

SOME ADDITIONS TO AND ELUCIDATIONS OF THE LICHEN BIOTA OF ČESKÝ KRAS (BOHEMIAN KARST, CENTRAL BOHEMIA, CZECH REPUBLIC)

Několik dodatků a upřesnění k lichenobiotě Českého krasu



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Abstract:

This contribution presents selected finds of lichens made by the author during recent excursions conducted in the proximity of the SW outskirts of Prague, in the area called Český kras (Bohemian Karst). Twenty-nine species are listed of which thirteen are novelties for this area. In addition, the recent literature was excerpted and an update to the checklist of the Protected Landscape Area Český kras (Svoboda et al. 2014) is presented. Ten new records were published elsewhere in the period 2015–2018, one species was mistakenly omitted from the checklist and another one has been reinstated, bringing the total number of lichen species currently known for this area to 461.



Key words:

new records, lichenized fungi, regional lichenofloristics

INTRODUCTION

The lichen biota of the Bohemian Karst is very diverse thanks to the region's varied geology and geomorphology as well as its preserved close-to-natural ecosystems. The total number of recorded species, after a partial revision of historical records, amounts to 436 (Svoboda et al. 2014). Subsequently, numerous contributions were published, containing data on lichens from the Bohemian Karst (Lenzová & Svoboda 2015, Prieto et al. 2015, Špryňar et al. 2015, Frolov et al. 2016, Knudsen & Kocourková 2016, Halda et al. 2017, Šoun et al. 2017, Czarnota & Guzow-Krzemińska 2018, Malíček et al. 2018a,b). Most of these papers were not primarily focused on the area of the Bohemian Karst, but most of

them yielded additional species for this area (see the paragraph 'Overview of changes and additions..'). The list presented below, of specimens collected by the author, includes species not recorded previously and taxa so far known from only one or two localities in the area. The exception is one of the 'flag-species' of the Bohemian Karst, *Phaeophyscia hirsuta*, an endangered macrolichen published from only one recent locality in the area, even though historically the Bohemian Karst used to be the hotspot for this species in the Czech Republic (see Svoboda 2007b).

METHODS

The presented material is preserved in the herbarium PRA. Sampling locations are presented using the original spelling on the labels except for the following information at the beginning: 'Czech Republic, C Bohemia, Czech karst', which is the same for all the specimens listed below. The delimitation of the area follows Svoboda et al. (2014). GPS coordinates were recorded using the WGS-84 datum. One specimen was studied chemically by TLC following Orange et al. (2013). The nomenclature and red-list categories are according to Liška & Palice (2010) with certain amendments, which are summarized in Malíček et al. (2018b). In cases of species not listed in the mentioned sources, authorship abbreviations are given following the Index Fungorum (www.indexfungorum.org/Names/AuthorsOfFungalNames.asp). Recently published taxa not included on the Red List of lichens of the Czech Republic (Liška & Palice 2010) are denoted with '(-)'. Novelties in the lichen biota of the Bohemian Karst are marked as '*'. Images of selected species are based on dry herbarium specimens listed in the following text, with the exception of the sample of *Veizdaea retigera*, which was moistened prior to being photographed. The photographs were taken in the Optics Laboratory of the Institute of Botany of the Czech Academy of Science, under an Olympus SZX12 stereomicroscope equipped with an Olympus DP70 camera, processed using the software QuickPHOTO MICRO 3.0, including the Deep Focus module.

RESULTS

***Acrocordia conoidea* (DD)**

Srbsko: right bank of valley of the river Berounka between Srbsko and Karlštejn, small ravine 'Myší rokle' with a periodic stream, 49°55'45.4"N, 14°09'00.0"E, on shaded vertical to overhanging wet rock, alt. 230 m, 6. 4. 2013, Z. Palice 16315 (PRA).

This is the specification of the voucher specimen published by Špryňar et al. (2015). It was previously reported only from the valley of the stream Bubovický potok (Vondrák et al. 2007), so only two spots are currently known from the Bohemian Karst.

****Agonimia flabelliformis* (-)**

Vonoklasy: valley of the stream Kluček, oak forest at the foothill of a SSE-facing slope, 49°56'50.3"N, 14°17'25.2"E, terricolous (on compacted soil, humus and over bryophytes) of a tourist-trail embankment, alt. 250 m, 5. 4. 2020, Z. Palice 28800 (PRA).

****Arthonia didyma* (VU)**

Srbsko: valley near the Bubovické vodopády waterfalls, 49°56'55.5"N, 14°09'14.0"E, on bark of *Carpinus*, alt. 295 m, 23. 11. 2014, Z. Palice 18450 (PRA).

***Aspicilia dominiana* (CR)**

Černošice, Karlík: a diabase rocky-hill just N of the village, 49°56'17.4"N, 14°15'42.2" E, on a steeply inclined S-facing diabase rock face, alt. 250 m, 26. 7. 2011, Z. Palice 14789 (PRA).

This is the specification of the specimen shortly mentioned by Lenzová & Svoboda (2015). The only previous record of this taxon from the area comes from diabase rocks near the settlement Solopisky listed within a phytosociological relevé (Černohorský 1940). The voucher ZP 14789 was also used in a preliminary phylogenetic study of the *Aspiciliella intermutans* complex encompassing putative cryptic species (Zakeri et al. 2019). The authors did not ascribe the Bohemian samples previously referred to *Aspicilia dominiana* (Lenzová & Svoboda 2015) to a species, but implicitly referred to them as members of 'the *Aspiciliella intermutans* complex', avoiding the name *Aspicilia dominiana*. In the study by Zakeri et al. (2019), the sample ZP 14789 and also other Bohemian specimens from diabase rocks are part of a single separate lineage differing from the putative clade of *Aspiciliella intermutans* (Nyl.) M. Choisy s. str. For the time being, the present author prefers to keep *Aspicilia dominiana* as a separate taxon pending the results of the advertised, more detailed revision of the complex by Zakeri and coauthors.

****Bacidia arceutina* (EN)**

Srbsko: Bubovické vodopády waterfalls, 49°56'56"N, 14°09'14"E, on bark of *Acer platanoides*, alt. 303 m, 9. 4. 2016, Z. Palice 20780 (PRA).

***Bacidia circumspecta* (CR)**

Bubovice: Doutnác hill [433] - crest N of the summit covered by deciduous seminatural forest, 49°57'31.9"N, 14°09'14.2"E, on bark of *Quercus petraea*, alt. 422 m, 28. 3. 2020, Z. Palice 28730 (PRA, as *Scutula circumspecta*; Fig. 1).

Only one previous record, from Svatý Jan pod Skalou, exists from the Bohemian Karst (Svoboda et al. 2014).

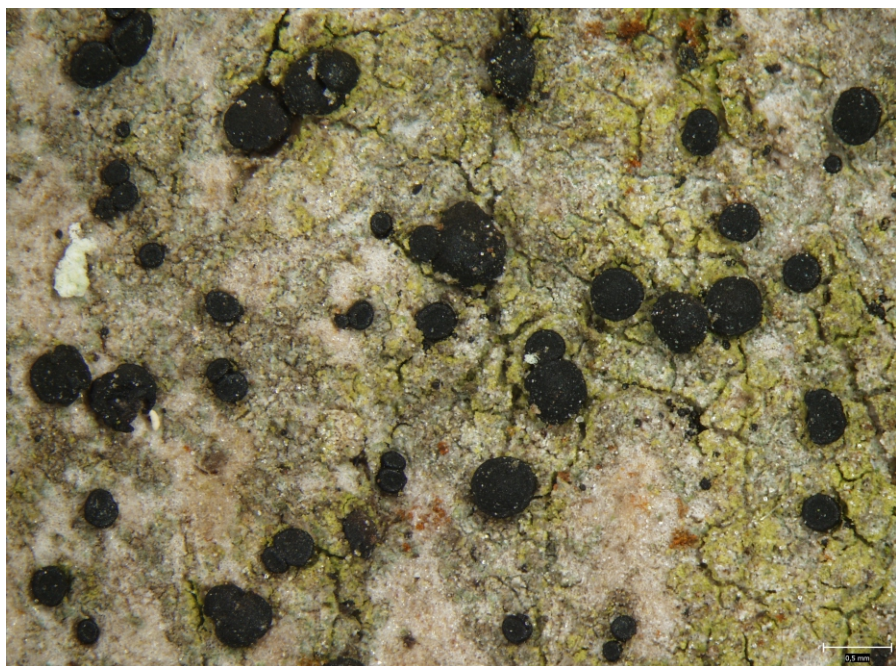


Fig. 1. *Bacidia circumspecta* is an endangered epiphytic lichen of the Czech lichen biota. In central Bohemia it has only a couple of localities.

Obr. 1. *Bacidia circumspecta* je ohroženým epifytickým druhem České republiky. Ve středních Čechách má pouze několik lokalit.

***Bacidia subincompta* (VU)**

Srbsko: valley near the Bubovické vodopády waterfalls, 49°56'55.5"N, 14°09'14.0"E, on bark of *Carpinus*, alt. 295 m, 23. 11. 2014, Z. Palice 18405 (PRA, as *Toniniopsis subincompta*).

This is a confirmation of this taxon, formerly collected at the same locality by O. Peksa on *Fagus* (Svoboda 2007a) but later mistakenly omitted from the checklist of the area (Svoboda et al. 2014).

***Bacidina egenula* (DD)**

Beroun: Damil - secondary scrub on a N-facing slope, 49°56'49.5"N, 14°04'43.5"E, on shaded stones half-immersed in trail-cutting, alt. 340 m, 29. 3. 2014, Z. Palice 17530 (PRA).

This record of this likely overlooked calcicolous pioneer species is only the second finding for the area. Recently, one specimen, collected by P. Czarnota in a limestone-quarry near the village of Karlštejn was listed as a Genbank voucher used in a phylogenetic analysis in a study describing *Bacidina mendax* as a new species (Czarnota & Guzew-Krzemińska 2018).

****Biatoridium monasteriense* (VU)**

Srbsko, Bubovické vodopády waterfalls, 49°56'56"N, 14°09'14"E, on bark of *Acer platanoides*, alt. 303 m, 9. 4. 2016, Z. Palice 20805 (PRA); Vonoklasy: valley of the stream Kluček, 49°56'43.7"N, 14°17'00.5"E, on bark of *Sambucus nigra*, + *Strigula affinis*, alt. 269 m, 5. 4. 2020, Z. Palice 28785 (PRA).

****Botryolepraria lesdainii* (NT)**

Srbsko: Bubovické vodopády waterfalls, W-facing overhanging rock wall, 49°56'54"N, 14°09'14"E, on slightly inclined seepaged limestone rock, alt. 295 m, 10. 7. 2014, Z. Palice 18176 (PRA).

****Caloplaca turkuensis* (DD)**

Srbsko: abandoned orchard just NE of the village in the direction of the Kubrychtova bouda chalet, 49°56'31.36"N, 14°08'34.48"E, on bark of *Malus*, alt. 243 m, 23. 11. 2014, Z. Palice 18936 (PRA).

This is a sterile specimen with delimited circular soralia corresponding to well developed specimens in the PRA herbarium.

****Candelaria pacifica* (-)**

Všeradice: alley in front of the cemetery, 49°52'37.9"N, 14°06'38.6"E, on bark of *Acer platanoides*, alt. 364 m, 12. 6. 2017, Z. Palice 23902 (PRA).

****Chaenotheca stemonea* (VU)**

Srbsko: Bubovické vodopády waterfalls, by a W-facing overhanging rock wall, 49°56'54"N, 14°09'14"E, on bark of old *Picea*, alt. 295 m, 10. 7. 2014, Z. Palice 18192 (PRA).

****Cladonia humilis* (DD)**

Srbsko: sand-pit quarry (Tertiary sediment load) just SE of the village, 49°56'00.5"N, 14°08'35.5"E, terricolous, alt. 255 m, 3. 6. 2017, Z. Palice 23862 (PRA).

The voucher specimen was tested by TLC (atranorin, fumarprotocetraric acid).

***Dirina stenhammari* (EN)**

Srbsko: rock outcrops just SE of the Bubovické vodopády waterfalls, S-facing slope, 49°56'51.7"N, 14°09'17.4"E, on a half-shaded, vertical, SE-facing rock face, alt. 300 m, 20. 5. 2017, Z. Palice 23736 (PRA).

Previously, Vondrák et al. (2007) recorded the species from two other localities within the area.

***Gyalecta subclausa* (DD)**

Srbsko: right bank of valley of the river Berounka between Srbsko and Karlštejn, small ravine 'Myší rokle' with a periodic stream, 49°55'45.4"N, 14°09'00.0"E, on shaded vertical to overhanging wet rock, alt. 230 m, 6. 4. 2013, Z. Palice 16283 (PRA; Fig. 2).

This is the specification of the voucher specimen reported by Špryňar et al. (2015). In the Czech Republic, this rare taxon of damp limestone rocks is otherwise known from only two historical localities in Moravia: Zkamenělé zámky near Litovel (Suza 1928) and Blansek in the Moravian Karst (Vězda 1959).

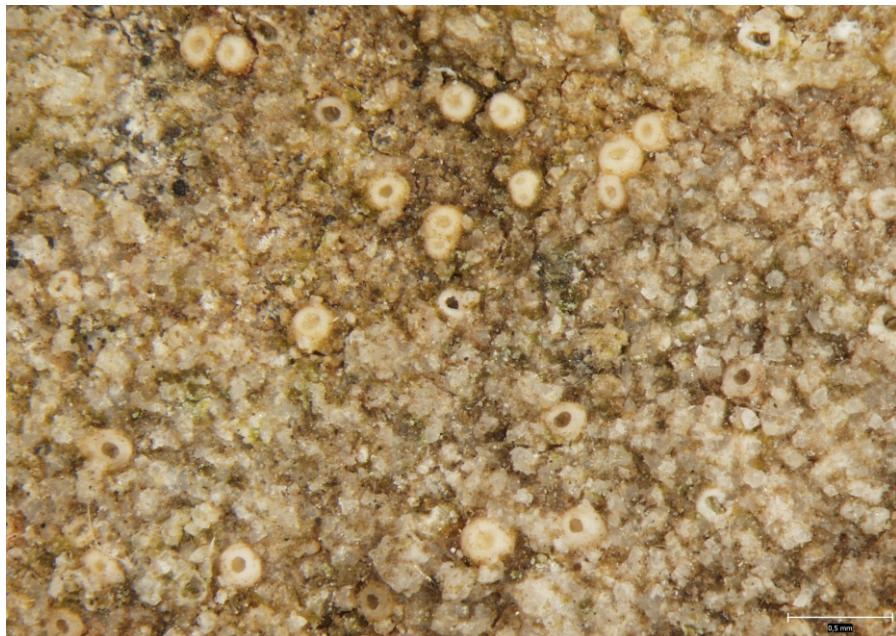


Fig. 2. *Gyalecta subclausa* is known from only three localities in the Czech Republic. This apparently relictual species is a characteristic inhabitant of sheltered damp calcareous overhangs.

Obr. 2. Druh *Gyalecta subclausa* je známý pouze ze tří lokalit v rámci České republiky. Tento zřejmě reliktní zástupce je charakteristickým obyvatelům chráněných vlhkých vápencových převisů.

****Lecania cyrtellina* (DD)**

Radotín: nature reserve Radotínské údolí, valley of the brook Radotínský potok upstream of the mill 'Taslarův mlýn' near the crossing of the red tourist trail, 49°59'50.1"N, 14°18'23.8"E, on bark of *Malus*, + *Alyxoria varia*, alt. 263 m, 20. 5. 2018, Z. Palice 25031 & J. Palicová (PRA).

****Lecania hutchinsiae* (DD)**

Srbsko: sand-pit quarry (Tertiary sediment load) just SE of the village, 49°55'57.7"N, 14°08'33.5"E, on dusty silicate pebbles on a moving sandy-slope, open sunny place, alt. 260 m, 3. 6. 2017, Z. Palice 23832 (PRA).

***Lecanora sambuci* (NT)**

Srbsko: Koda, margin of xerothermic deciduous forest on SSE-facing slopes above the brook Kodský potok, 49°55'58.1"N, 14°06'57.2"E, on bark of *Quercus pubescens*, + *Caloplaca raesaenii*, alt. 320 m, 1. 4. 2017, Z. Palice 26537 (PRA, as *Myrtolecia sambuci*).

The only previous record from the Bohemian Karst, by Svoboda (2007a), came from bark of *Sambucus nigra*.

***Myriospora heppii* (LC)**

Srbsko: right bank of valley of the river Berounka between Srbsko and Karlštejn, small ravine 'Myší rokle' with a periodic stream, 49°55'45.4"N, 14°09'00.0"E, on shaded vertical to overhanging wet rock, alt. 230 m, 6. 4. 2013, Z. Palice 16295 (PRA, as *Caeruleum heppii*).

This is the specification of the voucher specimen reported by Špryňar et al. (2015, as *Caeruleum heppii*).

***Phaeophyscia hirsuta* (CR)**

Srbsko: Koda, open steppe-like S-facing slopes above the brook Kodský potok, 49°56'03.5"N, 14°07'27.0"E, on exposed but sheltered limestone rock, alt. 370 m, 1. 4. 2017, Z. Palice 26404 (PRA); Srbsko, rock outcrops just SE-ESE of the Bubovické vodopády waterfalls, xerothermic vegetation on an open, S-SW-facing slope, 49°56'52.5"N, 14°09'17.0"E, on half-shaded, vertical, SE-facing rock (and over bryophytes), alt. 315 m, 20. 5. 2017, Z. Palice 23734 & 23749 (PRA).

The distribution of this species in the Czech Republic was summarized by Svoboda (2007b), who reported only two recent findings for the country: one from the Bohemian Karst and one from the Křivoklátsko region. Since then it was discovered in three additional localities in southern Moravia (Halda et al. 2017, Malíček & Vondrák 2018).

***Placynthium garovaglii* (EN)**

Srbsko: rock outcrops just SE-ESE of the Bubovické vodopády waterfalls, xerothermic vegetation on an open, S-SW-facing slope, 49°56'53.0"N, 14°09'17.9"E, in a fissure of a SE-facing limestone rock face, alt. 319 m, 20. 5. 2017, Z. Palice 23745 (PRA).

It has been recorded only twice in the Bohemian Karst (Svoboda 2007a, Svoboda et al. 2014). The cited voucher is sparse but fertile. Apothecia contain distinctly bent, 2-4 celled ascospores 24-27 × 5 µm in size.

***Placynthium hungaricum* (DD)**

Koněprusy: a small abandoned quarry near the bus stop 'Koněprusy, jeskyně', 49°54'48.9"N, 14°04'34.2"E, on vertical limestone rock, alt. 435 m, 11. 4. 2015, Z. Palice 20539 (PRA).

The species was introduced as a novelty for the Czech lichen biota by Svoboda (2007a). This is the third locality in the Bohemian Karst and at the same time in the Czech Republic.

***Porina linearis* (DD)**

The voucher of the specimen reported previously by Špryňar et al. (2015) is specified in Halda et al. (2017); however, the name of the ravine 'Myší rokle'

is not listed therein. Only a couple of records are known from the Czech Republic (see Halda et al. 2017).

****Staurothele rugulosa* (DD)**

Bubovice: Doutnác hill [433] - S-facing xerothermic slope, 49°57'18.2"N, 14°09'12.3"E, on loose limestone stone, + *Verrucaria nigrescens* agg., alt. 398 m, 28. 3. 2020, Z. Palice 28733 (PRA; Fig. 3).

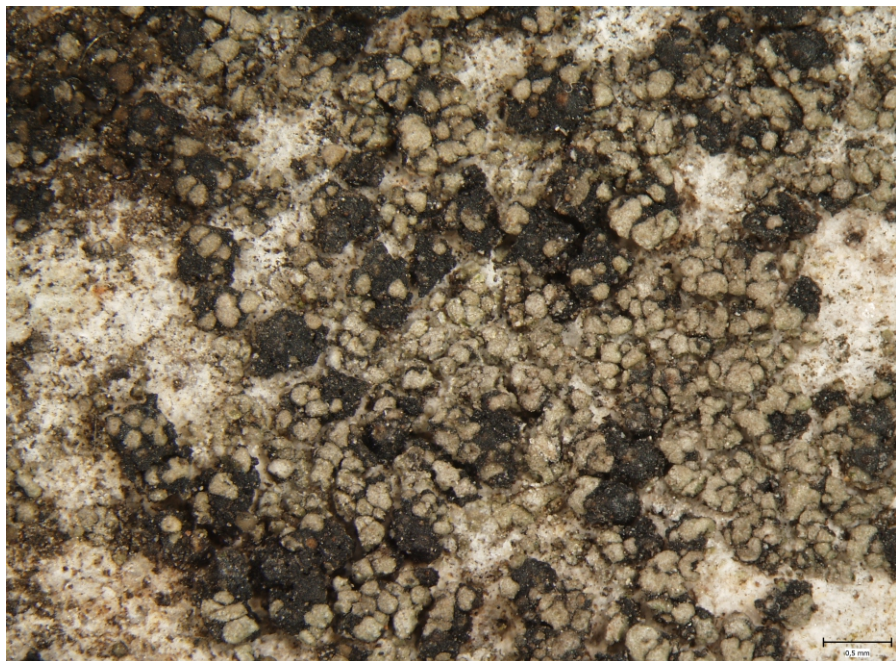


Fig. 3. In the Czech Republic, *Staurothele rugulosa* is a poorly known pioneer taxon of calcareous rocks. It produces distinct black perithecia, which are partly hidden below grey areoles of the thallus.

Obr. 3. V České republice je *Staurothele rugulosa* málo známým pionýrským druhem vápencových skal. Tvoří výrazná černá peritecia, která jsou zčásti skrytá pod šedými stélkovými areolami.

****Strigula affinis* (-)**

Srbsko: Berounka river valley, alluvial forest on the right bank of the river, just 150 m SW from the tourist trail-crossing 'V Kozle', 49°56'52.8"N, 14°07'33.4"E, on bark of *Salix alba*, alt. 220 m, 29. 3. 2014, Z. Palice 17529 (PRA); Vonoklasy: valley of the stream Kluček, 49°56'43.7"N, 14°17'00.5"E, on bark of *Sambucus nigra*, + *Biatoridium monasteriense*, alt. 269 m, 5. 4. 2020, Z. Palice 28786 (PRA; Fig. 4).

This species was only recently reported for the first time from the Czech Republic, namely from the alluvial forests at the confluence of the rivers Dyje and Morava in southern Moravia (see the supplementary list of the paper by Vondrák et al. 2016). The specimen ZP 17529 was part of a rich population which was the dominant of a large trunk of *Salix alba* from the

base to above eye level. Both perithecia and pycnidia are formed in a sample conforming well with the description by Roux & Sérusiaux (2004). On the other hand, the voucher ZP 28786 is quite fragmentary. A few pycnidia were detected in this sample, and it contains dozens of relatively large perithecia approaching 0.3 mm. The length of the measured ascospores reached 20 μm , so the possibility of misidentification of the similar taxon *Strigula jamesii* was excluded (cf. Roux & Sérusiaux 2004).

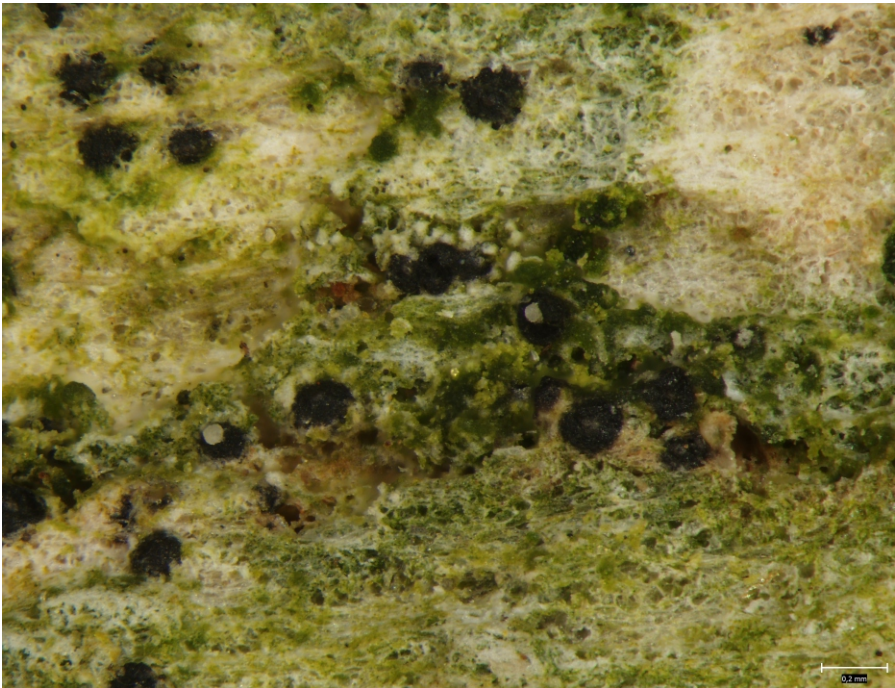


Fig. 4. *Strigula affinis*, an inconspicuous epiphytic species of subneutral bark, is known from only a few lowland localities in the Czech Republic. Its black perithecia and pycnidia, largely immersed in the substrate, are mutually almost indistinguishable without microscopy. This aberrant specimen shows bright green coverings on the picture that, however, do not belong to perithecia but represent non-symbiotic chlorococcoid algae.

Obr. 4. *Strigula affinis*, nenápadný druh rostoucí na dřevinách se subneutrální borkou, je známý z České republiky pouze z několika nížinných lokalit. Jeho černá peritecia a pyknidy, hluboce zanořené do substrátu, se nedají bez mikroskopování téměř rozpoznat. Tato netypická položka je pokryta sytě zelenými povlaky nesymbiotické zelené řasy, které nepatří k lišejníku.

***Thelenella muscorum* (VU)**

Srbsko: rock outcrops just SE–ESE of the Bubovické vodopády waterfalls, xerothermic vegetation on an open, S–SW-facing slope, 49°56'52.5"N, 14°09'17.0"E, on decaying bryophytes on half-shaded, vertical, SE-facing rock, alt. 315 m, 20. 5. 2017, Z. Palice 23743 (PRA).

This species was previously recorded in the area only once (Vondrák et al. 2007).

***Veздаea retigera* (DD)**

Srbsko: Koda, in the valley of the stream Kodský potok near a wooden bridge, 49°55'57.4"N, 14°07'07.4"E, on bark (incl. bryophytes) of *Fraxinus*, alt. 292 m, 1. 4. 2017, Z. Palice 24334 (PRA); Bubovice, N-foothill of Doutnác hill [433], deciduous forest, 49°57'44.7"N, 14°09'18.2"E, on mossy calcareous loamy soil along a forest trail, alt. 403 m, 15. 3. 2020, Z. Palice 28671 (PRA; Fig. 5).

The voucher ZP 28671 is richly fertile whereas the specimen ZP 24334 contains only gonioscysts. The sole previous record by Svoboda (2007a) comes from the area.

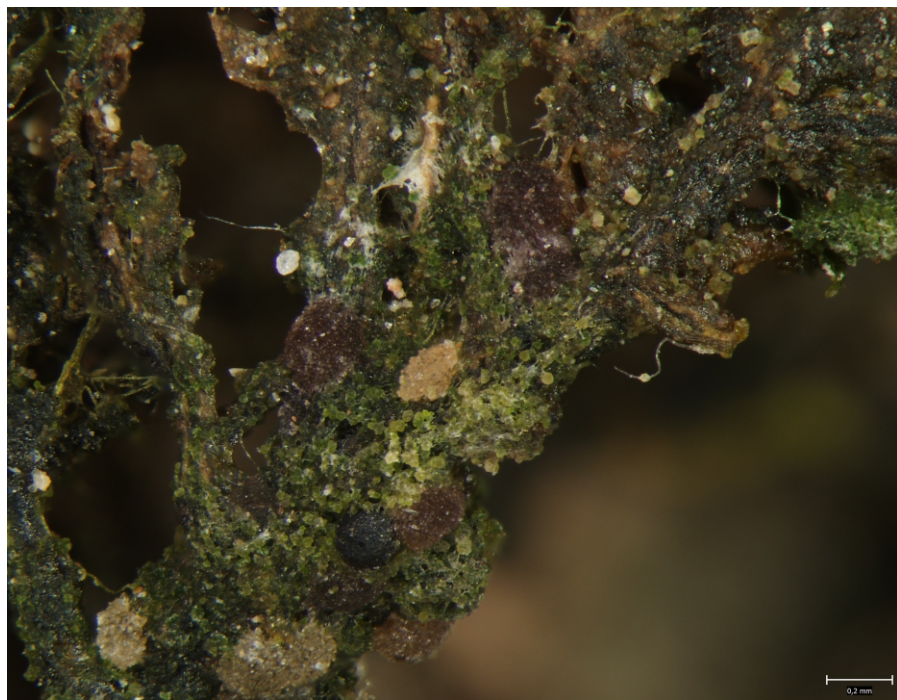


Fig. 5. *Veздаea retigera* is a delicate ephemeral species occupying a wide range of substrates, in this case overgrowing decaying shoots of a pleurocarpous moss. Except for one black perithecium of an unknown fungus, both young pale ascomata of this species and senescent ones (becoming reddish to brownish) are seen on the picture. The thallus formed by tiny dispersed yellowish-green gonioscysts is widely spreading. Moistened herbarium specimen.

Obř. 5. *Veздаea retigera* patří k malým efemérním druhům porůstajících široké spektrum substrátů, v tomto případě tlející lodyžky pleurokarpního mechu. Kromě jednoho černého peritecia neznámé houby je na snímku možné vidět jak mladé bledé, tak rovněž již zanikající červenavě-hnědavě zbarvené plodnice tohoto druhu. Stélka je tvořena drobnými žlutozelenými gonioscystami rozptýlenými po celé lodyžce. Navlhčená herbářová položka.

***Xanthoria sorediata* (EN)**

Srbsko: valley of the river Berounka between Srbsko and Karlštejn, N-facing rock outcrops above the river Berounka, 49°55'45.4"N, 14°09'01.4"E, on exposed limestone rock (S-exposition), alt. 255 m, 6. 4. 2013, Z. Palice 16482 (PRA).

This is the specification of the voucher specimen reported by Špryňar et al. (2015). Up-to-date records of this relict nitrophilous species from the Czech Republic exist for only two regions: conglomerate rocks in the valleys of the rivers Rokytná and Svatka in southern Moravia (Suza 1928, 1944) and the exposed chloritic gneiss/phyllite outcrop Petrovy kameny in the Hrubý Jeseník Mts (Suza 1929).

Overview of changes and additions pertaining to the lichen biota of the Bohemian Karst between 2015–2018 based on an excerpt of the literature

Changes to the checklist by Svoboda et al. (2014):

Acarospora nitrophila (sensu Wirth et al. 2013) → ***Acarospora praeruptorum*** H. Magn. [see Knudsen & Kocourková 2017] – Note: The respective material from the Bohemian Karst has not been revised by the authors and some specimens may belong to other taxa;

Aspicilia contorta (p.p., orig. sub *A. hoffmannii* auct. / *A. contorta* subsp. *hoffmanniana*) → ***Aspicilia hoffmanniana*** (R. Sant.) Cl. Roux & M. Bertrand, alternatively *Circinaria hoffmanniana* (R. Sant.) A. Nordin [see Roux et al. 2016] – Note: The reinstatement of the taxon distinguished at the level of species by earlier authors has, during recent decades, been subsumed under *A. contorta*. Both *A. contorta* s. str. and *A. hoffmanniana* occur in the area, see Svoboda (2007a), who dealt the two taxa at the subspecific level;

Aspicilia simoënsis → ***Aspicilia cinerea*** [see Šoun et al. 2016];

Bacidina neosquamulosa (auct. bohem.) → ***Bacidina mendax*** [see Czarnota & Guzow-Krzemińska 2018];

Protoblastenia calva (incl. *P. siebenhaariana*) → ***Protoblastenia lilacina*** [see Malíček et al. 2018b].

Additions to the checklist by Svoboda et al. (2014): ***Acarospora sphaerosperma*** [Knudsen & Kocourková 2016; as *Acarospora oligospora* in Špryňar et al. 2015], ***Bacidina egenula*** [Czarnota & Guzow-Krzemińska 2018], ***Caloplaca microstepposa*** [Frolov et al. 2016; paratype of the newly described species], ***Gyalecta subclausa*** [Špryňar et al. 2015], ***Metamelanea caesiella*** [Prieto et al. 2015], ***Myriolecis perpruinosa*** [Malíček et al. 2018b], ***Porina linearis*** [Špryňar et al. 2015], ***Psorotichia diffracta*** [Halda et al. 2017], ***Punctelia borreri*** [Šoun et al. 2017], ***Xanthoria sorediata*** [Špryňar et al. 2015].

CONCLUSIONS

Based on selected discoveries of lichens by the author and an excerpt of the recent literature, the current number of species known from the Bohemian Karst has risen to 461. Because no intensive or targeted research has been conducted by lichenologists in this area in recent years and the presented records were obtained more or less 'accidentally', the actual species diversity is expected to be much greater. Focused research in specific habitats, targeted hunting for members of some promising taxonomic groups and intensification of inventories in small areas would considerably enhance the knowledge on the diversity of the local lichen biota.

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