frequently formed between thalline areoles, c. 0.1–0.25 mm diam., but sometimes without hymenium (similarly to *V.* sp. 11). Hymenium rarely developed in JV24742, ascospores few and poorly developed and 17–18 × 13–16 µm. Ascospores well developed in JV25144, 15–28 × 13–16 µm; smaller spores almost globose. Occurring on andesitic pebbles in steppe (JV25144) or on nutrient-rich andesitic outcrops at river bank, together with sorediate *Bacidina* sp (JV24742). **ITS** sequenced (both specimens) and **mtSSU** sequenced (JV24742); the ITS sequences placed in the same group as *Verrucaria* sp. 2, *V.* sp. 3 and *V.* sp. 11.

***Verrucaria* sp. 16** – 1: sil; Voucher: PRA-JV24739. Sorediate crust without perithecia. Thallus olive green to brownish, <50 µm thick, epilithic. Cortex and the black basal layer absent. Soralia beige-green, very small, c. 0.05–0.15 mm diam, irregularly punctiform, convex. Soredia only 15–25 µm diam., usually with up to 6 algal cells in optical view. Algal cells 3–8 µm diam. Occurring on andesitic pebbles in scree together with

Verrucaria sp. 5. **ITS** sequenced; almost identical with the NCBI sequence of *Verrucaria* aff. *trabicola* (98.5 % identity) generated by Pykälä et al. (2019), but their specimen was epiphytic and without soredia. We have sequenced ITS of more Czech and Slovakian specimens of *Verrucaria* specimens with tiny punctiform soralia with following results: one was closely related to *V.* sp. 16 and *V.* aff. *trabicola* (PRA-ZP15480 with about 98 % identity with both sequences) and two specimens (PRA-ZP29891 and ZP30029) were closely related to *V. tallbackensis*, the species belonging to the same group (*Verrucaria kalenskyi* – *V. xyloxena* species complex sensu Pykälä et al. 2019).

***Verrucaria* sp. 17** – 7: ca (mortar in ruin wall); Voucher: PRA-JV25024. Thallus olive green, epilithic, membranaceous, not divided into areoles, but with occasional cracks; mostly up to 50 µm thick. Cortex and the black basal layer absent. Algal cells 4–8 µm diam., not arranged in stacks. Perithecia 0.15–0.25 mm diam., half-immersed in thallus, with poorly developed carbonised involucrellum, indistinguishable from exciple. Ascospores 20–28 × 9–13 µm. Occurring on mortar together with calcicolous bryophytes. **ITS** sequenced; the sequence stays solitary within the clade of *V. dolosa*, *V. hydrophila* and *V. placida*. **mtSSU** sequenced.

***Verrucaria* sp. 18** – 1: sil; Voucher: PRA-JV24701. Morphologically similar to *V. dolosa*. Thallus brown, epilithic, membranaceous, divided by thin cracks into tiny areoles, c. 0.1–0.2 mm diam. Areoles up to 50 µm thick. Cortex and the black basal layer absent. Algal cells 4–7 µm diam., not arranged in stacks. Perithecia c. 0.1–0.2 mm diam., sessile to half-immersed in thallus. Carbonised involucrellum thin, enclosing perithecia, not laterally spreading. Ascospores 14–18 × 5.5–7 µm. **ITS** and **mtSSU** sequenced; the ITS sequence stays solitary within the clade of *V. dolosa*, *V. hydrophila*, *V. placida* and *V.* sp. 17.

***Verrucaria* sp. 19** – 6: ca-concrete; Voucher: PRA-JV24858. Morphologically similar to *V. viridula* and *V. tabacina* Thallus rimose-areolate, pale brown-grey; polygonal areoles variable in size, 0.1–0.8 mm diam., up to 150 µm thick. Cortex and the black basal layer absent. Algal cells in whole vertical profile, sometimes forming poorly arranged stacks; algal cells 6–10 µm diam. Perithecia 0.5–0.7 mm diam., half-immersed or fully immersed in thalline warts. Carbonised involucrellum sphaerical, enclosing perithecia, 70–100 µm thick. Periphyses well developed, 30–40 µm long and 3–5 µm thick. Ascospores 20–29 × 14–17 µm. Occurring on rain-sheltered concrete in humid and shaded conditions in the bottom of stream valley, together with *Caloplaca chrysodeta*. **ITS** sequenced. It is related to *V. tabacina* (c. 91.5% identity with JV21269) and *V. viridula*, but our and NCBI sequences of *V. viridula* have <91% identities with *V.* sp. 19.

***Verrucaria* sp. 20** – 1: ca/esr; Voucher: PRA-JV25145. Outer morphology similar to *Staurothele frustulenta*. Thallus brown-grey, bullate-areolate in centre and subsquamulose at thallus margins. Areoles/squamules c. 0.2–1 mm diam., 100–300 µm thick. Cortex absent, but the uppermost mycobiont cells form c. 5 µm thick, brown-pigmented layer. Medulla and black basal layer absent. Algal cells 4–8 µm diam., sometimes arranged in stacks. Perithecia globose, 0.15–0.3 mm diam., fully immersed in thallus (only a small round area around ostiolum visible on thallus). Carbonised involucrellum absent. Exciple brown (but colourless below perithecium), 15–25 µm thick. Ascospores 10–15 × 6–8.5 µm. Occurring on sun-exposed lime enriched andesitic rock. **ITS** sequenced; identities with Verrucariaceae spp. available in NCBI are below 86%.

***Verrucaria* sp. 21** – 6: sil; Voucher: PRA-JV25040. Thallus dark green, up to 100 µm thick, but typically much thinner and membranaceous; not divided by cracks. Algal cells 5–12 µm diam. Cortex and black basal layer absent. Perithecia 0.2–0.25 mm diam., raised above thallus (up to half-immersed in thallus). Carbonised involucrellum c. 20–30 µm thick, reaching the perithecial base, but neither incurving below the exciple nor laterally spreading; sometimes enclosing 2 or 3 adjacent perithecia. Periphyses forming a palisade tissue at ostiolum, c. 10–15 × 1–2 µm. Ascospores 10–16 × 5–7 µm. Occurring on shaded and damp andesitic stone with *Verrucaria praetermissa* and *V.* sp. 14. **ITS** sequenced; closest NCBI Blast hits are various *Heteroplacidium* and *Placidium* with shared identities below 97%, but with low covers (mostly 30–40%) and identities largely restricted to the 5.8S rDNA part. **mtSSU** sequenced; closest NCBI Blast hits are various Verrucariaceae (e.g. *Mastodia* and *Hydropunctaria*) with identities up to 92%.

***Verrucaria* sp. 22** – 1: ca; Voucher: PRA-JV25038. Thallus areolate, pale grey, without pigmentation in section. Areoles irregular in shape and size, c. 0.2–0.7 mm diam., 100–150 µm thick. Cortex absent, but colourless epinecral layer present, up to 30 µm thick. Medulla and black basal layer absent. Algal cells 4–8 µm diam., not arranged in stacks. Perithecia globose, 0.2–0.25 mm diam., half-immersed or fully immersed in thallus. Carbonised involucrellum absent, but exciple brown in upper part and with colourless bottom; 20–40 µm thick. Ascospores 14–17 × 5.5–7 µm. Occurring on calcareous inclusion in andesitic rock with *Diplotomma alboatrum*. **ITS** sequenced; closest NCBI Blast hit is a North American *Verrucaria* sp., MZ922242 (95% identity). Other NCBI sequences share identities below 90%. **mtSSU** sequenced.

List of named taxa

Lichenicolous, non-lichenized fungi

$^{\alpha}$***Abrothallus caerulescens*** – 1, 3: sil-on *Xanthoparmelia conspersa*; Vouchers: JK (in Kocourková 2000), JM12059.

$^{\alpha}$***Abrothallus tulasnei*** – 10: sil-on *Xanthoparmelia conspersa*; Voucher: JK10381.

$^{\alpha}$***Arthrorhaphis aeruginosa*** – 1, 4, 5, 7, 14: log-on *Cladonia* squamules. Voucher: JK6561.

$^{\alpha}$***Cercidospora macrospora*** – 1, sil-on *Lecanora garovaglii*; Voucher: JK10353.

$^{\alpha}$***Cercidospora solearispora*** – 1, esr: on *Circinaria caesiocinerea;* Voucher: JK10510.

$^{\alpha}$***Clypeococcum cladonema*** – 7: sil-on *Xanthoparmelia verruculifera* (Kocourková 2000).

ᵅ***Clypeococcum hypocenomycis*** – 3: Qpe-on *Hypocenomyce scalaris* (Kocourková 2000).

ᵅ***Dactylospora deminuta* s.lat.** – 4, 7: Apl, Qpe-on *Bacidia rubella*, *Rinodina efflorescens*, unidentified crust; Vouchers: PRA-JV20628, 24142, 24162. Apothecia dark brown to black, 0.1–0.3 mm diam., with raised margin and flat disc. Exciple, 30–40 µm wide, extended below hypothecium, with orange-brown pigment, KOH+ dark brown. Asci 8-spored. Ascospores grey to brown, 3-septate, 14–18 × 4–6 µm. Identification tentative; ascospore characters do not correspond with the description in Triebel (1989). **ITS** sequenced (JV24162; on unidentified thin crust).

ᵅ***Dactylospora parasitica*** – 7: Apl-on *Pertusaria amara*; Voucher: PRA-JV24261. **ITS** sequenced.

ᵅ***Endococcus brachysporus*** (NEW) – 9: sil-on *Porpidia tuberculosa*; Voucher: PRA-JV24517. Also recorded from Central Bohemia on the same host (Malý Blaník, 5 May 2001, coll. J. Kocourková, PRM896122).

ᵅ***Endococcus karlstadtensis*** (NEW) – 1: cs-on *Endocarpon pusillum;* Voucher: JK10503. Also recorded from a nearby locality on the same host (Stříbrný luh Nature Reserve, 19 August 2020, coll. J. Vondrák, PRA-JV24628).

ᵅ***Endococcus macrosporus*** – 1, 7, 10: sil-on *Rhizocarpon geographicum*, *R. lecanorinum*; Vouchers: JK (in Kocourková 2000), JK4003, 4979, PRA-JV24689.

ᵅ***Endococcus perpusillus*** s.lat. – 1, sil-on *Circinaria caesiocinerea*; Voucher: JK10362.

ᵅ***Endococcus stigma*** – 1: sil-on *Acarospora praeruptorum*; Voucher: PRM906842.

ᵅ***Intralichen christiansenii*** – 1: sil-on *Catillaria atomarioides;* Voucher: JK10529.

ᵅ***Karschia talcophila*** – 3: sil-on *Diploschistes scruposus*; Voucher: JK (in Kocourková 2000).

ᵅ***Lichenoconium erodens*** – 6, 7, 11: Aglu, Pic, Qpe, sil-on *Cladonia coniocraea*, *Flavoparmelia caperata*, *Lecanora conizaeoides, Parmelia saxatilis*; Vouchers: JK3926, 4804, 4843, 10357.

ᵅ***Lichenoconium lecanorae*** – 1,10, 11: esr-on *Xanthoparmelia conspersa. X. pulla*, *X. verruculifera*, sil-on *Parmelia saxatilis*, Qpe-on *Lecanora conizaeoides*; Fra-on *Lecidella elaeochroma*; Vouchers: JK2258, 2259, 3990, 3484, 10539, PRM906953.

ᵅ*Lichenoconium lichenicola* – 1: sil-on *Physcia dubia;* Voucher: JK10528.

ᵅ***Lichenoconium usneae*** – 11: Qpe, sil-on *Ramalina europaea*; Voucher: JK (in Kocourková 2000), JK10450.

ᵅ***Lichenodiplis lecanorae*** – 1, 7: sil-on unidetified crust, Fra-on *Lecanora* cf. *saligna*; Vouchers: JK (in Kocourková 2000), PRA-JV23416.

ᵅ***Lichenostigma alpinum*** – 6: Car-on unidentified sorediate crust*;* Voucher: JK5474 (only in anamorph).

ᵅ***Lichenostigma chlaroterae*** (NEW) – 7: Car-on *Lecanora pulicaris;* Voucher: JK4985 (only as anamorph).

ᵅ***Lichenostigma cosmopolites*** – 1, 6, 7, 8, 11: sil-on *Xanthoparmelia conspersa*; Vouchers: JK10380, PRM (Kocourková 2000).

ᵅ***Lichenostigma elongatum*** – 1, 8: sil-on *Aspicilia brucei* and *Circinaria caesiocinerea*; Vouchers: JK3937, PRA-JV24596, 24878.

$^{\alpha}$***Lichenostigma gracilis*** – 1: sil-on *Acarospora praeruptorum*; Vouchers: PRM906842a, PRA-JV24690.

$^{\alpha}$***Lichenothelia convexa*** – 1, 3, 5: sil-on *Acarospora*; Vouchers: PRA-JV20932, 20996.

$^{\alpha}$***Lichenothelia rugosa*** – 1, 2, 3, 11: sil-on *Diploschistes scruposus*; Voucher: JK (in Kocourková 2000), JK2827, 10567, PRA-JV21223.

$^{\alpha}$***Marchandiomyces corallinus*** – 1: sil-on *Ramalina capitata*; Voucher: PRA-JV24691.

$^{\alpha}$***Microcalicium arenarium*** – 2, 4, 5, 7, 11, 13: sil-lichenicolous on *Psilolechia*; Vouchers: JK7666, 7669, PRA-JV24137. **mtSSU** sequenced (JV24137).

$^{\alpha}$***Muellerella erratica*** – 1, 7: esr-on *Circinaria contorta*, ca-on *Protoblastenia rupestris*; Vouchers: JK (in Kocourková 2000, as *Muellerella pygmaea* var. *athallina*), JK10452.

$^{\alpha}$***Muellerella lichenicola*** – 1: esr-on *Caloplaca flavovirescens*; Voucher: JK (in Kocourková 2000).

$^{\alpha}$***Muellerella polyspora*** (NEW) – 2: Car-on *Arthonia radiata*; Voucher: PRA-ZP29758.

$^{\alpha}$***Muellerella pygmaea*** – 3: sil-on *Lecidea fuscoatra*; Voucher: JK (in Kocourková 2000).

$^{\alpha}$***Muellerella ventosicola*** – 11: sil-on *Rhizocarpon reductum*; Voucher: JK (in Kocourková 2000).

$^{\alpha}$***Nectriopsis micareae*** (NEW) – 6: dw-stump-on *Micarea prasina* s.lat.; Voucher: PRA-JV24164. Perithecia c. 0.1 mm diam., ascospores 10–13 × 3 µm, curved, resembling *Nectriopsis rubefaciens*.

$^{\alpha}$***Paranectria oropensis*** (NEW) – 6, 9: Acam, Car, Fra-on *Aquacidia trachona*, *Lecania croatica*; Voucher: PRA-JV24156. Also recorded from Prague, on *Physcia adscendens* (coll. J. Kocourková, 2020, JK10280).

$^{\alpha}$***Phaeospora rimosicola*** – 10: esr-on *Rhizocarpon petraeum*; Voucher: PRA-ZP31558.

$^{\alpha}$***Polycoccum minutulum*** – 7, 13: sil-on *Trapelia placodioides;* Vouchers: JK4973, 4978.

$^{\alpha}$***Roselliniella cladoniae*** – 1: cs-on *Cladonia pocillum;* Voucher: JK10495.

$^{\alpha}$***Sarcopyrenia cylindrospora*** – 7, 10: sil-on *Aspicilia* sp., *Rhizocarpon geographicum*; Vouchers: JK (in Kocourková 2000), JK10444, PRA-JV25099.

$^{\alpha}$***Spirographa ciliata* s.l.** (NEW) – 1: sil-on *Xanthoparmelia conspersa;* Voucher: JK10490. In the Czech Republic, the species is known only as anamorph (*Cornutispora ciliata*). Here we employ the broad concept of *S. ciliata*, in which the species is not host-specific.

Additional records from the Czech Republic: Křivoklátsko: Vysoký Tok Nature Reserve, on *Lecanora conizaeoides*, 12 Sept. 2018, coll. J. Kocourková (JK10074); Nezabudické skály NR, 16 Febr. 2002, coll. J. K. (PRM896173); Lánská obora game reserve, on *L. conizaeoides*, 5 May 2002, coll. J. K. (PRM900163); on *Pertusaria coccodes*, 24 June 2002, coll. J. K. (PRM900182); Řevničov, source area of Klíčava brook, on *L. conizaeoides*, 18 May 2001, coll. J. K. (PRM895830); near Horácká Lísa gamekeeper´s house, on *Cladonia macilenta*, 13 Oct. 2001, coll. J. K. (PRM896145). Eastern Bohemia: Nové Město n. Metují, valley of the Metuje River (Peklo), on *Cladonia caespiticia*, coll. J. K. & F. Berger (PRM895843).

$^{\alpha}$***Sphinctrina leucopoda*** – 1: sil-on *Diploschistes scruposus*; Field record: JM.

$^{\alpha}$***Stigmidium fuscatae*** – 1: sil-on *Acarospora fuscata*, *A. gallica*, *A. praeruptorum*; Vouchers: JK (in Kocourková 2000), PRA-JV24971.

$^{\alpha}$***Stigmidium lichenum*** (NEW) – 1: esr-on *Verrucaria* cf. *maculiformis*; Vouchers: PRA-JV24748, 24950, 24970.

$^{\alpha}$***Stigmidium rivulorum*** – 6: sil-inundated-on *Verrucaria aquatilis*; Voucher: JM11881a. This lichenicolous fungus is possibly conspecific with *Pseudarthopyrenia rivularis* described from the Czech Republic as an aquatic lichen on siliceous stones (Servít 1955). Our specimen has tiny perithecia (about 0.1 mm diam.) on black thallus; ascospores *Arthopyrenia*-like, 1-septate, 15–18 × 4–5 µm.

$^{\alpha}$***Stigmidium xanthoparmeliarum*** – 1, 7: sil-on *Xanthoparmelia conspersa*, *X. protomatrae*; Vouchers: JK (in Kocourková 2000).

$^{\alpha}$***Taeniolella delicata*** – 1: sil-on *Protoparmeliopsis garovaglii*; Voucher: JK10484.

$^{\alpha}$***Taeniolella* spp.** – 9, 11: sil-on *Rhizocarpon reductum* and *Lecidea fuscoatra*; Vouchers: JK2829, PRA-JV24535.

$^{\alpha}$***Tremella candelariellae*** (NEW) – 3: Qpe-on *Candelariella xanthostigma*; Voucher: PRA-ZP30966.

$^{\alpha}$***Tremella diploschistina*** (NEW) – 1: sil-on *Diploschistes scruposus*; Voucher: PRA-JV23423. *Additional Czech record*: Šumava Mts, Hamry: nature reserve Bílá strž, rock-outrop-ridge at SE part of the reserve, 49°11'15.9"N, 13°09'57.5"E, infecting *Diploschistes scruposus* on SW-facing, half-shaded low vertical part of mica-schist outcrop, alt. 1075 m, 17 Sept. 2019, coll. Z. Palice (PRA-ZP27715).

$^{\alpha}$***Tremella wirthii*** (NEW) – 2: dw-log (Qpe)-on *Protoparmelia hypotremella*; Vouchers: PRA-JV23710a, ZP29015. **ITS** sequenced (JV23710a).

$^{\alpha}$***Unguiculariopsis acrocordiae*** – 1, 2, 3, 10, 14: Qpe, Til, Ulm-on *Acrocordia gemmata*; Vouchers: PRA-JV, ZP.

$^{\alpha}$***Weddellomyces xanthoparmeliae*** – 7: sil-on *Xanthoparmelia conspersa*; Voucher: JK7674.

Non-lichenized microfungi

$^{\beta}$***Amphisphaeria umbrina*** – 5, 14: Qpe; Vouchers: PRA-JV24191, 24328. **ITS** and **mtSSU** sequenced (24328).

$^{\beta}$***Bertia gigantospora*** (NEW) – 1, 2, 3: Acam, Apl; Voucher: PRA-JV24354, 24923. Characterized by exceptionally large ascospores, 36–45 × 12–14 µm (Nannfeldt 1975). Described from Florida, but recently also reported from Europe, Great Britain. It occurs in lowlands of the Czech Republic, preferrably on *Acer campestre* in lichen communities, typically with *Bacidina* sp. 1 (see above). It was previously reported from the Czech Republic as *Rhagadostoma* sp. (Vondrák et al. 2016). European specimens may be distinct from the sequenced *Bertia gigantospora* from Kenya (Mugambi & Huhndorf 2010).

$^{\beta}$***Cheiromycella microscopica*** (NEW) – 4, 5: dw-log (Abi); Vouchers: PRA-JV24882, 24893.

$^{\beta}$***Cryptodiscus foveolaris*** – 2, 6: dw; Vouchers: PRA-JV, ZP.

$^{\beta}$***Exarmidium inclusum*** – 1: dw-log (Fra); Voucher: PRA-JV24702.

^{β}***Hyalotrochophora lignatilis*** (NEW) – 13: dw-log; Voucher: PRA-JV23983.

^{β}***Hysterium pulicare*** – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14: Apl, Aps, Fra, Qpe; Voucher: PRA-JV24930.

^{β}***Karschia cezannei*** – 1, 2, 4, 5, 7, 8: Qpe; Vouchers: JK, PRA-JV, PRA-ZP. Common in the study area on weathered bark of older oaks. The species was also recorded in nearby areas (e.g. Vysoký Tok Nature Reserve, coll. J. Kocourková, JK9656, 9689, 10130).

^{β}***Karstenia* aff. *idaei*** – 1: Ulm; Voucher: PRA-ZP31630. *K. idaei* is taxon originally described from canes of *Rubus idaeus* (Sherwood 1977), but recently suggested to be a plurivorous saprophytic species growing also on weathered bark and wood of various deciduous trees and shrubs (e.g. Friebes 2011). The present specimen fits quite well the decription in Sherwood (1977) and additional notes in Friebes (2011) in overall habitus, and ascospore and excipular characters. It deviates by the presence of crystals non-soluble in KOH, forming a surficial layer of epihymenium, resulting in a faint pruina of largely hidden disc, and by slightly coloured, distinctly delimited subhymenium, intensifying yellow-orange after adding KOH. Similarly-looking specimens from the Czech Republic were identified as *Ramonia chrysophaea* (e.g. Vondrák et al. 2016; not studied in detail later), and may well be conspecific or related to our specimen. However, the name *R. chrysophaea* is highly misunderstood and misapplied. In literature it is attributed to at least three different entities: i) Verkley (1999) studied the very sparse Persoon's original material of *Peziza chrysophaea* in L, and concluded it is possibly conspecific with *Stictis friabilis*, over which should have nomenclatoric priority; ii) previously Vězda (1966) missed the Persoon's type specimen and designed a neotype on (apparently) a lichenized fungus, old Nylander's specimen from France with distinctly halonate ascospores, which is very close and possibly identical to *Ramonia subsphaeroides* according to descriptions in the same work (Vězda 1966); iii) currently used concept of *R. chrysophaea* by the British authors (e.g. Sanderson & Purvis 2009) which was followed in identification of Czech specimens (e.g. Vondrák et al. 2016), resembles that one by Sherwood (1977) for *Karstenia idaei* and *K. sorbina*. The species delimitation in the *Karstenia/Ramonia*-complex is not clarified yet and remains to be solved in future. **ITS** sequenced; closest NCBI Blast hit is *Karstenia rhopaloides* (FJ904685; 87.2% identity). **mtSSU** sequenced; closest NCBI Blast hits: various Ostropomycetidae (identities up to 88%).

^{β}***Kirschsteiniothelia aethiops*** – 2: Ulm; Voucher: PRA-JV24059. Ascospores 1-septate, sole-shaped, 22–30 × 12–14 µm, grey-brown. Hamathecium of branched and anastomosed paraphysoids. Perithecial wall dark brown, cellular, surrounding the centrum. *Peridiothelia grandiuscula* has similar size and shape of ascospores, but the brown perithecial wall should be absent below hymenium.

^{β}***Leptosillia wienkampii*** – 3: Fra; Voucher: PRA-JV24928.

^{β}***Peridiothelia fuliguncta*** – 1, 2: Til-base; Vouchers: JM13737, PRA-JV23457, ZP30116.

$^{\beta}$***Pseudotryblidium neesii*** – 4: Abi; Voucher: PRA-JV24149. Anamorph recorded. Dark red to black pycnidia of irregular shape, 0.2–0.5 mm diam. Conidia curved, c. 20 × 6 µm.

$^{\beta}$***Rebentischia massalongoi*** – 2, 6, 9: Acam, Apl; Vouchers: PRA-JV24188, 24533, 24694.

$^{\beta}$***Requienella fraxini*** (NEW) – 1: Fra; Voucher: PRA-JV24337.**ITS** sequenced.

$^{\beta}$***Sarea coeloplata*** (NEW) – 7, 9: Pic-resin; Vouchers: JK4952, PRA-JV24514. Hardly distinguishable from *S. difformis*, but distinct in the DNA sequence data. According to Mitchell et al. (2021), our specimen JV24514 belongs to the "clade 2" of this species. Older specimen JK4952 is tentatively identified.

$^{\beta}$***Sarea resinae*** – 6, 9: Pic-resin; Voucher: PRA-JV23906. **ITS** and **mtSSU** sequenced.

Semilichens

$^{\gamma}$***Absconditella rubra*** (DD) – 2: Car; Voucher: PRA-ZP31463. Although recently described (van den Boom et al. 2015), it has already been recorded from numerous sites in the Czech Republic, also in regions with impoverished lichen flora (Malíček et al. 2018a). It is easily overlooked and has only a single record in Týřov.

$^{\gamma}$***Anisomeridium macrocarpum*** (DD) – 1, 2, 3, 6, 7, 10, 13: Acam, Aps, FE, Til-tree bases; Vouchers: PRA-JV.

$^{\gamma}$***Arthonia punctiformis*** (DD) – 1, 2, 5, 6, 10, 11, 13, 14: Bet, Car, Cor, Cra, Fag, Qpe, Sari, Stor, Til-preferrably on thin twigs; Vouchers: PRA-JV.

$^{\gamma}$***Arthonia thoriana*** (NEW) – 4, 6: Aglu, Fra, Qpe, dw-snag (Abi, Aglu); Vouchers: PRA-JV20623, 23882, 24891, 24892. Described as non-lichenized (Ertz et al. 2018) from southern England. In the study area it is common on mature *Alnus* trees in the bottom of the valley of Úpořský potok stream. We suggest the species is a semilichen with a loose association with algae. **mtSSU** sequenced (JV20623, 23882).
Other Czech records: South Bohemia. Benešov nad Černou, protected area Žofínský prales, alt. 780 m, 48.66992N, 14.70982E, on bark of *Ulmus glabra*, 30 July 2020, coll. J. Vondrák (PRA-JV24025); České Budějovice, Poněšice, valley of stream Kozlovský potok, alt. 390 m, 49.11401N, 14.47481E, on *Quercus robur*, 9 April 2021, coll. J. Vondrák (PRA-JV24954). (Frequent and abundant on the latter locality.)

$^{\gamma}$***Arthopyrenia analepta*** (DD) – 6, 8: Car, Sor-tw; Voucher: PRA-JV23984. Historical records from the Czech Republic (sub *A. fallax*) are more than 90 years old. In recent years, the species was rediscovered in several localities, one of which has been published (Malíček et al. 2017). Perhaps it is locally frequent in sites with humid mesoclimate on smooth bark, expecially on *Carpinus* rods.

$^{\gamma}$***Arthopyrenia fallaciosa*** (NEW) – 3: Bet; Vouchers: PRA-JV24545. Distribution in Europe is little known; said to be more frequent in northern Europe (Coppins & Earland-Bennett 2009). In the study area recorded on a single mature birch (49.96979N, 13.79521E). **mtSSU** sequenced.

$^{\gamma}$***Arthopyrenia inconspicua* auct., non (Nyl.) J. Lahm ex Körb.** (NEW) – 6: sil; Voucher: PRA-JV23972. A little known tiny semilichen with inconspicuous thallus and perithecia up to 0.1 mm diam. Perithecial wall is about 20 µm wide with colourless inner part and dark brown rough outer part; the wall is absent beneath perithecia. It is said to occur on base-rich siliceous stones at lower altitudes (Wirth et al. 2013). In the study area, it was found on acidic siliceous stone (rhyolite) at forest path. A similar species, *Arthopyrenia saxicola*, has larger perithecia and ascospores and occurs on calcareous substrata.

We apply here the name according to the concept of Wirth et al. (2013), however, the real *Arthopyrenia inconspicua* (Nyl.) J. Lahm ex Körb. is a non-lichenized fungus with specific fruiting bodies (catathecia), lichenicolous on *Verrucaria* (Roux 2020).

[Y]***Arthopyrenia salicis*** (DD) – 3, 5, 6: Car, Cor, Fra; Vouchers: PRA-JV. Species known to be either lichenized or not (Coppins & Orange 2009). Specimens from central Europe usually do not have a lichenized thallus, but perhaps are loosely associated with *Trentepohlia* and thus considered semilichens. In the Czech Republic, the species is locally frequent, especially on *Corylus* rods, but was only once published (Malíček et al. 2017).

[Y]***Chaenothecopsis pusilla*** (DD) – 3, 4, 5, 6, 10: Bet, Pin, Qpe, dw-snag (Abi, Fag, Pin); Vouchers: PRA-JV, ZP.

[Y]***Chaenothecopsis pusiola*** (DD) – 5: dw-snag (Fag); Voucher: PRA-JV23875.

[Y]***Chaenothecopsis rubescens*** (DD) – 2, 3, 5: Qpe; Vouchers: PRA-JV23725, 24321.

[Y]***Chaenothecopsis savonica*** (DD) – 4: dw-snag (Qpe); Voucher: PRA-JV24131.

[Y]***Cyrtidula quercus*** (NEW) – 6: Cor; Vouchers: PRA-JV. Recorded several times in the Czech Republic in recent years (Beskydy Mts, Třeboňsko, Podyjí), but those reports were unpublished. The species occurs on hazel rods and oak twigs where it forms numerous black stromata, each including few perithecia (Coppins & Earland-Bennett 2009). Ascospores are rarely well developed.

[Y]***Eopyrenula avellanae*** (NEW) – 3: Car; Vouchers: PRA-JV24588. In the Czech Republic, known from a single tree in the study area (49.97034N, 13.79457E) where it grows in an anamorpic state (with pycnidia only) together with *Naetrocymbe fraxini*.

[Y]***Epigloea soleiformis*** (DD) – 14: dw-log; Voucher: PRA-JV24252.

[Y]***Leptorhaphis epidermidis*** (DD) – 1: Bet; Voucher: PRA-JV24564. Recorded on a single old birch in the study area (49.98510N, 13.79186E).

[Y]***Leptorhaphis maggiana*** (DD) – 2, 4: Cor; Vouchers: PRA-JV24133.

[Y]***Lichenothelia papilliformis*** (NEW TO EUROPE) – 1: esr; Voucher: PRA-JV23406. Described from limestone in a single site in California (Ametrano et al. 2019). We report on the first known occurrence in Europe; on calcareous inclusion in andesitic rock in the study area. Our specimen has extensive areolate thalli similar to the silicicolous *L. scopularia* without ascocarps. **mtSSU** sequenced; Closest NCBI Blast results with identities >99% had *L. arida* (silicicolous), *L. intermixta* (calcicolous, but not forming areolate crusts) and *L. papilliformis* (calcicolous and morphologically corresponding to our specimen).

[Y]***Lichenothelia scopularia*** (DD) – 1, 2, 5, 9, 11: sil; Vouchers: PRA-JV21035, 21070, 24594. **mtSSU** sequenced (JV21070).

[Y]***Microcalicium ahlneri*** (DD) – 4: dw (Abi); Voucher: PRA-JV24276. A single record in the study area in a remnant of fir-pine forest on a scree with cold and humid mesoclimate (49.95894N, 13.80106E). **mtSSU** sequenced.

[Y]***Microcalicium disseminatum*** (DD) – 4: Qpe; Vouchers: PRA-JV24176, 24280. **ITS** and **mtSSU** sequenced (JV24176).

[Y]***Microcalicium minutum*** (NEW SPECIES) – 4: Pin; Voucher: PRA-JV24173. See the description above.

[Y]***Mycocalicium subtile*** (DD) – 1, 2, 4, 5, 11: dw-log, snag; Vouchers: PRA-JV20626, 23755, 24286, 25060 (anamorph). The anamorphic state (JV25060) sequenced for **ITS** and **mtSSU**. The anamorph has black pycnidia, 150–200 µm diam., with grey-green wall in section. Conidia are pale olive, 4–5 × 1.5–2.5 µm, ellipsoid or shortly bacilliform, sometimes slightly curved.

[Y]***Naetrocymbe fraxini*** (RE) – 3: Car; Voucher: PRA-JV24587. Rather frequent in oceanic regions of Europe, e.g. in Great Britain (Coppins & Orange 2009) where its ecology is similar to the common *Naetrocymbe punctiformis*. However, the species is certainly rare in central Europe (Wirth et al. 2013) and has a more specific ecology. The few records of this species in the Czech Republic are dated to the early 20th Century and are now more than 100 years old (cf. Vězda & Liška 1999). The only known recent occurrence is in the study area on rain-sheltered smooth bark of a single old *Carpinus* – the very same tree where also *Eopyrenula avellanae* and *Reichlingia zwackhii* have the only Czech records.

[Y]***Naetrocymbe punctiformis*** (DD) – 2, 3, 5: Car, Cor, Fag-tw, Til-tw; Vouchers: PRA-JV.

[Y]***Steinia geophana*** (LC) – 1, 6, 7, 13: dw-log, snag; Vouchers: JK3491, PRA-JV20659, 21237.

[Y]***Stenocybe pullatula*** (DD) – 6: Aglu-tw; Voucher: PRA-JV24160.

[Y]***Thelocarpon epibolum*** (LC) – 6: dw-log; Voucher: JK (in Kocourková-Horáková 1998).

[Y]***Thelocarpon intermediellum*** (NT) – 1, 3, 4: dw-log; Vouchers: PRA-JV20953, 21236.

Lichens

Absconditella lignicola (LC) – 3, 6, 7, 13: dw-log; Vouchers: JK, PRA-JV.

Acarospora admissa (DD) – 1, 3: sil; Vouchers: PRA-JV20968, 23431. (The record JV20968 published; Knudsen & Kocourková 2020a).

Acarospora fissa (NEW SPECIES) – 1: sil; Vouchers: PRA-JV. See the description above.

Acarospora franconica (DD) – 1: sil; Voucher: JM12580. (The record published; Knudsen & Kocourková 2020b).

Acarospora fusca (DD) – 3: sil; Voucher: PRA-JV24683.

Acarospora fuscata (LC) – 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12: sil; Vouchers: JK, JM, PRA-JV.

Acarospora gallica (DD) – 1, 13: sil; Vouchers: JK10354, 10369.

Acarospora glaucocarpa* f. *melaniza H. Magn. (DD) – 1: ca; Voucher: JK10522. It differs from the forma *typica* by the endolithic thallus and probably represents a distinct species from *A. glaucocarpa* (Knudsen et al. 2020).

Acarospora insolata (DD) – 1: sil; Vouchers: JM12581, PRA-JV21212.

Acarospora intermedia (DD) – 1, 8: sil; Vouchers: PRA-JV21141, 24202. (The record published; Knudsen & Kocourková 2020a).

Acarospora irregularis (DD) – 1: sil; Voucher: PRA-JV21216.

Acarospora praeruptorum (DD) – 1, 3, 7: sil; Vouchers: JK4977, PRA-JV (6 specimens), ZP31386, PRM906842.

Acarospora rugulosa (VU) – 1: sil; Voucher: JK10519.

Acarospora squamulosa (syn. *Acarospora peliocypha*) (DD) – 1, 7: sil; Vouchers: JK4980, 10355, 10508, 10532, 10355, JM12585, PRA-JV20666, 23488. **ITS** and **mtSSU** sequenced (JV20666).

Acarospora subfuscescens (syn. *Polysporina lapponica* auct.) (LC) – 1, 3, 7, 8: sil-lichenicolous on *Acarospora*; Vouchers: PRA-JV.

Acarospora umbilicata (NT) – 1, 10: esr; Vouchers: JM, PRA-JV21170, ZP31502.

Acarospora veronensis (NT) – 1, 3, 10: sil-pebbles; Vouchers: JM, PRA-JV.

Acarospora versicolor (VU) – 1, 7: esr; Vouchers: PRA-JV23435, 23586, 24202.

Acrocordia conoidea (DD) – 6, 13: esr; Voucher: PRA-JV23883.

Acrocordia gemmata (EN) – 1, 2, 3, 5, 6, 7, 8, 10, 11, 12, 13, 14: Acam, Apl, Aps, Car, Cor, Fag, Fra, Qpe, Til, Ulm; Vouchers: JM, PRA-JV, ZP. Frequent and abundant in the study area; the high red list category (EN) is probably overestimated. Morphotype with unpigmented perithecia (albinomorph) also recorded (JV24050).

Agonimia allobata (DD) – 1, 2, 3, 6, 11, 13, 14: Acam, Apl, Fag, Fra, Qpe, Til, Ulm-tree bases, roots; Vouchers: JM, PRA-JV, ZP.

Agonimia flabelliformis (DD) – 14: Qpe; Voucher: PRA-JV24269. Recorded in the study area on a single tree where it was abundant and richly fertile. **ITS** and **mtSSU** sequenced.

Agonimia gelatinosa (DD) – 2: as; Voucher: PRA-JV23716. Known as an arctic-alpine species, but some records exist from European lowlands (Sérusiaux et al. 1999). In the Czech Republic, it was reported from mountains (Bouda et al. 2019) and lower altitudes (Vondrák et al. 2010). Probably a rare lichen in the study area; only one thallus recorded on sandy soil in steppe at top of an andesite cliff.

Agonimia globulifera (DD) – 1, 3: bryo-ca; Vouchers: PRA-JV20896, 21027.

Agonimia opuntiella (NT) – 1, 3, 7, 10: bryo-ca, bryo-esr, Fra; Vouchers: JK, PRA-JV, ZP.

Agonimia repleta (DD) – 1, 2, 3: Fag, Fra, Qpe-tree bases, roots; Vouchers: PRA-JV24224, 24695, 25151.

Agonimia tristicula (LC) – 1, 2, 3, 8, 9, 10, 13: bryo-ca, bryo-esr, Apl, Fra, Qpe; Vouchers: JK, JM, PRA-JV, ZP.

Agonimia vouauxii (DD) – 1: bryo-esr; Voucher: PRA-JV21021. In the study area, it occurs on old stems of the moss *Abietinella abietina* (and rarely on plant debris) in rocky steppes.

Alyxoria ochrocheila (DD) – 6: Fag; Voucher: PRA-JV24335. Several young thalli (with pycnidia, but without apothecia) observed on a single tree in the study area.

Alyxoria varia (NT) – 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14: Acam, Apl, Aps, Car, Fag, Fra, Qpe, Til, Ulm, dw, esr; Vouchers: JK, PRA-JV, ZP.

Amandinea punctata (LC) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14: Acam, Apl, Aps, Car, Cra, Fag, Fra, Pin, Qpe, Til, Stor, dw, sil; Vouchers: JK, PRA-JV, ZP.

Anema decipiens (NT) – 1, 3: ca, esr; Vouchers: JM, PRA-JV.

Anema tumidulum (DD) – 1, 3: ca; Vouchers: PRA-JV, ZP.

Anisomeridium polypori (LC) – 1, 2, 3, 4, 5, 6, 11, 13, 14: Acam, Apl, Aps, Car, Cor, Fag, Fra, Qpe, Sam, Til, Ulm, sil. Vouchers: PRA-JV24884 (saxicolous), 24916 (saxicolous), ZP29756, 30116.

Aquacidia trachona (VU) – 1, 2, 5, 6, 7, 8, 10, 11, 13, 14: Acam, Aglu, Aps, Car, Fag, Fra-roots, bases, sil; Vouchers: JM, PRA-JV, ZP.

Aquacidia viridifarinosa (VU) – 1, 13: sil; Voucher: PRA-JV23436.

Arctoparmelia incurva (NT) – 9: sil; Voucher: PRA-JV24539. In the study area, a few thalli recorded in a single site. The similar *Xanthoparmelia mougeotii* is locally frequent.

Arthonia atra (EN) – 3, 5, 6: Apl, Car, Cor; Vouchers: JK, PRA-JV. **mtSSU** sequenced (JV23909).

Arthonia didyma (VU) – 1, 2, 3, 6, 10, 11, 13: Apl, Car, Cor, Fag, Fra, Qpe; Vouchers: JK, JM, PRA-JV, ZP. **ITS** sequenced (JV23914).

Arthonia dispersa (EN) – 1, 2: Acam-tw, Car; Voucher: PRA-JV23467.

Arthonia fusca (NT) – 1: ca: Voucher: JK10454.

Arthonia helvola (VU) – 6: Pic; Voucher: PRA-JV25088.

Arthonia mediella (VU) – 4, 5, 12, 13, 14: Apl, Aps, Qpe; Vouchers: PRA-JV.

Arthonia radiata (VU) – 1, 2, 3, 5, 6, 7, 8, 10, 11, 13: Car, Cor, Fag, Fra; Vouchers: JK, PRA-JV, ZP.

Arthonia ruana (VU) – 2, 3, 6, 13: Aps, Cor, Fra; Vouchers: JK, PRA-JV.

Arthonia spadicea (NT) – 3, 4, 5, 6, 10, 13, 14: Aglu, Car, Fag, Pic, Qpe. Voucher: PRA-ZP31385.

Arthrorhaphis grisea (LC) – 3, 7: as-on *Baeomyces rufus*; Vouchers: JK4852, JM12063.

Aspicilia brucei (NEW) – 1, sil; Vouchers: PRA-JV23387, 23416. In the study area, we recorded a luxuriant population in a single site on sun-lit andesite rock. The thallus is thick, of strongly bullate areoles which turn into irregular isidiate outgrowths in central parts of thalli. Norstictic acid present in upper part of medulla. Apothecia not recorded. The species is so far known from North America and Pyrenees only (Roux et al. 2011c). **ITS** and **mtSSU** sequenced (both specimens). The ITS sequence fits the specimen from Pyrenees (>99% identity) and from North America (98%). DNA sequences of *A. brucei* are surprisingly very distinct from all Megasporaceae available in NCBI.

Aspicilia cinerea (NT) – 1, 2, 3, 4, 5, 9, 10, 12: sil; Vouchers: JM, PRA-JV, ZP. **ITS** sequenced (JV24549).

Aspicilia cinerea* f. *papillata Arnold – 1, 8: sil; Vouchers: PRA-JV21182, 23387. Probably a morphotype of *A. cinerea* with strongly bullate thallus areoles and occasionally with irregular isidiate outgrowths. **mtSSU** sequenced (JV21182); closest NCBI Blast results are *A. cinerea* and *A. dudinensis* from Sweden (both c. 99% identity).

Aspicilia goettweigensis (DD) – 1, 2, 3, 7: sil; Vouchers: JK, JM, PRA-JV, ZP. **ITS** sequenced (JV23397, 23713). The most frequent *Aspicilia* on sun-lit andesite rocks.

Aspicilia laevata (NT) – 1, 5, 9: sil; Vouchers: PRA-JV24502, 24566. **ITS** sequenced (24502). Montane lichen restricted to screes with cold microclimate in the study area.

Aspicilia verrucigera (DD) – 4, 9: sil; Vouchers: JM12041, PRA-JV24214, 24528. **ITS** and **mtSSU** sequenced (JV24214).

Bacidia albogranulosa (DD) – 2, 3, 12, 14: Apl, Fra, Qpe; Vouchers: JM11990, PRA-JV24258, 24974. A recently described epiphytic species (Malíček et al. 2018b) preferring nutrient rich bark of *Acer* spp. Scattered in scree forests in the study area. **ITS** sequenced (JV24974).

Bacidia arceutina (EN) – 3: Cor; Voucher: PRA-JV24590.

Bacidia auerswaldii (RE) – 10, 12: Acam, Apl; Vouchers: PRA-JV23910, 24256, 25100. Considered regionally extinct in the Czech Republic by Liška & Palice (2010), but recently rediscovered (Šoun et al. 2015, Vondrák et al. 2016b). Species of undisturbed lowland forests. Recorded only on two trees in the study area. **ITS** and **mtSSU** sequenced (JV23910).

Bacidia bagliettoana (LC) – 1, 10: bryo-cs; Vouchers: PRA-JV23682, ZP31645.

Bacidia circumspecta (CR) – 1, 2, 5, 6, 9, 14: Aps, Car, Qpe; Vouchers: PRA-JV. Considered critically endangered in the Czech Republic by Liška & Palice (2010), but its recent records are on the increase (Malíček et al. 2021). Detected on eight trees in the study area.

Bacidia hyalina (NEW SPECIES) – 2, 6, 8: Apl, Qpe; Vouchers: PRA-JV. See the description above.

Bacidia incompta (CR) – 7, 10: Aps, Car, dw-died part of trunk; Vouchers: PRA-JV20677, ZP31503, 31504. Considered critically endangered in the Czech Republic by Liška & Palice (2010), however, this species, preferring bark enriched by sap flows, was probably overlooked. Its records in suitable microsites are recently on the increase (Malíček et al. 2021).

Bacidia rosella (EN) – 5, 8, 10, 13, 14: Apl. Scattered in the study area on few mature mapple trees.

Bacidia rubella (VU) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14: Acam, Apl, Aps, Car, Cor, Fra, Qpe, Til, Ulm; Vouchers: JK, PRA-JV, ZP.

Bacidia subincompta (VU) – 1, 2, 3, 5, 6, 9, 10, 13: Acam, Apl, Aps, Cor, Fag, Fra, Qpe, Ulm; Vouchers: JK5312, PRA-ZP29748.

Bacidia vermifera (CR) – 1, 2, 4, 7, 9, 10, 12, 14: Apl, Aps, Car, Fag, Fra, Ulm, dw; Vouchers: JM, PRA-JV, ZP. Considered critically endangered in the Czech Republic by Liška & Palice (2010), but its recent records are on the increase (Malíček et al. 2021). Rather frequent in the study area in sparse sun-lit forests and forest-steppes.

Bacidina adastra (DD) – 1: sil; Voucher: PRA-JV24569. **ITS** sequenced.

Bacidina arnoldiana (DD) – 1, 5, 6, 7, 11, 12, 13, 14: sil; Voucher: PRA-JV24248, 24947. **ITS** sequenced (24248).

Bacidina brandii (DD) – 4: dw-stump (Pic); Voucher: PRA-JV24312.

Bacidina chloroticula (LC) – 6, 14: sil; Vouchers: PRA-JV23976, 24251, 24921. On volcanic stones and pebbles in shade.

Bacidina egenula (DD) – 7: ca, esr; Vouchers: PRA-JV24934, 24938. **ITS** and **mtSSU** sequenced (JV24938).

Bacidina indigens (syn. *Bacidia viridescens* auct.) (DD) – 7, 8: esr, ca; Vouchers: PRA-JV24868, 24943.

Bacidina inundata (VU) – 6: sil-inundated; Vouchers: JK4535, JM11882.

Bacidina mendax (DD) – 1, 2, 3, 4, 5, 6, 10, 14: Acam, Apl, Car, Fag, Fra, Qpe, Stor; Vouchers: PRA-JV, ZP.

Bacidina phacodes (EN) – 2, 14: Fag; Vouchers: PRA-JV23920, 24220. Only on two overaged trees in the study area.

Bacidina pycnidiata (DD) – 6: sil, dw-log (Fra); Vouchers: JK3496, 10565, PRA-JV24216, ZP29722.

Bacidina sulphurella (LC) – 2, 3, 4, 6, 7, 9, 10, 11, 12, 13, 14: Acam, Ainc, Aglu, Apl, Aps, Car, Cor, Fag, Fra, Pspi, Qpe, Sal, dw; Vouchers: JK, JV. **mtSSU** sequenced (JV24913).

Baeomyces rufus (LC) – 1, 2, 3, 4, 10: as, sil; Voucher: PRA-JV23424.

Bagliettoa baldensis (NT) – 11: ca; Voucher: PRA-JV20700.

Bagliettoa calciseda (NT) – 1: ca; Vouchers: JK10487, PRA-JV25035, 25141. **ITS** sequenced (both PRA specimens).

Biatora pontica (DD) – 2: Car; Voucher: PRA-ZP29755. Only one sterile sorediate thallus found in the study area. Rare in the Czech Republic, with few records in southern Moravia up to now (Vondrák et al. 2016b, Malíček et al. 2017). **TLC**: granulosin, thiophanic acid, cf. arthothelin, pontica unknowns.

Biatora veteranorum (EN) – 1, 2, 4, 5, 8, 14: Qpe, dw-log, dw-stump; Vouchers: PRA-JV24120, ZP30070.

Biatoridium monasteriense (VU) – 1, 2, 6, 7, 13: Acam, Apl, Aps, Cor, Fra, Sam, Ulm; Vouchers: PRA-JV.

Bilimbia fuscoviridis (DD) – 1, 3, 6, 8, 11, 13, 14: esr, sil, Fra-root; Vouchers: JM, PRA-JV (all specimens without apothecia). According to Coppins & Aptroot (2009), it is recorded on limestone and other calcareous rock types. This is true for most Czech records (e.g. Malíček 2013, Svoboda et al. 2014, Halda et al. 2017), but all nine records from the study area were on base enriched andesite rocks. **ITS** sequenced (JV20638, 20699).

Bilimbia microcarpa (VU) – 1, 2, 3: bryo-esr; Vouchers: PRA-JV20895, 24228, 24721. Lichens with predominantly 3-septate ascospors and small apothecia are identified as this species, although the separation from *B. sabuletorum* is tentative.

Bilimbia sabuletorum (LC) – 1, 4, 7, 10, 13: bryo-ca, bryo-esr, bryo-Til; Vouchers: PRA-JV21136, 25089, ZP30670.

Blennothallia crispa (NT) – 1, 3, 10: ca, cs; Vouchers: PRA-JV20905, 21218, 25032, 25071, ZP31641, PRM906920. **mtSSU** sequenced (JV25032, 25071).

Botryolepraria lesdainii (NT) – 1, 3, 6, 7, 8, 10, 13: esr, ca (bryo); Vouchers: JM11883, PRA-ZP30958.

Brianaria lutulata (VU) – 3, 6: sil; Vouchers: PRA-JV24881, 24883, 24912.

Brianaria sylvicola (LC) – 1, 2, 4, 5, 9: sil; Vouchers: JK10377, 10530, PRA-JV24145, 24532, 24541. Rare in the study area; sometimes with pycnidia only.

Bryoria fuscescens (VU) – 1, 2, 3, 4, 5, 10, 11: Bet, Lar, Qpe, dw-log, snag; Voucher: PRA-JV24327.

Bryostigma muscigenum (NT) – 2, 6: Fag, Fra, sil; Vouchers: PRA-JV23959, 24894 (saxicolous), ZP29692. **ITS** and **mtSSU** sequenced (JV23959).

Buellia aethalea (LC) – 1, 2, 3, 4, 5, 7, 8, 9, 10, 12: sil; Vouchers: JK, PRA-JV. **mtSSU** sequenced (JV24685).

Buellia badia (NT) – 1, 2, 3, 5, 7, 8, 9: sil; Vouchers: JK, JM, PRA-JV. **ITS** and **mtSSU** sequenced (JV20950); closest relative in NCBI Blast is *B. badia* (up to 98% in ITS and 100% in mtSSU).

Buellia microcarpa (NEW SPECIES) – 1, 3: sil-pebbles; Vouchers: PRA-JV. See the description above.

Buellia disciformis (VU) – 6, 8: Car; Vouchers: JM11889, PRA-JV24199. **ITS** sequenced (JV24199).

Buellia griseovirens (LC) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13: Aps, Car, Cor, Fag, Fra, Qpe, Sari, Sor, Til, dw; Vouchers: JK, JM, PRA-JV, ZP. **TLC**: atranorin, traces of norstictic acid (JM12637).

Buellia ocellata (NEW) – 1: sil; Voucher: PRA-JV21275. Recorded only a single thallus in the study area. **ITS** & **mtSSU** sequenced. **Fig. 12A**

Buellia sandstedei (NEW) – 1, 3: sil-pebbles; Vouchers: JM13707, PRA-JV21059, 24684. Our specimens are tentatively identified as this little known species, morphologically intermediate between *Amandinea punctata* and *Buellia badia*. **TLC**: no substances (JV21059). **ITS** sequenced (all specimens) and **mtSSU** sequenced (JM13707, JV21059). Closest relative in NCBI Blast is *B. badia* in ITS (<95% identity) and *Buellia* spp. in mtSSU (97%). Although *B. badia* is certainly closely related, it differs in larger, more conspicuous and often lichenicolous thalli. ITS and mtSSU sequences of *B. badia* (recorded in the study area nearby *B. sandstedei*) are distinct and the ITS has 97–98% similarity with NCBI records of *B. badia*.

Another Czech record: Central Bohemia, Neveklov region, Nahoruby, Poličany: Psané skály, S-facing rocky slopes above Mastník brook, alt. 270 m, 49°43'56.0"N, 14°25'30.1"E, on acidic chert rock close to water level, 27 Dec. 2020, coll. J. Malíček (J. Malíček 14171).

Byssoloma diederichii (NEW) – 4, 9: Pic-needles, sil; Vouchers: PRA-JV24304, 24530, 24889. Apothecia absent in all specimens. Pycnidia numerous, very similar to *Fellhaneropsis myrtillicola*, but differs in shape and size of microconidia which are ellipsoid, 3–4 × 1.5–2 µm. The species was known from oceanic Europe: Azores and France (Sérusiaux 1998), and Great Britain (Giavarini & Sérusiaux 2009). Our records from central

Europe are surprising and perhaps suggest an expansion of this species to more continental areas. It was locally common in young spruce plantations in the study area. Once recorded on shaded rhyolitic stone (JV24889).

Caeruleum heppii (LC) – 1, 10: esr; Vouchers: PRA-ZP30666, 31743.

Calicium abietinum (CR) – 1, 2: Qpe-wood on bases of living trees; Vouchers: PRA-JV24240, 24352, ZP30110. Rare in central Europe. Most 19th and early 20th Century records from the Czech Republic belong to the common *C. glaucellum*. The only reliable record is from wood of fir snag in the Beskydy Mts (Vondrák et al. 2006). In the study area, it specifically occurs on hard wood at bases of ancient living oaks together with *Rinodina archaea* and *Protoparmelia* spp. **mtSSU** sequenced (24352).

Calicium adspersum (EN) – 4, 5: Qpe; Voucher: PRA-JV24177.

Calicium glaucellum (NT) – 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 14: Qpe, dw-log, snag, stump; Vouchers: JK, PRA-JV, ZP. **ITS** sequenced (JV24550).

Calicium montanum (DD) – 4: Pin; Vouchers: PRA-JV24110, ZP29699. Only two records published from the Czech Republic up to now (Šoun 2010, Vondrák & Kubásek 2019). In the study area, it is rather frequent on old pine trees in a lit and humid scree at point 49.95901N, 13.80149E.

Additional Czech record: South Bohemia. Šumava Mts: Mt. Trojmezná hora [1361], dead climatic spruce forest at N facing slope 370 m NW of the top, 48°46'25"N 13°49'34"E, on wood of *Picea* snag, alt. 1330 m, 24 July 2013, coll. P. Koubková (PRA-ZP17463).

Calicium parvum (EN) – 4: Pin; Voucher: PRA-JV24287. In the Czech Republic so far known only from southern Bohemia (Peksa 2006, Malíček et al. 2021).

Calicium pinastri (VU) – 4: Pin; Vouchers: PRA-JV24174, 25156. In the Czech Republic so far known only from southern and eastern Bohemia (Peksa 2006, Malíček et al. 2021). In the study area it occurs in a sparse pine forest with specifically humid mesoclimate (49.95901N, 13.80149E). Other species restricted to this site are e.g. *Calicium montanum*, *C. parvum*, *Microcalicium ahlneri* and *M. minutum*. **ITS** and **mtSSU** sequenced (JV25156).

Calicium salicinum (VU) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14: Acam, Apl, Aps, Fra, Qpe, dw-snag, stump; Vouchers: JK, JM, PRA-JV, ZP. **TLC**: norstictic acid (JM11978).

Calicium viride (VU) – 1, 2, 3, 4, 5, 10, 13: Apl, Fra, Qpe, Til; Vouchers: JK, PRA-JV, ZP. Scattered in the study area, more frequent in oak forests and forest-steppes. It is here probably in suboptimal conditions as most records are sterile, only with pycnidia.

Callome multipartita (RE) – 1: ca; PRA-JV25063. In the first half of the 20th Century, it was recorded from three sites within the Czech Republic (Malíček et al. 2021). **ITS** and **mtSSU** sequenced.

Caloplaca arnoldii (CR) – 1, 2, 3, 7, 8, 11, 12, 13: esr. Voucher: PRA-ZP31753. The classification as critically endangered in the Czech Republic (Liška et al. 2008, Liška & Palice 2010) is on the basis of an incorrect species concept. Records of this species were called by different names, e.g. *C. saxicola*, and the name *C. arnoldii* was employed only for extreme morphotypes with small, reddish and distinctly lobed thalli. Nowadays *C. arnoldii* is considered a common polymorphic species on overhanged, base-rich siliceous and calcareous rocks (Gaya 2009).

Caloplaca atroflava (DD) – 1, 2, 3, 7, 8, 10, 13: esr; Vouchers: JK, JM, PRA-JV. **ITS** sequenced (JV24710), **mtSSU** sequenced (JV21204a, 23728a). The blastidiate morphotype is more frequent than the non-blastidiate one.

Caloplaca cerinella (VU) – 1, 2 ,3, 7, 9: Fag, Fra, Rosa-tw, dw-snag; Vouchers: JŠ, PRA-JV.

Caloplaca cerinelloides (DD) – 7: Aps; Vouchers: PRA-JV20694.

Caloplaca chlorina (LC) – 1, 2, 3, 6, 7, 13: Fra-base, esr, sil; Vouchers: JM, PRA-JV. **ITS** sequenced (JV20940). Previously published from the area by Vondrák et al. (2007).

Caloplaca chrysodeta (NT) – 1, 2, 3, 7, 8, 10, 13, 14: esr, ca, bryo.

Caloplaca cirrochroa (NT) – 1, 3, 7, 8, 10, 12: esr, ca; Vouchers: JM12654, PRA-JV21030.

Caloplaca crenulatella s.lat. (LC) – 1, 3, 7: esr, ca. Previously published from the area by Vondrák et al. (2007).

Caloplaca decipiens (LC) – 7: ca; Voucher: JK3499.

Caloplaca demissa (NT) – 1, 2, 3, 7, 8, 10, 12, 13: esr, sil; Vouchers: JK, PRA-JV, ZP. **mtSSU** sequenced (JV24967).

Caloplaca flavocitrina (LC) – 1, 2, 3, 7, 8, 10, 11, 12, 13: esr, ca, Car, Qpe; Vouchers: JK, JM, PRA-JV. Specimens resembling *Caloplaca citrina* sequenced and their identity with *C. flavocitrina* confirmed: **ITS** sequenced (JM11933, JV23439, 23715, 24236, 24914), **mtSSU** sequenced (JV23715, 24914, 25055). Previously published from the area by Vondrák et al. (2007).

Caloplaca flavovirescens (NT) – 1, 3: ca; Vouchers: PRA-ZP31675, PRM892510.

Caloplaca grimmiae (NT) – 1, 3, 7, 10: sil-on *Candelariella coralliza*; Voucher: JK10359. Rare in the study area.

Caloplaca holocarpa (LC) – 1, 2, 7, 9, 10, 12, 13: sil, Car-root, Fag, Fra.

Caloplaca interfulgens (DD) – 1: esr.

Caloplaca irrubescens (VU) – 1, 3, 7, 8: esr, sil.

Caloplaca lucifuga (EN) – 2, 14: Car, Fra, Qpe; Vouchers: JM11932, PRA-JV24090, ZP29734.

Caloplaca monacensis (DD) – 1, 2, 3, 6, 7, 10: Car, Fra, Qpe, Ulm; Vouchers: JM, PRA-JV, ZP. Previously reported from the study area by Šoun et al. (2011). **ITS** and **mtSSU** sequenced (JV24095).

Caloplaca obliterans (EN) – 1, 2: esr, sil; Vouchers: PRA-JV23437, 23730, ZP31754. Predominantly a mountain species preferring base-enriched siliceous overhangs in the subalpine belt. In the Czech Republic it has been known from typical subalpine habitats in the Krkonoše and Hrubý Jeseník Mts (Vondrák et al. 2007, Vondrák & Malíček 2015) and from a lowland occurrence on serpentine rocks at Mohelno (Suza 1931). Similarly to the latter, the two records in the study area are peculiar by their low altitudes. **mtSSU** sequenced (JV23437).

Caloplaca obscurella (NT) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12: Acam, Apl, Aps, Car, Cor, Fag, Fra, Qpe, dw-snag, sil; Vouchers: JM, PRA-JV, ZP.

Caloplaca phlogina (DD) – 3: Fra, esr; Vouchers: PRA-JV24907, 24908. **ITS** and **mtSSU** sequenced (24907).

Caloplaca polycarpa (VU) – 1: ca; Voucher: PRA-JV23433.

Caloplaca pyracea (LC) – 1, 3, 7: Apl, Car, Fra-tw; Vouchers: PRA-JV.

Caloplaca raesaenenii (VU) – 1, 2, 3, 7, 8: Fra, Qpe-bryo; Vouchers: JM, PRA-JV, ZP.

Caloplaca rubelliana (CR) – 7: esr; Vouchers: JK, PRA-JV, PRA-ZP. Thermophilous lichen known from a few Czech localities (Malíček & Vondrák 2016). Previously published from the area by Vondrák et al. (2007).

Caloplaca subpallida (VU) – 1, 2, 3, 8, 9, 10, 13: esr, sil; Vouchers: JK, PRA-JV, ZP. **ITS** sequenced (JV23733), **mtSSU** sequenced (JV21225, 23396).

Caloplaca substerilis (DD) – 1, 2, 3, 7: Acam, Fra, Qpe, Ulm; Vouchers: JM, PRA-JV. **ITS** and **mtSSU** sequenced (JV24100).

Caloplaca ulcerosa (DD) – 1, 7: esr; Vouchers: JM, PRA-JV, ZP. Species with generally maritime distribution and epiphytic occurrences, however a single anomalous record was known deeply inland on limestone in the Czech Republic (Vondrák et al. 2009). Here we report on a second Czech occurrence, also saxicolous, represented by a rich and fertile population on stones and concrete in walls of the ruin Týřov. (Another fertile population was detected at one place on Týřovické skály rocks: 49.98336N, 13.79381E.) **ITS** and **mtSSU** sequenced (JV20661).

Caloplaca viridirufa (VU) – 1, 3, 7, 8, 10: esr, sil; Vouchers: JK, JM, PRA-JV. The species is locally common in the study area forming typical apothecia with anthraquinones in red discs, but a rare form with black discs lacking anthraquinones was also recorded (JV24676).

Caloplaca vitellinula (DD) – 1, 7, 11: esr; Vouchers: PRA-JV. Sometimes considered conspecific with *C. holocarpa* (Vondrák et al. 2016a), but in the study area, both species were observed to form distinct crusts when growing next to each other: *C. vitellinula* has conspicuous yellow thallus which is missing in *C. holocarpa*.

Caloplaca xerica (VU) – 1, 7, 8: esr; Voucher: PRA-ZP31640.

Candelaria concolor s.str. (NT) – 2, 3, 10: Aps, Fag; Voucher: PRA-JV23752.

Candelariella aurella (LC) – 1, 2, 3, 7, 10, 13: ca, esr, Qpe. Voucher: PRA-JV23720. **ITS** and **mtSSU** sequenced (JV23720, epiphytic).

Candelariella coralliza (LC) – 1, 2, 3, 8, 9, 10, 11: sil, *Juniperus* wood; Vouchers: JM, PRA-JV, ZP. **mtSSU** sequenced (JV20942a).

Candelariella efflorescens agg. (NT) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14: Aps, Car, Cor, Cra, Fag, Fra, Qpe-tw, dw.

Candelariella vitellina (LC) – 1, 2, 3, 7, 8, 10: sil, Cor, Qpe; Voucher: JK4832.

Candelariella xanthostigma (LC) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14: Acam, Apl, Car, Cor, Fag, Fra, Qpe, Stor, Ulm, dw; Vouchers: JK, JM, PRA-ZP, PRM.

Carbonea assimilis (DD) – 1: sil; Vouchers: JM12594, PRA-JV20997, 21255.

Catillaria atomarioides (DD) – 1, 3, 11: sil; Vouchers: JK, JM, PRA-JV.

Catillaria chalybeia (NT) – 1, 3, 7, 8, 10, 12: esr, sil; Vouchers: JK, PRA-JV.

Catillaria fungoides (DD) – 3, 10, 12: Cor, Lar, esr; Vouchers: PRA-JV24492, 24589, 25074, ZP30682 (all specimens without apothecia). **ITS** and **mtSSU** sequenced (JV24589). Closest NCBI Blast match is *Catillaria nigroclavata* in ITS (identities 91–92%) and *Speerschneidera euploca* in mtSSU (identity 93%). The saxicolous specimens (JV25074, ZP30682) could be identified as the typically saxicolous *C. nigroisidiata*, however they occurred in peculiar communities of epiphytes on stone (together with *Catillaria nigroclavata*, *Halecania viridescens*, *Lecania cyrtella* and *L. naegelii*).

Catillaria lenticularis (NT) – 1, 3, 10: ca; Vouchers: JK10498, PRA-JV21029.

Catillaria nigroclavata (VU) – 1, 2, 3, 6, 8, 10: Acam, Aps, Car, Cor, Fag, Fra, Ulm-tw, roots, esr; Vouchers: PRA-JV, ZP.

Catinaria atropurpurea (EN) – 7: dw-log; Voucher: PRA-JV20637.

Cetraria aculeata (NT) – 1, 9: as; Voucher: JM12026.

Cetraria islandica (NT) – 4: as.

Cetrelia monachorum (DD) – 2: Car, Qpe-bryo; Voucher: PRA-JV23921. **TLC**: anziaic acid, 4-*O*-demethylimbricaric acid, imbricaric acid, perlatolic acid, atranorin.

Chaenotheca brachypoda (VU) – 2, 3, 4, 6, 7, 9, 12, 13, 14: Acam, Apl, Fag, Fra, Sam.

Chaenotheca chlorella (EN) – 4, 14: Fra, dw-snag (Abi); Vouchers: PRA-JV24270, 24841. Only two records in the study area. **mtSSU** sequenced (JV24841).

Chaenotheca chrysocephala (NT) – 1, 2, 3, 4, 5, 6, 9, 10, 11, 13, 14: Acam, Apl, Aps, Car, Fag, Fra, Qpe, Til, dw-snag.

Chaenotheca ferruginea (LC) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14: Acam, Aglu, Apl, Aps, Car, Fag, Fra, Qpe, Pic, Til, dw-snag; Vouchers: JK3944, 4807.

Chaenotheca furfuracea (LC) – 1, 2, 3, 4, 5, 6, 7, 8, 11, 13, 14: Apl, Aglu, Aps, Car, Fag, Fra-base, Qpe, roots, as; Voucher: PRA-ZP31750.

Chaenotheca hispidula (EN) – 2, 3, 5, 6: Acam, Fra, Qpe, Til; Vouchers: PRA-JV, ZP.

Chaenotheca phaeocephala (VU) – 1, 2, 13, 14: Apl, Aps, Car, Fra, Qpe, Til; Vouchers: PRA-JV23736, 24060, ZP29698. **mtSSU** sequenced (JV23736).

Chaenotheca stemonea (VU) – 5, 6, 7, 13, 14: Aglu, Apl, Aps, Fag, Qpe, Til; Voucher: JK10570.

Chaenotheca trichialis (NT) – 1, 2, 3, 4, 5, 6, 9, 12, 13, 14: Acam, Aglu, Apl, Aps, Bet, Car, Fag, Fra, Pic, Qpe, Til, Ulm, dw-snag. Vouchers: JK, PRA-ZP.

Chaenotheca xyloxena (VU) – 3, 4, 5, 8, 10, 11: dw-log, snag, stump; Vouchers: JK5307, 10569, PRA-JV24294.

Chrysothrix candelaris (VU) – 2, 3, 5, 13, 14: Apl, Fra, Qpe, dw-log; Voucher: PRA-JV24317.

Chrysothrix chlorina (LC) – 1, 2, 3, 4, 6, 8, 9, 12: Bet, Pin, Qpe, sil; Voucher: PRA-ZP30074.

Circinaria caesiocinerea (LC) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13: sil; Vouchers: JK, JM, PRA-JV. **ITS** and **mtSSU** sequenced (JV23398).

Circinaria calcarea (LC) – 1: esr.

Circinaria contorta (LC) – 1, 2, 3, 7, 8, 10, 13: ca, esr; Vouchers: JK, PRA-JV.

Circinaria hoffmanniana (DD) – 1, 3, 8: ca, esr; Vouchers: JK4817, PRA-JV24861, 24917.

Cladonia arbuscula* ssp. *squarrosa (NT) – 1, 2, 4, 9, 11: as.

Cladonia caespiticia (NT) – 1, 2, 4, 9, 12: as; Vouchers: PRA-JV, ZP. **ITS** and **mtSSU** sequenced (JV24116).

Cladonia cenotea (LC) – 2, 8, 10: dw.

Cladonia ciliata (VU) – 1, 2, 4: as; Vouchers: JM12043, PRA-JV21149.

Cladonia coccifera / C. diversa (LC) – 1, 3, 4, 5, 10, 12: as; Vouchers: PRA-JV. **TLC**: usnic acid, zeorin (JV24303), usnic acid, zeorin, porphyrilic acid (JV24302).

Cladonia coniocraea (LC) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14: Aglu, Car, Fra-base, Pin, Qpe, Sari-bryo, dw-log, snag; Vouchers: JK.

Cladonia digitata (LC) – 4, 5, 6, 10, 11, 14: Aglu, Pin-base, dw-log, stump; Vouchers: JK.

Cladonia fimbriata (LC) – 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14: Aglu, Fag, Fra, Pin, Qpe, Sari, Til-base, as, dw-log; Vouchers: JK.

Cladonia floerkeana (LC) – 1, 2, 5: dw-log; Vouchers: PRA-JV21154, 23899.

Cladonia foliacea (NT) – 1, 3: as.

Cladonia furcata (LC) – 1, 4, 5, 10: as; Vouchers: JK, JM, PRA-JV. **TLC**: fumarprotocetraric & protocetraric acids (JM13720).

Cladonia glauca (VU) – 1, 2, 4, 9: Bet, as, dw; Vouchers: JM, PRA-JV.

Cladonia gracilis (LC) – 2, 4, 9: as.

Cladonia grayi (NT) – 8: Fre-base; Voucher: JM12645. **TLC**: fumarprotocetraric acid, grayanic acid.

Cladonia macilenta (LC) – 1,2, 3, 5, 6, 8, 9, 10, 11, 13, 14: as, dw; Vouchers: JK, PRA-JV. **ITS** and **mtSSU** sequenced (JV23891).

Cladonia merochlorophaea (DD) – 1, 2, 3, 4, 6, 9: as, dw, bryo-sil; Vouchers: JM12038, 12623. **TLC**: fumarprotocetraric acid, merochlorophaeic and 4-O-methylcryptochlorophaeic acids (12623).

Cladonia mitis (DD) – 1, 2, 5, 8, 9, 10: as; Vouchers: JM, PRA-JV.

Cladonia parasitica (EN) – 1, 2, 3, 8, 14: dw-log, stump; Vouchers: PRA-JV, ZP. Locally frequent in dry rocky sites, on old oak logs with hard wood resisting decay. Thalli are often poorly developed, granular, with indistinct squamules. Mostly without apothecia. **ITS** sequenced (JV24101).

Cladonia phyllophora (NT) – 1, 2, 4: as-bryo; Voucher: PRA-JV24153.

Cladonia pleurota (NT) – 1, 2, 3, 4, 5, 8, 9, 10: as, bryo-sil; Vouchers: PRA-JV24147, 25114.

Cladonia pocillum (LC) – 1, 8, 10: cs; Vouchers: JK10497, PRA-JV25115.

Cladonia polycarpoides (VU) – 2, 10: as; Vouchers: PRA-JV25116, ZP30770.

Cladonia polydactyla (NT) – 4: Pin-base; Voucher: PRA-JV24283. Montane lichen, very rare at altitudes below 500 m where it prefers sites with cold mesoclimate in gorges of sandstone areas (Malíček et al. 2021). Only one record from the study area on mesoclimatically suitable rhyolite scree (49.95894N, 13.80106E).

Cladonia pyxidata (LC) – 1, 2, 3, 4, 5, 7, 8, 9, 10: Fra, Pin-base, as; Voucher: JV25113.

Cladonia ramulosa (NT) – 1, 4: Qpe-base, as, bryo-sil; Vouchers: JM, PRA-JV. **ITS** sequenced (JV24319).

Cladonia rangiferina (NT) – 2, 4, 8: as.

Cladonia rangiformis (NT) – 1, 2, 3, 4, 5, 8, 9, 10, 11: as; Vouchers: PRA-JV.

Cladonia rei (LC) – 1, 5, 12: as; Vouchers: JM, PRA-JV. **TLC**: fumarprotocetraric acid, homosekikaic acid (JM12644).

Cladonia squamosa (LC) – 1, 2, 4, 6, 8, 9: as, bryo-sil, Bet, Fag, Pin-base; Vouchers: PRA-JV20852, 24152.

Cladonia strepsilis (VU) – 1, 4, 9: as; Vouchers: PRA-JV. A luxuriant population was recorded on rhyolite scree at point 49.95752N, 13.79972E. The lichen here forms unusually large thalli resembling *Cladonia turgida* (JV24313).

Cladonia subulata (LC) – 1, 2, 4, 8: as; Voucher: PRA-JV21142 (UV-).

Cladonia uncialis s.str. (NT) – 2, 10: as; Voucher: JM11940.

Cladonia uncialis* subsp. *biuncialis (DD) – 4, 9: as.

Cladonia verticillata (NT) – 1, 2, 9: as; Vouchers: PRA-JV.

Clauzadea monticola (NT) – 6, 7: ca, esr; Voucher: PRA-JV23903, 24940.

Coenogonium pineti (LC) – 2, 3, 4, 5, 6, 9, 11, 13, 14: Aglu, Abi, Bet, Car, Fag, Fra, Qpe, Pic, snag; Vouchers: PRA-ZP31387, PRM891420.

Collema flaccidum (NT) – 1, 2, 3, 6, 8: esr, Fra-base.

Cystocoleus ebeneus (NT) – 1, 3: sil; Vouchers: JM, PRA-JV.

Dendrographa latebrarum (VU) – 1, 2, 4, 5, 8, 12, 13: esr, sil; Voucher: PRA-JV20862.

Dermatocarpon meiophyllizum (RE) – 1: esr-inundated; Vouchers: JK10524, PRA-JV23410, 23497, 24709. Occurring on periodically inundated andesitic rock at Berounka river bank together with *Porocyphus coccodes* and *Staurothele fissa*. The more frequent aquatic species, *Dermatocarpon luridum*, was not detected in the study area. **ITS** sequenced (JV24709); closest NCBI Blast results were *D. meiophyllizum* (identity 95–97.5%). **mtSSU** sequenced (JV23410, 24709).

Dermatocarpon miniatum (NT) – 1, 2, 3, 8, 10, 13: esr, ca; Vouchers: JK, JM, PRA-JV, ZP. Our identification is tentative as the taxonomy of *Dermatocarpon* is not yet settled. **ITS** sequenced (JV25066-morphotype with large lobes; JV25028-morphotype with small condensed lobes; both sequences identical except of one indel position), **mtSSU** sequenced (JV23399).

Dibaeis baeomyces (LC) – 1, 2, 4: as; Voucher: PRA-JV21244.

Dimelaena oreina (VU) – 1: sil; Vouchers: PRM755957, JM12583. Central European occurrences are mostly restricted to hard siliceous rocks in extremely dry (wind-drying) mesoclimate. Its distribution in the Czech Republic is described by Suza (1942, 1947). In the study area restricted to a single sampling site (Týřovické skály rocks), but it is luxuriant there on most exposed, vertical faces of hard andesitic outcrops.

Diploicia canescens (EN) – 8: esr; Voucher: JM12653. Recorded in a single sampling site where it is abundant on base-rich and lime enriched andesitic rocks.

Diploschistes euganeus (DD) – 1: sil; Voucher: PRA-JV23401.

Diploschistes gypsaceus (DD) – 1, 8: ca, esr; Voucher: PRA-JV23495.

Diploschistes muscorum (LC) – 1, 2, 3, 4, 7, 8, 10: dw, sil-on *Cladonia*, Fra, Pin, Qpe-base; Voucher: JK.

Diploschistes scruposus (LC) – 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12: sil, Qpe; Vouchers: JK.

Diplotomma alboatrum (NT) – 1, 3, 7, 8, 10, 11: esr, ca; Vouchers: JK, JM, PRA-JV, ZP.

Diplotomma porphyricum (DD) – 1: esr; Voucher: PRA-JV21205. Identified on the basis of the concept in Wirth et al. (2013) where it is separated from *D. alboatrum* by its thallus containing norstictic acid and the occurrence on base-rich siliceous (not calcareous) rocks. It also has smaller and not pruinose thallus and apothecia. In contrast to the common *D. alboatrum*, it is genuinely a rare species in central Europe. In the study area it occurs on base-rich andesite with e.g. *Caloplaca atroflava*, *Myriolecis persimilis* and *Rinodina moziana*.

Dirina fallax (DD) – 1, 2, 13, 14: sil, Til-root; Vouchers: PRA-JV23426, 23927, 25064, ZP31757. **ITS** and **mtSSU** sequenced (JV25064).

Dirina massiliensis (EN) – 8: ca, esr; Vouchers: PRA-JV24848, 24852. **ITS** and **mtSSU** sequenced for both specimens.

Elixia flexella (DD) – 4: dw-snag (Pin); Voucher: PRA-ZP29693. In general, a montane species with few records in the Czech Republic (Palice et al. 2003, Malíček & Palice 2013). Its occurrence at low altitude in the study area is exceptional (355 m, 49.95931N, 13.80122E).

Enchylium polycarpon (VU) – 1, 3: ca; Vouchers: PRA-JV24927, 25031. **mtSSU** sequenced (JV25031).

Enchylium tenax (LC) – 1, 2, 3, 7, 8, 10: bryo-cs; Vouchers: JK, PRA-JV, ZP.

Endocarpon adscendens (DD) – 1: cs; Vouchers: JK10461, PRA-JV25053, 25054, 25149, 25150, ZP31636. The specimen ZP31636 identified as *E. adsurgens*, but here we merge all specimens with raised margins of squamules under *E. adscendens*.

Endocarpon latzelianum (= *E. psorodeum* auct. medioeur.) (EN) – 1, 3, 8, 13: esr, sil; Vouchers: PRA-JV20872, 23499, 23940, 24866, 24885, 24901.

Endocarpon pusillum (NT) – 1, 3, 7, 10: ca, cs; Vouchers: JK, PRA-JV20973, 25070.

Enterographa hutchinsiae (EN) – 2: sil; Voucher: PRA-JV23723.

Enterographa zonata (VU) – 1, 2, 5, 6, 8, 9, 11, 12, 13, 14: sil, Til-root; Vouchers: JK3929, PRA-JV23729, 23928.

Eopyrenula leucoplaca (RE) – 1, 2, 3, 5: Acam, Car, Cor, Fra, Qpe; Vouchers: PRA-JV, ZP. Considered extinct from the Czech Republic by Liška & Palice (2010), but recently rediscovered (Malíček et al. 2014, Vondrák et al. 2016). Perhaps broadly distributed in the Czech Republic at lower altitudes, but inconspicuous and overlooked. Often recorded in its anamorpic state (with pycnidia only).

Evernia divaricata (CR) – 14: Pspi.

Evernia mesomorpha (CR) – 10: Lar.

Evernia prunastri (NT) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12: Acam, Aps, Car, Cra, Fra, Pspi, Qpe, Sari-tw, dw-log, snag; Vouchers: JK.

Fellhanera bouteillei (CR) – 1, 4, 6, 12, 13: Abi, Pic-tw, leaves, dw, sil; Vouchers: PRA-JV24888 (saxicolous), ZP30753 (saxicolous). Considered critically endangered in the Czech Republic (Liška & Palice 2010), but recent records are strongly on the increase (Malíček et al. 2021). However, it is still rather rare at lower altitudes with drier climate, e.g. in the study area.

Fellhanera gyrophorica (DD) – 6: Aglu; Voucher: PRA-JV23911. Known from four sites in the Czech Republic (Malíček et al. 2021): the study area (recorded on a single tree) and three localities in southern Bohemia.

Fellhanera subtilis (NT) – 1: sil; Voucher: PRA-ZP31664. Usually epiphytic, but our record is from andesitic stones in scree with rather humid microclimate.

Fellhanera viridisorediata (DD) – 1: sil; Voucher: PRA-ZP31744. Usually epiphytic, but our record is from andesitic stones in scree with rather humid microclimate.

Flavoparmelia caperata (EN) – 1, 2, 3, 4, 7, 8, 10, 11: Aps, Car, Cornus, Cra, Fra, Qpe, Sari, Til, dw, sil. Vouchers: JK, JM.

Fuscidea cyathoides (NT) – 4, 5: sil; Vouchers: JM12040, PRA-JV24132. In the study area, it is frequent on rhyolite rocks, but not recorded on andesite.

Fuscidea pusilla (DD) – 2, 4, 6, 9: Bet, Car, Fra, Pin, dw-log, sil; Vouchers: JM, PRA-JV, ZP. Apart from epiphytic occurrences, it is one of the dominant lichens on a damp rhyolite scree in the sampling site 9. **TLC**: divaricatic acid (JV24920-saxicolous, ZP29745). **mtSSU** sequenced (JV24298).

Fuscidea recensa (DD) – 1, 4, 12: sil; Vouchers: PRA-JV21166, 21177, ZP31763. **ITS** and **mtSSU** sequenced (JV21177).

Gonohymenia schleicheri (NEW) – 1: esr; Voucher: PRA-JV21241. Species similar to *Lichinella nigritella*, but the thallus lobes have scabrous surface and are without granular isidia. According to Nimis et al. (2018; as *Lichinella schleicheri* (Hepp) nom. prov.), it is widespread in Europe.

Graphis scripta (VU) – 1, 2, 3, 5, 6, 7, 10, 13: Car, Cor, Fag, Fra; Voucher: JK4803.

Gyalecta derivata (CR) – 2, 12: Apl, Fag; Vouchers: PRA-JV24219, 24259.

Gyalecta fagicola (EN) – 2, 3, 6, 8: Acam, Cor, Fag, Fra-also tw; Vouchers: PRA-JV23963, 24078, ZP30055, 30991. **ITS** and **mtSSU** sequenced (JV24078)

Gyalecta flotowii (CR) – 3, 14: Apl, Fra, Til; Vouchers: PRA-JV24169, 24272, 24486.

Gyalecta jenensis (LC) – 6, 13: esr; Vouchers: PRA-JV23907, 23950. **ITS** sequenced at the specimen without apothecia, but with pycnidia (JV23907).

Gyalecta truncigena (CR) – 7: Ulm; Voucher: PRA-JV20687.

Gyalideopsis helvetica (DD) – 5: dw-log; Voucher: PRA-JV23900. In the Czech Republic, it is known from mountains, at altitudes above 800 m (Malíček et al. 2021). The record from the study area (a few sterile thalli with goniocystangia on a single spruce log) is from altitude 430 m.

Gyrographa gyrocarpa (LC) – 1, 3, 9, 10, 11, 12, 13: sil.

Halecania viridescens (DD) – 1, 2, 3, 6, 8, 10, 11, 12: Acam, Aps, Car, Cor, Fra, Qpe, Ulm-tw, roots, esr; Vouchers: JM, PRA-JV, ZP.

Hazslinszkya gibberulosa (DD) – 3, 6, 12, 14: Acam, Apl, Aps, Fra; Vouchers: PRA-JV.

Hertelidea botryosa (CR) – 1, 2, 3, 4, 5, 8, 10: Pin-base, dw-log (Qpe), stump (Qpe, Pin); Vouchers: PRA-JV, ZP. In the Czech Republic considered critically endangered (Liška & Palice 2010) and known from mountains, at altitudes above 600 m (Malíček et al. 2021). The species has, however, been recorded frequently, occasionally fertile, at lower altitudes in the study area and some close localities.

Hyperphyscia adglutinata (EN) – 1, 2: sil, Car; Vouchers: PRA-JV21243 (saxicolous), PRA-ZP30063.

Hypocenomyce scalaris (LC) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14: Cra, Pin, Qpe, Til, dw, sil; Vouchers: JK, PRA-ZP, PRM.

Hypogymnia farinacea (VU) – 1: Car, Cra-tw.

Hypogymnia physodes (LC) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14: Acam, Aglu, Apl, Bet, Car, Cra, Fra, Pic, Pin, Qpe, Sari-tw, dw, sil; Vouchers: JK.

Hypogymnia tubulosa (NT) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12: Apl, Aps, Bet, Cra, Fag, Fra, Qpe, Sari-tw, dw; Voucher: JK5297.

Hypotrachyna revoluta (CR) – 1, 3: sil. Classification as critically endangered in the Czech Republic (Liška & Palice 2010) is overestimated, because epiphytic records of the species are recently on the increase (Malíček et al. 2021). Both records from the study area are however saxicolous and belong to the occurrences of "relic character" (Vondrák & Liška 2010).

Immersaria cupreoatra (NEW) – 1, 7: sil-on *Buellia aethalea*; Vouchers: PRA-JV21162, 23490. Considered as an alpine lichen, on *Buellia* (Nimis et al. 2018). Our specimens tentatively identified as they may belong to another *Immersaria* species. Vouchers: PRA-JV21162, 23490. **TLC**: unknown substance in height of argopsin in solvent systemes A, B', C (JV21162). **mtSSU** sequenced (both specimens). **Fig. 12B**

Imshaugia aleurites (VU) – 1, 2, 3, 4, 5, 8, 9, 10, 11: Bet, Fag, Pin, Sari, dw-log, snag, sil.

Inoderma byssaceum (RE) – 6, 14: Apl, Fra; Vouchers: PRA-JV24489, 25086. Considered extinct from the Czech Republic by Liška & Palice (2010), but recently rediscovered after more than 100 years (Malíček et al. 2014, Vondrák et al. 2016). It is a species of low altitudes requiring a humid mesoclimate. In the study area, young thalli with pycnidia (without apothecia) recorded on two trees. **mtSSU** sequenced (JV24489).

Inoderma sorediatum (NEW) – 4, 14: Qpe, Til-root; Vouchers: PRA-JV24850, 23926. Although not recorded from the Czech Republic yet, it is locally abundant in stands of old oaks with a humid mesoclimate. It occurs in communities of Arthoniomycetes: e.g. *Arthonia mediella*, *A. thoriana*, *Buellia violaceofusca*, *Chrysothrix candelaris* and *Inoderma byssaceum*. **mtSSU** sequenced (JV24850).

Additional Czech records: Southern Bohemia. České Budějovice, Poněšice, valley of stream Kozlovský potok, alt. 390 m, 49.11401N, 14.47481E, on *Quercus robur*, 9 April 2021, coll. J. Vondrák (PRA-JV24952) - frequent and abundant in the locality; Southern Moravia, distr. Břeclav: nature reserve Ranšpurk, a flood-plain forest around the largest blind arm, 48°40'48"N, 16°56'45"E, on dry and shaded bark of old

Quercus robur, alt. 153 m, 17 Sept. 2020, coll. Z. Palice & J. Vondrák (PRA-ZP29605); **TLC**: confluentic and 2’-O-methylperlatolic acid).

Ionaspis lacustris (VU) – 1, 6: esr; Vouchers: PRA-JV23877, 24751. Only two records in the study area on damp andesite in shady sites.

Ionaspis obtecta (NEW) – 3: sil; Voucher: PRA-JV24497. Considered very rare in Europe with scattered occurrences e.g. in the Alps (Nimis et al. 2018); perhaps somewhat more frequent in Scandinavia (Santesson et al. 2004). It was recorded on an andesitic boulder in sparse forest on steep SW exposed slope (49.96898N, 13.79665E). Accompanying species: *Acarospora fuscata*, *Catillaria chalybeia*, *Rhizocarpon rubescens*, *Scoliciosporum umbrinum* and *Varicellaria lactea*.
Other Czech records: Central Bohemia, Ostrovec u Terešova (okr. Rokycany), CHKO Křivoklátsko, přírodní rezervace Lípa, bezlesé skalní výchozy na hřebeni nad meandrem Zbirožského potoka, na výslunném skalním výchozu (dacit až ryodacit) obohaceném železem, 49°56'16.860"N, 13°44'44.100"E, 334 m n. m., 3 Sept. 2020, coll. J. Šoun (Museum Rokycany BL1046); Northern Bohemia, distr. Děčín, protected landscape area Lužické hory: Mt Malý Stožec, semiopen phonolite boulder scree at S-facing slope, SW of the top, 50°50'56.3"N, 14°32'14.5"E, on exposed, iron-rich boulder, alt. 600 m, 27 May 2020, coll. I. Marková, Z. Palice & P. Uhlík (PRA-ZP30850); Southern Bohemia, Šumava Mts, Prachatice: the valley of Blanice, bedrock of the rivulet, ca 1km NW of the castle ruin Hus, 48°57'46.9"N, 13°55'04.3"E, on recently exposed, illuminated, iron-rich gneiss stones in the alluvium, with *Porpidia* spp., *Micarea erratica*, *Trapelia placodioides*, *Rhizocarpon reductum*, alt. 685 m, 27 July 2020, coll. Z. Palice (PRA-ZP30578).

Jamesiella anastomosans (DD) – 2, 4, 5, 6, 7, 9, 11, 13, 14: Bet, Fag, Pavi, Pspi-tw, dw-log, sil-bryo; Vouchers: PRA-JV, ZP.

Lasallia pustulata (NT) – 1, 2, 5, 8, 9, 12: sil; Vouchers: JM12030, PRM.

Lathagrium cristatum (NT) – 1, 3, 10: ca, Fra-root; Vouchers: PRA-JV20972, 20992.

Lathagrium fuscovirens (LC) – 1, 2, 3: esr, ca; Vouchers: PRA-JV, ZP.

Lecania croatica (DD) – 2, 3, 6, 7, 12, 14: Acam, Apl, Aps, Cor, Car, Fra, Til, Ulm-tw; Vouchers: JM, PRA-JV, ZP. **mtSSU** and **ITS** sequenced (JM11890, JV23912).

Lecania cyrtella (LC) – 1, 2, 3, 6, 7, 8, 9, 10, 11: Acam, Aglu, Apl, Aps, Car, Cor, Fag, Fra, Qpe, Sam, Stor, Til-tw, sil; Vouchers: PRA-JV, ZP. **mtSSU** sequenced (JV23489a); **ITS** and **mtSSU** sequenced (JV24705, ZP30715; both saxicolous).

Lecania cyrtellina (DD) – 1, 2, 3, 6: Acam, Car, Cor, Fra, Sam, Til; Vouchers: PRA-JV, ZP.

Lecania erysibe (NT) – 7: ca; Voucher: PRA-JV23569.

Lecania hutchinsiae (DD) – 1: esr; Voucher: PRA-JV25140.

Lecania inundata (DD) – 1, 3, 7, 8: esr, ca; Vouchers: JK, JM, PRA-JV.

Lecania leprosa (DD) – 7: ca; Voucher: PRA-JV23568. **mtSSU** sequenced.

Lecania naegelii (NT) – 1, 2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14: Acam, Aps, Car, Cor, Fag, Fra-tw, Sam, esr, sil; Vouchers: PRA-JV, ZP.

Lecania rabenhorstii (VU) – 8: ca; Voucher: PRA-JV24843. **ITS** and **mtSSU** sequenced.

Lecania turicensis (DD) – 1: esr; Voucher: PRA-JV21253.

Lecanora aitema (DD) – 3: dw-log (Qpe); Voucher: PRA-ZP31040. **TLC**: usnic acid, thiophanic acid (trace), zeorin.

Lecanora albella (EN) – 2, 3, 4, 6, 8, 11, 14: Apl, Car, Fra, Qpe, Til; Vouchers: JK, JM, PRA-JV, ZP.

Lecanora argentata (NT) – 1, 2, 3, 4, 5, 6, 7, 8, 11, 12, 13, 14: Apl, Aps, Car, Cor, Fag, Fra.

Lecanora campestris (NT) – 1, 10, 13: esr; Voucher: PRA-JV23969.

Lecanora cenisia **f.** ***soredians*** (DD) – 9: sil; Voucher: PRA-JV24540. **TLC**: atranorin, roccellic acid, cf. nephrosteranic acid.

Lecanora chlarotera (LC) – 3: Fra, Qpe; Vouchers: PRA-JV20927, ZP30967.

Lecanora compallens (DD) – 1, 2, 3, 8: Car, Fra, Qpe; Vouchers: JM. **TLC**: usnic acid, zeorin (JM11931, 11938, 13723, 13739).

Lecanora conizaeoides (LC) – 1, 2, 3, 4, 5, 9, 10, 11, 14: Pin, Qpe, dw-log, snag, stump; Vouchers: JK, PRA-JV.

Lecanora expallens (LC) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14: Acam, Aglu, Apl, Aps, Car, Cor, Fag, Fra, Qpe, Sari, Stor, Til, log, snag; Vouchers: JK, PRA-JV, ZP. **TLC**: usnic acid, zeorin, thiophanic acid, arthothelin (trace), expallens unknown (ZP30671). **ITS** sequenced (JV23754), **mtSSU** sequenced (JV20685).

Lecanora impudens (DD) – 12: Apl; Voucher: PRA-JV24257. Few recent records are known from the Czech Republic, mostly in the Šumava Mts (Malíček et al. 2021). **ITS** and **mtSSU** sequenced. *Lecanora allophana* f. *sorediata* is closely related, but differs by a few mutations in mtSSU.

Lecanora intricata (LC) – 1: sil; Voucher: PRA-JV21260.

Lecanora intumescens (VU) – 2, 3, 5, 6: Car; Vouchers: PRA-JV, ZP.

Lecanora leptyrodes (DD) – 1, 2, 3, 5, 6, 7, 11, 13: Car, Cor, Fra-tw, Qpe; Vouchers: JK, JM, PRA-JV.

Lecanora orosthea (NT) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13: sil, Qpe; Vouchers: JK, JM, PRA-JV, ZP. **TLC**: usnic acid (major), gangaleoidin, norgangaleoidin, zeorin (ZP30949). **ITS** and **mtSSU** sequenced (JV24522; specimen with distinct white filamentose prothallus); **mtSSU** sequenced (JM11923).

Lecanora phaeostigma (DD) – 2, 4, 5, 10, 11: Pin, Pavi, Pspi-tw, dw-log, stump, snag; Vouchers: PRA-JV, ZP. **ITS** sequenced (JV24083).

Lecanora polytropa (LC) – 1, 2, 3, 5, 8, 9, 10, 11, 12, 13: sil; Voucher: JK.

Lecanora pulicaris (LC) – 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14: Acam, Apl, Car, Cor, Fag, Fra, Pavi, Pin, Pspi, Qpe, Sari, dw-snag; Vouchers: JK, PRA-JV, ZP. **TLC**: atranorin, roccellic acid, fumarprotocetraric acid (ZP30050).

Lecanora rouxii (DD) – 3, 8: ca, esr; Voucher: JM12657.

Lecanora rupicola (LC) – 1, 3, 4, 5, 8, 9, 10, 11, 12: sil; Vouchers: PRA-JV24924, ZP30950. **TLC**: atranorin, sordidone, thiophanic acid, eugenitol, roccellic acid (ZP30950). **ITS** and **mtSSU** sequenced (JV24924).

Lecanora saligna (LC) – 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12: Car, Fag, Fra, Qpe, dw; Vouchers: PRA-JK, JV, ZP. **ITS** and **mtSSU** sequenced (JV23701).

Lecanora sarcopidoides (DD) – 1, 2, 4, 8, 11: dw-log (Qpe), Pin; Vouchers: PRA-JV20649, 23916, 24175, 24700. **mtSSU** sequenced (JV24175).

Lecanora soralifera (NT) – 1, 3, 10: sil; Vouchers: PRA-JV21202, 24548, ZP30932. **TLC**: usnic acid, zeorin, unknown terpenoid [rf values: A: B': C=4: (2-)3: 3] (ZP30932).

Lecanora subaurea (VU) – 1: sil; Voucher: PRA-JV21018. **TLC**: pannarin, rhizocarpic acid, zeorin.

Lecanora subravida (NEW) – 2: dw-Qpe; Vouchers: PRA-ZP29180, 30004. **TLC**: isousnic, usnic and pseudoplacodiolic acid (both specimens). The taxon was reported from the Czech Republic only once, based on two specimens by J. Suza collected in S Moravia (Suza 1921). This material needs revision because historical understanding of this taxon was largely based on apothecial characters which are quite variable within the *Lecanora saligna* group. van den Boom & Brand (2008) revived this forgotten taxon, most easily recognizable from related species by its chemistry. This is the first confirmed occurrence of the species from the Czech territory.

Lecanora subsaligna (DD) – 2, 4, 5: Fag-tw, Qpe; Vouchers: PRA-JV23894, ZP29003.

Lecanora symmicta (NT) – 1, 2, 3, 5, 6, 10, 11, 12, 13: Car, Fag, Fra-tw, Lar, Pavi, Pspi, Qpe, Stor-tw, dw; Vouchers: PRA-JV, ZP. Sorediate morphotype recorded (JV24499).

Lecanora varia (VU) – 10: dw; Voucher: PRA-JV23699.

Lecidea albohyalina (EN) – 6: Car; Voucher: PRA-JV23538. Recorded on a single mature hornbeam in the study area; the lichen formed extensive cover with frequent pycnidia. Apothecia absent.

Lecidea fuscoatra (LC) – 1, 2, 3, 4, 5, 7, 8, 9, 10, 11: sil; Vouchers: JK, JM, PRA-JV. **TLC**: gyrophoric acid (JV23482). **ITS** and **mtSSU** sequenced (JV23392a).

Lecidea fuscoatrina (NEW TO EUROPE) – 3, 7, 10: sil; Vouchers: PRA-JV20885, 23578, 25073, ZP30984. Our specimens resemble *Lecidea fuscoatra* and *Immersaria athroocarpa* in their outer appearance, but *L. fuscoatra* clearly differs in the secondary metabolite content, and *I. athroocarpa*, sharing the presence of the confluentic acid syndrome, differs in its strongly amyloid (I+ blue) medulla. Other similar species, *Lecidea aptrootii*, *L. grisella* and *L. uniformis*, differ in the presence of gyrophoric acid and the absence of confluentic acid syndrome. *Lecidea fuscoatrina*, recently described from siliceous rocks in western North America (Hertel & Printzen 2004) shares chemical and morphological characters with our specimens, including conidia size (8–10 × 1 µm in our specimens). The DNA sequences from our material also correspond with *L. fuscoatrina* (see below). **TLC**: confluentic acid syndrome; i.e. confluentic acid, 2'-O-methylmicrophyllinic acid and trace of 2-O-methylperlatolic acid (JV20885, 23578, ZP30984). **ITS** sequenced (JV23578, 25073), **mtSSU** sequenced (JV20885, 25073). Closest NCBI Blast hits to our mtSSU sequences are *Lecidea fuscoatra* and *L. fuscoatrina* with identities 99.5–100%. Closest NCBI Blast hits to our ITS sequences belong to *L. fuscoatra* (95–97% identity). Lower identity is shared with *L. fuscoatrina*

(MK591838; 93.5%), which is partly caused by presumed incorrect editation detected in MK591838 by unexpected substitutions in invariable regions of ITS2. We speculate that *L. fuscoatrina* may represent a distinct chemotype within *L. fuscoatra*.

Lecidea grisella (LC) – 1, 3, 10: sil; Vouchers: PRA-JV20888, 20999, 25069. **ITS** and **mtSSU** sequenced (JV25069).

Lecidea lactea (DD) – 3, 9, 11: sil; Vouchers: PRA-JV20664, 24537, 24547.

Lecidea nylanderi (VU) – 1, 2, 3, 4, 6, 8, 9, 10, 12: Bet, Fag, Qpe, dw; Vouchers: JM, PRA-JV, ZP. Frequently fertile. **TLC**: divaricatic acid (JM12032).

Lecidea plana (NT) – 1, 3, 4, 9, 12: sil; Vouchers: JM, PRA-JV. **ITS** and **mtSSU** sequenced (JV20894).

Lecidea plebeja (NEW) – 4: Pin, dw-Pin root, stump (Pin); Vouchers: PRA-JV24285, 24301, 24305, 24306. Superficially resembling *Amandinea punctata*, but the anatomy of apothecia discloses its relationship to Malmideaceae (dark brown hypothecium, amyloid tubular structure in tholus in asci, excipular hyphae apically thickened and with with brown cap, tiny simple colourless ascospores, apothecial pigments belonging to secalonic acid derivatives – K+ golden yellow). It has 8-spored asci whereas similar species differ by asci with 12–16 spores. It is a rare species in Europe with a few records in the Alps (Nimis et al. 2018), perhaps more frequent in Scandinavia (Santesson et al. 2004) and boreal zone of Russia (Urbanavichus 2010). In the study area, the species is restricted to two pine stands on scree with cold and humid mesoclimate (49.95894N, 13.80106E and 49.95752N, 13.79972E). **ITS** and **mtSSU** sequenced (JV24285).

Lecidea strasseri (DD) – 14: Til-mossy root; Voucher: PRA-JV23929. One historical and three recent occurrences are known from Moravia (Malíček et al. 2021), but this is the first record in Bohemia. In the study area, it was found on roots of two old *Tilia* polycormons in a single rocky stand (49.96388N, 13.81194E).

Lecidea tessellata (DD) – 1, 10: sil; Vouchers: JK10517, JM12593, PRA-JV20979, 21134, 23425, 25067. **ITS** and **mtSSU** sequenced (JV25067).

Lecidella carpathica (LC) – 1, 2, 3, 5, 7, 10: sil; Voucher: PRA-JV21015.

Lecidella albida (DD) – 2, 3, 8: Apl, Car, Cor; Vouchers: PRA-JV20880, 24479, 24920, ZP30064, 30955. **TLC**: atranorin, capistratone, thiophanic acid, cf. arthothelin (JV20880, ZP30064, 30955), atranorin and capistratone (JV24479, 24920). **mtSSU** sequenced (ZP30064).

Lecidella elaeochroma (NT) – 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14: Acam, Apl, Aps, Car, Cor, Fag, Fra, Qpe, Sari, Stor, Til, Ulm, dw; Vouchers: JK, PRA-JV. JK5314 – f. *soralifera*.

Lecidella flavosorediata (VU) – 1, 2, 3: Apl, Qpe, Sari; Vouchers: JM12587, PRA-JV20919, 23505, 24225, 24558. **TLC**: thiophanic acid, arthothelin (JV23505), arthothelin (JM12587), granulosin (JV20919). **ITS** sequenced (JV20919, 24225, 24558); **mtSSU** sequenced (JV24558).

Lecidella scabra (LC) – 1, 2, 3, 7, 8, 10: sil, Acam, Car, Qpe, Stor; Vouchers: JM, PRA-JV, ZP. **TLC**: atranorin, arthothelin (JM12590), atranorin, cf. arthothelin (ZP29385); atranorin, thiophanic acid, cf. arthothelin (ZP30055).

Lecidella stigmatea (LC) – 1, 3, 10: esr, ca; Vouchers: JK10445, 10509, PRA-JV20907, 21137.

Lempholemma chalazanum (VU) – 1: cs; Vouchers: PRA-JV21167, 21233, 24707, ZP31643.

Lempholemma polyanthes (VU) – 2, 3, 7: cs; Vouchers: JK10566, PRA-JV20969, 23679.

Lepraria borealis (LC) – 1, 2, 3, 4: as, sil, bryo-sil, Fra; Vouchers: JM, PRA-JV, ZP. A common species on xerothermic andesite and rhyolite rocky sites. **TLC**: atranorin, rangiformic acid (JV23504, 23507, 23509, 23706, 24507, ZP30968), atranorin, rangiformic & norrangiformic acids (JM12046), atranorin, rangiformic & norrangiformic acids, roccellic acid (JM13729, 13738, both epiphytic). **ITS** and **mtSSU** sequenced (JV23507, 23706); closest NCBI blast result was certainly the type of *L. bergensis* (>99% identity in mtSSU; 96.7% in ITS), but this species contains anthraquinones in the hypothallus which were not observed in our specimens. Sequences of saxicolous and terricolous specimens of *L. borealis* are currently absent in NCBI database. (ITS Sequence from corticolous '*L. borealis*' recorded on bark of *Populus tremula* (Ekman & Tønsberg 2002) is a different species related to *L. neglecta*).

Lepraria caesioalba (LC) – 1, 2, 3, 4, 5, 8, 9, 10, 11: sil, bryo-sil, Pin, Qpe-root, dw; Vouchers: JK, JM, PRA-JV.

Lepraria crassissima (NT) – 2, 5, 6, 7, 8, 13, 14: esr, sil, bryo-sil; Vouchers: JM, PRA-JV. **TLC**: divaricatic acid, zeorin, nordivaricatic acid (JV20641). **ITS** and **mtSSU** sequenced (JV20641).

Lepraria elobata (LC) – 1, 4, 9: Pin, sil; Vouchers: PRA-JV24521, 24680, ZP30683. **TLC**: atranorin, zeorin, stictic acid (ZP30683).

Lepraria finkii (LC) – 1, 2, 3, 4, 5, 6, 8, 10, 11, 12, 13, 14: Acam, Aglu, Apl, Aps, Bet, Car, Cor, Fag, Fra, Qpe, Sari, Stor, Taxus, Til, Ulm-bryo; Vouchers: ZP30042, 31031. **TLC**: atranorin, zeorin, stictic acid (both specimens).

Lepraria humida (NEW) – 9: sil; Voucher: PRA-JV24507. *Lepraria humida* was described from the British Isles as a saxicolous lichen containing atranorin, rangiformic acid and anthraquinones and the six reliable ITS sequences also came from Great Britain (Slavíková-Bayerová & Orange 2006). ITS sequence of our specimen shows 98.6–100% identities with those from the British specimens and represents the first sequenced *L. humida* published in Europe outside the British Isles. Morphologically and chemically identical specimens from France, the Balkan and Central Europe have different ITS sequences and were assigned to *Lepraria* sp. H (Slavíková-Bayerová & Orange 2006). **TLC**: rangiformic acid, atranorin; anthraquinones absent, neither detected in hypothalline hyphae. As anthraquinones are absent from the Czech specimen, we consider their presence not diagnostic. **ITS** sequenced.

Lepraria incana (LC) – 1, 2, 3, 4, 5, 6, 8, 9, 11, 12, 13, 14: Aglu, Apl, Aps, Car, Fag, Fra, Pic, Pin, Qpe, Sari, Stor, Til, dw, sil; Vouchers: JK, PRA-JV, ZP. **TLC**: divaricatic acid, zeorin (ZP29004, 29383, 30103).

Lepraria jackii (NT) – 2, 4, 6, 13: Car, Pin, Qpe, Taxus, Til, dw; Voucher: PRA-JV24307.

Lepraria membranacea (LC) – 1, 2, 3, 4, 5, 7, 8, 9, 10, 12, 14: sil, Fra; Vouchers: JK4819, ZP30677. **TLC**: pannaric acid, atranorin, roccellic acid (ZP30677).

Lepraria nylanderiana (VU) – 1, 2, 3: sil, esr, cs; Vouchers: JM, PRA-JV, ZP. **TLC**: thamnolic acid, roccellic acid (JV20929, 21238, ZP30945), thamnolic acid, roccellic acid, rangiformic acid (JM11950), thamnolic acid, roccellic acid, traces of atranorin (JM12603).

Lepraria rigidula (LC) – 2, 3, 4, 5, 6, 7, 13, 14: Apl, Bet, Car, Fag, Sari. Voucher: PRA-ZP30657. **TLC**: atranorin, cf. nephrosteranic acid (only seen in B' solvent).

Lepraria vouauxii (LC) – 1, 2, 3, 5, 7, 8, 12, 14: Acam, Apl, Car, Fag, Fra, Qpe, Til, Ulm; Vouchers: JM, PRA-JV, ZP. **TLC**: pannaric acid 6-methylester, traces of pannaric acid (JM12599, 12646, ZP29218, 29813, 30675, 30676, 31032).

Leprocaulon nicholsiae (NEW TO EUROPE) – 2, 8: esr, Qpe-trunk base; Vouchers: PRA-JV23702 (epiphytic), 24844. A leprose crust so far known from USA and Canada (Tripp & Lendemer 2019). It is generally a saxicolous lichen, but we report also on an epiphytic occurrence on a tree base in a rocky site (49.96573N, 13.80936E) where it grows together with other predominantly saxicolous lichens, e.g. *Leprocaulon quisquiliare*. **ITS** sequenced (both specimens); NCBI Blast results showed highest similarity with *L. nicholsiae* specimens (94.2–99.4 % identities). Other known *Leprocaulon* sequences had distinctly lower similarities. **TLC**: usnic acid, zeorin (JV23702).

Leprocaulon quisquiliare (NT) – 1, 2, 3, 7, 8: sil, Fra, Qpe-base. Vouchers: JK, PRA-JV24677, ZP29737. **ITS** sequenced (JV24677, epiphytic).

Lichenomphalia umbellifera (LC) – 4, 9: as; Vouchers: PRA-JV24128, 24138. **ITS** sequenced (both specimens).

Lichinella myriospora (NEW) – 1: ca; Voucher: PRA-JV20982. Identification confirmed by M. Schultz.

Lichinella nigritella (EN) – 1, 3: esr, ca; Vouchers: JK, PRA-JV, ZP. **mtSSU** sequenced (JV24864).

Lithothelium phaeosporum (DD) – 2, 3, 14: Aps, Fra; Vouchers: PRA-JV23964, 24159, 24488. In the Czech Republic hitherto known from a single lowland site (Vondrák et al. 2016). **ITS** and **mtSSU** sequenced (JV24159), **mtSSU** sequenced (JV24488).

Lithothelium septemseptatum (NEW) – 3, 14: Fra, Til; Vouchers: PRA-JV24170, 24481, 24485. **ITS** sequenced (JV24485), **mtSSU** sequenced (JV24170).

Lobothallia radiosa (LC) – 1, 7: sil; Vouchers: JK2843, PRA-JV23584a, 25107. **ITS** sequenced (admixture in JV23584).

Macentina abscondita (LC) – 7: Sam; Voucher: PRA-JV20674.

Macentina dictyospora (LC) – 7, 10: Fra-root, Ulm-base; Vouchers: PRA-JV24364, 25025, ZP31065.

Melanelia stygia (VU) – 1: sil; Voucher: PRA-JV21176.

Melanelixia fuliginosa (LC) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12: sil; Vouchers: JK3995, JM11941.

Melanelixia glabratula (LC) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14: Ainc, Apl, Aps, Bet, Car, Cor, Fag, Fra, Pin, Qpe, Sari, Til, dw, sil; Vouchers: JK3983, PRA-ZP30060.

Melanelixia subargentifera (VU) – 2, 3, 12, 13: Apl, Fra, Qpe, Ulm; Vouchers: JK3873, 5263.

Melanelixia subaurifera (VU) – 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 14: Acam, Aglu, Car, Cor, Cra, Fag, Fra, Lar, Pspi, Qpe, Sari, Stor-tw, dw.

Melanohalea elegantula (VU) – 2, 9, 14: Acam, Qpe-tw, Sam; Vouchers: JŠ, PRA-JV20859, 24542. **ITS** and **mtSSU** sequenced (JV24542).

Melanohalea exasperatula (LC) – 1, 2, 3, 4, 5, 6, 9, 10, 11, 12, 14: Acam, Aps, Cra, Fag, Fra, Qpe-tw, dw; Voucher: JK5295.

Metamelanea caesiella (DD) – 1, 3, 6: ca; Vouchers: JK10477, PRA-JV20920, 21042, 21270, 21271.

Micarea byssacea (DD) – 5, 6: Car, dw-log (Abi); Voucher: PRA-JV24854. **mtSSU** sequenced.

Micarea coppinsii (NEW) – 4, 9: sil; Vouchers: PRA-JV24314, 24543. A species with suboceanic distribution in Europe with the easternmost limit in Austria (Türk & Hafellner 2017). It has saxicolous and corticolous occurrences (Coppins 2009), but in the study area, it appears to be strictly saxicolous, occurring on damp rhyolite boulders in screes together with crusts of filamentous algae and *Jamesiella anastomosans*. It forms a luxuriant population at point 49.95845N, 13.80153E where it forms pale green, almost globose soralia (morphotype with blue-grey soralia not observed). **TLC** (JV24543): 5-O-methylhiascic acid (major), gyrophoric acid (trace to minor). **mtSSU** sequenced (JV24314); Closest NCBI Blast result: *Micarea peliocarpa* (97.7% identity).

Another Czech record: Czech Republic, S Bohemia, Šumava Mts, Frymburk, nature reserve Otovský potok, boggy alder-spruce forest, near the navigational canal Schwarzenberský kanál, 48°38'34.1"N, 14°02'56.0"E, on bark of *Alnus incana*, alt. 781 m, 27 October 2021, coll. Z. Palice (PRA-ZP32008).

Micarea denigrata (LC) – 1, 2, 3, 4, 5, 6, 8, 10, 11, 12: Pin, Qpe, dw; Vouchers: JM, PRA-JV, ZP. **ITS** and **mtSSU** sequenced (JV23465).

Micarea elachista (EN) – 2, 4: Pin, dw-Qpe; Vouchers: PRA-JV24311, ZP29015, 30082. Recent records from the Czech Republic are otherwise only from southern Bohemia (Malíček et al. 2021).

Micarea erratica (LC) – 9, 10: sil; Vouchers: PRA-JV25057, ZP31561. **ITS** sequenced (JV25057).

Micarea fallax (DD) – 1, 5: dw-log (Abi, Aps); Vouchers: PRA-JV24711, 24744. **mtSSU** sequenced (JV24744).

Micarea globulosella (CR) – 2, 9: dw-log (Pin, Qpe); Vouchers: PRA-JV23708, 24501. Basically a montane species with the vast majority of Czech records at altitudes above 700 m (Malíček et al. 2021). In the study area it occurs at its lowermost known limit at 350

m. Gyrophoric acid was not detected in specimens from the study area. **ITS** sequenced (JV24501).

Micarea herbarum (NEW) – 2: dw-log (Qpe); Vouchers: PRA-ZP29088, 30066. Recently described species (van den Boom et al. 2017) resembling diminutive forms of *M. misella*. The closely related *M. nowakii* (Guzow-Krzemińska et al. 2019), also with distinct sessile pycnidia, differs in the presence of micareic acid (no substances detected by TLC in *M. herbarum*). Perhaps not rare but overlooked as undeveloped *Micarea* spp.

Micarea leprosula (VU) – 4: sil-bryo; Voucher: PRA-JV24113.

Micarea lignaria (LC) – 4, 5: sil-bryo; Vouchers: PRA-JV24122, 24125.

Micarea lithinella (LC) – 1, 2, 6, 14: sil; Vouchers: PRA-JV23726, 23967, 24899, ZP30728.

Micarea melaena (LC) – 4, 5, 14: Bet, Pin, dw-log, snag, stump (Abi, Pin), sil-bryo; Vouchers: JM12044, PRA-JV24253, 24290, 24890.

Micarea micrococca (LC) – 1, 2, 4, 5, 6, 9, 12: Aglu, Bet, Fag, Pic, dw; Vouchers: PRA-JV21180, 24300, 24898. **ITS** and **mtSSU** sequenced (JV24898).

Micarea microsorediata (NEW) – 4, 9: Bet, dw-log (Qpe); Vouchers: PRA-JV24297, 24503. Identified with the use of **mtSSU** sequences (both specimens).

Micarea misella (LC) – 1, 2, 3, 4, 6, 8, 10, 14: dw-log, snag, stump; Vouchers: PRA-JV20952, 24246, 24288, 24718, 24857, 24902. **mtSSU** sequenced (JV24902).

Micarea peliocarpa (LC) – 2, 9: Fra, *Calluna*, dw-log; Vouchers: JK2828, PRA-JV23714, 23744. **ITS** and **mtSSU** sequenced (JV23744).

Micarea prasina s.str. (DD) – 4, 5: dw-log, snag; Vouchers: PRA-JV24289, 24851. **ITS** sequenced (JV24851), **mtSSU** sequenced (JV24289).

Micarea pusilla (DD) – 14: dw-stump (Pic); Voucher: PRA-JV23918. **ITS** and **mtSSU** sequenced.

Micarea soralifera (DD) – 1, 4, 5, 6, 7: Bet-bryo, dw-log, stump; Vouchers: PRA-JV23982, 24563, 24574, 24849, ZP29955. **mtSSU** sequenced (JV24563, 24574, 24849).

Micarea substipitata (NEW SPECIES) – 4: dw-snag (Abi); Voucher: PRA-JV24847 (**ITS** and **mtSSU** sequenced). See the description above.

Micarea tomentosa (DD) – 4: dw-stump (Abi); Vouchers: PRA-JV24856, 24863. **mtSSU** sequenced (both specimens).

Micarea viridileprosa (NT) – 4, 5, 6, 9, 13: as, dw-log, stump; Vouchers: PRA-JV23902, 23919, 23982, 24150, 24505. **ITS** sequenced (JV23902); **mtSSU** sequenced (JV23902, 23982).

Miriquidica deusta (DD) – 1: sil; Voucher: PRA-JV21192. **TLC**: miriquidic acid. The voucher specimen is sterile, as are most specimens known from the Czech Republic (most Czech records concentrated in the nearby area, Brdy Hills).

Miriquidica intrudens (DD) – 1: sil-lichenicolous on *Acarospora* spp., *Lecidea fuscoatra*, *Rhizocarpon* spp.; Vouchers: PRA-JV21191, 21195, 23446, 23494. **TLC**: miriquidic acid (21191). Hitherto known from three regions within the Czech Republic: Krkonoše Mts (Malíček & Kocourková 2014, reported without more precise locality data; Sněžka Mt and Stříbrné návrší, Kocourková, unpublished), Himlštejn at Ohře river (Ondřej Peksa, unpublished) and Ralsko (Vondrák, unpublished). Occurrence of a similar lichen, *M. instrata*, is plausible in the study area, as it was recorded from a site nearby (Malíček & Kocourková 2014).

Miriquidica leucophaea (NT) – 11: sil; Voucher: JK4984.

Miriquidica pycnocarpa (EN) – 1: sil; Voucher: PRA-JV21190.

Montanelia disjuncta (NT) – 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13: sil; Vouchers: JK10368, PRA-JV21041, PRM909543.

Montanelia panniformis (VU) – 1, 4: sil; Vouchers: JK4752, PRA-JV21051.

Montanelia sorediata (DD) – 1, 2, 3, 5, 8: sil; Vouchers: JM11929, PRA-JV21040.

Multiclavula mucida (EN) – 4: dw-log (Abi); Voucher: PRA-JV24281. The lowermost occurrence of the species in the Czech Republic and the second from the central part of Bohemia; the first one was from the nearby nature reserve Kohoutov (Malíček 2020).

Myriolecis albescens (LC) – 1, 7: ca, esr; Voucher: PRA-JV21160.

Myriolecis dispersa agg. (LC) – 1, 3, 7, 8, 10, 13: ca, esr; Vouchers: JM, PRA-JV.

Myriolecis hagenii (NT) – 1, 2, 3, 8: Car, Fra, Qpe; Vouchers: JM, PRA-JV.

Myriolecis persimilis (NT) – 1, 2, 3, 6, 7, 9, 13: Car, Fag, Fra-tw, Sam, sil; Vouchers: JM, PRA-JV.

Myriolecis sambuci (NT) – 3: Fra; Voucher: PRA-ZP30960.

Myriolecis semipallida (DD) – 1: ca; Vouchers: JK10447, PRA-JV25117.

Normandina acroglypta (DD) – 1, 2, 3, 5, 10: Fra, Qpe-usually on roots; Vouchers: JM, PRA-JV, ZP. **TLC**: zeorin (JM11927).

Ochrolechia androgyna agg. (VU) – 7: Apl; Voucher: PRA-JV20625. **TLC**: only gyrophoric/lecanoric acid detected in the small specimen (analysed twice). Absence of Androgyna-unknowns suggests the placement outside *O. androgyna* s.str.

Ochrolechia microstictoides (VU) – 1, 2, 4: Qpe, dw-log, snag; Vouchers: JM12597, PRA-JV23711, ZP30062.

Ochrolechia turneri (VU) – 1, 2, 3, 5, 7, 8, 13: Apl, Fra, Qpe; Vouchers: JM, PRA-JV, ZP. **ITS** and **mtSSU** sequenced (JV23905).

Opegrapha lithyrga (DD) – 1, 2, 6, 8, 9, 13: sil; Vouchers: PRA-JV20624, 21153, 23421, ZP30658.

Opegrapha niveoatra (NT) – 2, 3, 6, 7, 11, 12, 13: Aglu, Apl, Aps, Car, Fag, Fra, Qpe, esr; Vouchers: JK, JM, PRA-JV, ZP. **mtSSU** sequenced (JV24477, 24895), **ITS** and **mtSSU** sequenced (JV23582; saxicolous).

Opegrapha paraxanthodes (DD) – 8: ca; Voucher: PRA-JV24865.

Opegrapha trochodes (DD) – 2, 3, 6: Apl, Fra; Vouchers: PRA-JV23954, 24484.

Opegrapha vermicellifera (VU) – 1, 2, 3, 5, 6, 7, 8, 11, 12, 13, 14: Acam, Apl, Aps, Car, Fag, Fra, Qpe, sil; Vouchers: JM, PRA-JV, ZP.

Parmelia ernstiae (DD) – 2, 3, 4, 5, 6, 10: Bet, Fag, Qpe, Sari, dw-log, snag; Voucher: JM11926.

Parmelia omphalodes (NT) – 1, 4, 11, 12: sil; Vouchers: JK3927, PRA-JV24235.

Parmelia saxatilis (LC) – 1, 2, 3, 4, 8, 9, 11, 12: sil; Voucher: JK.

Parmelia serrana (DD) – 3: dw-log; Voucher: JM12073. **TLC**: atranorin, salazinic acid, 2 fatty acids.

Parmelia sulcata (LC) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14: Acam, Aps, Car, Cor, Cra, Fra, Pin, Qpe, Sari, Til-tw, dw, sil; Vouchers: JK, PRA-ZP. **mtSSU** sequenced (ZP29979).

Parmeliopsis ambigua (LC) – 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 14: dw-log, snag, Fag, Pin, Qpe, Sari; Vouchers: JK.

Peltigera canina (VU) – 7, 8, 11, 12: ca-bryo; Vouchers: JK3492, 5303.

Peltigera didactyla (LC) – 1, 13: as, cs; Vouchers: PRA-JV21231, 23978, PRM892121.

Peltigera elisabethae (CR) – 1, 8, 13: as, cs; Vouchers: PRA-JV23486, 23943.

Peltigera extenuata (DD) – 1, 7, 8: as, bryo-sil; Vouchers: JM12658, PRA-JV23463.

Peltigera horizontalis (EN) – 1, 2, 3, 5, 7, 10, 12, 14: bryo-sil, Apl, Fra-roots; Vouchers: JK6542, PRA-JV23731, 25039. **ITS** sequenced (JV25039).

Peltigera lepidophora (EN) – 1, 10: as, cs; Vouchers: PRA-JV24111, 25118.

***Peltigera neocanina* ined.** (NEW) – 3, 14: bryo-Fra-roots; Vouchers: PRA-JV24483, 25087. The name was introduced by Miadlikowska et al. (2003), but it is still not formally described. However, the species is well circumscribed on the basis of ITS sequences (Jüriado et al. 2017). The species is morphologically similar to *P. membranacea* by its whitish lower surface of thallus and the slender, “bottle-brush-like” rhizines. **ITS** and **mtSSU** sequenced (JV24483).

Other Czech occurrences: Šumava Mts., protected area Boubín, among mosses on gneiss stone (PRA-JV23645) and Šumava Mts., protected area Čertova stráň, on root of *Fagus* (PRA-JV24456); both specimens confirmed by **ITS** barcode.

Peltigera polydactylon (EN) – 2: as; Voucher: PRA-ZP29377. **TLC**: zeorin, polydactylin, dolichorrhizin.

Peltigera praetextata (NT) – 1, 2, 3, 5, 6, 8, 11, 12, 13, 14: Apl, Aps, Fag, Fra, Qpe, Til-root, base, dw, bryo-sil; Vouchers: JK3490, PRA-JV24483, PRM908769.

Peltigera rufescens (NT) – 1, 2, 3, 7, 10: as, cs; Vouchers: JK4836, PRA-JV24222.

Peltula euploca (EN) – 1, 3, 8: ca; Vouchers: PRA-JV21024, ZP31646.

Pertusaria albescens (NT) – 1, 2, 3, 4, 7, 8, 9, 11, 13: Acam, Car, Fra, Qpe, dw; Vouchers: JK, PRA-JV.

Pertusaria amara (NT) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14: Aglu, Acam, Apl, Car, Cor, Fra, Qpe, Stor, dw; Vouchers: JK, PRA-ZP, PRM.

Pertusaria amara* f. *isidiata Harm. (DD) – 1, 2, 3, 8: Fra, Qpe; Vouchers: JM, PRA-JV. **TLC**: picrolichenic acid, protocetraric acid (JM11944).

Pertusaria aspergilla (EN) – 1, 4: sil; Vouchers: JM, PRA-JV. **TLC**: fumarprotocetraric acid (JM12616).

Pertusaria coccodes (VU) – 2, 8: Car, Qpe; Vouchers: PRA-JV24198, 24226.

Pertusaria corallina (NT) – 1, 4, 5, 12: sil; Vouchers: JM, PRA-JV21052.

Pertusaria coronata (VU) – 17: Apl, Fra; Vouchers: JM, PRA-JV24260, 24340.

Pertusaria flavida (EN) – 1: Fra, Qpe; Vouchers: JM12578, PRA-JV24344. Recorded in a single site in the study area, where it was frequent (detected on tens of trees).

Pertusaria hymenea (EN) – 7: Car; Voucher: PRA-JV20670.

Pertusaria leioplaca (VU) – 1, 2, 3, 5, 6, 7, 8, 10: Acam, Aps, Car, Cor, Fag, Fra; Vouchers: JK, PRA-JV.

Pertusaria pertusa (EN) – 2, 6: Apl, Car; Vouchers: PRA-JV23960, 24155.

Pertusaria stalactiza (NEW) – 1: sil; Vouchers: JM13711, PRA-JV23412. Recorded in nutrient-rich communitiy on a bird-perching rock spur. It is similar to an epiphytic *Pertusaria amara* var. *isidiata*, but the secondary metabolites differ and isidia are distinctly larger (100–200 µm diam., versus 50–100 µm in *P. amara* var. *isidiata*). **TLC**: lecanoric acid, protocetraric acid (JM13711). **ITS** and **mtSSU** sequenced (JM13711). Closest NCBI Blast results are *Pertusaria amara* in ITS (93% identity) and *P. excludens* and *P. aspergilla* in mtSSU (>99% identity). **Fig. 12C, D**

Phaeophyscia chloantha (EN) – 1, 2, 3: Acam, Aps, Fra, Ulm; Vouchers: PRA-JV21268, 24715, 24731, ZP30665.

Phaeophyscia endophoenicea (EN) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13: Acam, Apl, Aps, Car, Cor, Fra, Qpe, Ulm-bryo; Voucher: JK4810.

Phaeophyscia hirsuta (CR) – 8: esr; Voucher: PRA-JV24859.

Phaeophyscia nigricans (LC) – 1, 3, 7: Fra, ca; Voucher: PRA-JV20936.

Phaeophyscia orbicularis (LC) – 1, 2, 3, 4, 6, 7, 9, 10, 12, 13: Apl, Aps, Car, Cor, Fag, Fra, Qpe, esr, ca.

Phaeophyscia sciastra (NT) – 1, 3, 10: ca, esr; Vouchers: PRA-ZP30924, 31644, PRM909545.

Phlyctis argena (LC) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14: Acam, Apl, Aps, Car, Cor, Fag, Fra, Qpe, Sari, Stor, Til, Ulm, dw, bryo, sil; Vouchers: JK, JM, PRA-JV, ZP.

Physcia adscendens (LC) – 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 14: Acam, Apl, Aps, Car, Cor, Cra, Fag, Fra, Pspi, Qpe, Stor, Ulm-tw; Voucher: JK.

Physcia aipolia (EN) – 2, 3, 6: Fra-tw.

Physcia caesia (LC) – 1, 3, 7, 8: ca, esr.

Physcia dimidiata (NT) – 1, 2, 7, 8: ca, esr, Apl; Vouchers: JK4824, PRA-ZP31651 (epiphytic), PRM906669.

Physcia dubia (LC) – 1, 2, 3, 6, 7, 8, 10, 11, 12, 13: Apl, Aps, Car, Fag, Fra, Qpe, Stor-base, sil. Vouchers: JK, JM, PRA-ZP.

Physcia stellaris (VU) – 1, 2, 6, 12, 14: Acam, Fra-tw, Pspi.

Physcia tenella (LC) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14: Acam, Aglu, Apl, Aps, Car, Cor, Cra, Fag, Fra, Qpe, Ulm-tw, dw, sil; Voucher: JK.

Physconia enteroxantha (NT) – 1, 2, 3, 7, 8, 10, 14: Acam, Apl, Aps, Car, Cra, Fag, Fra, Qpe, dw; Vouchers: JK, PRA-JV, ZP. **ITS** and **mtSSU** sequenced (JV24074).

Physconia grisea (LC) – 7: Qpe; Voucher: JK3506.

Physconia perisidiosa (VU) – 2, 3, 4, 7, 8, 9, 11, 14: Apl, Aps, Fra, Qpe, bryo-sil; Vouchers: JK, PRA-JV, ZP.

Piccolia ochrophora (NT) – 7: Sam.

Placidium rufescens (NT) – 1, 3, 7, 8: esr, cs; Vouchers: JK10505, PRA-JV20644, 20916, 20986, 25108.

Placidium squamulosum (LC) – 1: cs; Vouchers: JK4544, JM12609, PRA-ZP31629.

Placopyrenium cinereoatratum (NEW) – 1: sil-inundated; Vouchers: PRA-JV21204, 21222, 23502. Orange (2009) described it as lichenicolous on *Staurothele fissa*. In the study area, the species is frequent on the riverside andesite outcrops, usually associated with *S. fissa*, but not necessarily lichenicolous. **ITS** sequenced (JV21204).

Placopyrenium fuscellum (VU) – 1, 3, 10: ca, esr; Vouchers: JK10483, JM12607, PRA-JV25048, 25093, ZP30679, 31608, PRM906668.

Placynthiella dasaea (LC) – 2, 3, 9: Lar, dw-log; Vouchers: PRA-JV24504, PRA-ZP29954.

Placynthiella icmalea (LC) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14: Bet, Cra, Pin, Qpe, dw, as; Vouchers: JK, PRA-JV, ZP. **ITS** and **mtSSU** sequenced (JV23901).

Placynthiella oligotropha (LC) – 1, 2, 9: as.

Placynthiella uliginosa (LC) – 1, 2, 3, 5, 10: as; Vouchers: PRA-JV21263, ZP31655.

Placynthium nigrum (NT) – 1, 2, 3, 10: ca; Vouchers: JK10506, PRA-JV21245, 24926. **mtSSU** sequenced (JV24926).

Placynthium subradiatum (EN) – 1: ca; Vouchers: PRA-JV21037, 21044.

Platismatia glauca (NT) – 1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 14: Bet, Cra, Fag, Fra, Pin, Pspi, Qpe, Sari-tw, dw-log, snag, sil; Vouchers: JK.

Pleopsidium flavum (VU) – 1: sil. We consider it a glacial relict, restricted in Central Europe to hard siliceous rocks in continually unforested, continental regions. Nowadays the lichen is common in arid regions of Eurasia where steppe is a zonal biome. Its distribution in central Europe is restricted to a few sites at Prague in central Bohemia (Suza 1942) and a few in the Danube valley at Krems an der Donau (Suza 1947). Its occurence in the study area (only a few thalli recorded) is outstanding by the substantial distance from all known localities in central Bohemia.

Pleurosticta acetabulum (VU) – 3: Fra.

Porina aenea (LC) – 1, 2, 3, 4, 5, 6, 7, 10, 11, 13, 14: Abi, Aglu, Aps, Car, Cor, Fag, Fra, Pic, Stor, Til, Ulm; Vouchers: JK3503, 10366, PRA-JV23956, 24134. Only a few specimens were identified as *P. aenea* with brown pigments in involucrellum, unchanged after KOH treatment. Most epiphytic records belong to *P. byssophila*, with purple pigments changed to blue-grey after KOH.

Porina byssophila (DD) – 1, 2, 3, 5, 6, 9, 12, 13, 14: Acam, Apl, Car, Cor, Fag, sil, esr; Vouchers: JM, PRA-JV, ZP. Epiphytic and saxicolous occurrences are frequent throughout the study area. Saxicolous *P. chlorotica* and epiphytic *P. aenea* differ only in involucrellum pigmentation that appears to have an intermediate state in some specimens. The complex of these three *Porina* species urgently needs revision.

Porina chlorotica (LC) – 1, 3, 5, 6, 7, 8, 9, 10, 11, 13: sil; Vouchers: PRA-JV24578, ZP31589, 31755. Perhaps less frequent than *P. byssophila*.

Porina lectissima (VU) – 6: sil; Voucher: PRA-JV24161.

Porina leptalea (EN) – 2: Fag; Voucher: PRA-JV24221.

Porocyphus coccodes (DD) – 1, 13: sil-river bank; Vouchers: PRA-JV21221, 23989.

Porocyphus rehmicus (NEW) – 1, 3: ca; Vouchers: PRA-JV21025, 21043, 21228, ZP31633. In the study area restricted to cyanolichen communities on lime enriched surfaces periodically inundated by seepage water.

Additional Czech records: Central Bohemia, distr. Praha-západ, Český kras, Černošice, Vonoklasy: limestone quarry overgrown by shrubs, just c. 0.5km WNW of the village, N49°57'06", E014°16'17", on steeply inclined seepage limestone S-SW facing rock, alt. 315 m, 26 July 2011, coll. Z. Palice, det. M. Schultz (PRA-ZP14769); South Moravia, distr. Blansko, Moravský Kras, NR Rudické propadání, W-facing xerothermic rock outcrops just SE of the rock-form 'Kolíbky', 49°20'01.1"N, 16°44'07.2"E, on low limestone rock, alt. 463 m, 16 April 2015, coll. Z. Palice & P. Uhlík (PRA-ZP21202).

Porpidia cinereoatra (EN) – 1, 5, 8, 11: sil; Vouchers: JK4974, JM12660, PRA-JV21032, 24896. **ITS** and **mtSSU** sequenced (JV24896).

Porpidia contraponenda s.lat. (NEW) – 4: sil; Voucher: PRA-JV24123. **TLC**: methyl-2-O-microphyllinate. **ITS** and **mtSSU** sequenced; closest NCBI Blast results: *Porpidia* sp. (3 specimens from North America; identity in ITS 97–99.3%), closely related to *P. contraponenda* and *P. cinereoatra* (Orange 2014b). On the basis of similarity in secondary metabolites, we tentatively call our specimen *P. contraponenda*.

Porpidia crustulata (LC) – 1, 3, 4, 5, 9, 10, 11, 12: sil; Vouchers: PRA-JV24124, 24538. **TLC**: stictic acid (24124).

Porpidia nigrocruenta (DD) – 1, 4: sil; Voucher: PRA-JV24135.

Porpidia soredizodes (LC) – 1, 3, 4, 5, 9: sil; Vouchers: JK10372, PRA-JV.

Porpidia tuberculosa (LC) – 1, 2, 3, 8, 9, 10, 11, 12, 13: sil; Vouchers: JK, JM, PRA-JV, ZP. Specimens with rusty coloured thalli are sometimes present on iron-rich rocks, resembling *P. melinodes*, but the medulla is amyloid.

Protoblastenia rupestris (LC) – 1, 3, 6, 10, 13: esr, ca; Vouchers: JK10453, PRA-JV23430.

Protoparmelia badia (LC) – 1, 11: sil.

Protoparmelia hypotremella (DD) – 1, 2, 3, 8: Car, Qpe, dw; Vouchers: JM, PRA-JV, ZP29015 (fertile). **ITS** and **mtSSU** sequenced (JV23710, 24196). Rather frequent in the study area, especially on hard wood of oak logs, where it forms pale grey granular to subsquamulose thalli, similar to *Rinodina excrescens*, but P- and UV+ white. Apothecia are present in the specimen ZP29015, likewise in the specimen recently reported from the National Park Podyjí (Malíček 2021); until now reported fertile only from North America (Brodo & Aptroot 2005). **Fig. 12F** (fertile thallus)

Protoparmelia oleagina (NEW) – 2, 5: Qpe, dw; Vouchers: PRA-JV24320 (richly fertile), 24470, ZP29015. Distinct from the related *P. hypotremella* by darker (olive-brown) thalli of tiny granules. The negative UV reaction of thallus is also characteristic (Aptroot et al. 1997, Brodo & Aptroot 2005), although both species are indistinguishable by TLC. In the Czech Republic this species was previously collected in the Šumava Mts on hard wood of solitary *Sorbus aucuparia* as a host of *Sphinctrina* *anglica* (Palice 1999) but not explicitely listed. **ITS** sequenced (24320). **Fig. 12E** (fertile thallus)

Protoparmeliopsis garovaglii (NT) – 1, 3, 7, 8: sil; Vouchers: JK5233, 10353.

Protoparmeliopsis muralis (LC) – 1, 2, 3, 5, 7, 8, 10, 13: esr, sil; Voucher: PRA-JV24207.

Protothelenella corrosa (LC) – 5, 9: sil; Voucher: PRA-JV24524. The records in the study area at altitudes below 500 m are outstanding, as *P. corrosa* is predominantly a montane lichen.

Pseudevernia furfuracea (NT) – 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 14: Aglu, Car, Cra, Fag, Fra, Pin, Pspi, Qpe, Sari-tw, dw-log, snag; Voucher: JK4011.

Pseudoschismatomma rufescens (VU) – 1, 2, 3, 5, 6, 7, 8, 12, 13: Apl, Bet, Car, Cor, Fag, Fra, Qpe; Vouchers: PRA-JV24562 (anamorph), ZP29759. Sometimes covering large areas in a purely anamorphic stage with crowded tiny pycnidia, fewer than 0.1 mm diam.; conidia 6–7 × 2.5–3 µm. **mtSSU** sequenced (JV24562).

Psilolechia clavulifera (LC) – 5, 6, 9: sil (dry side of stones); Vouchers: PRA-JV23936, 24529. Majority of Czech occurrences are from organic substrata, but the three records from the study area are saxicolous.

Psilolechia lucida (LC) – 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14: sil.

Psoroglaena stigonemoides (DD) – 13: Acam; Voucher: PRA-JV23973.

Psorotichia schaereri (DD) – 1, 3: ca, esr; Vouchers: PRA-JV21028, 21033, 24904, 25052. **mtSSU** sequenced (JV25052).

Pterygiopsis neglecta (DD) – 1: ca; Vouchers: PRA-JV21272, 23408, 23484. In the study area, it occurs either on rocks periodically irrigated by seepage water enriched by lime, or on periodically inundated rocks on the river side. In the Czech Republic so far known from few localities in valley of Vltava river (Malíček & Vondrák 2016). **ITS** sequenced (JV23408).

Pterygiopsis umbilicata (CR) – 1, 3: ca; Vouchers: PRA-JV. In the study area, it is rather frequent on lime enriched rocks periodically irrigated by seepage water. In the Czech Republic, it was previously known only from its type locality (Vězda 1978, Šoun et al. 2015, Malíček et al. 2017).

Punctelia jeckeri (VU) – 1, 2, 3, 5, 6, 8, 10, 12, 14: Car, Cra, Fra, Qpe-tw.

Punctelia subrudecta (VU) – 1, 2, 3, 6, 8: Aps, Car, Cra, Fra, Qpe-tw; Voucher: PRA-ZP31421.

Pycnora praestabilis (VU) – 1, 2: Pin, dw-log, snag, stump; Vouchers: JM12588, PRA-JV23751.

Pycnora sorophora (NT) – 1, 2, 3, 4, 9, 10, 11: Pin, dw-snag, stump; Vouchers: PRA-JV, ZP. **ITS** and **mtSSU** sequenced (JV23721).

Pycnothelia papillaria (VU) – 1, 2, 9: as; Vouchers: JK4755, PRA-JV21251.

Pyrenula nitida (EN) – 1, 2, 3, 5, 6, 8, 14: Aps, Car, Cor, Fag.

Pyrenula nitidella (EN) – 2, 3, 6: Car, Cor, Fra (young); Vouchers: PRA-JV20697, 23955, 23961, 24157. **ITS** and **mtSSU** sequenced (JV24157).

Ramalina capitata (VU) – 1: sil (bird-perching); Voucher: PRA-JV21010.

Ramalina europaea (NT) – 1, 2, 3, 4, 5, 6, 8, 10, 11, 12, 14: Acam, Apl, Car, Fra, Qpe, sil; Vouchers: JK, JM, PRA-JV, ZP. **ITS** sequenced (JM11934, PRA-JV24581), and **mtSSU** sequenced (JM11934, 11935, PRA-JV24347, 24581).

Ramalina farinacea (VU) – 2, 3, 4, 5, 8, 9, 10, 11, 12, 13: Apl, Car, Fag, Fra, Qpe-tw, dw-snag; Vouchers: JK4848, PRA-ZP29710.

Ramalina obtusata (RE) – 2: Car; Voucher: PRA-JV24089. This is the only published record from the Czech Republic in the last 80 years. Few modern records are however known from the Šumava Mountains in Southern Bohemia. **ITS** and **mtSSU** sequenced; identity of the ITS sequence with *R. obtusata* was confirmed by Sergio Pérez Ortega.

Reichlingia leopoldii (DD) – 6, 8, 13: Aps, sil; Vouchers: JK10568, PRA-JV21074, 23953.

Reichlingia zwackhii (NEW) – 3: Car; Voucher: PRA-JV24586. In central Europe, it is a very rare lichen occurring at low altitudes on smooth bark of *Carpinus* or *Fraxinus* (Wirth et al. 2013), sometimes reported as a facultative parasite on *Phlyctis argena* (Cameron et al. 2020). Recorded on a single old tree in the study area.

Rhizocarpon disporum (NT) – 1: sil; Vouchers: JK10364, PRA-JV21026.

Rhizocarpon distinctum (LC) – 1, 2, 3, 5, 7, 8, 9, 10, 11, 12: sil; Vouchers: JK, JM, PRA-JV, ZP. **ITS** and **mtSSU** sequenced (JV23892).

Rhizocarpon fratricida (NEW) – 1: sil-on *Rhizocarpon geographicum*; Vouchers: JK10564, 10577. First record for Central Europe. So far known only from Italy (Sicily, Sardinia; Nimis 2016) and from a single locality in southeastern France (Roux & Uriac 2018). The species forms very small thalli lichenicolous on yellow *Rhizocarpon* species, with I+ blue medulla and strongly halonate, 1-septate grey-brown ascospores, 14–23 × 7–8.5 µm.

Rhizocarpon geminatum* var. *citrinum (NEW) – 1, 7: sil; Vouchers: JK4889, PRA-JV20643, 23584. Whereas *Rhizocarpon geminatum* prefers damp sites close to streams and lakes (Fletcher et al. 2009), the var. *citrinum* occurs in xerothermic sites. The Czech record of *R. geminatum* from rocks in the valley of Vltava river (Malíček et al. 2008) probably belongs to this taxon. **ITS** sequenced (JV23584), **mtSSU** sequenced (JV20643). The var. *citrinum* is distinct from *R. geminatum* on a species level (E. Timdal, pers. communication).

Rhizocarpon geographicum (LC) – 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12: sil; Vouchers: JK10482, JM12035.

Rhizocarpon grande (VU) – 1, 3, 4, 8, 9: sil; Vouchers: JK5311, PRA-JV21011, 21061, 24112, 24877.

Rhizocarpon lecanorinum (LC) – 1, 3, 4, 5, 9, 10, 12: sil; Vouchers: JK4002, JM12031.

Rhizocarpon oederi (VU) – 1: sil; Vouchers: JK10479, PRA-JV24579, ZP31663.

Rhizocarpon petraeum (VU) – 1, 10: ca, esr; Vouchers: PRA-JV21022, 23438, ZP31557.

Rhizocarpon postumum (DD) – 1: sil; Voucher: PRA-ZP31659.

Rhizocarpon reductum (LC) – 1, 2, 3, 4, 5, 8, 9, 10, 11, 12: sil; Vouchers: JK, JM, PRA-JV, ZP, PRM.

Rhizocarpon rubescens (NEW) – 1, 2, 3: sil; Vouchers: PRA-JV21235, ZP29011. Genuinely rare in Europe. Most records are from southern Scandinavia (Ihlen 2004); the species is not present in the checklist of the Alps (Nimis et al. 2018) or the German lichen flora (Wirth et al. 2013). It has a few scattered records in the study area and one more Czech locality has recently been found.

Additional Czech record: Šumava Mts. Záblatí, Řepešín, protected area Čertova stráň, alt. 660 m, 49.00698N, 13.89251E, coll. J. Vondrák, 9 Sept. 2020 (PRA-JV24379).

Rhizocarpon viridiatrum (VU) – 1, 2, 3, 5, 7, 8, 10: sil; Vouchers: JK, JM, PRA-JV, ZP.

Rimularia gibbosa s.lat. (NT) – 1, 2, 3, 8, 10: sil; Vouchers: JM, PRA-JV. Two species are presumably present in the study area. One has strongly bullate thallus and resembles a typical morphotype of *R. gibbosa*; this one was only recorded in the sampling site 1 (JV20988, 24688). **ITS** and **mtSSU** sequenced (JV24688).

Another one, common throughout the area, has low areoles that soon become entirely blastidiate. This morphotype resembles *Lambiella furvella* or *Rimularia intercedens*. **ITS** sequenced (JV20960, 21023) and **mtSSU** sequenced (JV21023, 23583).

Both species are closely related to *R. gibbosa* (according to data in NCBI), but both have ITS sequences distinct from the typical *R. gibbosa* (PRA-JV24407; CZ-Šumava Mts).

Rimularia insularis (NT) – 1: sil-lichenicolous on *Lecanora rupicola*; Vouchers: JK10518, PRA-JV21211.

Rinodina archaea (CR) – 2: dw-Qpe-root; Voucher: PRA-JV24239. Our record represents the only known recent occurrence in the Czech Republic. Rather recently, it was mentioned as an associated species from the Šumava Mts (Palice 1999), but this record probably refers to *R. orculata*. In the study area, only a single small thallus was collected on hard wood at trunk base of an old living oak. Identification confirmed by Helmut Mayrhofer. **mtSSU** sequenced.

Rinodina aspersa (NT) – 1, 2, 3, 5, 7, 8, 9, 10, 11, 13: sil-pebbles; Vouchers: JK, JM, PRA-JV. **ITS** sequenced (JV25068), **mtSSU** sequenced (JV20960a, 25068).

Rinodina bischoffii (LC) – 1, 7, 10: ca; Vouchers: JK10488, PRA-JV23443, 23450, 25096.

Rinodina calcarea (VU) – 1: ca, esr; Voucher: PRA-JV21265.

Rinodina efflorescens (VU) – 1, 2, 3, 4, 5: Aps, Car, Qpe, dw-log; Vouchers: JM, PRA-JV, ZP. **ITS** sequenced (JV23876), **mtSSU** sequenced (JV23860).

Rinodina excrescens (DD) – 2, 3: Car, Qpe; Vouchers: PRA-JV24241, 24552.

Rinodina exigua (VU) – 1, 2, 3, 4, 5, 8, 10, 11, 12: Apl, Aps, Car, Fag, Fra, Qpe-tw; Vouchers: JK, JM, PRA-JV, ZP.

Rinodina fimbriata (DD) – 1, 6: esr-inundated; Vouchers: PRA-JV24737, 24738, 24922. Atranorin absent in all specimens (tested by polarised light - the bright colour of the small atranorin crystals is diagnostic; Mayrhofer, unpublished). It has only two other records from the Czech Republic (Halda 2017). **ITS** and **mtSSU** sequenced (JV24738).

Rinodina freyi (EN) – 1, 3, 12: Fra, Lar-tw; Vouchers: JM12056, PRA-JV20912, 23468, 24491.

Rinodina moziana (DD) – 1, 2, 8, 13: sil-river bank, sil; Vouchers: PRA-JV (5 specimens), ZP29177. Sheard (2018) revised and summarized the synonymy of this widespread subcosmopolitan, but poorly known and certainly rare species related to *R. oxydata*. It was described under various names from three continents: from Asia (Japan) in 1890 (as *Lecanora moziana*), from North America (U.S.A.: Illionis) in 1891 (as *Lecidea destituta*) and from Europe (Czech Republic) in 1984 (as *Rinodina vezdae*). The last description (Mayrhofer 1984) refers to the type locality at Veverská Bitýška in southern Moravia (collected by A. Vězda in 1956). Our records represent the only known recent occurrences of the species in the Czech Republic.

Rinodina oleae (LC) – 7: ca, esr; Voucher: PRA-JV23570. Abundant occurrence on andesitic stones in ruin walls. **ITS** sequenced. Closest NCBI Blast results are three sequences of *R. oleae* (c. 98% identity). Some authors recognize *Rinodina oleae* as an epiphytic species, distinct from the saxicolous *R. gennarii*. Our record is saxicolous and thus could be identified as *R. gennarii*.

Rinodina obnascens (NEW) – 7: sil, esr; Voucher: PRA-JV20630. Species with blastidiate thallus morphology similar to *R. furfurea*, but it differs in ascospores (Milvina-type in *R. obnascens* and Dubyana-type in *R. furfurea*). So far known mainly from southern Europe (Mayrhofer & Poelt 1979, Mayrhofer 1984, Giralt 2001, Grube et al. 2001, Mayrhofer et al. 2005, Nimis et al. 2018). In the study area, it occurs on xerothermic base-rich outcrops of andesite below the ruin of Týřov. Accompanying species include *Caloplaca rubelliana*, *Lobothallia radiosa*, *Rhizocarpon geminatum* var. *citrinum* and *Verrucaria sphaerospora*. **ITS** and **mtSSU** sequenced.

Rinodina oxydata (NT) – 1, 2, 3, 7, 8, 10, 11: sil, Fag-root; Vouchers: JK, JM, PRA-JV, ZP. **ITS** and **mtSSU** sequenced (JV24720, 24966).

Rinodina pityrea (LC) – 1, 3, 7, 10: Acam, Fra, Qpe; Vouchers: PRA-JV21220, 24909, 24932, ZP30963.

Rinodina poeltiana (NEW) – 2, 3: Fra, Qpe; Vouchers: PRA-JV24062, 24063, 24476, ZP30067, 30759. Described from a single site in Austria (Giralt et al. 1993) as an epiphyte on *Salix alba*. Later recorded in the west of North America (Sheard 2010) and in Italy: South Tyrol (Nascimbene 2014, Nimis et al. 2018). **ITS** and **mtSSU** sequenced (JV24063). **Fig. 12G**

Rinodina pyrina (VU) – 1, 2, 3, 6, 13: Fag, Fra-tw, log; Vouchers: JM, PRA-JV.

Rinodina subpariata (DD) – 2, 3, 4, 8, 12, 14: Car, Cor, Fra, Qpe, Stor; Vouchers: PRA-JV, ZP.

Romjularia lurida (VU) – 1: ca, cs; Vouchers: PRA-JV21013, 25152.

Ropalospora viridis (LC) – 2, 3, 4, 5, 6, 7, 14: Ainc, Bet, Car, Cor, Fag, Pspi, Sari; Vouchers: JM11925, 11989, 12042. **TLC**: perlatolic acid (all specimens).

Rostania occultata (CR) – 1: Fra-base; Voucher: PRA-JV24348. Four records are known from the Czech Republic from the first half of 20th Century. Afterwards recorded only once in the Šumava Mts (Palice 1999).

Rufoplaca griseomarginata (NEW SPECIES) – 1: esr; Voucher: PRA-JV23414. See the description above.

Sagedia simoënsis (DD) – 1, 2, 3, 9, 10: sil; Vouchers: JM12069, 12626, PRA-JV21036, 24531, ZP30680, 31059, 31505. Thallus variable; soralia dark blue grey to pale grey, rough granulose to farinose. **mtSSU** sequenced (JV24531, with farinose blue-grey soralia).

Sarcogyne regularis (LC) – 1, 3, 10: ca, esr; Vouchers: JM12613, PRA-JV21135, 23419, 23442, 25102, ZP31745. **mtSSU** sequenced (23419, sterile specimen).

Sarcosagium campestre (LC) – 10: Fra-roots; Voucher: PRA-JV24362.

Sclerophora pallida (CR) – 2: Fra; Vouchers: PRA-JV24245, ZP29694. A rare species with a single detected occurrence in the study area.

Sclerophora peronella (EN) – 14: Apl-wood in hollow; Voucher: PRA-JV24189. A rare species with a single detected occurrence in the study area.

Scoliciosporum chlorococcum (LC) – 1, 2, 3, 4, 11: Bet, Car, Qpe, dw-log; Vouchers: JK5300, 10383, PRA-JV20627, 24299.

Scoliciosporum gallurae (DD) – 8: Fra; Voucher: JM12635. Probably underrecorded, because its sterile thalli (if present) were automatically identified as the common *S. sarothamni*.

Scoliciosporum sarothamni (LC) – 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14: Acam, Aglu, Aps, Car, Cor, Fag, Fra, Qpe, Pavi, Sari-tw, dw, sil; Voucher: PRA-JV21208.

Scoliciosporum schadeanum (DD) – 4: Qpe; Voucher: PRA-JV24119.

Scoliciosporum umbrinum (LC) – 1, 2, 3, 4, 8, 10, 11: Fag, Qpe, sil; Vouchers: JK10371, JM12045, ZP31013.

Schismatomma pericleum (EN) – 7, 12, 13: Apl, Fra; Vouchers: JM11975, PRA-JV24254, 24262.

Scytinium gelatinosum (VU) – 1: esr-bryo; Voucher: PRA-JV24713.

Scytinium intermedium (DD) – 1, 3, 10: ca, cs; Vouchers: PRA-JV20955, 21187, 25065. Although the species is known to be richly fertile (Jørgensen 1994), it forms extensive thalli without apothecia in the study area.

Scytinium lichenoides s.str. (DD) – 1, 2, 3, 14: Apl, Fra, Til-mossy root; Vouchers: PRA-JV24080, 24168, 24275. The name *Leptogium (Scytinium) lichenoides* has been also used for a common species *L. (S.) pulvinatum* in the Czech Republic, however *S. lichenoides* s.str. (sensu Otálora et al. 2008) is certainly rare in the Czech Republic. In the study area, it is scattered on mossy roots and tree bases in humid scree forests. For differences from epiphytic specimens of *L. magnussonii*, see below. **ITS** sequenced (JV24080), **mtSSU** sequenced (all specimens).

Scytinium magnussonii (DD) – 1, 2, 3, 8, 13: ca, esr, Fra; Vouchers: JM11951, PRA-JV21200, 23479, 25029, 25036. Corticolous specimens differ from the similar *L. lichenoides* by rounded (not elongated and denticulate), shiny brown (not matt, grey) and only slightly striate thallus lobes. It has smaller cortical cells (4–10 vs. 8–13 µm diam.) and denser algal layer with *Nostoc* more in clusters than in chains (*Nostoc* predominantly in chains in *L. lichenoides*). Isidia are tiny, granular or very shortly coralloid (often long coralloid in *L. lichenoides*). **mtSSU** sequenced (JM11951, JV25036).

Scytinium plicatile (VU) – 1, 3, 8, 10: ca, esr; Vouchers: PRA-JV24732, 24867.

Scytinium pulvinatum (LC) – 1, 2, 3, 7, 8, 10, 11, 13: ca, esr-bryo, Fra-roots; Vouchers: JK, JM, PRA-JV.

Scytinium schraderi (VU) – 1, 3, 10: cs; Vouchers: JK10502, PRA-JV24925.

Scytinium subtile (EN) – 1, 2, 3, 7, 10: Apl, Car, Fra, Qpe-usually on roots; Vouchers: PRA-JV, ZP.

Scytinium tenuissimum (VU) – 1, 10: as; Voucher: PRA-JV23685.

Scytinium teretiusculum (EN) – 1, 2, 3: Fra, Qpe-bryo-usually on roots; Vouchers: JM, PRA-JV, ZP.

Sparria endlicheri (CR) – 1, 2, 3, 8, 13, 14: sil, esr; Vouchers: JM, PRA-JV. Recently considered as regionally extinct in some Central European countries (cf. Vondrák et al. 2010), but intensive floristic research in the Czech Republic in the last decade revealed numerous localities from lowlands to lower mountains. It specifically grows below mineral enriched siliceous outcrops accompanied by *Dirina fallax* and *Dendrographa latebrarum*.

Staurothele fissa (EN) – 1, 13: sil, esr-river bank; Vouchers: PRA-JV21213, SMNS-STU-F-0001982. A dominant lichen on riverside, periodically inundated, andesite rocks. **ITS** sequenced (SMNS-STU-F-0001982).

Staurothele frustulenta (LC) – 1, 7: esr; Vouchers: PRA-JV20978, 25110, ZP30661, 31634.

Strangospora moriformis (NT) – 1, 2, 5, 11: dw-log; Vouchers: PRA-JV20639, 25153.

Strangospora pinicola (NT) – 1, 2, 3, 5, 9, 10, 12: Fag, Fra, Qro, dw- fence, log, snag; Vouchers: JM, PRA-JV, ZP.

Strigula jamesii (DD) – 1, 2, 6, 7, 11: Apl, Cor, Fra, Til, ca; Vouchers: PRA-JV20672, 20673, 24052, 24057, 24706, 24900 (saxicolous), ZP30100 (as *Strigula* cf. *affinis*). The lichen with suboceanic distribution, with the easternmost occurrence in Slovakia. In the Czech Republic, has so far been known from the Moravian Karst only (Palice et al. 2018). All specimens from the study area had only perithecia, i.e. pycnidia were absent. Some specimens (JV24052, ZP30100) have slightly larger ascospores (c. 17–20 × 5–6 µm) and the latter has larger perithecia (0.2–0.25 mm). These two could be identified as a poorly developed *Strigula affinis*. **ITS** sequenced (JV24052, 24057) and **mtSSU** sequenced (JV24052).

Strigula taylori (NEW) – 2, 7, 13: Fra, esr; Vouchers: JM11955, 11976, PRA-JV23945. Corticolous specimens (JM11955, 11976) are with perithecia and micropycnidia. The saxicolous specimen (JV23945) was with macropycnidia only and the sizes of conidia, 12–16 × 2–3 µm, fits *S. taylori* better than similar species (Roux et al. 2004).

Synalissa ramulosa (NT) – 1, 3: ca; Vouchers: JK, PRA-JV. **ITS** and **mtSSU** sequenced (JV24687).

Tephromela atra (NT) – 1, 3, 5, 8, 12: sil; Voucher: PRA-JV21240.

Tephromela grumosa (LC) – 1, 3, 5, 8, 10, 11, 12: sil; Vouchers: JK10370, PRA-JV20963, ZP30673.

Thelenella muscorum* var. *muscorum (VU) – 1, 2: Fra, Qpe-bryo; Vouchers: JM11953, PRA-JV21185, 23924.

Thelenella pertusariella (NT) – 2, 6: Acam, Apl, Car; Vouchers: PRA-JV24187 (sub *T. vezdae*), ZP29715.

Thelidium minimum (DD) – 13: esr; Voucher: JK4972. Matching the description in Wirth et al. (2013), but occurring on base-rich andesitic (not calcareous) rock. Identification tentative.

Thelocarpon laureri (LC) – 1, 2, 3, 5: sil-pebbles; Vouchers: PRA-JV20873, 21143.

Thyrea confusa (VU) – 1, 3: ca, esr; Vouchers: PRA-JV. **mtSSU** sequenced (JV25033).

Toninia aromatica (EN) – 1, 7: ca, esr; Vouchers: PRA-JV21239, 23574, ZP31628. **ITS** sequenced (JV23574).

Toninia sedifolia (LC) – 1, 3, 8: cs; Voucher: PRA-JV20974, 25091, ZP31673.

Trapelia elacista (DD) – 2, 14: sil; Voucher: PRA-ZP29132.

Trapelia glebulosa (LC) – 1, 3, 9, 10, 11: sil; Vouchers: JK10367, JM13715. **ITS** sequenced (JM13715).

Trapelia obtegens (LC) – 1, 2, 3, 5, 8, 9, 10, 12: sil; Vouchers: JK3932, PRA-JV20868.

Trapelia placodioides (LC) – 1, 2, 3, 10, 11, 12: sil; Voucher: JK5476.

Trapeliopsis flexuosa (LC) – 1, 2, 3, 5, 6, 8, 9, 10, 11, 12: Qpe, dw-log, snag; Vouchers: JK, PRA-ZP.

Trapeliopsis gelatinosa (NT) – 4: as; Voucher: PRA-JV24139.

Trapeliopsis glaucolepidea (NT) – 2, 6, 12: dw; Voucher: PRA-JV24234.

Trapeliopsis granulosa (LC) – 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12: dw, sil-bryo, as; Vouchers: JK5310, 10476, PRA-ZP30052.

Trapeliopsis pseudogranulosa (LC) – 4, 5, 6, 9: dw-log, as, Pic-rootplate; Vouchers: PRA-JV23979, 24510. **ITS** and **mtSSU** sequenced (JV23979).

Tuckermannopsis chlorophylla (NT) – 1, 2, 4, 5, 9, 10, 11, 14: Fag, Lar, Qpe, Sari, dw-log; Voucher: JK5247.

Umbilicaria hirsuta (LC) – 1, 2, 3, 4, 8, 9, 10, 12: sil; Vouchers: PRA-JV20957, 20980, 21148.

Umbilicaria polyphylla (LC) – 1: sil; Voucher: JK10527.

Usnea barbata (CR) – 8, 9, 11, 12: Acam, Cra, dw; Vouchers: PRA-JV23938, 24536.

Usnea dasopoga (VU) – 2, 4: Qpe, dw-snag.

Usnea glabrata (RE) – 14: Pspi; Voucher: PRA-JV24526. Although considered regionally extinct in the Czech Republic (Liška & Palice 2010), recent records are on the increase (Šoun et al. 2017). **TLC**: fumarprotocetraric acid, usnic acid.

Usnea hirta (VU) – 2, 3, 5, 9, 10, 11: Car, Lar, Qpe-tw, dw-snag; Vouchers: PRA-JV, ZP. **TLC**: murolic acid complex, usnic acid (JV23880, 23881).

Usnea subfloridana (EN) – 1, 2, 5, 10: Cra, Pin, Qpe-tw; Vouchers: PRA-JV, ZP. **TLC**: thamnolic acid, usnic acid (JV21197, ZP29139).

Usnea substerilis (CR) – 2, 5, 6, 7, 8, 9, 10, 14: Cra, Acam, Fag, Fra, Pspi, Qpe-tw; Vouchers: PRA-JV. **TLC**: salazinic acid, usnic acid (JV20858, 21196, 24525).

Usnea viktoriana (DD) – 2: Qpe-tw; Voucher: PRA-ZP31292. **TLC**: usnic acid, alectorialic acid.

Varicellaria hemisphaerica (EN) – 2: Til; Voucher: JM11942. **TLC**: lecanoric acid.

Varicellaria lactea (NT) – 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12: sil; Vouchers: JK, PRA-JV, ZP.

Verrucaria aquatilis (VU) – 6: sil-inundated; Vouchers: JM11881b, PRA-JV24591, 24593.

Verrucaria breussii (DD) – 2: Fra, Qpe-base; Vouchers: PRA-JV23707, ZP30041, 30628. **mtSSU** sequenced (JV23707).

Verrucaria bryoctona (VU) – 1, 2, 3, 6, 10: Apl, Fra, Qpe, Ulm-base; Vouchers: PRA-JV20698, 21170, 24365, 24931, ZP29724. **ITS** sequenced (JV20698, 24365); **mtSSU** sequenced (JV20698, 21170, 24931, ZP29724).

Verrucaria devensis (NEW) – 1: esr-inundated; Voucher: PRA-JV25051. Occurring on mineral-rich inundated rock together with *V. praetermissa*. Morphology fits the description by Orange (2014a). **ITS** sequenced. The sequence is almost identical with NCBI sequences of *V. devensis* (identities >99.5%).

Another Czech record: Central Bohemia, Sedlčany region, rocky valley of Mastník brook 150 m SW of Líšnice settlement, alt. 290 m, 49°43'21.0''N, 14°25'58.6''E, on inundated siliceous stone in brook, 7 August 2021, coll. I. Černajová & J. Malíček (J. Malíček 14542 & 14543).

Verrucaria elaeina (NEW) – 1, 6, 7, 11, 12, 14: sil, esr, ca-mortar; Vouchers: JM, PRA-JV. Somewhat similar to the aquatic *V. praetermissa*, but grows in non-aquatic, rather base-rich rocks in damp sites. Not published from the Czech Republic yet, but perhaps locally frequent. It is abundant on suitable sites in the study area. **ITS** sequenced (JV20682, 21080, 23405, 23941, 23966, 23878) and **mtSSU** sequenced (JV20682, 23395, 23405, 23966).

Verrucaria elaeomelaena (DD) – 6: sil-inundated; Vouchers: PRA-JV. So far only published once from the Czech Republic (Halda 1999). In the study area it is, together with *V. praetermissa* and *V. hydrophila*, the most common lichen on stones in streams. **ITS** sequenced (JV23575, 23577, 23886).

Verrucaria furfuracea (DD) – 1, 7, 8, 13: ca; Vouchers: PRA-JV. **ITS** sequenced (JV23572); the sequence is distinct from our sequences of *V. macrostoma*.

Verrucaria hegetschweileri (DD) – 1, 2, 3, 10: Apl, Aps, Fra, Qpe-root, base; Vouchers: PRA-JV, ZP. **ITS** and **mtSSU** sequenced (JV20931, 23704). The sequences are almost identical with *Verrucaria* sp. 5 (see the known unknown), a taxon which differs by a different involucrellum structure and its occurrence on rocks.

Verrucaria hydrophila (VU) – 1, 6: sil-inundated; Vouchers: PRA-JV. **ITS** sequenced (JV23576, 23681, 24840, SMNS-STU-F-0001985) and **mtSSU** sequenced (JV23681, 24840).

Verrucaria macrostoma (DD) – 1, 7, 8, 10, 13: ca; Vouchers: JK10455, PRA-JV23400, 23942, 24873, 24941. **ITS** sequenced (JV23400, 23942); **mtSSU** sequenced (JV24941). Specimen 21173 from the study area is also tentatively identified as *V. macrostoma*, but it has granular isidiate outgrowths on margins of squamules and has distinct ITS sequence (with 95% identity to the other two obtained sequences).

Verrucaria maculiformis (DD) – 1: esr-periodically inundated; Vouchers: PRA-JV24838, 24951, 24969. Mature photobiont cells 10–15 µm diam. **ITS** sequenced (JV24838); it is placed in the group with *Verrucaria substerilis*, *V. tenuispora* and *V. teyrzowensis*

(Fig. 8); members of the group are characterized by the occurrence of large photobiont cells. All specimens with lichenicolous *Stigmidium lichenum*.

***Verrucaria margacea* s.lat.** (VU) – 1: esr-inundated; Voucher: SMNS-STU-F-0001991 (collected by Holger Thüs). *Verrucaria margacea* s.lat. is a monophyletic group of high genetic diversity which consists of several lineages with apparently distinct distributional patterns. For some of these lineages from rather low elevations in Central Europe older names may already exist in the literature, but morphological delimitation of species in this group is difficult and the aggregate is in need of revision (Thüs et al. 2015, Stordeur et al. 2020).

Verrucaria memnonia (DD) – 4: sil; Voucher: JM12050. Identified by Othmar Breuss. **mtSSU** sequenced.

Verrucaria muralis (LC) – 1, 7: ca; Vouchers: PRA-JV24730, 24933. **ITS** sequenced (both specimens); **mtSSU** sequenced (JV24730).

Verrucaria nigrescens s.lat. (LC) – 1, 2, 3, 7, 8, 10, 11, 12, 13: ca, esr, sil; Vouchers: JK, JM, PRA-JV. **ITS** sequenced (JV23409, 23485, 23498, 23748, 23939, 24498, SMNS-STU-F-0001981, 0001986, 0001989). The name is currently used for specimens belonging to more than one species. Two unrelated ITS clades were obtained from the studied specimens (Group 1 and 2 in Fig. 11).

Verrucaria ochrostoma (LC) – 7: sil, esr; Voucher: PRA-JV20683. Identification tentative. **ITS** sequenced.

Verrucaria polysticta (DD) – 1, 2, 3, 8, 10, 13: ca, esr; Vouchers: PRA-JV20928, 23948, 24871. **ITS** sequenced (JV23948), **mtSSU** sequenced (JV24871).

Verrucaria praetermissa (VU) – 1, 6, 11: sil-inundated; Vouchers: JM, PRA-JV. **ITS** sequenced (JM11881, JV23681a, SMNS-STU-F-0001983) and **mtSSU** sequenced (JM11881).

Verrucaria procopii (DD) – 1: ca; Voucher: PRA-JV23449. **ITS** and **mtSSU** sequenced. Closely related to non-sorediate forms of *V. macrostoma*.

Verrucaria sphaerospora (VU) – 7: esr; Vouchers: JK10516, PRA-JV23573. **ITS** sequenced (JV23573).

Verrucaria substerilis (NEW SPECIES) – 1, 2, 13: esr; Vouchers: PRA-JV. See the description above.

Verrucaria tabacina (NEW) – 1: ca; Voucher: PRA-JV21269. Identification tentative, however the specimen matches well with the description by Breuss & Berger (2010). Distribution of *V. tabacina* is little known; it is presumed to be rare in central Europe, preferring xerothermic sites. **ITS** and **mtSSU** sequenced; closest NCBI Blast relative in mtSSU is *Verrucaria viridula* (98.8% identity), but no close relative found in ITS (*V. viridula* and Verrucariaceae spp., <92%).

Verrucaria tectorum (DD) – 1, 5, 7: ca, sil-pebbles; Vouchers: PRA-JV. **ITS** sequenced (JV23571). Earlier considered as a blastidiate morphotype of *V. nigrescens*, but our ITS data support its distinction on the species level.

Verrucaria tenuispora (NEW SPECIES) – 1: esr; Vouchers: PRA-JV. See the description above.

Verrucaria teyrzowensis (NEW SPECIES) – 1: esr; Vouchers: PRA-JV. See the description above. Information supplementing the protolog: the species also occurs epiphytically at the base of trunks, as shown by recent findings. The following two entries were verified by ITS sequences that are identical to the type sequence.

Additional records: **Czech Republic**. Pálava Protected Landscape Area, Horní Věstonice, Děvín-Kotel-Soutěska National Nature Reserve, in forest along red tourist path near S border of reserve, 0.5 km N of Klentnice, 48°51'21''N, 16°38'41''E, alt. 340 m, on bark of *Fraxinus excelsior*, coll. Jiří Malíček & Jan Vondrák 29 November 2013 (herb. JM6354). **Slovakia**. W Carpathians, Muránska planina plateau: nature reserve Šarkanica, S-SSE-facing slope, a well-lit deciduous forest, 48°42.86'N, 19°59.42'E, on bark at exposed roots of old Fagus, alt. 645 m, 30 September 2009, Z. Palice 12957 (PRA).

Verrucaria viridigrana (DD) – 1, 2, 3, 7: Apl, Fra, Qpe, Ulm-base; Vouchers: PRA-JV24338, 24356 (containing depigmented perithecia), 24490, 24561, 24741, ZP31047. **ITS** sequenced (JV24338, 24356, 24741, ZP31047); **mtSSU** sequenced (JV24338, 24356, 24490, 24741, ZP31047). **Fig. 12H**

Verrucaria viridula (NT) – 7, 10: ca, ca-concrete; Vouchers: PRA-JV24939, 24942, ZP31749. **ITS** and **mtSSU** sequenced (JV24939).

Vezdaea acicularis (LC) – 1, 2, 3, 9, 10: as, sil-bryo, ca-bryo; Vouchers: PRA-JV20956, 23717, ZP31654.

Vezdaea aestivalis (NT) – 6: dw (Car), sil-bryo (*Thamnobryum*); Vouchers: PRA-JV24919, ZP30957.

Vezdaea retigera (DD) – 1, 10, 14: Fra, Qpe-root (also on *Peltigera*); Vouchers: PRA-JV24271, 24359.

Violella fucata (LC) – 2, 4, 5, 6, 7, 10, 13, 14: Bet, Car, Fag, Pin, Sari, dw-log; Voucher: PRA-JV24279.

Vulpicida pinastri (NT) – 2, 3, 5, 6, 9, 11: dw-log, snag; Voucher: PRA-ZP30048.

Waynea giraltiae (NEW) – 2: Qpe; Voucher: PRA-ZP30031. Recently described, inconspicuous species growing in fissures of old trees in sparse forests. Known from a few localities in Europe (van den Boom 2010, Palice et al. 2018, Ravera et al. 2018, Urbanavichus et al. 2020). The sterile thallus recorded in the study area was distinguished from *Agonimia opuntiella*, similar species but one which rarely occurs on bark. *Waynea giraltiae* has algal layer distinctly separated from the cortex which is formed by several layers of thick-walled cells. Hairs on the thallus surface are formed by a single thick-walled hypha. *Agonimia opuntiella* has an indistinct cortex and hairs are formed by several parallel hyphae.

Xanthomendoza fallax (NT) – 1, 2, 8: ca, esr; Voucher: JK4821.

Xanthoparmelia conspersa (LC) – 1, 2, 3, 4, 5, 7, 8, 9, 10, 11: sil, dw, Fra, Pin, Qpe-base, dw-log; Vouchers: JK, JM, PRA-ZP30075 (epiphytic). **TLC**: norstictic acid, stictic acid complex, usnic acid (JM13713).

Xanthoparmelia loxodes (LC) – 1, 2, 3, 4, 5, 9, 10: sil, dw; Vouchers: JK10475, JM12033, 12627, 21214, PRA-ZP31747. **TLC**: glomelliferic acid, traces of: glomellic acid, perlatolic acid and 1 fatty acid (JM12033).

Xanthoparmelia mougeotii (EN) – 3, 4, 10: sil; Vouchers: JK4001, JM12048, PRA-JV24129, 24546.

Xanthoparmelia plittii (NEW) – 2: sil; Voucher: ZP31016. **mtSSU** sequenced.

Xanthoparmelia protomatrae (NT) – 1, 2, 3, 4, 8, 9: sil, as; Vouchers: JM11946, 12643, PRA-JV20951, 21062, ZP31017, PRM758532.

Xanthoparmelia pulla agg. (LC) – 1, 3, 7, 10: sil; Vouchers: JK4833, JM216, PRA-JV20911. **TLC**: divaricatic acid, stenosporic acid, cf. glomelliferic acid (JM216; *X. pulla* s.str.).

Xanthoparmelia stenophylla (LC) – 1, 3, 5, 7, 9, 10, 11: sil.

Xanthoparmelia verruculifera (LC) – 1, 2, 3, 4, 7, 8: sil, Fra-base; Vouchers: JK, JM, PRA-JV, PRM. **TLC**: divaricatic/stenosporic acid, traces of lobaric acid (JM12039).

Xanthoria candelaria (LC) – 1, 5, 7, 9: Cra, Qpe-tw, dw; Vouchers: JK3498, PRA-JV23898.

Xanthoria elegans (LC) – 2, 7: esr, ca.

Xanthoria parietina (LC) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14: Acam, Apl, Aps, Car, Cor, Cra, Fag, Fra, Qpe, Ulm-tw. Voucher: JK3959.

Xanthoria polycarpa (NT) – 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14: Acam, Car, Fag, Fra, Lar, Qpe-tw, dw, sil.

Xanthoria sorediata (EN) – 1: esr; Vouchers: PRA-JV23447, ZP31635. Recently known from three localities in the Czech Republic (Vondrák & Malíček 2015, Palice 2020). We recorded tens of thalli in two micro-sites within the study area. Another unpublished record is from a nearby locality: Čertova skála Nature Reserve, collected by Jana Kocourková, 1996.

Xylopsora caradocensis (LC) – 1, 4, 9: Pin, dw-log.

Xylopsora friesii (EN) – 2, 10: dw-snag; Vouchers: PRA-JV23734, 23694, ZP30098.

Zwackhia viridis (EN) – 3, 4, 5, 6, 7, 14: Apl, Car, Fag, Fra; Vouchers: PRA-JV20640, 20679, 23692.

References

Ametrano C. G., Knudsen K., Kocourková J., Grube M., Selbmann L. & Muggia L. (2019) Phylogenetic relationships of rock-inhabiting black fungi belonging to the widespread genera *Lichenothelia* and *Saxomyces*. – Mycologia 111: 127–160.

Aptroot A., Diederich P., van Herk C. M., Spier L. & Wirth V. (1997) *Protoparmelia hypotremella*, a new sterile corticolous species from Europe, and its fungi. – Lichenologist 29: 415–424.

Bouda F., Syrovátková L., Halda J. P., Malíček J., Palice Z. & Vondrák J. (2019) Lišejníky zaznamenané během 26. Jarního setkání Bryologicko-lichenologické sekce ČBS ve Zlatohorské vrchovině a v Jeseníkách v dubnu 2019 [Lichens recorded during the 26th Spring meeting of the Bryological and lichenological section of the CBS in Zlatohorská vrchovina hills and the Jeseníky Mts (Silesia), April 2019]. – Bryonora 64: 1–20.

Brodo I. M. & Aptroot A. (2005) Corticolous species of *Protoparmelia* (lichenized Ascomycotina) in North America. – Canadian Journal of Botany 83: 1075–1081.

Cannon P., Ertz D., Frisch A., Aptroot A., Chambers S., Coppins B., Sanderson N., Simkin J. & Wolselsey P. (2020) *Arthoniales*: *Arthoniaceae*, including the genera *Arthonia*, *Arthothelium*, *Briancoppinsia*, *Bryostigma*, *Coniocarpon*, *Diarthonis*, *Inoderma*, *Naevia*, *Pachnolepia*, *Reichlingia*, *Snippocia*, *Sporodophoron*, *Synarthonia* and *Tylophoron*. – Revisions of British and Irish Lichens 1: 3–48.

Coppins B. J. & Aptroot A. (2009) *Bacidia* De Not (1846). – In: Smith C. W., Aptroot A., Coppins B. J., Fletcher A., Gilbert O. L., James P. W. & Wolseley P. A. (eds), The lichens of Great Britain and Ireland, p. 189–207, The British Lichen Society, London.

Coppins B. J. & Earland–Bennett P. M. (2009) *Cyrtidula* Minks (1876). – In: Smith C. W., Aptroot A., Coppins B. J., Fletcher A., Gilbert O. L., James P. W. & Wolseley P. A. (eds), The lichens of Great Britain and Ireland, p. 368–369, The British Lichen Society, London.

Coppins B. J. & Orange A. (2009) *Arthopyrenia* A. Massal. (1852). – In: Smith C. W., Aptroot A., Coppins B. J., Fletcher A., Gilbert O. L., James P. W. & Wolseley P. A. (eds), The lichens of Great Britain and Ireland, p. 171–181, The British Lichen Society, London.

Ekman S. & Tønsberg T. (2002) Most species of *Lepraria* and *Leproloma* form a monophyletic group closely related to *Stereocaulon*. – Mycological Research 106: 1262–1276.

Ertz D., Sanderson N., Łubek A. & Kukwa M. (2018) Two new species of *Arthoniaceae* from old-growth European forests, *Arthonia thoriana* and *Inoderma sorediatum*, and a new genus for *Schismatomma niveum*. – Lichenologist 50: 161–172.

Friebes G. (2011) Über sieben interessante, in der Steiermark nachgewiesene Schlauchpilze (Ascomycota). – Joannea Botanik 9: 5–22.

Gaya E. (2009) Taxonomical revision of the *Caloplaca saxicola* group (*Teloschistaceae*, lichen-forming *Ascomycota*). – Bibliotheca Lichenologica 101: 1–191.

Giavarini V. & Sérusiaux E. (2009) *Byssoloma* Trevisan (1853). – In: Smith C. W., Aptroot A., Coppins B. J., Fletcher A., Gilbert O. L., James P. W. & Wolseley P. A. (eds), The lichens of Great Britain and Ireland, p. 239–240, The British Lichen Society, London.

Giralt M. (2001) The lichen genera *Rinodina* and *Rinodinealla* (lichenized *Ascomycetes*, *Physciaceae*) in the Iberian Peninsula. – Bibliotheca Lichenologica 79: 1–160.

Giralt M., Obermayer W. & Mayrhofer H. (1993) *Rinodina poeltiana* spec. nov. (lichenized *Ascomycetes*, *Physciaceae*) a new corticolous blastidiate species from Austria. – Herzogia 9: 709–714.

Grube M., Lindblom L. & Mayrhofer H. (2001) Contributions to the lichen flora of Crete: a compilation of references and some new records. – Studia Geobotanica 20: 41–59.

Guzow-Krzemińska B., Sérusiaux E., van den Boom P. P. G., Brand A. M., Launis A., Łubek A. & Kukwa M. (2019) Understanding the evolution of phenotypical characters in the *Micarea prasina* group (*Pilocarpaceae*) and descriptions of six new species within the group. – MycoKeys 57: 1–30.

Halda J. (1999) Příspěvek k poznání lichenoflóry Orlických hor 2. [Contribution to the knowledge of the lichen flora in Orlické hory Mts] – Acta Musei Richnoviensis (Sect. natur.) 6: 1–32.

Halda J. P. (2017) Lišejníky ledovcového karu Velká kotlina v Hrubém Jeseníku [Lichens of the Velká kotlina glacial cirque in the Hrubý Jeseník Mts (Grossen Kessel, Hohe Gesenke)]. – Acta Musei Richnoviensis (sect. natur.) 24: 7–52.

Halda J. P., Kocourková J., Lenzová V., Malíček J., Müller A., Palice Z., Uhlík P. & Vondrák J. (2017) Lišejníky zaznamenané během 22. Jarního setkání Bryologicko-lichenologické sekce ČBS v Moravském krasu v dubnu 2015 [Lichens recorded during the 22th Spring

meeting of the Bryological and lichenological section of the CBS in the Moravian Karst (Czech Republic), April 2015]. – Bryonora 59: 1–23.
Hertel H. & Printzen C. (2004) *Lecidea*. – In: Nash T. H. III et al. (eds), Lichen flora of the Greater Sonoran Desert Region, p. 287–309, Arizona State University, Tempe, USA.
Ihlen P. G. (2004) Taxonomy of the non-yellow species of *Rhizocarpon* (*Rhizocarpaceae*, lichenized *Ascomycota*) in the Nordic countries, with hyaline and muriform ascospores. – Mycological Research 108: 533–570.
Jørgensen P. M. (1994) Further notes on European taxa of the lichen genus *Leptogium*, with emphasis on the small species. – Lichenologist 26: 1–29.
Jüriado I., Kaasalainen U. & Rikkinen J. (2017) Specialist taxa restricted to threatened habitats contribute significantly to the regional diversity of *Peltigera* (Lecanoromycetes, Ascomycota) in Estonia. – Fungal Ecology 30: 76–87.
Knudsen K., Adams J. N., Kocourková J., Wang Y., Ortañez J. & Stajich J. E. (2020) The monophyletic *Sarcogyne canadensis*–*wheeleri* clade, a newly recognized group sister to the European *Acarospora glaucocarpa* group. – Bryologist 123: 11–30.
Knudsen K. & Kocourková J. (2020a) *Acarosporaceae* of Belarus. – Herzogia 33: 394–406.
Knudsen K. & Kocourková J. (2020b) Two poorly-known species of European *Acarospora* (*Acarosporaceae*). – Herzogia 33: 1–8.
Kocourková J. (2000) Lichenicolous fungi of the Czech Republic (the first commented checklist). – Sborník Národního Musea v Praze, Řada B 55: 59–169.
Kocourková-Horáková J. (1998) Distribution and ecology of the genus *Thelocarpon* (*Lecanorales*, *Thelocarpaceae*) in the Czech Republic. – Czech Mycology 50: 271–302.
Kondratyuk S. Y., Lőkös L., Farkas E., Kärnefelt I., Thell A., Yamamoto Y. & Hur J.-S. (2020) Three new genera of the *Teloschistaceae* proved by three gene phylogeny. – Acta Botanica Hungarica 62: 109–136.
Koukol O., Hofmann T. A. & Piepenbring M. (2017) *Dendroseptoria mucilaginosa*: a new anamorphic fungus with stauroconidia and phylogenetic placement of *Dendroseptoria*. – Mycological Progress 16: 1065–1070.
Liška J. & Palice Z. (2010) Červený seznam lišejníků České republiky (verze 1.1) [Red List of lichens of the Czech Republic (version 1.1)]. – Příroda 29: 3–66.
Liška J., Palice Z. & Slavíková Š. (2008) Checklist and Red List of lichens of the Czech Republic. – Preslia 80: 151–182.
Malíček J. (2013) Lišejníky Týnčanského krasu [Lichens of the Týnčany Karst (Central Bohemia)]. – Zprávy České botanické společnosti 48: 143–162.
Malíček J. (2020) Lišejníky NPR Kohoutov na Křivoklátsku [Lichens of the Kohoutov National Nature Reserve in the Křivoklát region]. – Bryonora 66: 25–33.
Malíček J. (2021) Příspěvek k poznání lišejníků NP Podyjí [Contribution to the lichen biota of Podyjí National Park (South Moravia)]. – Bryonora 68: 10–22.
Malíček J., Palice Z., Bouda F., Czarnota P., Halda J. P., Liška J., Müller A., Peksa O., Svoboda D., Syrovátková L., Vondrák J. & Wagner B. (2008) Lišejníky zaznamenané během 15. Jarního setkání Bryologicko-lichenologické sekce ČBS na Sedlčansku [Lichens recorded during 15th Spring meeting of the Bryological and lichenological section CBS in the Sedlčany region]. – Bryonora 42: 17–30.
Malíček J., Palice Z. & Vondrák J. (2014) New lichen records and rediscoveries from the Czech Republic and Slovakia. – Herzogia 27: 257–284.
Malíček J., Palice Z. & Vondrák J. (2018a) Additions and corrections to the lichen biota of the Czech Republic. – Herzogia 31: 453–475.

Malíček J., Palice Z., Vondrák J., Łubek A. & Kukwa M. (2018b) *Bacidia albogranulosa* (*Ramalinaceae*, lichenized *Ascomycota*), a new sorediate lichen from European old-growth forests. – MycoKeys 44: 51–62.
Malíček J. & Vondrák J. (2016) Zajímavé nálezy lišejníků ve středním Povltaví II. – saxikolní druhy [Interesting records of lichens in the Middle Vltava Region II. – saxicolous species]. – Bryonora 58: 46–65.
Mayrhofer H. (1984) Die saxicolen Arten der Flechtengattungen *Rinodina* und *Rinodinella* in der Alten Welt. – The Journal of the Hattori Botanical Laboratory 55: 327–493.
Mayrhofer H., Denchev C. M., Stoykov D. Y. & Nikolova S. O. (2005) Catalogue of the lichenized and lichenicolous fungi in Bulgaria. – Mycologia Balcanica 2: 3–61.
Mayrhofer H. & Poelt J. (1979) Die saxicolen Arten der Flechtengattung *Rinodina* in Europa. – Bibliotheca Lichenologica 12: 1–186.
Miadlikowska J., Lutzoni F., Goward T., Zoller S. & Posada D. (2003) New approach to an old problem: incorporating signal from gap-rich regions of ITS and rDNA large subunit into phylogenetic analyses to resolve the *Peltigera canina* species complex. – Mycologia 95: 1181–1203.
Mitchell J. K., Garrido-Benavent I., Quijada L. & Pfister D. H. (2021) *Sareomycetes*: more diverse than meets the eye. – IMA Fungus 12**:** 6.
Mugambi K. & Huhndorf S. M. (2010) Multigene phylogeny of the *Coronophorales*: morphology and new species in the order. – Mycologia 102: 185–210.
Nannfeldt J. A. (1975) Stray studies in the *Coronophorales* (Pyrenomycetes) 4–8. – Svensk Botanisk Tidskrift 69: 289–335.
Nascimbene J. (2014) Increasing the knowledge on the epiphytic lichens of South Tyrol: a contribution from a three-years project. – Gredleriana 14: 111–126.
Nimis P. L. (2016) The lichens of Italy – a second annotated catalogue. – EUT Edizioni Università di Trieste, Trieste.
Nimis P. L., Hafellner J., Roux C., Clerc P., Mayrhofer H., Martellos S. & Bilovitz P. O. (2018) The lichens of the Alps – an annotated checklist. – MycoKeys 31: 1–634.
Orange A. (2009) Two parasitic species of *Placopyrenium* (*Verrucariaceae*) from freshwater habitats in north-west Europe. – Lichenologist 41: 131–139.
Orange A. (2014a) Two new or misunderstood species related to *Verrucaria praetermissa* (*Verrucariaceae*, lichenized Ascomycota). – Lichenologist 46: 605–615.
Orange A. (2014b) *Porpidia irrigua*, a new species related to *P. contraponenda*. – Lichenologist 46: 269–284.
Otálora M. A. G., Martínez I., Molina M. C., Aragón G. & Lutzoni F. (2008) Phylogenetic relationships and taxonomy of the *Leptogium lichenoides* group (*Collemataceae*, Ascomycota) in Europe. – Taxon 57: 907–921.
Palice Z. (1999) New and noteworthy records of lichens in the Czech Republic. – Preslia 71: 289–336.
Palice Z. (2020) Some additions to and elucidations of the lichen biota of Český kras (Bohemian Karst, Central Bohemia, Czech Republic). – Bryonora 65: 9–21.
Palice Z., Malíček J., Peksa O. & Vondrák J. (2018) New remarkable records and range extensions in the central European lichen biota. – Herzogia 31: 518–534.
Peksa O. (2006) *Calicium parvum* (*Caliciaceae*) – a new calicioid lichen to the Czech Republic. – Silva Gabreta 12: 51–56.
Pykälä J., Kantelinen A. & Myllys L. (2019) Taxonomy of the *Verrucaria kalenskyi* – *V. xyloxena* species complex in Finland. – Nova Hedwigia 109: 489–511.

Ravera S., Vizzini A., Cogoni A., Aleffi M., Benesperi R., Bianchi E., von Brackel W., Cataldo D., D'Antonio C., Di Nuzzo L., Favero Longo S. E., Gheza G., Isocrono D., Matteucci E., Martellos S., Morosini L., Nimis P. L., Ongaro S., Poponessi S., Puntillo D., Sguazzin F. & Tretiach M. (2018) Notulae to the Italian flora of algae, bryophytes, fungi and lichens: 5. – Italian Botanist 5: 31–43.

Roux C. (2020) Lectotypification de *Verrucaria leptotera* f. *inconspicua* Nyl. (syn. *Arthopyrenia inconspicua* (Nyl.) J. Lahm ex Körb.). – Bulletin de la Societé Linnéenne de Provence 71: 87–89.

Roux C., Nordin A., Tibell L. & Sohrabi M. (2011c) Quelques espèces d'Aspicilia peu connues ou nouvelles des Pyrénées-Orientales (France). – Bulletin de la Société Linnéenne de Provence, n° spécial 14: 177–227.

Roux C., Sérusiaux E., Bricaud O. & Coppins B. (2004) Le genre *Strigula* (lichens) en Europe et en Macaronésie [The genus *Strigula* (Lichens) in Europe and Macaronesia]. – Bibliotheca Lichenologica 90: 1–96.

Roux C. & Uriac P. (2018) Lichens et champignons lichénicoles observés dans quelques localités de la Drôme septentrionale granitique. – Bulletin de la Société Linnéenne de Provence 69: 97–105.

Sanderson N. A. & Purvis O. W. (2009) *Ramonia* Stizenb. (1862). – In: Smith C. W., Aptroot A., Coppins B. J., Fletcher A., Gilbert O. L., James P. W. & Wolseley P. A. (eds), The lichens of Great Britain and Ireland, p. 788–790, The British Lichen Society, London.

Santesson R., Moberg R., Nordin A., Tønsberg T. & Vitikainen O. (2004) Lichen-forming and lichenicolous fungi of Fennoscandia. – Museum of Evolution, Uppsala University, Uppsala.

Sérusiaux E. (1998) Deux nouvelles espèces de *Byssoloma* Trev. (lichens, *Pilocarpaceae*) d'Europe occidentale et de Macaronésie [Two new species of *Byssoloma* Trev. (Lichenes, *Pilocarpaceae*) from western Europe and Macaronesia]. – Cryptogamie, Bryologie–Lichénologie 19: 197–209.

Sérusiaux E., Diederich P., Brand A. M. & van den Boom P. (1999) New or interesting lichens and fungi from Belgium and Luxembourg. 8. – Lejeunia 162: 1–95.

Servít M. (1955) Nové lišejníky. Lichenes novi. – Rozpravy Československé Akademie Věd 65: 1–45.

Sheard J. W. (2010) The lichen genus *Rinodina* (*Lecanoromycetidae, Physciaceae*) in North America, north of Mexico. – National Research Council of Canada, NRC Research Press, Ottawa.

Sheard J. W. (2018) A synopsis and new key to the species of *Rinodina* (Ach.) Gray (*Physciaceae*, lichenized Ascomycetes) presently recognized in North America. – Herzogia 31: 395–423.

Sherwood M. A. (1977) The ostropalean fungi. – Mycotaxon 5: 1–277.

Šoun J. (2010) První nález *Calicium montanum* v České republice [First record of *Calicium montanum* in the Czech Republic]. – Bryonora 46: 19–23.

Šoun J., Vondrák J., Søchting U., Hrouzek P., Khodosovtsev A. & Arup U. (2011) Taxonomy and phylogeny of the *Caloplaca cerina* group in Europe. – Lichenologist 43: 113–135.

Šoun J., Vondrák J. & Bouda F. (2015) Vzácné a málo známé druhy lišejníků Třebíčska a okolí [Rare and little known species in the Třebíč Region and its surroundings]. – Bryonora 56: 1–23.

Spribille T., Fryday A. M., Pérez-Ortega S., Svensson M., Tønsberg T., Ekman S., Holien H., Resl P., Schneider K., Stabentheiner E., Thüs H., Vondrák J. & Sharman L. (2020)

Lichens and associated fungi from Glacier Bay National Park, Alaska. – Lichenologist 52: 61–181.
Stordeur R., Breuss O., Eckstein J., Grünberg H., Kison H.-U., Schiefelbein U., Schultz M. & Thüs H. (2020) Beiträge zur Flechtenflora Sachsen-Anhalts und Thüringens. – Herzogia 33: 377–393.
Suza J. (1921) Čtvrtý příspěvek k lichenologii Moravy [Fourth contribution to lichenology of Moravia]. – Sborník Klubu přírodovědného v Brně 3: 1–50.
Suza J. (1931) Srovnávací studie o lišejníkové floře serpentinů (Mohelno, Gurhof a Kraubath) [A comparative study on lichens of serpentinites]. – Sborník Přírodovědecké společnosti v Moravské Ostravě 6: 231–256.
Suza J. (1942) Česká xerthermní oblast a lišejníky [The Czech xerothermic area and its lichens]. – Věstník Královské české společnosti nauk 1941/18: 1–38.
Suza J. (1947) Praebohemikum a lišejníky [Praebohemicum and its lichens]. – Věstník Královské české společnosti nauk 1946/10: 1–34.
Svoboda D., Halda J. P., Malíček J., Palice Z., Šoun J. & Vondrák J. (2014) Lišejníky Českého krasu: shrnutí výzkumů a soupis druhů [Lichens of the Český kras/Bohemian Karst (Central Bohemia, Czech Republic): a summary of previous surveys and a checklist of the area]. – Bohemia centralis 32: 213–265.
Thüs H., Orange A., Gueidan C., Pykälä J., Ruberti C., Lo Schiavo F. & Nascimbene J. (2015) Revision of the *Verrucaria elaeomelaena* species complex and morphologically similar freshwater lichens (*Verrucariaceae*, Ascomycota). – Phytotaxa 197: 161–185.
Triebel D. (1989) Lecideicole Ascomyceten. Eine Revision der obligat lichenicolen Ascomyceten auf lecideoiden Flechten. – Bibliotheca Lichenologica 35: 1–278.
Tripp E. A. & Lendemer J. C. (2019) Highlights from 10+ years of lichenological research in Great Smoky Mountains National Park: celebrating the United States National Park Service Centennial. – Systematic Botany 44: 943–980.
Türk R. & Hafellner J. (2017) Zweiter Nachtrag zur Bibliographie der Flechten in Österreich [Second supplement to the bibliography of lichens in Austria]. – Stapfia 104: 1–137.
Urbanavichus G., Vondrák J., Urbanavichene I., Palice Z. & Malíček J. (2020) Lichens and allied non-lichenized fungi of virgin forests in the Caucasus State Nature Biosphere Reserve (Western Caucasus, Russia). – Herzogia 33: 90–138.
van den Boom P. P. G. (2010) *Waynea giraltiae*, a new lichen species from the Iberian Peninsula. – Lichenologist 42: 29–33.
van den Boom P. P. G., Brand A. M., Coppins B. J. & Sérusiaux E. (2017) Two new species in the *Micarea prasina* group from Western Europe. – Lichenologist 49: 13–25.
van den Boom P. P. G. & Etayo J. (2001) Two new sorediate species of lichens in *the Catillariaceae* from the Iberian Peninsula. – Lichenologist 33: 103–110.
van Nieuwenhuijzen E. J., Miadlikowska J. M., Houbraken J. A. M. P., Adan O. C. G., Lutzoni F. M. & Samson R. A. (2016) Wood staining fungi revealed taxonomic novelties in Pezizomycotina: new order Superstratomycetales and new species *Cyanodermella oleoligni*. – Studies in Mycology 85: 107–124.
Verkley G. J. M. (1999) A monograph of the genus *Pezicula* and its anamorphs. – Studies in Mycology 44: 1–180.
Vězda A. (1966) Flechtensystematische Studien IV. Die Gattung *Gyalidea* Lett. – Folia Geobotanica et Phytotaxonomica 1: 311–340.
Vězda A. (1978) Neue oder wenig bekannte Flechten in der Tschechoslowakei II. – Folia Geobotanica et Phytotaxonomica 13: 397–420.

Vězda A. & Liška J. (1999) Katalog lišejníků České Republiky [A catalogue of lichens of the Czech Republic]. – Botanický ústav ČSAV, Průhonice.
Vondrák J., Kocourková J., Palice Z. & Liška J. (2007) New and noteworthy lichens in the Czech Republic – genus *Caloplaca*. – Preslia 79: 163–184.
Vondrák J. & Liška J. (2010) Changes in distribution and substrate preferences of selected threatened lichens in the Czech Republic. – Biologia 65: 595–602.
Vondrák J. & Malíček J. (2015) *Teloschistaceae* Velké kotliny a Petrových kamenů v Hrubém Jeseníku [Teloschistaceae of the localities Velká kotlina and Petrovy kameny in the Hrubý Jeseník Mts]. – Bryonora 56: 45–55.
Vondrák J., Merkulova O. & Redchenko O. (2010) Several noteworthy lichens found in the foothills of the Šumava Mts, South Bohemia, Czech Republic. – Bryonora 45: 31–35.
Wirth V., Hauck M. & Schultz M. (2013) Die Flechten Deutschlands. Band 1, 2. – Ulmer, Stuttgart.

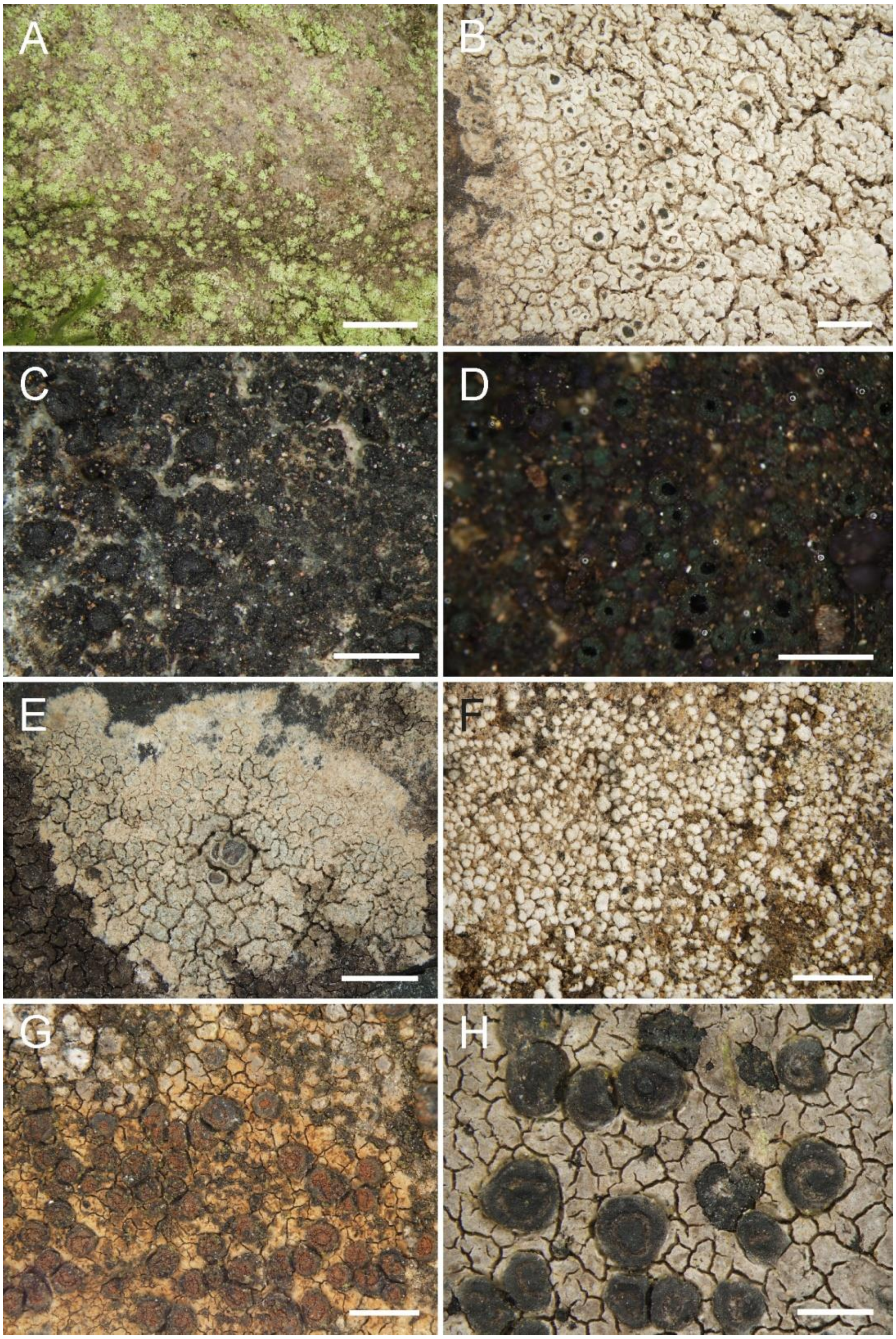

Fig. 10. Known unknowns. A, *Bacidina* sp. 1 (PRA-JV24355); B, *Circinaria* sp. (PRA-JV24719); C, D, *Stigmidium* sp. (PRA-JV20985) on a cyanolichen crust, C, in dry state, D, wetted; E, *Myriolecis* sp. (PRA-JV23493); F, Trapeliaceae sp., extensive sterile crust (PRA-JV21130); G, H, *Rhizocarpon* sp., G, thallus of older, rusty red and umbonate apothecia (PRA-JV24544), H, thallus with umbonate apothecia without rusty pruina. Scales: A, B, E–G – 1 mm; C, D, H – 0.5 mm.

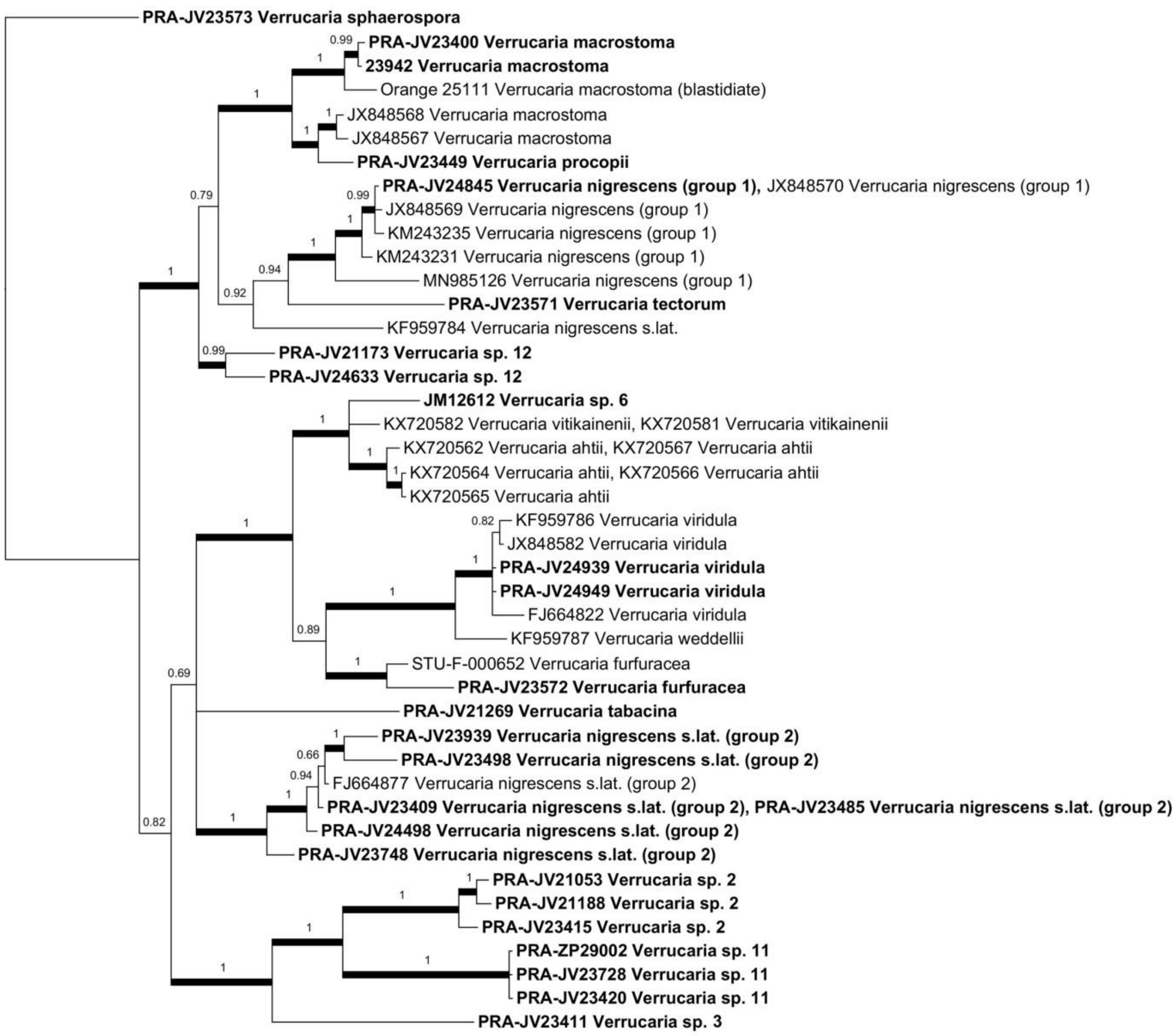

Fig. 11. Phylogenetic tree of the *Verrucaria nigrescens*/*V. viridula* complex and related taxa based on ITS sequence data. SYM model with gamma distribution was used as a model of sequence evolution. The tree was constructed using Bayesian inference run for 87000 generations, and was rooted with *Verrucaria sphaerospora* (PRA-JV23573). Numbers on branches indicate posterior probabilities. Bold lines indicate branches with posterior probabilities >0.95.

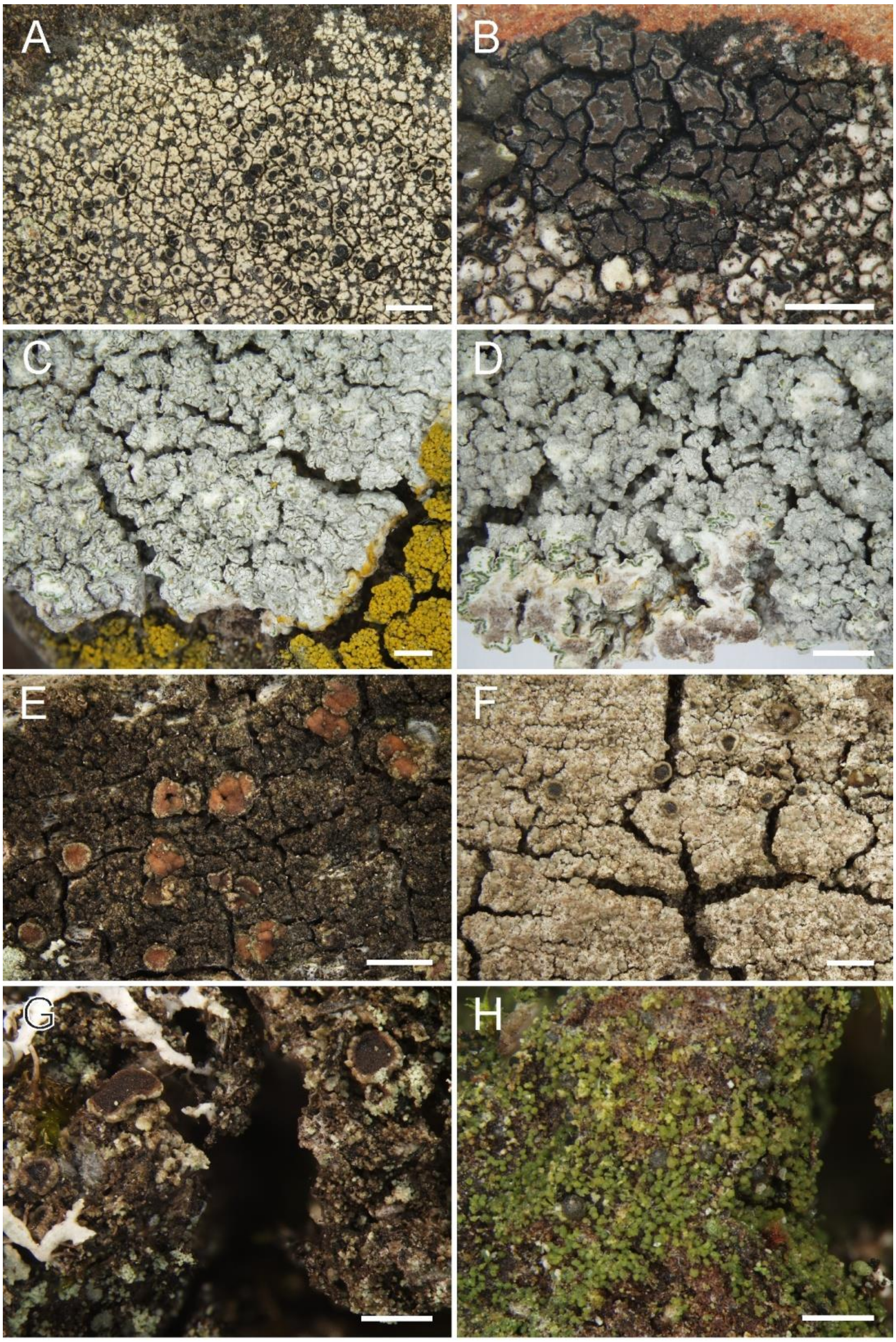

Fig. 12. Valuable records. A, *Buellia ocellata* (PRA-JV21275); B, *Immersaria cupreoatra* (PRA-JV23490); C, D, *Pertusaria stalactiza* (PRA-JV23412), C, outer appearance, D, detail with a section in the coralloid thallus; E, *Protoparmelia oleagina*, fertile (PRA-JV24320); F, *Protoparmelia hypotremella*, fertile (PRA-ZP29015), with *Tremella wirthii* in the right upper corner; G, *Rinodina poeltiana*, fertile (PRA-JV24063); H, *Verrucaria viridigrana* (PRA-ZP31047). Scales: A–F – 1 mm; G, H – 0.5 mm.

Vondrák J., Svoboda S., Malíček J., Palice Z., Kocourková J., Knudsen K., Mayrhofer H., Thüs H., Schultz M., Košnar J. & Hofmeister J. (2022) From Cinderella to Princess: an exceptional hotspot of lichen diversity in a long-inhabited central-European landscape. – Preslia 94: 143–181.

Supplementary Data S2. – Catalogue of habitats (sorted from the most frequent to the least)

For epilithic lichens

The classification is based on the availability of carbonates and other minerals (acidic siliceous, base-rich siliceous, calcareous), availability of light (sun-lit, shaded), availability of water (e.g. seapage rocks, stones in streams, river side rocks, vs. overhanged or air-drying rocks), extrinsic nutrient enrichment (bird perching rocks) and on size (rocks, stones, pebbles).

(1) **Pebbles and stones in forest.** Present in all sampling sites. Examples of species: *Arthopyrenia inconspicua*, *Bacidina arnoldiana*, *B. pycnidiata*, *Micarea erratica*, *M. lithinella*, *Verrucaria* cf. *dolosa* a *V.* aff. *hunsrueckensis*.

(2) **Acidic rock outcrops in shade.** A common habitat present in most sampling sites. Examples of species: *Circinaria caesiocinerea*, *Chrysothrix chlorina*, *Fuscidea recensa*, *Ionaspis obtecta*, *Lecanora intricata*, *Lecidea tessellata*, *Lichenothelia scopularia*, *Miriquidica pycnocarpa*, *Rhizocarpon rubescens* and *R. reductum*. Below overhangs: *Enterographa zonata*, *Gyrographa gyrocarpa* and *Opegrapha lithyrga*.

(3) **Sun-exposed acidic rocks**. A common habitat present in most sampling sites. Examples of dominant species: *Acarospora* spp., *Buellia aethalea*, *Lasallia pustulata*, *Lecanora rupicola*, *Lecidea fuscoatra*, *L. grisella*, *Rhizocarpon distinctum*, *R. geographicum*, *R. lecanorinum*, *Tephromela grumosa* and *Umbilicaria hirsuta*. Rare species: e.g. *Buellia ocellata*, *Immersaria cupreoatra*, *Miriquidica deusta*, *Pleopsidium flavum*, *Rhizocarpon disporum* and *R. grande*. Lichenicolous lichens: *Carbonea assimilis*, *Miriquidica intrudens*, *Rhizocarpon viridiatrum* (locally common) and *R. insularis*. Inconspicuous lichens, such as *Catillaria atomarioides* and *C. chalybeia*, are locally dominant. Montane species: *Melanelia stygia*. On iron-rich rocks: *Lecanora subaurea*.

(4) **Base-rich outcrops in shade.** Examples of species in dryer sites: *Bilimbia fuscoviridis*, *Caloplaca flavocitrina*, *C. subpallida* and *C. vitellinula*. In damper sites: *Clauzadea monticola*, *Gyalecta jenensis* and *Verrucaria elaeina*. Below overhangs and on vertical faces: *Caloplaca obliterans*, *C. viridirufa*, *Diplotomma canescens* (rare). On slightly base enriched overhangs: *Sparria endlicheri*, *Dendrographa latebrarum*, *Dirina fallax* and *Reichlingia leopoldii*.

(5) **Sun-lit base-rich rocks.** Specific xerothermic lichen communities are developed on surfaces exposed to rain with e.g. *Caloplaca rubelliana*, *Lobothallia radiosa*, *Placopyrenium fuscellum*, *Rhizocarpon geminatum* var. *citrinum*, *Rinodina obnascens*, *Verrucaria sphaerospora* and *Xanthoria calcicola*. Other species prefer vertical faces: e.g. *Caloplaca demissa*, *C. irrubescens*, *Physcia dimidiata* and *Xanthomendoza fallax*.

(6) **Pebbles and stones in rocky steppes and dry screes.** Examples of species: *Acarospora veronensis*, *Buellia microcarpa* (described here), *Caloplaca atroflava*, *Lecidella scabra*, *Rhizocarpon oederi* (on iron rich stones), *Rinodina aspersa*, *Thelocarpon laureri*, *Trapelia* spp., *Verrucaria nigrescens* and *V. tectorum*.
(7) **Calcareous inclusions in andesite outcrops.** A spatially restricted and rare habitat with two groups of microsites: (a) **exposed to rain** usually with common calciferous lichens: *Rinodina bischoffii*, *Sarcogyne regularis* and *Verrucaria macrostoma*, and (b) **below overhangs** with e.g. *Caloplaca cirrochroa* and cyanolichens: *Anema decipiens*, *A. tumidulum* and *Metamelanea caesiella*.
(8) **Lime enriched seapage rocks with cyanolichens.** Rare habitat, well developed in only two sampling sites, but rich in unique species: e.g. Collemataceae spp., *Lichinella myriospora*, *L. nigritella*, *Porocyphus rehmicus*, *Psorotichia schaereri*, *Pterygiopsis neglecta*, *P. umbilicata*, *Synalissa ramulosa* and *Thyrea confusa*.
(9) **Boulders in damp screes.** Open screes with large boulders are restricted to rhyolite bedrock in the southern part of the area: northern slope of the hill Tok (sampling site 9) and valley of Prostřední potok stream (sites 4 and 5) where montane species are present: e.g. *Aspicilia laevata*, *A. verrucigera*, *Arctoparmelia incurva*, *Lecidea lactea*, *Micarea leprosula* and *Protothelenella corrosa*.
(10) **Extremely exposed hard rocks.** Well developed only in the locality Týřovické skály on sites where harder bedrock forms bare outcrops protruding from softer rosks. Linked habitats are **wind-drying vertical faces** with luxuriant growths of *Dimelaena oreina* and **bird perching rocks** supporting occurrences of nitrophilous species, e.g. *Ramalina capitata*, *Candelariella* spp., the rare *Pertusaria stalactiza*, and the lichenicolous *Caloplaca grimmiae*.
(11) **Nutrient-rich outcrops at river bank.** A specific habitat developed in two sampling sites. Species: *Caloplaca atroflava*, *Caloplaca chlorina*, *Dermatocarpon meiophyllizum*, *Diplotomma porphyricum*, *Placopyrenium cinereoatratum*, *Porocyphus coccodes*, *Rinodina moziana*, *Staurothele fissa* and *Verrucaria* spp.
(12) **Stones and concrete in wall of ruin.** Some synanthropic lichens, absent from other sites, are present: e.g. *Lecania erysibe*, *L. leprosa*, *Rinodina oleae*. *Caloplaca ulcerosa*, elsewhere in Europe usually epiphytic, is frequent on the walls.
(13) **Stones in streams.** Examples of species: *Bacidina inundata*, *Stigmidium rivulorum*, *Verrucaria elaeomelaena*, *V. hydrophila* and *V. praetermissa*.

For terricolous lichens
Classified according to the predominant lichen growth form (*Cladonia* carpets vs. other types) and according to availability of minerals (lime) and light.
(1) **Bryophytes and plant debris in lime enriched microsites:** Typically developed in rock crevices influenced by Ca-rich seapage water. Species: *Agonimia globulifera*, *A. opuntiella*, *A. tristicula*, *Bilimbia sabuletorum*, *Endocarpon pusillum*, *Lempholemma chalazanum*, *L. polyanthes*, *Placidium rufescens*, *P. squamulosum*, *Romjularia lurida*, *Scytinium intermedium* and *Toninia sedifolia*.

(2) **Soil and bryophytes on rocky steppes.** On soil: *Agonimia gelatinosa*, *Dibaeis baeomyces*, *Pycnothelia papillaria*, *Placynthiella oligotropha*, *P. uliginosa* and *Vezdaea acicularis*. On bryophytes (*Abietinella abietina* and *Rhytidium rugosum*): *Agonimia vouauxii*.
(3) ***Cladonia* carpets on acid soils.** Locally well developed in sparse pine forests, on screes and on mossy rocks. Species: *Cladonia* spp., *Cetraria aculeata*, *C. islandica*.
(4) **Soil patches in damp sites.** A habitat with few rather common species: e.g. *Lichenomphalia umbellifera*, *Micarea viridileprosa*, *Trapeliopsis gelatinosa* and *T. pseudogranulosa*.

For epiphytic lichens
Classified according to the light and humidity conditions, and the predominant tree species. (Habitats with a negligible contribution to lichen biodiversity of the study area are not included in the catalogue. Examples of such habitats include conifer plantations or various types of deciduous forests in unfavourable climate and without over-mature trees.)
(1) **Hornbeam stands.** Hornbeams, when growing in suitably humid mesoclimate and in lit sites, have some rare species: *Biatora pontica*, *Lecidea albohyalina*, *Naetrocymbe fraxini*, *Reichlingia zwackhii*, etc.
(2) **Damp scree forests.** Old trees (*Acer campestre*, *A. platanoides*, *A. pseudoplatanus*, *Fraxinus*, *Tilia*, *Ulmus*) host numerous old-growth forest species: e.g. *Bacidia auerswaldii*, *Gyalecta flotowii*, *Hazslinszkya gibberulosa*, *Lithothelium* spp. and *Schismatomma pericleum*.
(3) **Sparse oak forests and forest-steppes.** Old oaks, although without lichens on sun-exposed parts of trunks, are inhabited by numerous epiphytic species on sun-shaltered sites: e.g. *Caloplaca lucifuga*, *Chaenotheca phaeocephala* and *Rinodina poeltiana*. Specific microsites, at decorticated tree bases, have *Calicium abietinum*, *Protoparmelia oleagina* and *Rinodina archaea*.
(4) **Hawthorn and blackthorn shrubs.** Shrub communities typically occur on rocky slopes in ecotones between steppe and forest. Shrub twigs host macrolichen communities dominated by numerous Parmeliaceae and a group of common, largely nitrophilous microlichens. These species are in large part shared with tree twigs throughout the study area.
(5) **Hazel stands.** Hazel rods, when growing in suitably humid mesoclimate and in lit sites, host specific lichens: e.g. *Arthopyrenia salicis*, *Bacidia arceutina*, *Cyrtidula quercus*, *Leptorhaphis maggiana* and *Pyrenula nitidella*.
(6) **Pine stands.** Although pines are present in most sampling sites, their stands are usually in overly dry mesoclimate where few common lichen species can occur. Pine stands on rhyolite screes in the valley of Prostřední potok stream have, however, a humid mesoclimate which can support rare lichens: *Calicium montanum*, *C. parvum*, *C. pinastri* and *Microcalicium minutum*. Exposed wood at bases of old trees is inhabited by the rare *Lecidea plebeja*.
(7) **Sparse ash stands on nutrient-rich sites on rocky slopes.** Among the local trees, ashes are richest in lichen species. Specific communities of cyanolichens, e.g. *Scytinium lichenoides* s.str., *S. subtile* and *S. teretiusculum*, or communities of *Teloschistaceae*, with predominant *Caloplaca raesaenenii*, are developed on exposed roots.

(8) **Beech tree stands in damp sites.** Beech trees with valuable lichen flora are few; usually old trees in suitable damp mesoclimate. Specific species: *Alyxoria ochrocheila*, *Bacidia circumspecta*, *Bacidina phacodes*, *Gyalecta derivata*.

For lignicolous lichens

(1) **Rapidly decaying dead wood.** The most widespread habitat for lignicolous lichens with occurrences of *Cladonia* spp., *Peltigera praetextata* and microlichens: e.g. *Micarea* spp., *Trapeliopsis glaucolepidea*, *T. pseudogranulosa* and *Thelocarpon intermediellum*. Dead wood in spruce plantations hosts *Gyalideopsis helvetica*, *Micarea pusilla* and *M. viridileprosa*.

(2) **Wood resisting decay in dry and lit sites.** Oak (and also pine) wood in lit forests and forest-steppes resists decay for a long time. Logs and stumps are inhabited by numerous lichens, some of them specifically lignicolous. Noteworthy lichens are e.g. *Biatora veteranorum*, *Cladonia parasitica*, *Hertelidea botryosa*, *Micarea globulosella* and *Protoparmelia oleagina*.

(3) **Dead wood in remnants of humid fir-pine stands.** Only a few old firs now remain, scattered in local forests, but many logs, snags and stumps in the valley of Prostřední potok stream indicate that forests dominated by fir used to be there. The dead wood hosts a few specific lichens: *Elixia flexella*, *Micarea* spp., *Microcalicium ahlneri* and *Multiclavula mucida*.

Vondrák J., Svoboda S., Malíček J., Palice Z., Kocourková J., Knudsen K., Mayrhofer H., Thüs H., Schultz M., Košnar J. & Hofmeister J. (2022) From Cinderella to Princess: an exceptional hotspot of lichen diversity in a long-inhabited central-European landscape. – Preslia 94: 143–181.

Supplementary Table S1. – Dates of visits and man-hours spent sampling the fourteen sites

Site	Man / hours			
	Vondrák	Malíček	Palice	Sum
1	19.9.2019 (8 h), 13.10.2019 (7 h), 22.10.2019 (7 h), 25.10.2019 (7 h), 23.4.2020 (8 h) , 28.4.2020 (6 h), 21.10.2020 (4 h), 23.11.2020 (2 h), 25.2.2021 (6 h), 27.7.2021 (8 h), 16.8.2021 (6 h)	19.10.2018 (6 h), 1.11.2018 (6 h), 28.4.2020 (6 h)	25.2.2021 (6h), 27.7.2021 (8 h)	101
2	9.6.2020 (7 h), 23.7.2020 (1 h), 21.8.2020 (6 h), 30.9.2020 (2 h), 6.10.2020 (2 h)	12.7.2018 (5 h)	9.6.2020 (7 h), 6.10.2020 (6 h), 18.11.2020 (4 h)	40
3	12.9.2019 (8 h), 16.8.2019 (1 h), 18.11.2020 (2 h), 23.11.2020 (3 h), 26.3.2021 (6h)	4.10.2018 (2 h), 11.8.2018 (3 h)	26.3.2021 (6h)	31
4	7.8.2020 (8 h), 21.8.2020 (1 h), 6.10.2020 (1 h), 19.10.2020 (2 h), 24.3.2021 (3 h)	12.10.2018 (3 ha)	6.10.2020 (0.5 h)	18
5	9.7.2020 (5 h), 19.10.2020 (5 h)			10
6	12.8.2018 (3 h), 29.5.2020 (3 h), 9.7.2020 (2 h), 23.7.2020 (3 h), 7.8.2020 (2 h), 21.8.2020 (1 h), 30.9.2020 (1 h), 21.10.2020 (1 h), 24.3.2021 (1h)	12.7.2018 (3 h), 5.7.2018 (2 h)	6.10.2020 (0.5 h), 26.3.2021 (0.5h)	23
7	12.8.2018 (5 h), 16.8.2019 (1 h), 29.5.2020 (1 h), 30.9.2020 (1 h), 26.3.2021 (1h)	11.8.2018 (2 h)	26.3.2021 (1h)	12
8	30.9.2020 (2 h), 24.3.2020 (4 h)	24.9.2018 (4 h)		10
9	15.8.2019 (5 h), 9.11.2020 (6 h)	5.7.2018 (3 h)		14
10	29.5.2020 (6 h), 21.10.2020 (1 h), 7.7.2021 (8 h)		7.7.2021 (8 h)	23
11	11.8.2018 (7 h)			7
12	30.9.2020 (4 h), 18.11.2020 (2 h)	24.9.2018 (3 h)		9
13	14.7.2020 (6 h), 21.10.2020 (1 h)	11.8.2018 (3 h)		10

14	23.7.2020 (1 h), 4.8.2020 (2 h), 5.9.2020 (2 h), 6.10.2020 (2 h), 19.10.2020 (2 h), 9.11.2020 (1 h)			10

Vondrák J., Svoboda S., Malíček J., Palice Z., Kocourková J., Knudsen K., Mayrhofer H., Thüs H., Schultz M., Košnar J. & Hofmeister J. (2022) From Cinderella to Princess: an exceptional hotspot of lichen diversity in a long-inhabited central-European landscape. – Preslia 94: 143–181.

Supplementary Table S3. – NCBI accession numbers for sequences of specimens included in this study

Species	Voucher	ITS	mtSSU
Acarospora squamulosa	PRA-JV20666	OL396637	OL396694
Agonimia flabelliformis	PRA-JV24269	OK332931	OK465533
Aphisphaeria umbrina	PRA-JV24328	OL396664	OK465525
Arthonia atra	PRA-JV23909		OL396678
Arthonia didyma	PRA-JV23914	OL457936	
Arthonia thoriana	PRA-JV23882		OK465528
Arthonia thoriana	PRA-JV20623		OK465527
Aspicilia brucei	PRA-JV23387	OK332932	OK465535
Aspicilia brucei	PRA-JV23416	OK332933	OL396703
Aspicilia cinerea	PRA-JV24549	OL457937	
Aspicilia cinerea f. *papillata*	PRA-JV21182		OK465537
Aspicilia goettweigensis	PRA-JV23397	OK332934	
Aspicilia goettweigensis	PRA-JV23713	OK332935	
Aspicilia laevata	PRA-JV24502	OL396590	
Aspicilia verrucigera	PRA-JV24214	OK332936	OK465538
Bacidia albogranulosa	PRA-JV24974	OL396591	
Bacidia auerswaldii	PRA-JV23910	OK332937	OK465539
Bacidia hyalina	PRA-JV24084	MZ968995	OK019727
Bacidia hyalina	PRA-JV24092	OK332870	
Bacidia hyalina	PRA-JV24158		OK465488
Bacidia hyalina	PRA-JV24210	OK332871	
Bacidia hyalina	PRA-JV24274		OK465489
Bacidina adastra	PRA-JV24569	OK332938	
Bacidina arnoldiana	PRA-JV24248	OK332939	
Bacidina egenula	PRA-JV24938	OL396592	OK465540
Bacidina sp. 1	PRA-JV20656	OK332878	OK465492
Bacidina sp. 1	PRA-JV24163	OK332879	OL396715
Bacidina sp. 1	PRA-JV24353		OK465493
Bacidina sp. 1	PRA-JV24355	OK332880	OK465494
Bacidina sp. 1	PRA-JV24493	OK332881	OK465495
Bacidina sp. 1	PRA-JV24968		OK465496
Bacidina sp. 1	PRA-ZP30104	OK332882	OK465497
Bacidina sp. 2	PRA-JV21138		OK465498
Bacidina sp. 2	PRA-JV24247	OK332883	OK465499
Bacidina sp. 2	PRA-JV24915	OK332884	OK465500
Bacidina sp. 2	PRA-JV24921	OK332885	OK465501
Bacidina sp. 2	PRA-JV24944		OK465502
Bacidina sp. 3	PRA-JV24573	OK332886	OK465503

Bacidina sulphurella	PRA-JV24913		OK465541
Bagliettoa calciseda	PRA-JV25035	OK332981	
Bagliettoa calciseda	PRA-JV25141	OK332982	
Bilimbia fuscoviridis	PRA-JV20638	OL396636	
Bilimbia fuscoviridis	PRA-JV20699	OL396638	
Blennothallia crispa	PRA-JV25071		OL396765
Bryostigma muscigenum	PRA-JV23959	OL457938	OK465542
Buellia aethalea	PRA-JV24685		OK465543
Buellia badia	PRA-JV20950	OK332940	OK465544
Buellia disciformis	PRA-JV24199	OK332941	
Buellia microcarpa	JM13917	OL396670	OL396773
Buellia microcarpa	PRA JV20925	OL453198	
Buellia microcarpa	PRA-JV20925	OL396642	
Buellia microcarpa	PRA-JV21161	MZ968996	
Buellia ocellata	PRA-JV21275	OK332942	OK465545
Buellia sandstedei	JM13707	OL396606	OK465667
Buellia sandstedei	PRA-JV21059	OK332944	OK465546
Buellia sandstedei	PRA-JV24684	OK332945	
Calicium abietinum	PRA-JV24352		OK465547
Calicium glaucellum	PRA-JV24550	OK332946	
Calicium parvum	PRA-JV24287	OL396663	OL396718
Calicium pinastri	PRA-JV25156	OK333059	OL396696
Callome multipartita	PRA-JV25063	OK332948	OL396759
Caloplaca atroflava	PRA-JV21204a		OK465565
Caloplaca atroflava	PRA-JV23728a		OK465566
Caloplaca atroflava	PRA-JV24710	OK332949	OL396728
Caloplaca demissa	PRA-JV24967		OK465550
Caloplaca flavocitrina	JM11933	OK333054	OL396767
Caloplaca flavocitrina	PRA-JV23439	OK332951	
Caloplaca flavocitrina	PRA-JV23715	OK332952	OK465551
Caloplaca flavocitrina	PRA-JV24236	OK332953	OL396776
Caloplaca flavocitrina	PRA-JV24914	OK332954	OK465552
Caloplaca flavocitrina	PRA-JV25055		OL396756
Caloplaca chlorina	PRA-JV20940	OL396593	
Caloplaca monacensis	PRA-JV24095	OK332955	OK465553
Caloplaca obliterans	PRA-JV23437		OK465554
Caloplaca phlogina	PRA-JV24907	OK332956	OK465555
Caloplaca subpallida	PRA-JV23396		OK465557
Caloplaca subpallida	PRA-JV23733	OL396594	
Caloplaca substerilis	PRA-JV24100	OK332957	OK465558
Caloplaca ulcerosa	PRA-JV20661	OK332958	OK465559
Candelariella aurella	PRA-JV23720	OK332959	OL396680
Candelariella coralliza	PRA-JV20942a		OL396690
Catillaria fungoides	PRA-JV24589	OK332960	OL396681
Catillaria nigroclavata	PRA-JV25074a	OL396629	OL396762
Catillaria nigroisidiata	PRA-JV25074	OL453196	
Circinaria caesiocinerea	PRA-JV23398	OK332961	OK465563

Circinaria sp.	PRA-JV24719	OK332887	OK465504
Cladonia caespiticia	PRA-JV24116	OK332962	OK465567
Cladonia macilenta	PRA-JV23891	OL457939	OK465568
Cladonia parasitica	PRA-JV24101	OK332963	
Cladonia ramulosa	PRA-JV24319	OK332964	OL396719
Blennothellia crispa	PRA-JV25032		OL396741
Enchylinum polycarpon	PRA-JV25031		OL396740
Dactylospora deminuta s. lat.	PRA-JV24162	OK332926	OL396714
Dactylospora parasitica	PRA-JV24261	OK332927	
Dermatocarpon meiophyllizum	PRA-JV23410		OK465569
Dermatocarpon meiophyllizum	PRA-JV24709	OL457940	OK465570
Dermatocarpon miniatum	PRA-JV23399		OK465571
Dermatocarpon miniatum	PRA-JV25028	OL396619	
Dermatocarpon miniatum	PRA-JV25066	OK332965	
Dirina fallax	PRA-JV25064	OL396625	OL396760
Dirina massiliensis	PRA-JV24848	OK332966	OK465572
Dirina massiliensis	PRA-JV24852	OK332967	OK465573
Endocarpon adscendens	PRA-JV25053	OL396622	OL396754
Endocarpon adscendens	PRA-JV25149	OL396627	OL396712
Endocarpon adscendens	PRA-JV25150	OL396628	OL396723
Endocarpon cf. adscendens	PRA-JV25054		OL396710
Endocarpon pusillum	PRA-JV25070	OL396626	OL396764
Fuscidea pusilla	PRA-JV24298		OK465574
Fuscidea recensa	PRA-JV21177	OK332968	OK465575
Gyalecta fagicola	PRA-JV24078	OL457941	OK465576
Gyalecta jenensis	PRA-JV23907	OL396595	
Chaenotheca chlorella	PRA-JV24841		OK465561
Chaenotheca phaeocephala	PRA-JV23736		OK465562
Immersaria cupreoatra	PRA-JV21162		OK465577
Immersaria cupreoatra	PRA-JV23490		OK465578
Inoderma byssaceum	PRA-JV24489		OK465579
Inoderma sorediatum	PRA-JV24850		OK465580
Julella fallaciosa	PRA-JV24545		OK465529
Karstenia idaei	PRA-ZP31630	OL457927	OL473426
Karstenia sp.	PRA-JV24227		OK465505
Lecania croatica	JM11890	OK333055	OK465668
Lecania croatica	PRA-JV23912	OK332969	OK465582
Lecania cyrtella	PRA-JV23489a		OK465534
Lecania cyrtella	PRA-JV24705	OK332970	OK465584
Lecania cyrtella	PRA-ZP30715	OL457925	OL473424
Lecania leprosa	PRA-JV23568		OK465585
Lecania rabenhorstii	PRA-JV24843	OK332971	OK465586
Lecanora expallens	PRA-JV20685		OK465587
Lecanora expallens	PRA-JV23754	OK332972	
Lecanora impudens	PRA-JV24257	OK332973	OK465588
Lecanora orosthea	JM11923		OL396766
Lecanora orosthea	PRA-JV24522	OK332974	OK465589

Lecanora phaeostigma	PRA-JV24083	OK332975	
Lecanora rupicola	PRA-JV24924	OL457943	OK465591
Lecanora saligna	PRA-JV23701	OK332976	OK465592
Lecanora sarcopidoides	PRA-JV24175		OK465593
Lecanorales sp.	PRA-JV24028	OL457932	OK465506
Lecidea fuscoatra	PRA-JV23392a	OK332915	OK465490
Lecidea fuscoatra	PRA-JV23482	OL396651	OL396706
Lecidea fuscoatrina	PRA-JV25073	OL396676	OL473427
Lecidea fuscoatrina	PRA-JV20885		OK465595
Lecidea fuscoatrina	PRA-JV23578	OK332977	
Lecidea grisella	PRA-JV25069	OK332978	OL396763
Lecidea plana	PRA-JV20894	OK332979	OK465596
Lecidea plebeja	PRA-JV24285	OK332983	OK465597
Lecidea tessellata	PRA-JV25067	OK332984	OL396761
Lecidella albida	PRA-ZP30064	OL457926	OK465664
Lecidella flavosorediata	PRA-JV20919	OK332985	
Lecidella flavosorediata	PRA-JV24225	OK332986	
Lecidella flavosorediata	PRA-JV24558	OK332987	OK465599
Lepraria borealis	PRA-JV23507	OK332989	OK465600
Lepraria borealis	PRA-JV23706	OK332990	OK465601
Lepraria crassissima	PRA-JV20641	OK332991	OK465602
Lepraria humida	PRA-JV24507	OK332992	
Leprocaulon nicholsiae	PRA-JV23702	OL396596	
Leprocaulon nicholsiae	PRA-JV24844	OL396597	
Leprocaulon quisquiliare	PRA-JV24677	OK332993	
Lichenomphalia umbellifera	PRA-JV24128	OK332994	
Lichenomphalia umbellifera	PRA-JV24138	OL457945	
Lichenothelia papilliformis	PRA-JV23406		OK465530
Lichenothelia scopularia	PRA-JV21070		OL473428
Lichinella sp.	PRA-JV21241		OL396699
Lithothelium phaeosporum	PRA-JV24488		OK465604
Lithothelium phaerosporum	PRA-JV24159	OK332995	OK465603
Lithothelium septemseptatum	PRA-JV24170		OK465605
Lithothelium septemseptatum	PRA-JV24485	OL453197	
Lobothalia radiosa	PRA-JV23584a	OK332996	
Melanohalea elegantula	PRA-JV24542	OK332997	OK465606
Micarea byssacea	PRA-JV24854		OL396682
Micarea coppinsii	PRA-JV24314		OK465607
Micarea denigrata	PRA-JV23465	OK332998	OK465608
Micarea erratica	PRA-JV25057	OK332988	OL396757
Micarea fallax	PRA-JV24744		OK465609
Micarea globulosella	PRA-JV24501	OK332999	
Micarea micrococca	PRA-JV24898	OL396598	OL396683
Micarea microsorediata	PRA-JV24297		OK465610
Micarea microsorediata	PRA-JV24503		OL396684
Micarea misella	PRA-JV24902		OK465611
Micarea peliocarpa	PRA-JV23744	OL396599	OK465612

Micarea prasina	PRA-JV24851	OK333000	
Micarea prasina s. str.	PRA-JV24289		OL396685
Micarea pusilla	PRA-JV23918	OK333001	OK465613
Micarea soralifera	PRA-JV24563		OK465614
Micarea soralifera	PRA-JV24574		OK465615
Micarea soralifera	PRA-JV24849		OK465616
Micarea substipitata	PRA-JV23523	MZ968999	OK019730
Micarea substipitata	PRA-JV24847	MZ968998	OK019729
Micarea substipitata	PRA-ZP19376		OL473429
Micarea substipitata	PRA-ZP27411	MZ968997	OK019728
Micarea tomentosa	PRA-JV24856		OK465617
Micarea tomentosa	PRA-JV24863		OK465618
Micarea viridileprosa	PRA-JV23902	OL457946	OL396686
Micarea viridileprosa	PRA-JV23982		OL396687
Microcalicium ahlneri	PRA-JV24276		OK465531
Microcalicium arenarium	PRA-JV24137		OK465524
Microcalicium disseminatum	PRA-JV24176	OL457935	OK465532
Microcalicium minutum	PRA-JV24173	MZ969000	OK019731
Microcalicium minutum	PRA-JV24396	OK332872	OK465491
Mycocalicium subtile	PRA-JV25060	OL396623	OL396758
Myriolecis sp.	PRA-JV23493	OK332888	OK465507
Ochrolechia turneri	PRA-JV23905	OK333002	OK465619
Opegrapha niveoatra	PRA-JV23582	OL457947	OK465622
Opegrapha niveoatra	PRA-JV24477		OK465620
Opegrapha niveoatra	PRA-JV24895		OK465621
Ostropales sp.	PRA-JV24067	OK332889	
Parmelia sulcata	PRA-ZP29979		OK465665
Peltigera horizontalis	PRA-JV25039	OL396620	
Peltigera neocanina	PRA-JV24483	OL396607	OK465624
Pertusaria stalactisa	JM13711	OL457954	OK465669
Physconia enteroxantha	PRA-JV24074	OL396601	OK465626
Placopyrenium cinereoatrum	PRA-JV21204	OK333004	
Placynthiella icmalea	PRA-JV23901	OL396602	OK465627
Placynthium nigrum	PRA-JV24926		OK465628
Porpidia cinereoatra	PRA-JV24896	OK333005	OK465629
Porpidia contraponenda	PRA-JV24123	OK333006	OK465630
Protoparmelia hypotremella	PRA-JV23710	OK333007	OK465631
Protoparmelia hypotremella	PRA-JV24196	OK333008	OK465632
Protoparmelia oleagina	PRA-JV24320	OK333009	
Pseudoschismatomma rufesce	PRA-JV24562		OK465633
Psorotichia schaereri	PRA-JV25052		OL396753
Pterygiopsis neglecta	PRA-JV23408	OL457948	
Pycnora sorophora	PRA-JV23721	OK333010	OK465634
Pyrenula nitidella	PRA-JV24157	OK333011	OL396688
Ramalina europaea	JM11934	OK333056	OK465670
Ramalina europaea	JM11935		OL396768
Ramalina europaea	PRA-JV24347		OK465637

Ramalina europaea	PRA-JV24581	OK333013	OK465638
Ramalina obtusata	PRA-JV24089	OK333014	OK465639
Requienella fraxini	PRA-JV24337	OK332929	
Rhizocarpon distinctum	PRA-JV23892	OK333015	OK465640
Rhizocarpon geminatum var.	PRA-JV20643		OK465641
Rhizocarpon geminatum var.	PRA-JV23584	OK333016	
Rhizocarpon sp.	PRA-JV24544	OK332890	
Rhizocarpon sp.	PRA-JV24733	OK332891	OK465508
Rhizocarpon sp.	PRA-ZP31659	OL457928	
Rimularia gibbosa	PRA-JV20960	OK333017	
Rimularia gibbosa	PRA-JV21023	OK333018	OK465643
Rimularia gibbosa	PRA-JV23583		OK465644
Rimularia gibbosa	PRA-JV24407	OL396668	OL396722
Rimularia gibbosa	PRA-JV24688	OL457949	OK465642
Rinodina archaea	PRA-JV24239		OK465645
Rinodina aspersa	PRA-JV20960a		OK465646
Rinodina aspersa	PRA-JV25068	OL396603	
Rinodina efflorescens	PRA-JV23860		
Rinodina efflorescens	PRA-JV23876	OK333019	
Rinodina fimbriata	PRA-JV24737	OL396673	OL396731
Rinodina fimbriata	PRA-JV24738	OK333020	OK465648
Rinodina obnascens	PRA-JV20630	OL396604	OK465649
Rinodina oleae	PRA-JV23570	OK333021	
Rinodina oxydata	PRA-JV24720	OL396613	OK465650
Rinodina oxydata	PRA-JV24966	OK333022	
Rinodina poeltiana	PRA-JV24063	OK333023	OK465651
Rufoplaca griseomarginata	PRA-JV23413	MZ969001	OK019732
Rufoplaca griseomarginata	PRA-JV5624	OL396616	
Rufoplaca griseomarginata	PRA-JV5848	OL396661	
Rufoplaca griseomarginata	PRA-JV8748	OL396647	
Rufoplaca sp.	PRA-JV23393	OL396588	
Sagedia simoënsis	PRA-JV24531		OK465652
Sarcogyne regularis	PRA-JV23419		OK465653
Sarea coeloplata	PRA-JV24514	OL396608	
Sarea resinae	PRA-JV23906	OK332930	OK465526
Scytinium lichenoides	PRA-JV24080	OL396660	
Scytinium lichenoides	PRA-JV24168		OK465654
Scytinium lichenoides	PRA-JV24275		OK465655
Scytinium magnussonii	JM11951		OL396769
Scytinium magnussonii	PRA-JV25029		OL396780
Scytinium magnussonii	PRA-JV25036		OL396743
Staurothele fissa	SMNS-STU-F-000	OL457950	
Strigula jamesii	PRA-JV24052	OL505432	OK465657
Strigula jamesii	PRA-JV24057	OL453195	
Synalissa ramulosa	PRA-JV24687	OL457955	
Thelenella muscorum	JM11953	OL396669	OL396770
Thyrea confusa	PRA-JV25033		OL396742

Toninia aromatica	PRA-JV23574	OK333025	
Trapelia glebulosa	JM13715	OK333057	
Trapeliaceae sp.	PRA-JV21130	OK332892	OK465509
Trapeliopsis pseudogranulosa	PRA-JV23979	OK333026	OK465659
Tremella wirthii	PRA-JV23710a	OK332928	
Verrucaria aff. trabicola	PRA-ZP15480	OL457922	
Verrucaria breussii	PRA-JV23707		OK465660
Verrucaria bryoctona	PRA-JV20698	OK333027	OK465661
Verrucaria bryoctona	PRA-JV21170		OK465662
Verrucaria bryoctona	PRA-JV24365	OK333028	
Verrucaria bryoctona	PRA-JV24931	OL396617	OK465663
Verrucaria bryoctona	PRA-ZP29724		OL473421
Verrucaria devensis	PRA-JV25051	OK333029	
Verrucaria elaeina	PRA-JV23405	OK333032	OK465598
Verrucaria elaeina	PRA-JV23941	OK333033	
Verrucaria elaeina	PRA-JV23966	OK333034	OK465625
Verrucaria elaeina	PRA-JV20682	OK333030	OK465594
Verrucaria elaeina	PRA-JV21080	OK333031	
Verrucaria elaeina	PRA-JV23395		OK465623
Verrucaria elaeina	PRA-JV23878	OK333035	
Verrucaria elaeomelaena	PRA-JV23575	OK333036	
Verrucaria elaeomelaena	PRA-JV23577	OK333037	
Verrucaria elaeomelaena	PRA-JV23886	OK333038	
Verrucaria furfuracea	PRA-JV23572	OL396652	
Verrucaria hegetschweileri	PRA-JV20931	OK333039	OK465635
Verrucaria hegetschweileri	PRA-JV23704	OK333040	OK465636
Verrucaria hydrophila	PRA-JV23576	OK333041	
Verrucaria hydrophila	PRA-JV23681	OK333042	
Verrucaria hydrophila	PRA-JV24840	OK333043	
Verrucaria hydrophila	SMNS-STU-F-000	OL457956	
Verrucaria macrostoma	PRA-JV23400	OK333044	
Verrucaria macrostoma	PRA-JV23942	OK333045	
Verrucaria macrostoma	PRA-JV24941		OK465658
Verrucaria maculiformis	PRA-JV24838	OK333046	
Verrucaria margacea	SMNS-STU-F-000	OL457929	OL473431
Verrucaria memnonia	JM12050		OL396771
Verrucaria muralis	PRA-JV24730	OL457953	OK465590
Verrucaria muralis	PRA-JV24933	OL396605	
Verrucaria nigrescens s. lat.	SMNS-STU-F-000	OL457957	
Verrucaria nigrescens s. lat.	SMNS-STU-F-000	OL457958	
Verrucaria nigrescens s. lat.	SMNS-STU-F-000	OL457959	
Verrucaria nigrescens s. lat.	PRA-JV23409	OK333047	
Verrucaria nigrescens s. lat.	PRA-JV23485	OK333048	
Verrucaria nigrescens s. lat.	PRA-JV23498	OK333049	
Verrucaria nigrescens s. lat.	PRA-JV23748	OK333050	
Verrucaria nigrescens s. lat.	PRA-JV23939	OK333051	
Verrucaria nigrescens s. lat.	PRA-JV24498	OK333052	

Verrucaria ochrostoma	PRA-JV20683	OK333024	
Verrucaria polysticta	PRA-JV23948	OL457952	
Verrucaria polysticta	PRA-JV24871		OL396735
Verrucaria praetermissa	PRA-JV23681a	OK332873	
Verrucaria praetermissa	SMNS-STU-F-000	OL457960	
Verrucaria preatermissa	JM11881	OK333058	OK465564
Verrucaria procopii	PRA-JV23449	OK332902	OL396677
Verrucaria aff. *tallbackensis*	PRA-ZP29891	OL457923	OL473422
Verrucaria aff. *tallbackensis*	PRA-ZP30029	OL457924	OL473423
Verrucaria sp. 1	PRA-JV23414	OK332893	
Verrucaria sp. 10	PRA-JV24699	OK332911	OK465517
Verrucaria sp. 11	PRA-JV23420	OK332912	
Verrucaria sp. 11	PRA-JV23728	OK332913	
Verrucaria sp. 11	PRA-ZP29002	OK332914	OK465518
Verrucaria sp. 12	PRA-JV21173	OL396645	
Verrucaria sp. 12	PRA-JV24633	OL457930	OK465519
Verrucaria sp. 12	PRA-JV25030	OK332980	OL396739
Verrucaria sp. 12	PRA-JV25045		OL396750
Verrucaria sp. 13	PRA-JV24725	OK332916	OL396729
Verrucaria sp. 13	PRA-JV24973	OK332917	OK465520
Verrucaria sp. 14	PRA-JV24839	OK332918	OL396777
Verrucaria sp. 14	PRA-JV25041	OK332919	OL396747
Verrucaria sp. 15	PRA-JV24742	OK332920	OK465522
Verrucaria sp. 15	PRA-JV25144	OK332921	OL396738
Verrucaria sp. 16	PRA-JV24739	OL396589	OL396732
Verrucaria sp. 17	PRA-JV25024	OK332922	OL473430
Verrucaria sp. 18	PRA-JV24701	OK332923	OK465523
Verrucaria sp. 19	PRA-JV24858	OK332924	
Verrucaria sp. 2	PRA-JV21053	OK332894	
Verrucaria sp. 2	PRA-JV21188	OK332895	OK465510
Verrucaria sp. 2	PRA-JV23415	OK332896	
Verrucaria sp. 20	PRA-JV25145	OK332925	
Verrucaria sp. 21	PRA-JV25040	OL457933	OL396746
Verrucaria sp. 22	PRA-JV25038	OL457934	OL396745
Verrucaria sp. 3	PRA-JV23411	OK332897	OL396702
Verrucaria sp. 4	PRA-JV20693	OK332898	
Verrucaria sp. 4	PRA-JV20853	OK332899	OK465511
Verrucaria sp. 5	PRA-JV23971		OK465512
Verrucaria sp. 5	PRA-JV23987	OK332900	OK465513
Verrucaria sp. 5	PRA-JV24250		OK465514
Verrucaria sp. 5	PRA-ZP29726	OK332901	OK465515
Verrucaria sp. 6	JM12612	OK333053	OK465666
Verrucaria sp. 7	PRA-JV21188a	OK332903	
Verrucaria sp. 7	PRA-JV23403	OK332904	
Verrucaria sp. 7	PRA-JV23415	OK332905	
Verrucaria sp. 7	PRA-JV23566	OK332906	
Verrucaria sp. 7	PRA-JV24722	OK332907	

Verrucaria sp. 8	PRA-JV23735	OK332908	
Verrucaria sp. 9	PRA-JV20942	OK332909	
Verrucaria sp. 9	PRA-JV23566	OK332910	
Verrucaria sp. 9	SMNS-STU-F-000	OL457961	
Verrucaria sphaerospora	PRA-JV23573	OK332943	
Verrucaria substerilis	PRA-JV21184	MZ969002	
Verrucaria substerilis	PRA-JV23418	OK332874	
Verrucaria substerilis	PRA-JV23501	OK332875	
Verrucaria substerilis	PRA-JV23563	OK332876	
Verrucaria substerilis	PRA-JV23705	MZ970357	OK019734
Verrucaria substerilis	PRA-JV23952	OK332877	
Verrucaria substerilis	PRA-JV23988	OL457931	
Verrucaria substerilis	PRA-JV25147	OL396615	OL396716
Verrucaria tabacina	PRA-JV21269	OK332947	OK465516
Verrucaria tectorum	PRA-JV23571	OK332950	
Verrucaria tenuispora	PRA-JV21174	MZ969004	
Verrucaria tenuispora	PRA-JV24712	MZ969003	OK019733
Verrucaria teyrzowensis	PRA-JV21178	MZ969005	
Verrucaria viridigrana	PRA-JV24338	OL457942	OL396679
Verrucaria viridigrana	PRA-JV24490		OK465581
Verrucaria viridigrana	PRA-JV24741	OL396600	OK465549
Verrucaria viridigrana	PRA-ZP31047	OK333003	OK465560
Verrucaria viridigrana albinor	PRA-JV24356	OL505433	OL396720
Verrucaria viridula	PRA-JV24939	OK333012	OK465583
Xanthoparmelia plittii	PRA-ZP31016		OL473425

Vondrák J., Svoboda S., Malíček J., Palice Z., Kocourková J., Knudsen K., Mayrhofer H., Thüs H., Schultz M., Košnar J. & Hofmeister J. (2022) From Cinderella to Princess: an exceptional hotspot of lichen diversity in a long-inhabited central-European landscape. – Preslia 94: 143–181.

Supplementary Table S4. – Details of sequenced loci

locus	reference	primers	PCR settings
ITS	Gardes & Bruns (1993), White & al. (1990)	ITS1F (forward): CTTGGTCATTTAGAGGAAGTAA; ITS4 (reverse): TCCTCCGCTTATTGATATGC	94°C - 3 min; 7x: 94°C - 30 s, 62°C - 30 s (temperature was decreased by 1°C in each subsequent cycle), 72°C - 60 s; 38x: 94°C - 30 s, 56°C - 30 s, 72°C - 60 s; 72°C - 10 min
mrSSU	Arup & al. (2013), Zoller & al. (1999)	mrSSU1 (forward): AGCAGTGAGGAATATTGGTC; mrSSU7 (reverse): GTCGAGTTACAGACTACAATCC	94°C - 10 min; 40x: 94°C - 30 s, 52°C - 30 s, 72°C - 60 s; 72°C - 10 min

References:

Arup U., Søchting U. & Frödén P. (2013) A new taxonomy of the family Teloschistaceae. – Nordic Journal of Botany 31: 16–83.

Gardes M. & Bruns T. D. (1993) ITS primers with enhanced specificity for basidiomycetes – application for the identification of mycorrhizae and rusts. – Molecular Ecology 2: 113–118.

White T. J., Bruns T., Lee S. & Taylor J. W. (1990) Amplification and direct sequencing of fungal ribosomal RNA genes for phylogenetics. – In: Innis M. A., Gelfand D. H., Sninsky J. J. & White T. J. (eds), PCR protocols: a guide to the methods and applications, p. 315–322, Academic Press, New York.

Zoller S., Scheidegger C. & Sperisen C. (1999) PCR primers for the amplification of mitochondrial small subunit ribosomal DNA of lichen-forming ascomycetes. – Lichenologist 31: 511–516.

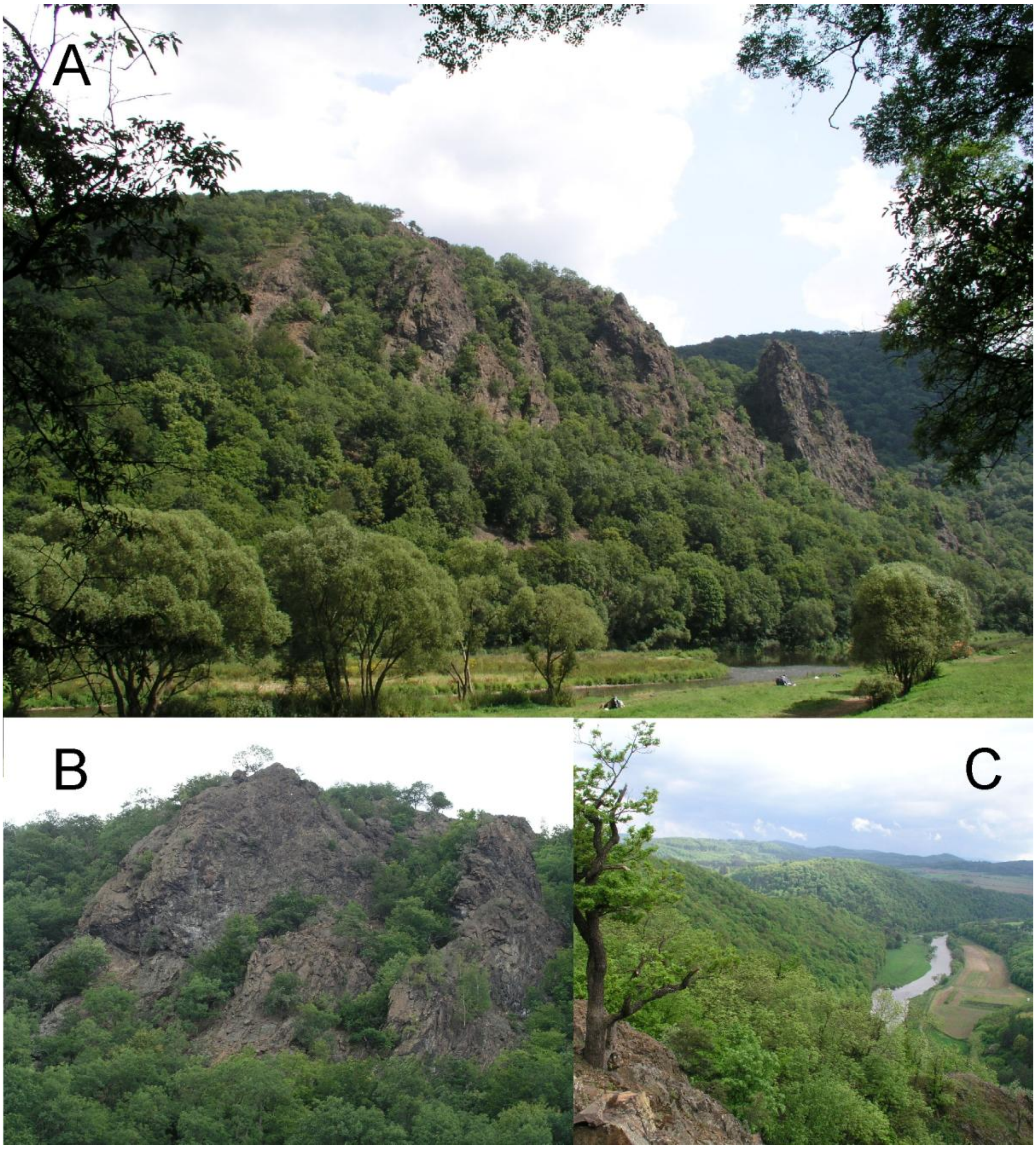

Fig. S1. Recent views on the study area. A, Týřovické skály rocks (site 1); B, detailed view on a part of the site 1 showing calcareous inclusions (white spots) in lower parts of cliffs; C, slopes above the river Berounka (sites 10, 11 and 13), recently covered by forest, but unforested in the 19th Century. Photographed by J. Kocourková in 2004 (A, B) and 2006 (C).