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LIŠEJNÍKY LEDOVCOVÉHO KARU VELKÁ KOTLINA V HRUBÉM JESENÍKU

Lichens of the Velká kotlina glacial cirque in the Hrubý Jeseník Mts. (Grossen Kessel, Hohe Gesenke)[1]

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Abstrakt: Vlastním průzkumem a excerpcí literárních zdrojů bylo ve Velké kotlině zjištěno 233 druhů lišejníků a 3 druhy lichenikolních hub. Recentně byly potvrzeny dlouho neověřené *Cladonia decorticata, Gyalecta kukriensis* a *Porina mammilosa*. Zaznamenáno bylo několik kriticky ohrožených druhů (*Collema glebulentum, Peltigera leucophlebia, P. malacea, P. venosa, Protopannaria pezizoides* a *Thelopsis melathelia*). Nově byly v kotlině nalezeny např. *Bacidina phacodes, Henrica melaspora, Peltigera lepidophora, P. polydactylon, Polyblastia peminosa, Porina grandis, Porocyphus coccodes, Protothelenella sphinctrinoidella, Solorina saccata, Staurothele fissa, Verrucaria dolosa, V. margacea*. Přesně byly lokalizovány lokality s výskytem bazifilních druhů. Druhy *Collemopsidium angermannicum, Rinodina fimbriata* a *Sporodictyon terrestre* jsou pro ČR nové. Dalším přírůstkem červeného seznamu lišejníků a novým druhem pro ČR je mikrolišejník *Atla alpina* rostoucí na skalce pod Vřesovou studánkou na Červené hoře v Jeseníkách.

Abstract: 233 species of lichens and 3 lichenicolous fungi were found in the Velká kotlina glacial cirque by research and excerption of the published data. Recently, unverified *Cladonia decorticata, Gyalecta kukriensis* and *Porina mammilosa* were confirmed. Several critically endangered species (*Collema glebulentum, Peltigera leucophlebia, P. malacea, P. venosa, Protopannaria pezizoides* and *Thelopsis melathelia*) were recorded. Also more noteworthy lichens *Bacidina phacodes, Henrica melaspora, Peltigera lepidophora, P. polydactylon, Polyblastia peminosa, Porina grandis, Porocyphus coccodes, Protothelenella sphinctrinoidella, Solorina saccata, Staurothele fissa, Verrucaria dolosa, V. margacea* were collected. Localities with the occurrence of calciphilous species were precisely located. Lichens *Collemopsidium angermannicum, Rinodina fimbriata* and *Sporodictyon terrestre* are new to the Czech Republic. Another contribution to the red list of lichens of the Czech Republic is the microlichen *Atla alpina* growing on the rock under Vřesová studánka on Červená hora in the Jeseníky Mts. It is also new lichen species to the Czech Republic.

INTRODUCTION

The Velká kotlina glacial cirque (fig. 22) is one of the most interesting lichenological sites in Europe. As exceptional and with regard to the state of the surrounding nature, a well-preserved and protected restricted area was discovered by researchers at the beginning of the 20th century (Laus 1910). That is why the inventory of lichens was sporadic and the site was not systematically processed in the lichenological field.

The unique glacier cirque is a part of the rugged mountain range of Hrubý Jeseník, formed by ice-cold icebergs of the last ice age. The largest nature reserve Praděd (2031 ha),

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where the Velká kotlina is located, belongs to the cadastral territories of Bruntál District. The altitude of the site (altitude 1100–1400 m asl, average annual temperature 1.2 ° C) and a number of diverse habitats (mountain meadows, dry rocks, cold springs, pools, wetlands) put the cirque among one of the richest botanical sites in Central Europe (Velká kotlina – botanical garden of Jeseníky, 480 species of vascular plants (Bureš & Burešová 1989), 300 species of bryophytes, 233 species of lichens). We can find endemic species such as *Plantago atrata* subsp. *sudetica* and *Dianthus carthusianorum* subsp. *sudeticus*, critically endangered species of *Crepis sibirica, Conioselinum tataricum, Aster alpinus* or *Carex vaginata*. Endemic are also butterflies *Erebia sudetica sudetica* and *Pithanus hrabei*. Among the rare inhabitants of the Velká kotlina are *Anthus spinoletta* and *Sicista betulina*. Herds of the mountain chamois graze on the forest-free area of the Vysoká hole Mt are the subject of the disputes. The area of the Velká kotlina is protected since 1955 when the National Nature Reserve Velká kotlina (225 ha) was established. Since 2000 it has been part of National Nature Reserve Praděd.

The geological structure of the Hrubý Jeseník Mts. is very complicated and extremely variable. Igneous, sedimentary and metamorphic rocks occur in the mountain region. The peak of Praděd Mt. and Petrovy kameny rocks are formed by a chloritic gneiss. In the Velká kotlina, schist (with various dopants, including carbonates) and uncharted limestone metatufs predominate (Novotný & Bureš 2018), rarely metabasalts, metaquartzite and secretive quartz stand out in more places. Quartz-carbonate veins are relatively frequent in the schist, which together with the above-mentioned calcareous phyllites and calcium metatufs are the main sources of calcium. Therefore, often both calciphilous species and species strictly bound to siliceous substrate grow together in a single habitat. Relief of the the Velká kotlina cirque forms a variety of surface forms – rock walls, flat slopes, scraps and troughs. Forest-free area in the central part of the cirque has been formed by avalanche and water erosion. Irregularly descending avalanches significantly affect the microclimatic conditions in the cirque. Reports about avalanches are known from the beginning of the last century. An one-hectare area of an old spruce forest was swept in the valley by avalanche in 1893 (Laus 1910). A layer of snow reaching up to 10 m in the Wimmer and the Grabowski Gullies cools lower parts of the circque and supplies water during the greater part of the season. That is why the largest number of arcto-alpine species survives in this part of the cirque (Bureš & Burešová 1989, Šafář & al. 2003).

HISTORY OF EXPLORING THE AREA

Due to the remoteness, inaccessibility and the heterogenity of the cirque, it has not yet been possible to survey the entire area systematically. The first explorers publishing lichenological data from Praděd Mt. and its surroundings were Gustav von Körber (Körber 1855) and Bertold Stein (1879, 1889) from Wroclaw and Friedrich August Kolenati (1860) from Prague. To the researchers exploring the region at the end of the 19th and the beginning of the 20th century belong Josef Anders (1899), Eugen Eitner (1896, 1901, 1911), Alfred Hilitzer (1927), Johann Hruby (1914), Filip Kovář (1908), Josef Nádvorník (1947), Miroslav Servít (1951, 1954), Václav Spitzner (1890a, b), Jindřich Suza (1929). In the second half of the 20th century Antonín Vězda (1960b, 1961) and Jiří Müller (1952) visited the Velká kotlina cirque several times. At the beginning of the 21st century the Velká kotlina cirque was searched by several lichenologist (Halda 2009, 2013, Halda & Bouda 2008, Halda & Palice 2008, Malíček 2014, Vondrák & Malíček 2015).

The data published from the beginning of the 20th century show the occurrence of extinct forest epiphytes in the Czech Republic, such as *Lobaria pulmonaria, Nephroma resupinatum* or *Usnea longissima* (Kovář 1908, Eitner 1911) . The rugged mountain climate, along with rugged terrain and diverse habitats explains the presence of narrowly specialized lichens (*Lecanactis dilleniana, Thelopsis melathelia*). Mountain calciphilous species growing under the overhangs, where the water enriches the acidic substrate with calcium, belong to the rarest species of the Velká kotlina cirque.

Most of papers mentioned above include data from the rocks of the Vitásek Ravine, the most famous part of the Velká kotlina cirque. The recent survey of lichens in the locality was carried out in 2007–2013 (Halda 2013) and in 2017 when other parts of the cirque were explored (Grabowski Gully, Kruťa Rock, Kettner Rock, Šmarda Wall, Kolenati Rocks, Petřík Rock, Podpěra Rock, Suza Wall, Hilitzer Rock and partly also Roemer Outcrops).

METHODS

According to the orthophoto map, the most remarkable rock formations and banks of streams were selected for the survey. Map 1 shows their location. Phyllites and calcareous metatuffs prevail at the locality. The calcium content of the substrate was tested in the field by reaction with 10% HCl. Sampling of specimens necessary for microscopic determination was performed within 7 days (from 21. 9. 2007 to 21. 8. 2017). Almost 300 samples were collected at 62 localities, later stored in the herbarium of the Museum of Natural History in Šumperk (SUM). 970 records of lichen occurrences were recorded. Latin names of lichens were unified according to the work of Liška & Palice 2010. Thanks to the excellent local toponymy of the cirque (Jeník, Bureš & Burešová 1983 , Bureš & Burešová 1989, Bureš 2013: 313), significant lichen species of many different habitats could be precisely located.

RESULTS

Up to now, 233 species of lichens have been known from the Velká kotlina cirque (see list in the table). Lichens of a rocky substrate and those growing on humus layer predominate whereas epiphytic lichenes were observed less often.

Grabowski Gully [Grabowského žleb]

Silicate rocks in the Grabowski gully in the northern part of the cirque are inhabited by lichens typical for silicate rocks in mountain areas (*Acarospora badiofusca, A. fuscata, Aspicilia caesiocinerea, Aspicilia cinerea, Aspicilia laevata, Bacidina inundata, Collemopsidium angermannicum, Fuscidea austera, F. kochiana, Lecanora intricata, L. polytropa, L. rupicola, Lecidea confluens, L. lapicida, L. lithophila, L. plana, Peltigera leucophlebia, Pleopsidium chlorophanum, Rhizocarpon reductum, Sporodictyon cruentum, Thelidium methorium, Verrucaria funckii*). In some places there is the silicate substrate enriched by calcium. The occurrence of common calciphilous lichens *Caloplaca chrysodeta, Lecanora dispersa, L. saxicola, Lepraria vouauxii, Physcia dubia* and *Thelidium methorium* is common. There are also freshwater lichens relatively abundant, such as *Aspicilia laevata, Bacidina inundata, Collemopsidium angermannicum, Sporodictyon cruentum* and *Verrucaria funckii*. Only in the Grabowski Gully there the arcto-alpine species *Miriquidica garovaglioi* was found.

Kolenati Rocks [Kolenatiho skály]

Rocks located south of the Grabowski žleb gully are partly enriched with calcium. In addition to common species known from siliceous rocks (*Aspicilia caesiocinerea, Lecanora rupicola, Micarea lignaria, Opegrapha gyrocarpa, Porpidia crustulata, Schaereria cinereorufa, Umbilicaria deusta* and *U. hirsuta*), calciphilous species *Lecidella carpathica, Lepraria vouauxii* and *Thelidium methorium* have also been found. The occurrence of the mountain species *Lecanora epanora, Pleopsidium chlorophanum* and *Porina grandis* is significant for the site. Shady places are often colonized by *Peltigera polydactylon* and rock bases by *Aspicilia laevata, Micarea lignaria, Opegrapha gyrocarpa* and *Sporodictyon cruentum*.

Šmarda Wall [Šmardova stěna]

The massive brown-black rock wall at the foot is covered with dripping water throughout the season. That is why there are many freshwater lichens, such as *Dermatocarpon luridum, Porina lectissima, Porocyphus coccodes, Porpidia ochrolemma, Rhizocarpon lavatum, Sporodictyon cruentum* and *Thelidium methorium. Verrucaria dolosa* and *V. margacea* grow occasionally in shaded crevices. The reddish rocks are colonized by the strikingly reddish ferrophilous lichens *Acarospora sinopica* and *Lecidea silacea.* The microlichens *Lecidea hypnorum* and *Protothelenella sphinctrinoidella* overgrowing bryophytes were recorded. In several places, the presence of *Lecidella carpathica* and *Thelidium methorium* is caused by content of calcium in rocks. To the most common species of the phyllite rock belong *Acarospora fuscata, A. smaragdula, Arthrorhaphis citrinella, Lecanora epanora, L. soralifera, Micarea lignaria, Pertusaria lactea, Porpidia crustulata, Rhizocarpon reductum* and *Verrucaria dolosa.*

Vitásek Ravine [Vitáskova rokle]

More than 100m long ravine in the steep slope provides the richest locality; therefore it is the most visited site in the Velká kotlina cirque. Many notable lichens grow in the system of phyllitic rock overhangs and slits with calcareous metatuffs content: *Belonia russula, Bilimbia lobulata, Caloplaca subalpina, Collema glebulentum, Fuscopannaria praetermissa, Gyalecta kukriensis, Henrica melaspora, Lecanactis dilleniana, Lecanora epanora, Lecidea hypnorum, Lecidoma demissum, Mycobilimbia tetramera, Peltigera leucophlebia, P. venosa, Polysporina lapponica, Porpidia speirea, Protopannaria pezizoides, Protoparmelia nephaea, Rinodina mniarea, Solorina saccata, Sporodictyon terrestre, Staurothele fissa, Thelidium methorium, T. papulare, Thelopsis melathelia* and *Vahliella leucophaea.* An extraordinary number of rare species in the Vitásek Ravine were commented on by lichenologists several times (Eitner 1911, Kovář 1908, Laus 1910, Hilitzer 1927, Suza 1928, Vězda 1959, Pišút 1967, 1969). There are not many rock outcrops enriched with calcium in the Eastern and the High Sudetes at similar altitudes. All of them are smaller than the rock formations in the Vitásek Ravine. Poorly known Vicherek Rocks at the NE slope of Jelení hřbet Mt. (Vězda 1960b), the rock at Červená hora Mt. in the Hrubý Jeseník Mts., by the older authors called Studénková hole – Brünnelheide (Hilitzer 1927, Suza 1929, Vězda 1960b), the mouth of an old mine gallery in the Velká Kotelná jáma in the Krkonoše Mountains and the basalt vein in the Malá Sněžná jáma – Kleine Schnee Grube in the Krkonoše Mts – Giant Mountains.

Becke Rocks [Beckeho skály]

Some time ago, a rare species *Caloplaca subalpina* specializing in calcium-enriched phyllite rocks was found on Becke Rocks (Vondrák et al. 2008).

Podpěra Rock [Podpěrova skála]

The Vitásek Ravine is adjacent to the southern side of Podpěra Rock. It is made up by more powerful quartz-carbonate veins. The bare soil in rock crevices is inhabited by the arctic-alpine species *Lecidoma demissum* and common *Peltigera rufescens.* The water-saturated surface of the rocks is covered with micro-lichens *Sporodictyon cruentum, Staurothele fissa* and *Verrucaria dolosa.* The species *Acarospora nitrophila* and *Lecanora orosthea* were observed in the drier parts.

Suza Wall [Suzova stěna]

The monumental wall is formed from phyllite and carbonate extrusions with quartz. Also here an effect of calcareous tuff impact on the species composition. It allows the occurrence of lichens unknown from the rest of the cirque. *Agonimia tristicula, Gyalecta jenensis, Lecidea hypnorum, Placidium rufescens* (fig. 12) and *Placopyrenium fuscellum* were reported quite often. *Aspicilia laevata, Dermatocarpon luridum, Rinodina fimbriata, Staurothele fissa* (fig. 19), *Verrucaria*

aquatilis, V. dolosa and *V. margacea* were observed at the edges of the irrigated rock cracks. The micro-lichen *Rinodina fimbriata* was found in the avalanche gully of Suza Wall as new to the Czech Republic. It grows on rocks flowed down by the precipitous water.

Hilitzer Rock [Hilitzerova skála]

The species diversity both of the Hilitzer Rock, difficult to reach rock formation in the western part of the cirque, and the Vitásek Ravine is comparable. Thanks to the basic metatuff impact, the rare mountain calciphilous lichens *Porina mammilosa, Porpidia spereia, Rhizocarpon disporum, Thelidium methorium, Thelopsis melathelia* and *Vahliella leucophaea* can survive here. *Dermatocarpon luridum, Porina lectissima, Rhizocarpon luridum* and *Sporodictyon cruentum* predominate on phyllite. *Placidium rufescens* appears in the slopes of the rocks.

Roemer Outcrops [Roemerovy výchozy]

The rocky outcrops protected by the slope represent the westernmost and not much explored part of the Velká kotlina cirque. *Placidium rufescens* was found in the slopes of calcareous metatuffs. Rarely occurring species is *Lecidea hypnorum. Porina lectissima* and *Rhizocarpon disporum* occur more commonly.

NOTEWORTHY LICHENS

Atla alpina S. Savić & Tibell (Fig. 1)

Thallus is composed of grey to whitish to grey verrucose crust. Ascomata are not covered by thalline collar. Perithecioid ascomata are black, slightly immersed on base (0.7–0.9 mm in diam.). Involucrellum rough at the surface without distinctly depressed ostiolum and not diverging towards the base. Eight dark brown muriform spores mature in asci (65–85 × 30–50 µm). Lichen grows on calcareous and calcium enriched rocks in mountains from subalpine to high alpine belt in Austria, Germany and Scandinavian countries (Savić &Tibell 2008a, Hafellner 2010, Moberg & al. 2017). *Henrica melaspora* differs with smaller ascospores (28–36 × 15–20 µm) and occurence on schist. *Sporodictyon schaererianum* also produces dark ascospores (63–73 × 33–40 µm) and grows on calcium enriched substrata but ascomata are covered by irregular pathes of thallus.

Locality: on the rocks above the Vřesová studánka on the Červená hora Mt., N50°08'44,71" E017°08'08,47", 1305 m, leg. J. Halda & M. Zmrhalová 16. 10. 2007 (JPH16493, 16503).

Belonia russula (Fig. 2)

Lichen forms a grainy to nodular, rusty brown thallus. Photobiont is an orange alga *Trentepohlia.* Partly immersed perithecia of the same color are in the size of 250–600 µm. The ostiolum of mature ascomata is dark to brown-black. Under ideal conditions, ascomata are seen as small warts (0.4–0.6 mm in diameter). The ascus develops eight colourless needle spores (75–100 × 3–6 µm), divided by 10–20 transverse septa. Lichen grows on vertical, damp, shaded walls under rock overhangs and in sheltered crevices of acidic rocks enriched with calcium or magnesium . In the Jeseníky Mts. it grows under the overhangs of the phyllite rocks in the upper part of the Vitásek Ravine in the Velká kotlina cirque. It is also known from the rocks above the Vřesová studánka on Červená hora Mt. and from the „Vicherek Rocks" at the north-east slope of Jelení hřbet Mt. It is also known from the Krkonoše Mts. from the Velká Kotelná, Čertova zahrádka and the Malá Sněžná jáma. Recently, it was found from several locations in the Slavkovský les (West Bohemia, Peksa 2011). A related terricolous arcto-alpine species *B. incarnata* known from nearby Petrovy kameny (locate between Praděd Mt. and Velká kotlina cirque) is distinguished by the

color of the thallus (white), the ascomata (pink to light brown) and the presence of a different photobiont (*Trebouxia*). *B. incarnata* has not been found in the Velká kotlina cirque until now. The calciphilous arcto-alpine species *Leucocarpia biatorella* (Fig. 11.) is almost indistinguishable from *B. incarnata* without microscope. Its thallus also colonizes humus and bryophytes, but it chooses calcium-enriched substrates. It can be distinguished by the absence of paraphyses in asci, a different structure of the ascus and the shape and size of the ascospores (28–39 × 10–12 µm, Vězda 1968). Due to the limited number of suitable localities for *Leucocarpia biatorella*, our site was found on a single rock above the Vřesová studánka at Červená hora Mt. (Halda & Palice 2008). It is more abundant in the Alps and the Carpathians (Berger et al 1998, Kiszka & Koscielniak 2006).

Bilimbia lobulata

The lichen forms a finely squamulose gray-white thalus overgrowing bryophytes and humus in mountainous areas (arcto-alpine species). The squamules (0.2–1 mm in diameter) are lighter at the margin. A waxy beige to a light brown hemispheric ascomata grow up from thallus (0.3–1mm in diameter). Asci produce eight colourless, fusiform, 3-7 septate ascospores (14–20 × 3–5 µm). Lichens grow also rarely like epiphytes in preserved forest stands. The species was recorded by the Kovář (1908) from the beech tree in the lower forested part of the cirque. Recent collections from the Vitásek Ravine belonged to *Bilimbia sabuletorum*. Recently *B. lobulata* was also found at Šumárník Mt. in the Jeseníky Mts (Malíček 2014). The calciphilous *Bilimbia sabuletorum* (fig. 3.) is distinguished by the presence on limestone rocks, larger spores and smaller squamules.

Additional locality of *Bilimbia sabuletorum*: Jeseníky Mts., Červená hora Mt., rocks above Vřesová studánka, N50°08'44,71" E017°08'08,47", 1305 m, leg. J. Halda & M. Zmrhalová 16. 10. 2007 (JPH16500, Fig. 3) together with *Atla alpina, Agonimia tristicula, A. globulifera, Caloplaca stillicidorum, Leptogium subtile, Leucocarpia biatorella, Sporodictyon schaererianum* and *Thelopsis melathelia*.

Caloplaca subalpina

Recently to science described inconspicuous microlichen creates a gray, cracked, crustose thallus, and rarely also occipital forming apothecia. Under the conditions of Central Europe, it was found under the rock overhangs of calcium-enriched phyllite rocks in mountain cirques. In the Vitásek Ravine, it grows usually in calcium-enriched rock crevices together with *Caloplaca arenaria, C. obliterans, C. saxicola* s. l. and *Physcia dubia* (Vondrák et al. 2008).

Collema glebulentum (Fig. 4)

Lichen belongs to the cyanolichens (photobiont *Nostoc*). It forms small (3 cm in diameter) greenish rosettes composed by small lobes 3–8 mm wide. Spherical isidia grow from the surface of the lobes. With time, the isidia create a rough crust on the thallus surface. In Central Europe, ascomata have not been reported. The arctic-alpine species grows on dripping or flooded calcium-enriched phyllite rocks in mountain areas. In the Czech Republic it was only found in the Velká kotlina cirque and the „Vicherek Rocks" at the north-east slope of Jelení hřbet Mt. (Vězda 1960a, b), and within the Sudetes it is known only from the castle Kynast near Jelenia Gora on the Polish side of the Krkonoše Mts. (Degelius 1954). Similar species *C. flaccidum* and *C. subflaccidum* are distinguished by the different shape of isidia (Pišút 1967). A. Vězda and J. Müller recorded this species in the rock crevices, under overhangs of phyllite rocks in the lower part of the Vitásek Ravine (Pišút 1967).

Collemopsidium angermannicum (Fig. 6)

Lichen creates a slight dark brown thallus. The cells of the photobiont (cyanobacteria) have a spherical to slightly elongated shape. Perithecia remain partially immersed in the

thallus. Their size is 120–300 µm in average and they are not covered by an involucrellum. The asci produce eight colourless spores divided by one septum (17–26 × 6–12 µm). The upper spore cell is larger than the lower one. Pycnidia are partly immersed in the thallus. They release short conidia (3 x 1 µm). Lichen grows on periodically flooded acidic rocks on shores of streams and rivers. It grows in Europe, Asia, Central and North America (Orange 2008). In the Czech Republic it was considered extinct. The only historical records comes from 1890 by E. Bayer, who collected the lichen in the Kamenný potok creek at Chotěboř (Servít 1955). Micro-lichen grows on the wet phyllite rock in the Grabowski Gully.

Additional localities: Orlické hory Mts., Nature reserve Zemská brána, N50°08'28,257"N E016°34'35,43", on inundated siliceous rock on the bank of Divoká Orlice river, 550 m, leg. J. Halda & O. Peksa, 3. 8. 2010 (JPH7598). Krkonoše National Park, Labský důl, Navorská jáma, N50°46'02,31" E015°33'01,67", on inundate granite rock, 1122 m, leg. J. Halda, 14. 8. 2017 (JPH15806).

Gyalecta kukriensis (Fig. 7)

The lichen forms an epilitic, crustose, gray-brown to ocher, areolate thallus, from which the ochre apothecia (0.3–0.5 mm in diameter) grow. The lower part of the ascoma remains in the thallus. The edges of apothecia are radially cracked. The photobiont is the orange-colored green alga *Trentepohlia*. The mature asci produce eight colourless, multi-cellular spores (18–25 × 5–7 µm) stretched at both ends into a blunt spike. The lichen was for the first time discovered at diabases in Karelia on the island of Kukri (Räsänen 1927). In the Czech Republic it is known only from Velká Kotelná jáma in Krkonoše Mts. (Hilitzer 1927) and from the Vitásek Ravine in the Hrubý Jeseník Mts. (Vězda 1958). A more abundant and more conspicuous species is *G. jenensis* especially on calcium-enriched metatuffs beneath the Firbas Slant.

Henrica melaspora (Fig. 8)

The lichen forms an epilitic, white, verrucose thallus to 0.2 mm thick. Globose black perithecia (0.5–0.8 mm in diam.) are prominent and not covered by thallus layer. Involucrellum protect all body of the perithecium. Asci produce 8 dark brown muriform ascospores (28–36 × 15–20 µm). *H. melaspora* is known from Scandinavia, the British Isles, from mountains in central and southern Europe and Greenland. At a locality in northern Sweden (Savić & Tibell 2008b), *H. melaspora* grows together with Thelopsis melathelia and *Collema glebulentum* similarly to the Velká cirque in the Hrubý Jeseníky Mts. The lichenologists Stein (1879), Novák (1888), Kuťák (1926), Migula (1929), Servít (1954) recorded the species in Velká Kotelná jáma and Obří důl in the Krkonoše Mts. together with *Sporodictyon schaererianum*. Recently it grows on calcium enriched quarzite rock in Vitásek Ravine in the Velká kotlina cirque. *H. melaspora* differs from species of *Sporodictyon* by absence of thallus collar covering the perithecia and smaller ascospores (51–68 × 26–34 µm in *S. cruentum*). Other similar species *Atla alpina* and *A. wheldonii* also produce bigger ascospores (more than 60 µm).

Lecanactis dilleniana

The lichen has a yellow-green crustose thallus. The brown-black lenticular apothecia and the thallus margin tend to be pruinose in the dry state. Photobiont is *Trentepohlia*. Eight spindle ascospores (25–27 × 4–5 µm) are developed in asci. It grows in calcium-enriched rock slits. In the Czech Republic it is famous from the Čertova zahrádka and the Malá Sněžná jáma cirque in the Krkonoše Mts., Buková Mt. in the Jizerské hory Mts. and the Vitásek Ravine in the Velká kotlina cirque in the Hrubý Jeseník Mts. (Vězda 1960b).

Lecanora epanora (Fig. 9)

The thallus is a crustose, granulose to areolate, yellowish to dark green. Pale yellow soralia (0.2–0.5 mm in diameter) grow from the areoles which in older thallus form a coherent layer. The yellowish-brown apothecia are rarely formed (0.5–1.5 mm in diameter). Asci release eight colourless unicellular ascospores (8–12 × 5–6 µm). The thallus contains epanorin, rhizocarpic acid (UV+ light orange) and zeorin (Smith et al. 2009). Lichens colonize ferriferous rocks. In the Krkonoše Mts., it is known from the valley of the Rudný potok in the Obří důl cirque. It was recently recorded in the Krušné hory Mts. (Halda & Uhlík 2011), it is a long-known species from the Vitásek Ravine in the Velká kotlina, where it accompanies *Acarospora sinopica* and *Lecanora subaurea* (Suza 1929).

Lecidea hypnorum (Fig. 10)

The lichen produces a gray, granular, furry thallus overgrowing mosses. Bowl-shaped brown apothecia (0.6–1.2 mm in diameter) grow individually or in small groups sitting tightly to the thallus. Colourless oval ascospores can be divided by 1–3 compartments and covered with an epispore (10–16 × 4–6 µm) on a surface. The thallus is UV + white. Grows in mountain areas. In Jeseníky Mts., it is a long-known species on bryophytes in the Vitásek Ravine in the Velká kotlina (Kovář 1908, Vězda 1960b, Halda 2013), where it grows together with *Protopannaria pezizoides, Sporodictyon terrestre* and *Thelopsis melathelia*. It was recently recorded on mosses on rock above the Vřesová studánka on Červená hora Mt. (Malíček 2014).

Lecidoma demissum

Lichen creates light to dark brown thallus (5–15 cm in diameter) consisting of crowded, inflated small squamules (1–2 mm in diameter). Round, round-eyed apothecia (0.5–2 mm in diameter) are closely adjacent to the thallus. The eight unicellular oval spores (12–16 × 5–7 µm) mature in asci. It grows on humus and bare soil in the woods in the highest positions of our mountains (arcto-alpine species), most in the Krkonoše Mts. and also in the Slavkovský les Mts. It is known in the the Hrubý Jeseník Mts. from Tabulové kameny at Praděd Mt. and in the Velká kotlina cirque, where it still survives on humus in slopes of rocks on Podpěra Rock. *Placynthiella oligotropha* is distinguished by a granularly warty, brown to yellow-brown thallus composed by goniocysts. *Trapeliopsis granulosa* forms a light gray nipple thallus and striking pink apothecia.

Mycobilimbia tetramera

The lichen creates a gray-green, granular, verrucous thallus. Grey to red-brown hemisherical apothecia (0.4–1.3 mm in diameter) are noticeably occluded at the base, they are lighter at the edge. Colorless acicular ascospores (17–22 × 5–7 µm, 3–septate, 8 spores in ascus). The species grows on bryophytes and humus in mountain areas. From the Czech Republic, it was reported from Sněžka Mt. (Krkonoše Mts., Eitner 1896) and Velká kotlina cirque (Vězda 1960b) in the past. However, it has not been recently confirmed from Velká kotlina. The more common *Bilimbia sabuletorum* is distinguished by lighter apothecia and longer spores with 3–7 septa (18–40 × 5–8 µm).

Peltigera leucophlebia

Lichen forms a deep green thallus (20–25 cm in diameter) composed by wide lobes (2–4 cm). The lobes are noticeably curled at the edges and slightly bent upward. Photobiont is green algae (*Coccomyxa*). Unbranched rhizines concolorous with the veins. The special feature is the presence of cephalodia, brown nodules firmly entangled to the surface of the thallus containing the cyanobacteria. The thallus contains gyrophoric acid (C+ red). It grows on bryophytes and humous soil in shady and humid conditions in mountain areas. It grow in

the Krkonoše Mts., in Tvarožné díry in the Králický Sněžník Mts. and in the Grabowski žleb and the Vitásek Ravine in the Velká kotlina cirque.

Peltigera venosa (Fig. 13)

Lichen creates tiny lobes resembling lobes of hepatics (up to 2 cm in diameter). The leaf-like, wet-green, smooth lobes (0.5–2 cm) overgrow each other and form small rosettes. Along the veins there are the brown warty cephalodia. Several flat, dark-brown, oval apothecia grow up at the edges of the lobes. Eight acicular, colourless spores (30–47 × 7–8 µm) are released from the asci. According to literary data from our territory erlier, the species was abundant in alluvial pathways and on bare soil. Today it is only growing in mountain areas in Central Europe. The Vitásek Ravine in the Velká kotlina cirque is the only site known in the Czech Republic recently.

Pertusaria amarescens

The golden-gray to yellow-green, gently warty, irregularly cracked crustose thallus creates irregular stains on rocks and boulders. From its surface, the light yellow flat soralia grows up to 1 mm in diameter. The insole produces thiofanic acid and other metabolites. It reacts with C and KC in orange, UV+ orange (Smith & al. 2009). Ascomata were not observed. It grows on calcium-enriched siliceous rocks in Europe and Asia. The lemon-like colour of the thallus is similar to *Lecanora epanora*, which produces epanorin, rhizocarpic acid and zeorin in its thallus. *P. amarescens* is difficult distinguish from *P. flavicans* (Hanko 1983) known in the Czech Republic from Károvské údolí valley near Zbraslav, Prague (Fessová 2010).

Porina grandis (Fig. 14)

The lichen creates a cracked brown thallus. The size of the perithecia is 400–800 µm in diameter, the base is immersed into the thallus. Among the other Central European species of this genus, *P. grandis* is the most prominent. The brown-red involucrellum covers the whole perithecium. The asci release 8 colourless spindle spores transversely divided by 7–8 septa (33–40 × 7–9 µm). The species grows rarely on damp shaded rocks along the streams in the mountains of central, western and northern Europe (Orange 2008). It was described by Körber from the Malá Sněžná jáma cirque in the Krkonoše Mts. (Körber 1865, Zeiske 1902). The species was reported by Kovář (1908) from Divoký důl on the Praděd Mt., the Hrubý Jeseník Mts.). The Wilczka valley (Tal der Wölfel) at the foot of the Polish side of Králický Sněžník Mt. was the closest known locality at that time (Keissler 1938). In the Velká kotlina cirque there the species grows in shade at the base of Kolenati Rock along with *Aspicilia laevata, Porpidia crustulata, Sporodictyon cruentum* and *Thelidium methorium*. Similar species *P. guentheri* differs by the size of the spores (32–45 × 5–6.5 µm).

Porina mamillosa (Fig. 15)

The lichen differs from the majority of Central European relatives by the way of choosing the substrate – it overgrows bryophytes. Single or groups of several black perithecia (0.3–0.5 mm in diameter) grow up from gray granular thallus. The perithecia are covered with a dark brown involucrellum, 80 µm thick. The asci releases 8 colourless spindle spores crosswise divided by three septa (25–40 × 4–6 µm). The lichen was described from Finland by Th. Fries (Fries 1861). The species has similar ecological demands and morphological structure as its closely related species *P. sudetica*, described by Körber from the glacial valley of the Zelený důl in Pec pod Sněžkou (Körber 1853, Zehgrund bis Petzkretscham), and also known from the Polish side of the Beskydy - Babia Góra (Stein 1873, Suza 1925). The only reliable distin-

guishing character is the cell number inside the spores (6–7 in *P. sudetica*). *P. mammillosa* is known in the Hrubý Jeseník Mts. from the rock above the Vřesová studánka on Červená hora Mt. (Vězda 1960b). In the Velká kotlina cirque it grows together with *Porpidia speirea, Thelidium methorium* and *Thelopsis melathelia* on the Hilitzer Rock. *P. sudetica* is also known from the Velká kotlina cirque (Suza 1928) but has not been found recently.

Porpidia speirea (Fig. 5)

The lichen creates a creamy, creamy-white thallus on the surface, bounded by a black stripe of the prothallus. Black immersed apothecia are separated from thallus by a narrow gap. Growing apothecia are pruinose on the surface. The apothecia grow 0.3–1.2 mm in diameter, grow up even in groups. The asci release eight oval, colourless unicellular spores (11–16 × 5–7 µm). An important distinctive feature is the production of confluent acid. The calciphilous species is known from shady limestone and calcium-enriched silicate rocks in Europe, Asia, North America and Australia (Jabłońska 2010). In the Czech Republic, the lichen is known from the Čertova zahrádka in the Krkonoše Mts. (Vězda 1960b), from the Velká kotlina cirque and the rocks above the Vřesová studánka at Červená hora Mt. in the Hrubý Jeseník Mts. (Vězda 1960b), where it grows together with *Rhizocarpon umbilicatum*. Currently it was found on the Hilitzer Rock in the Velká kotlina cirque. The related lichen *P. cinereoatra* does not grow on a calcium-enriched substrate.

Protoparmelia nephaea

The lichen produces a brown patch-shaped thallus with a striking brown-black prothallus. On the underside of the thallus, dark thalloconidia (spontaneously emerging spores produced from unspecialized cells) are separated. Oval dark blue-green thalloconidia are two or multicellular. It grows under the overhangs of ferriferous rocks often together with the strikingly yellow lichen *Pleopsidium chlorophanum*. In the Czech Republic, it is known from the Čertova zahrádka in the Krkonoše Mts. and from the Vitásek Ravine in the Velká kotlina cirque (Palice & al. 2008).

***Rinodina fimbriata* Körb.** (Fig. 16)

The lichen produces a light gray to grayish brown thallus. Black circular apothecia (0.4–0.8 mm in diameter) remain largely immersed in the thallus. Eight brown-green one-septated ascospores (21–24 × 11–17 µm) mature in asci. The lichen grows on regularly flooded acid rocks. Recently it has been found in the lower part of the Suza Wall in the Velká kotlina cirque. It differs in shape and size of spores from a similar species *Rhizocarpon badioatrum*, which colonizes similar habitats.

Additional locality: The lichen *Rinodina fimbriata* is also known from Železné hory Mts. (Halda & al. 2011: 48, fig. on page 46), where it was mistakenly determined as *Rhizocarpon badioatrum*: Železné hory Mts., Nasavrky, Peklo, nature reserve Krkanka, on bank of Chrudimka river, N49°51'34,87" E015°47'14,47", on inundated siliceous rock, 360 m, leg. Josef Halda, on the same sample with *Porocyphus coccodes* (JPH7643), 25. 9. 2009.

Rinodina mniaraea

The lichen is considered extinct in the Czech Republic. It forms a gray-brown crustose thallus with sessile brown ascomata with a lighter edge. Arctic-alpine lichen grows over mosses (nebo bryophytes) and on humous soil. The last record from the Velká kotlina cirque was made in the 60s of the 20th century (Vězda 1960b). Recently it has not been confirmed.

***Sporodictyon terrestre* (Th. Fr.) S.Savić & Tibell** (Fig. 18)

The lichen produces a conspicuous, grayish-white to brownish, nipple-shaped thallus containing cephalodia. Black perithecia (0.5–0,7 mm in diameter) grow scattered across the

thallus, and the thallus cover the perithecia almost to the ostiolum. Eight muriform hyaline ascospores (51–65 × 23–30 µm) mature in asci. Under the conditions of Central Europe, the lichen grows on limestone or calcium-enriched rocks, rarely on base-rich soil, often among bryophytes where it establishes on small pebbles at the surface of the soil in mountains in Central Europe, Scandinavia, Arctic, The Faroes, Iceland and Greenland (Savić & Tibell 2009). Very similar related species *Sporodictyon schaererianum* (Fig. 17) is known in the Czech Republic from the Krkonoše Mts. (the Velká Kotelná cirque) and from the Hrubý Jeseník Mts. (the Velká kotlina cirque, Hilitzer 1927; Červená hora Mt., Malíček 2014). It differs by two-spored asci and dark brown ascospores. *S. terrestre* grows in the Velká kotlina cirque on calcium-enriched quarzite rock in the Vitásek Ravine together with *Lecidea bryorum, Protothelenella sphinctrinoidella* and *Thelopsis melathelia*. Lichen *Sporodictyon cruentum* forms an inconspicuous dark green thallus, colonizes exclusively acidic, water-rinsed boulders.

Additional locality: The fertile specimen of the lichen was also found on the rock above Vřesová studánka at Červená hora Mt. together with *Leucocarpia biatorella:* on a calcium enriched rock, N50°08'44,71" E017°08'08,47", 1305 m, leg . J. Halda & M. Zmrhalová, 16. 10. 2007 (JPH16501). Ibid. *Leucocarpia biatorella*: JPH16505.

Thelidium methorium (Fig. 20)

The lichen creates a brown-gray crustose thallus, from which the hemispherical black perithecia grow (0.5–1.6 mm in diameter). The lower part of friuts is covered with the thallus. The asci produce eight colourless two-cell (up to 5 in overmature asci) spores (24–46 × 13–21 µm). It grows on calcium-enriched silicate rocks. In the Czech Republic the lichen grows in the stream of Rudný potok brook in the Obří důl cirque in the Krkonoše Mts. It was recently confirmed on Suza Wall and Podpěra Rock. In Vitásek Ravine, related species *T. papulare* (Fig. 21) was recorded more often.

Thelopsis melathelia (Fig. Halda 2009: 76)

Micro-lichen creates an orange to brown, dry, gray-green crustose thallus overgrowing bryophytes. From the thallus, bright spherical ascomata grow at first, darkening with time. They are cracked from the top. Large asci (200–250 × 15–25 µm) with hundreds of colourless four-cell ascospores (12–18 × 4–5 µm) are typoval for the species. It overgrows bryophytes under the overhangs of calcium-enriched siliceous rocks. The lichen is known in the Czech Republic from the Vitásek Ravine in the Velká kotlina cirque, from the „Vicherek Rocks" on the north-east slope of Jelení hřbet Mt. and from the rocks above the Vřesova studánka on Červená hora Mt. (Hilitzer 1927, Vězda 1960, Halda 2013, Malíček 2014).

Additional localities: The lichen still survives on the rock above the Vřesova studánka on the Červená hora Mt. together with *Leucocarpia biatorella* and *Sporodictyon terrestre:* overgrowing mosses on calcium-enriched rock, N50°08'44,71" E017°08'08,47", 1305 m, leg . J. Halda & M. Zmrhalová, 16. 10. 2007 (JPH16492).

SUMMARY

The significance of the Velká kotlina cirque consists of a number of diverse biotopes where isolated species survive with the closest localities in the Alps, the Carpathians or Scandinavia (e.g. arctic-alpine and arctic boreal lichens *Bilimbia lobulata, Gyalecta kukriensis, Henrica melaspora, Lecanactis dilleniana, Lecidoma demissum, Miriquidica garovaglioi, Opegrapha gyrocarpa, Peltigera venosa, Pleopsidium chlorophanum, Porina grandis, P. mamillosa, Porpidia ochrolemma, Sporastatia polyspora, Sporodictyon terrestre* and *Thelidium methorium*).

Along with species typical of acidic rocks also calciphilous lichens grow together (*Collema glebulentum, Gyalecta kukriensis, G. jenensis, Lecanactis dilleniana, Lecidea hypnorum, Lecanora dispersa, L. saxicola, Peltigera venosa, Placidium rufescens, Placopyrenium fuscellum, Thelidium methorium,*

Thelopsis melathelia, Solorina saccata, Thelidium papulare, Verrucaria muralis and *Vahliella leucophaea*. Both acidophilous and calciphilous species growing together were particularly observed in the Vitásek Ravine, Podpěra Rock, Suza Wall, Hilitzer Rock and Roemer Outcrops.

All of these lichens were confirmed after 70 years and were more precisely localized. Recently, rare lichens *Henrica melaspora, Miriquidica garovaglioi, Porina grandis, Porocyphus coccodes* and *Staurothele fissa* were found in the Velká kotlina cirque. Lichens *Atla alpina, Collemopsidium angermannicum, Rinodina fimbriata* and *Sporodictyon terrestre* are new to the Czech Republic.

Most of the rarest species can be considered weakly calciphilous. The occurrence of calcium-enriched phyllite and metatuffs is now intensively mapped by Leo Bureš and Zuzana Burešová. The research of the Velká kotlina cirque can not be considered completed, as lichenologist Filip Kovář noticed 110 years ago.

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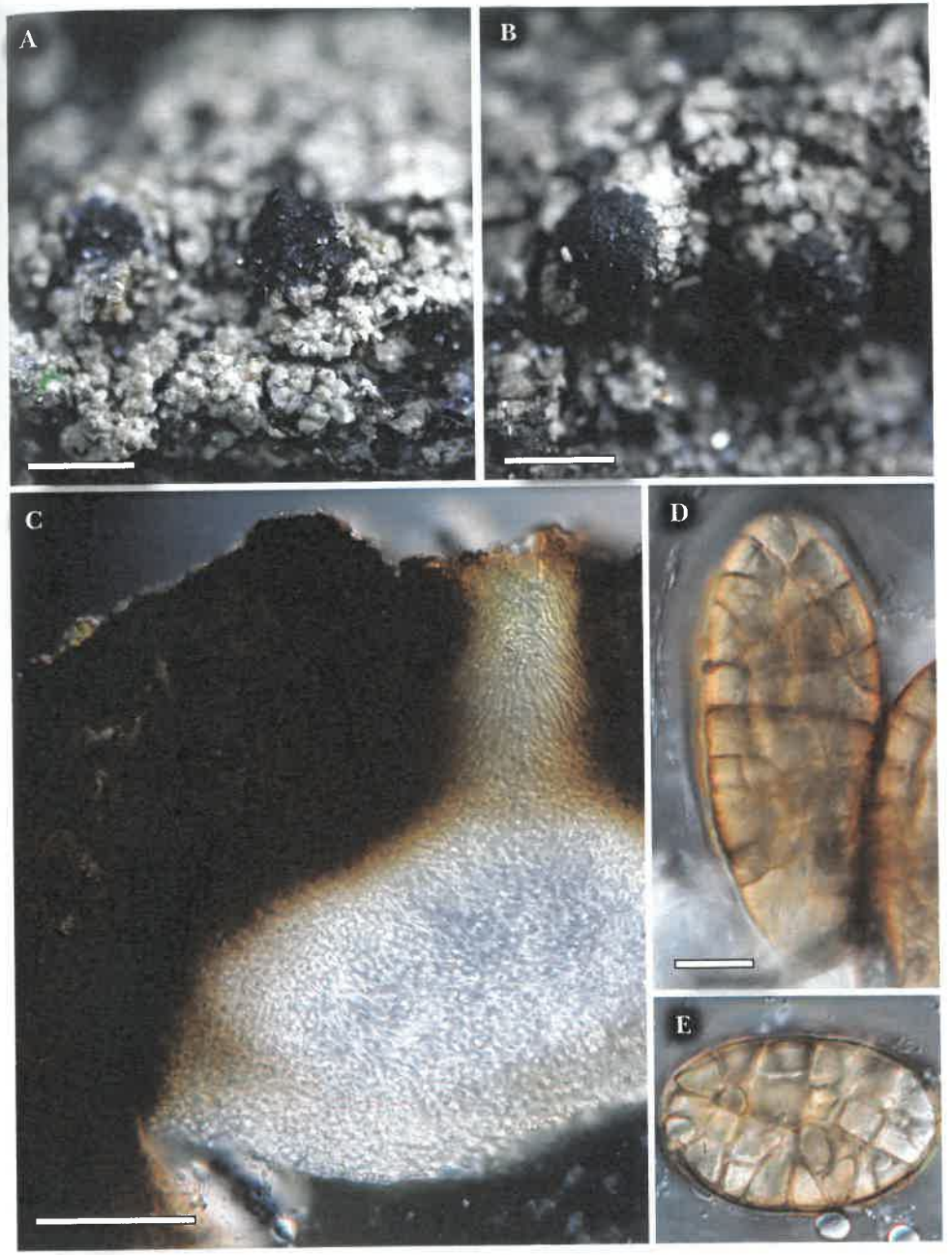


Fig. 1. *Atla alpina (JPH16487). A, B. Thallus with ascomata. C. Vertical section of an ascoma. D, E. Ascospores. Scale A, B = 1 mm, C = 100 µm, D, E = 10 µm. All photos Josef P. Halda, 2018.*

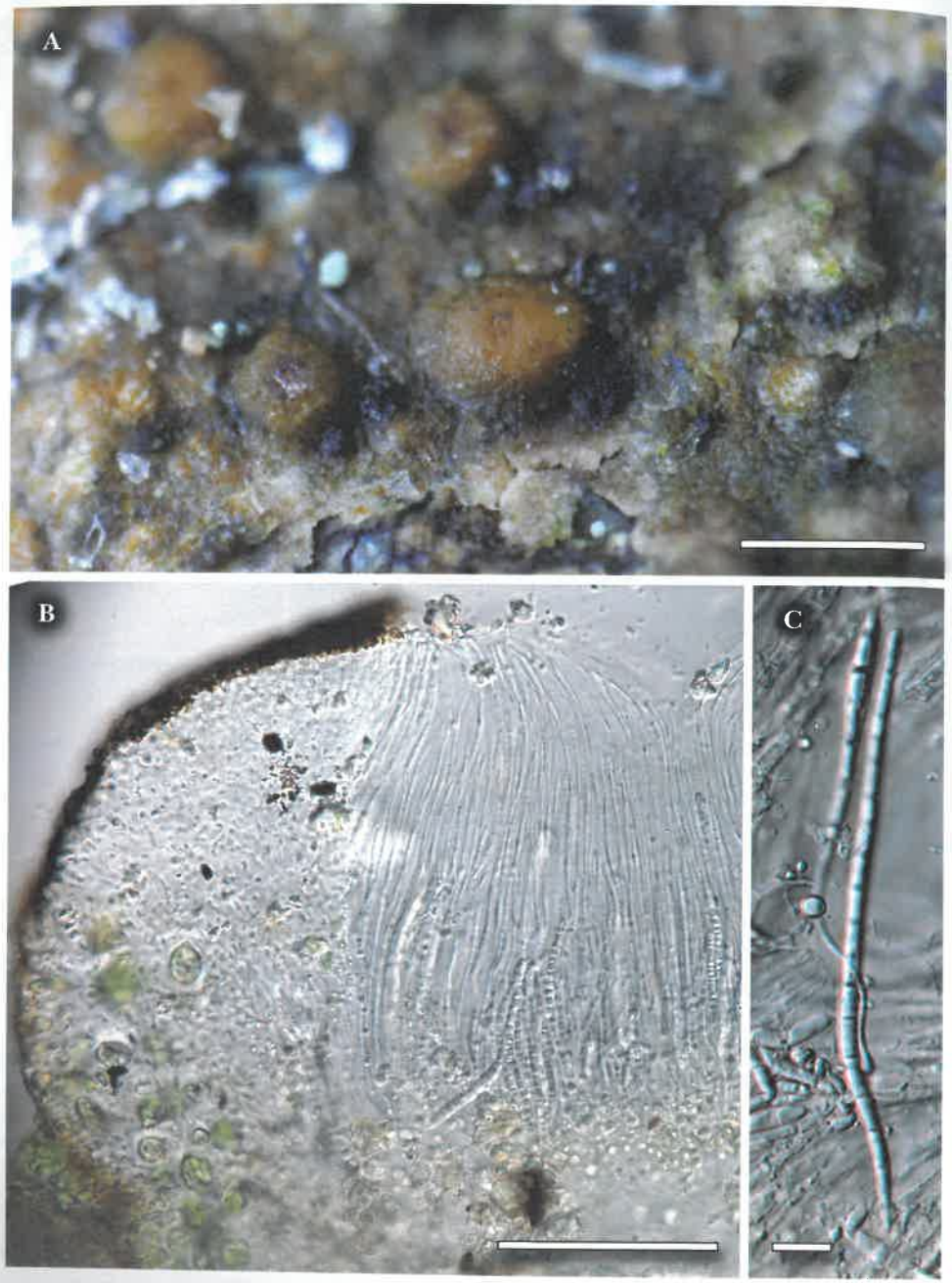


Fig. 2. Belonia russula (JPH 5520). ***A.*** *Thallus with ascomata.* ***B.*** *Verical section with an ascoma.* ***C.*** *Ascospore. Scale A = 500 µm, B = 100 µm, C = 10 µm.*

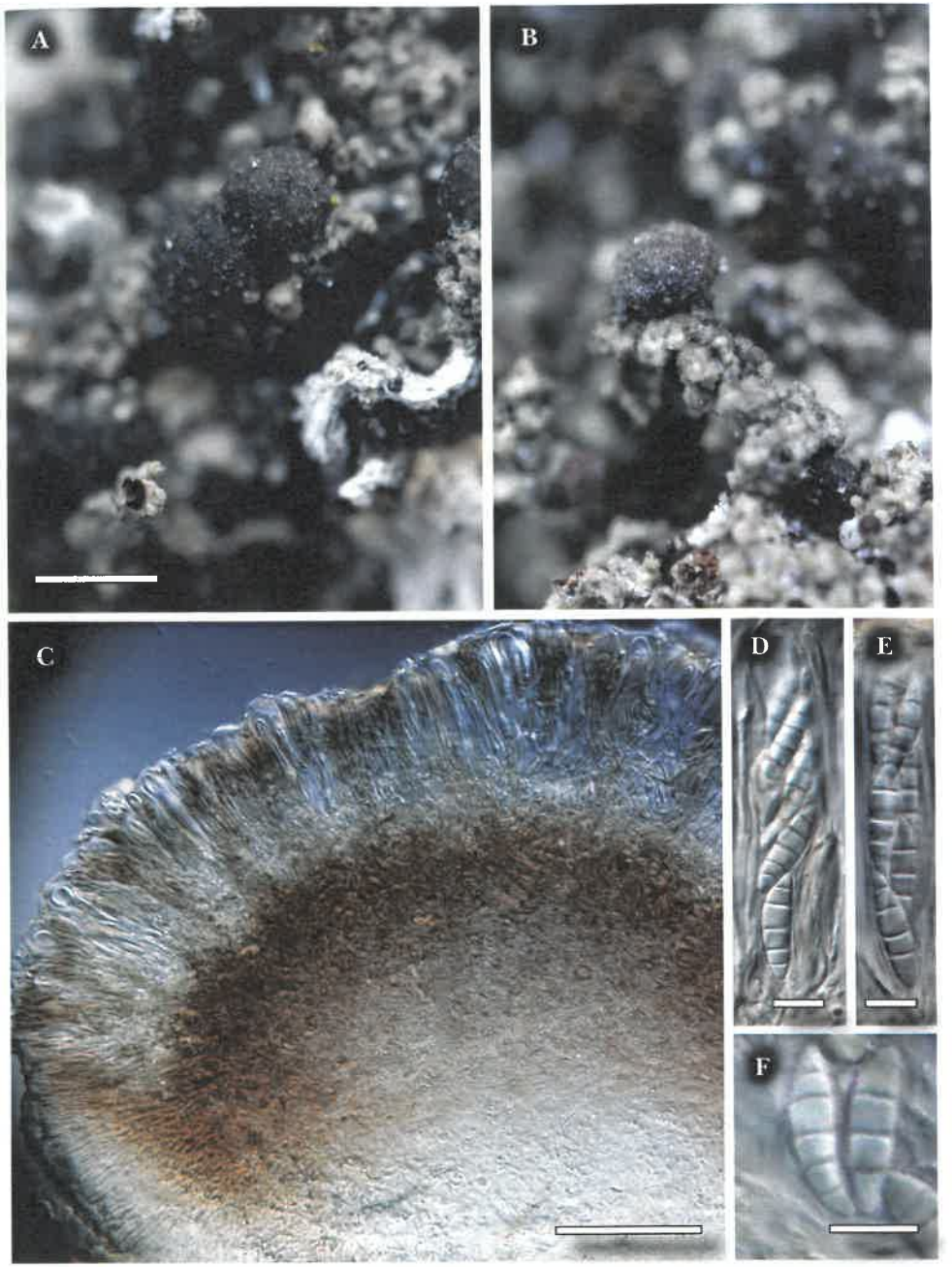


Fig. 3. Bilimbia sabuletorum (JPH16500). ***A, B.*** *Thallus with ascomata.* ***C.*** *Vertical section of an ascoma.* ***D, E.*** *Asci with ascospores.* ***F.*** *Ascospores. Scale A, B =1 mm, C = 100 µm, D – F= 10 µm.*

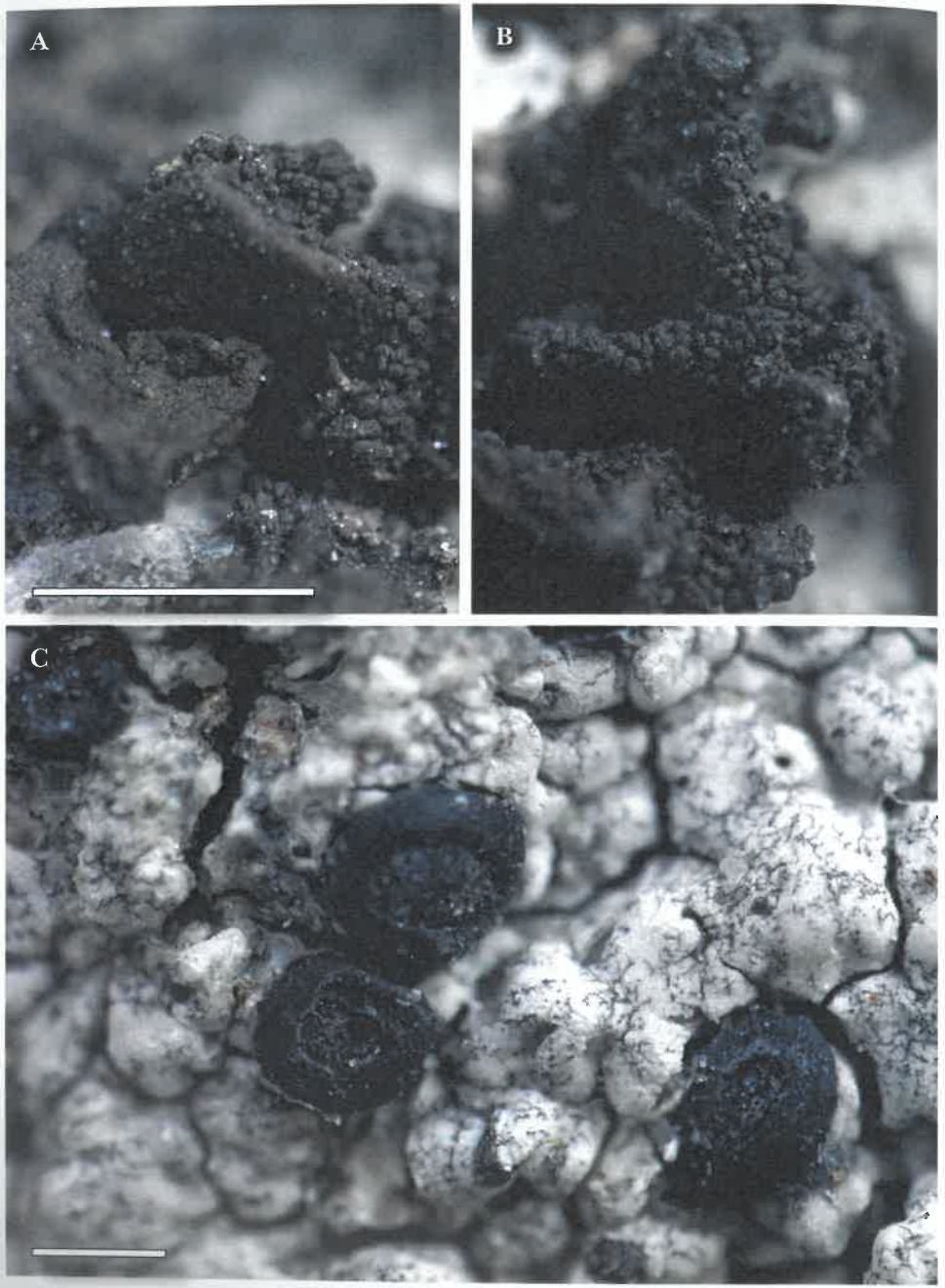


Fig. 4. Collema glebulentum (JPH16499). ***A, B****. Details of the thallus with isidia. Scale = 1 mm.*
Fig. 5. Porpidia speirea (JPH16521). ***C****. Thallus with ascomata. Scale = 1 mm.*

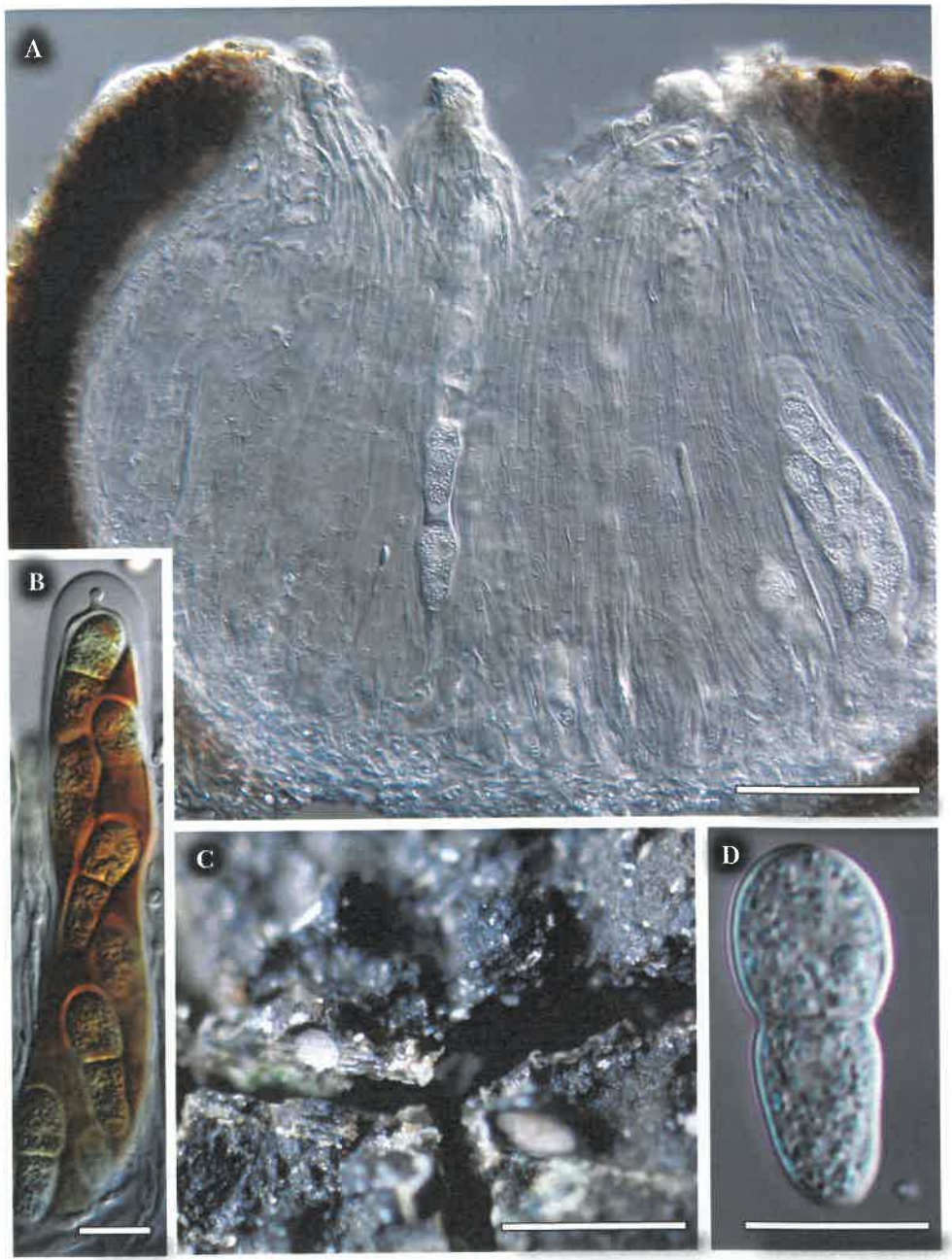


Fig. 6. Collemopsidium angermannicum (JPH7598). ***A****. Vertical section of an ascoma.* ***B****. Detail of an ascus (in Lugol).* ***C****. Detail od thallus with ascomata.* ***D****. Detail of an ascospore. Scale A = 50 µm, B = 10 µm, C = 500 µm, D = 10 µm.*

*Fig. 7. Gyalecta kukriensis (ZP19870). **A, B**. Thallus with ascomata. **C.** Vertical section of an ascoma. D, E. Ascospores. Scale A, B = 1 mm, C = 100 µm, D, E = 10 µm.*

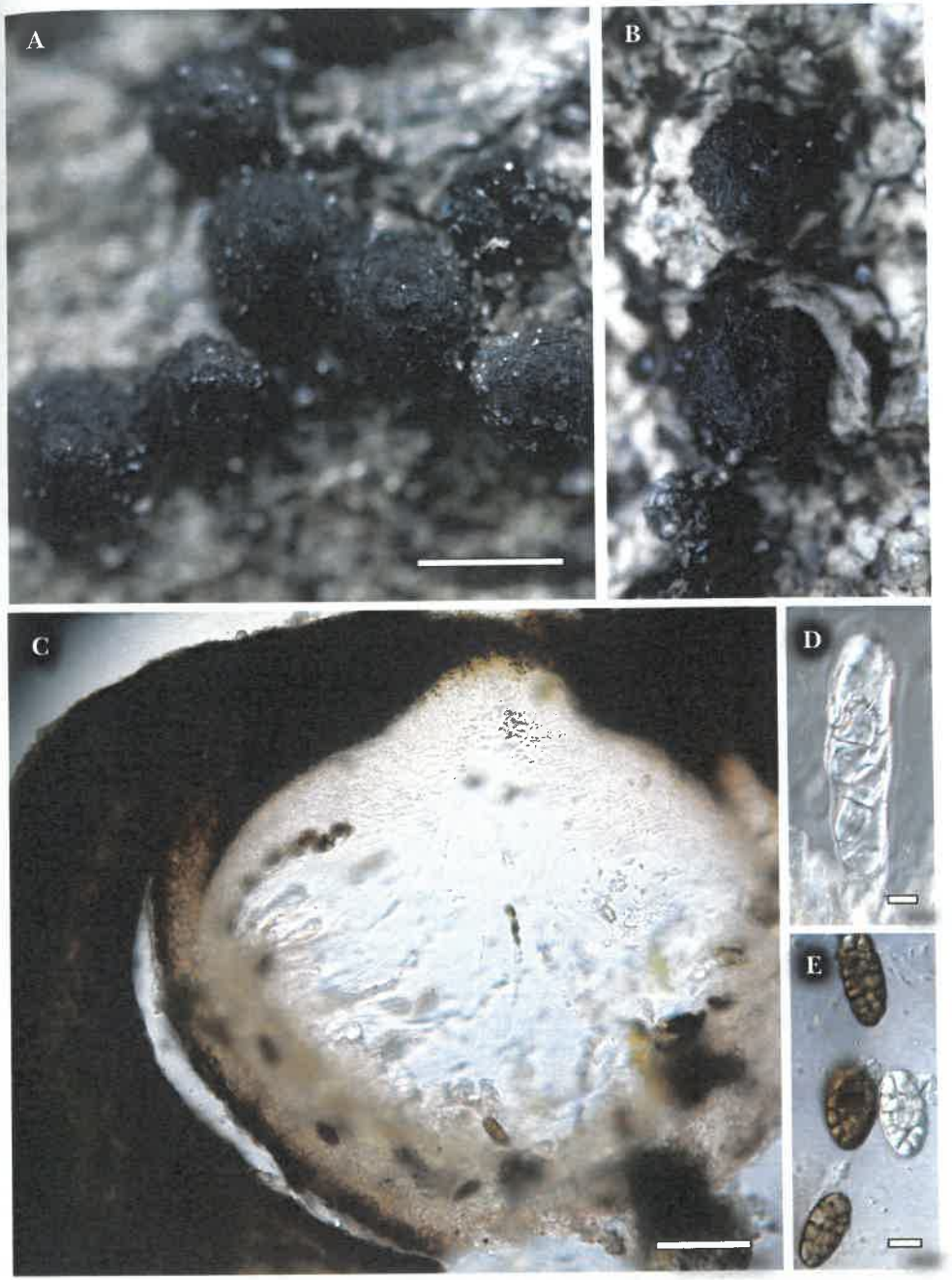
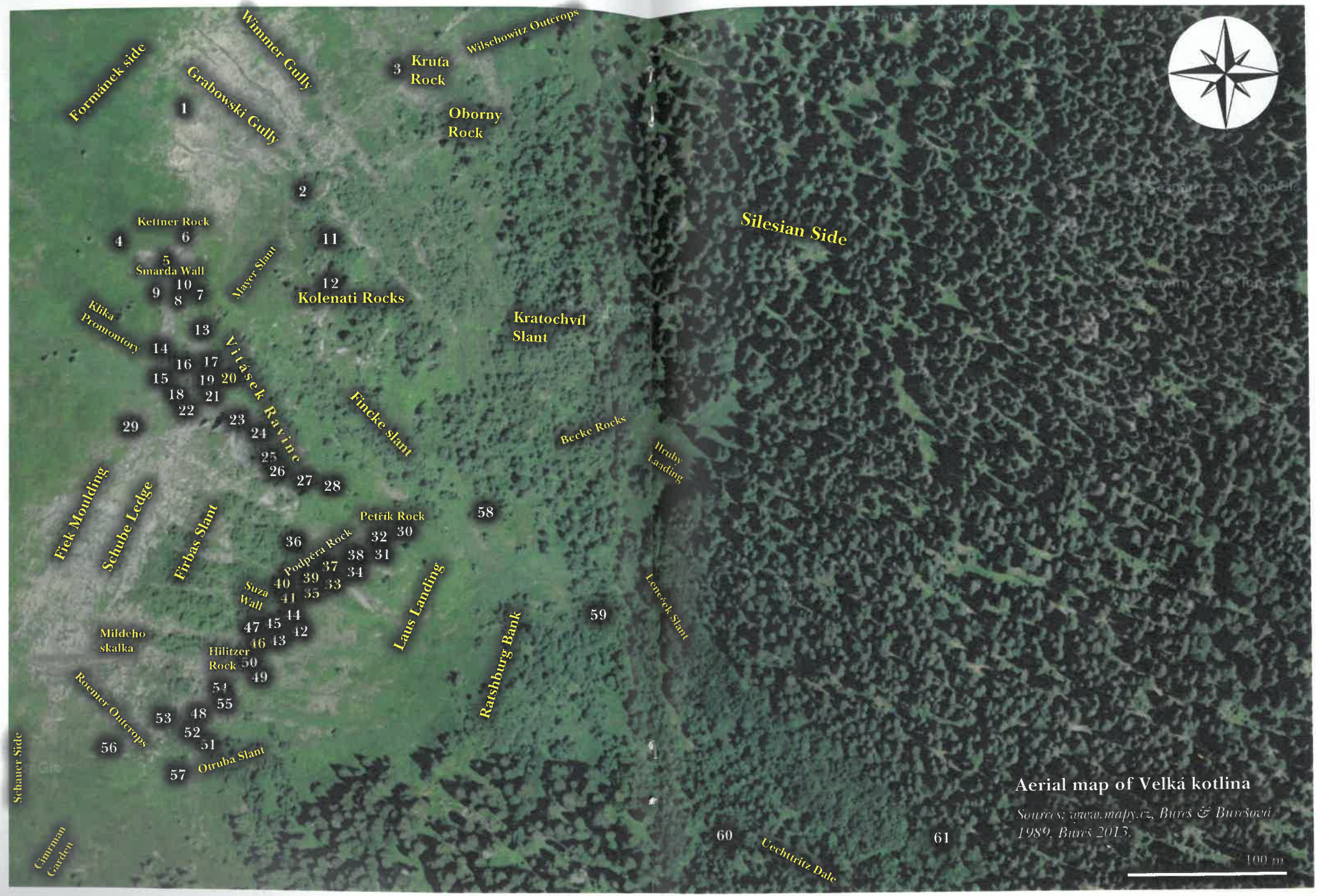


*Fig. 8. Henrica melaspora (JPH16511). **A, B**. Thallus with ascomata. **C.** Vertical section of an ascoma. **D**. An ascus with young ascospores **E.** Ascospores. Scale A, B = 1 mm, C = 100 µm, D, E = 10 µm.*


Wimmer Gully
Wilschowitz Outcrops
Formánek side
Grabowski Gully
Kruťa Rock
Oborny Rock
Silesian Side
Kettner Rock
Šmarda Wall
Mayer Slant
Kolenati Rocks
Kratochvíl Slant
Klika Promontory
Vitásek Ravine
Fincke slant
Becke Rocks
Hruby Landing
Fiek Moulding
Schube Ledge
Firbas Slant
Petřík Rock
Podpěra Rock
Suza Wall
Laus Landing
Lenoček Slant
Ratshburg Bank
Mildeho skalka
Hilitzer Rock
Roemer Outcrops
Otruba Slant
Schauer Side
Zimmman Garden
Uechtritz Dale
Aerial map of Velká kotlina
Sources: www.mapy.cz, Burš & Burešová 1989, Burš 2013.
100 m

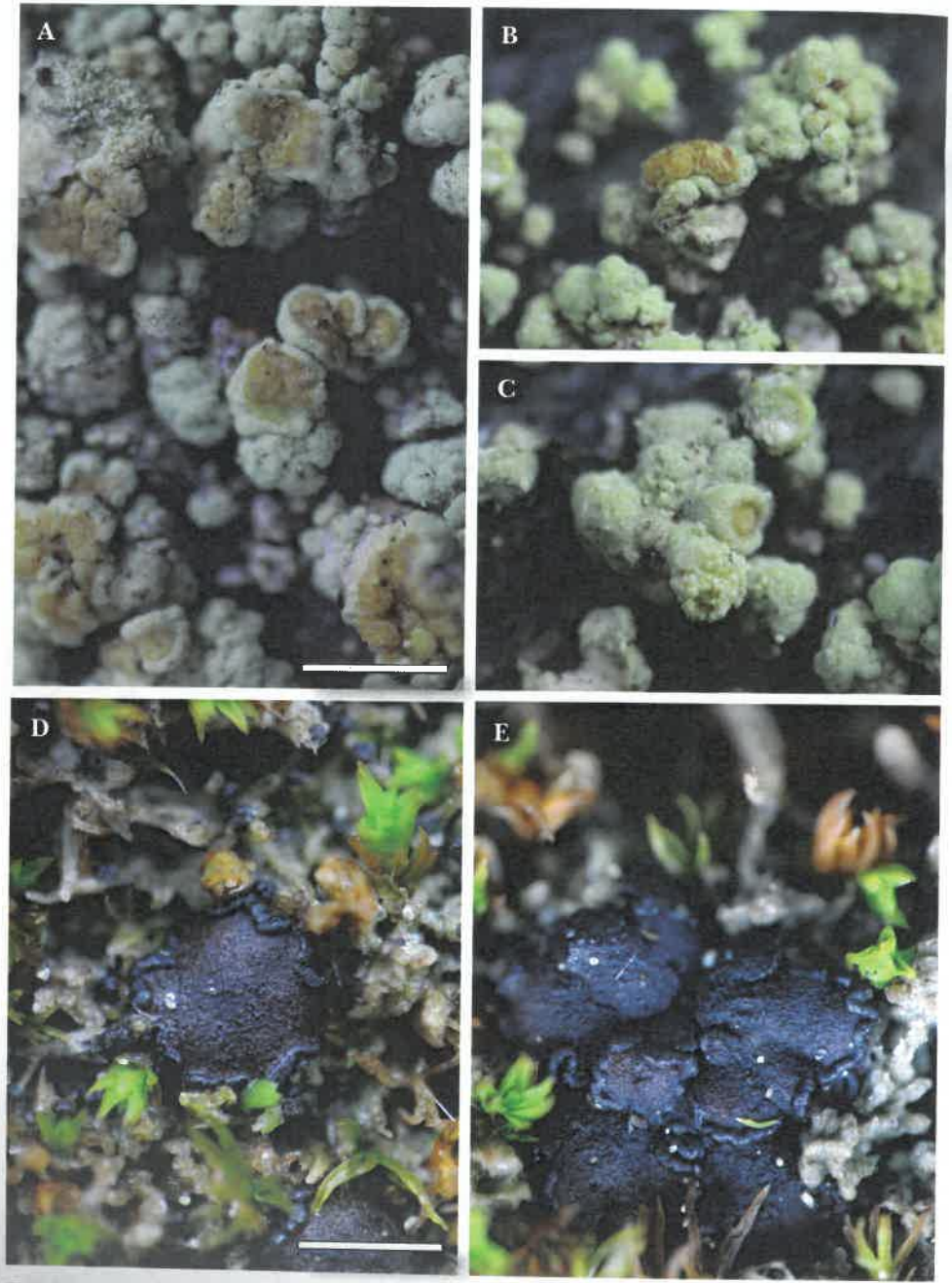


Fig. 9. Lecanora epanora (JPH16481). ***A–C****. Thallus with ascomata. Scale 1 mm.*
Fig. 10. Lecidea hypnorum (JPH16455). ***D–E****. Thallus with ascomata. Scale 1 mm.*

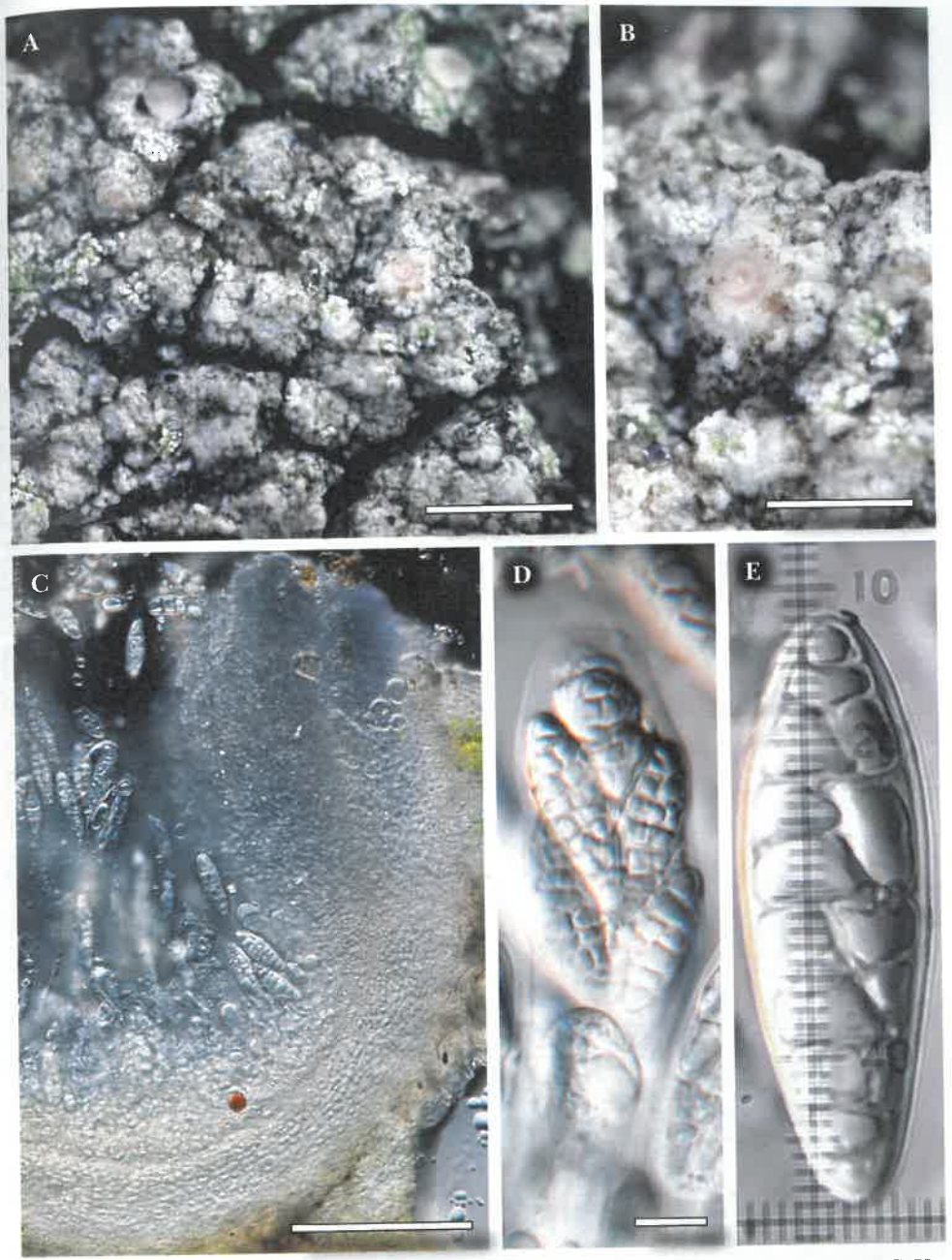


Fig. 11. *Leucocarpia biatorella (JPH16488).* ***A****. Thallus with ascomata.* ***B****. Detail of an ascoma.* ***C****. Vertical section of an ascoma.* ***D****. Ascus with ascospores.* ***E****. An ascospore. Scale A =1 mm, B = 0,5 mm, C = 100 µm, D = 10 µm, E = 1 µm.*

Fig. 12. Placidium rufescens (JPH16090). Thallus with ascomata. Scale = 10 mm.
Fig. 13. Peltigera venosa (JPH10483). A. Detail of thallus with ascomata. B. Thallus in optimal conditions from Norway (Finse, JPH16539). Scale = 10 mm, 8/2013, 8/2014.

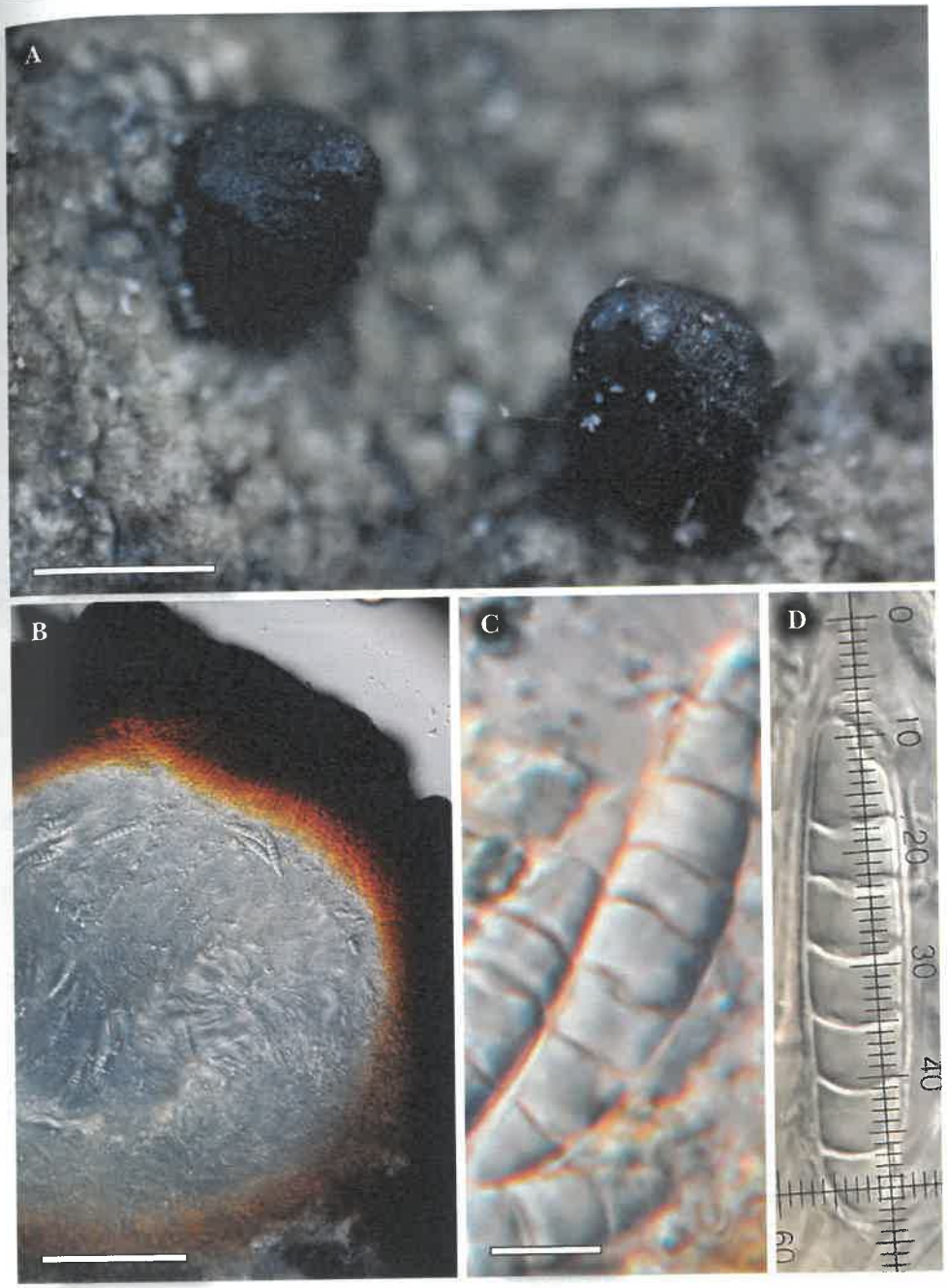


Fig. 14. Porina grandis (JPH10455). A. Thallus with ascomata. B. Vertical section of an ascoma. C – D. Ascospores. Scale A = 1 mm, B = 100 µm, C = 10 µm, D = 1 µm.

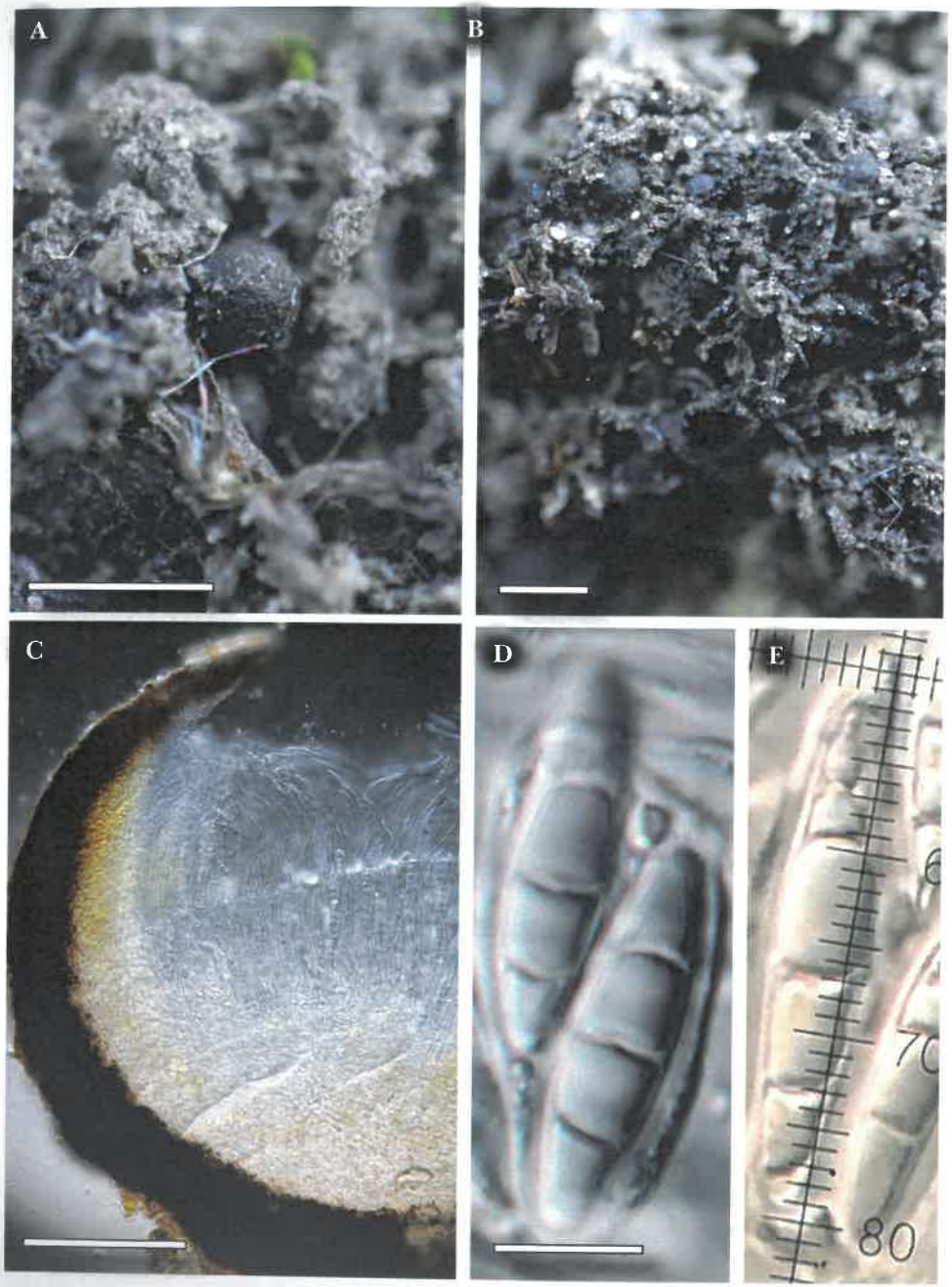


Fig. 15. Porina mamillosa (JPH16467). A, B. Thallus with ascomata. C. Vertical section of an ascoma. D, E. Ascospores. Scale A, B = 1 mm, C = 100 µm, D = 10 µm, E = 1 µm.

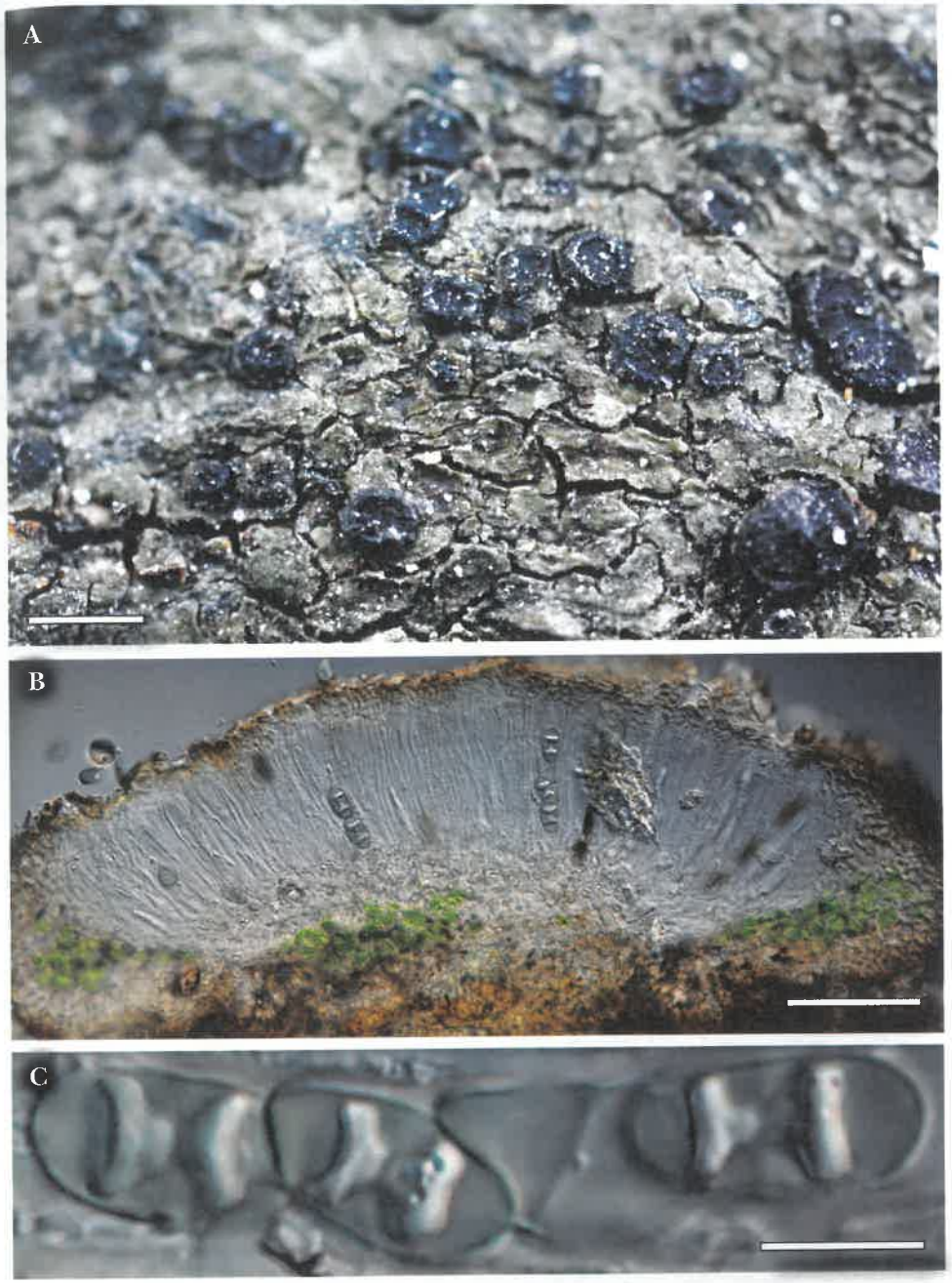


Fig. 16. Rinodina fimbriata (JPH16039). A. Thallus with ascomata. B. Vertical section of an ascoma. C. Ascospores. Scale A = 1 mm, B = 100 µm, C = 10 µm.

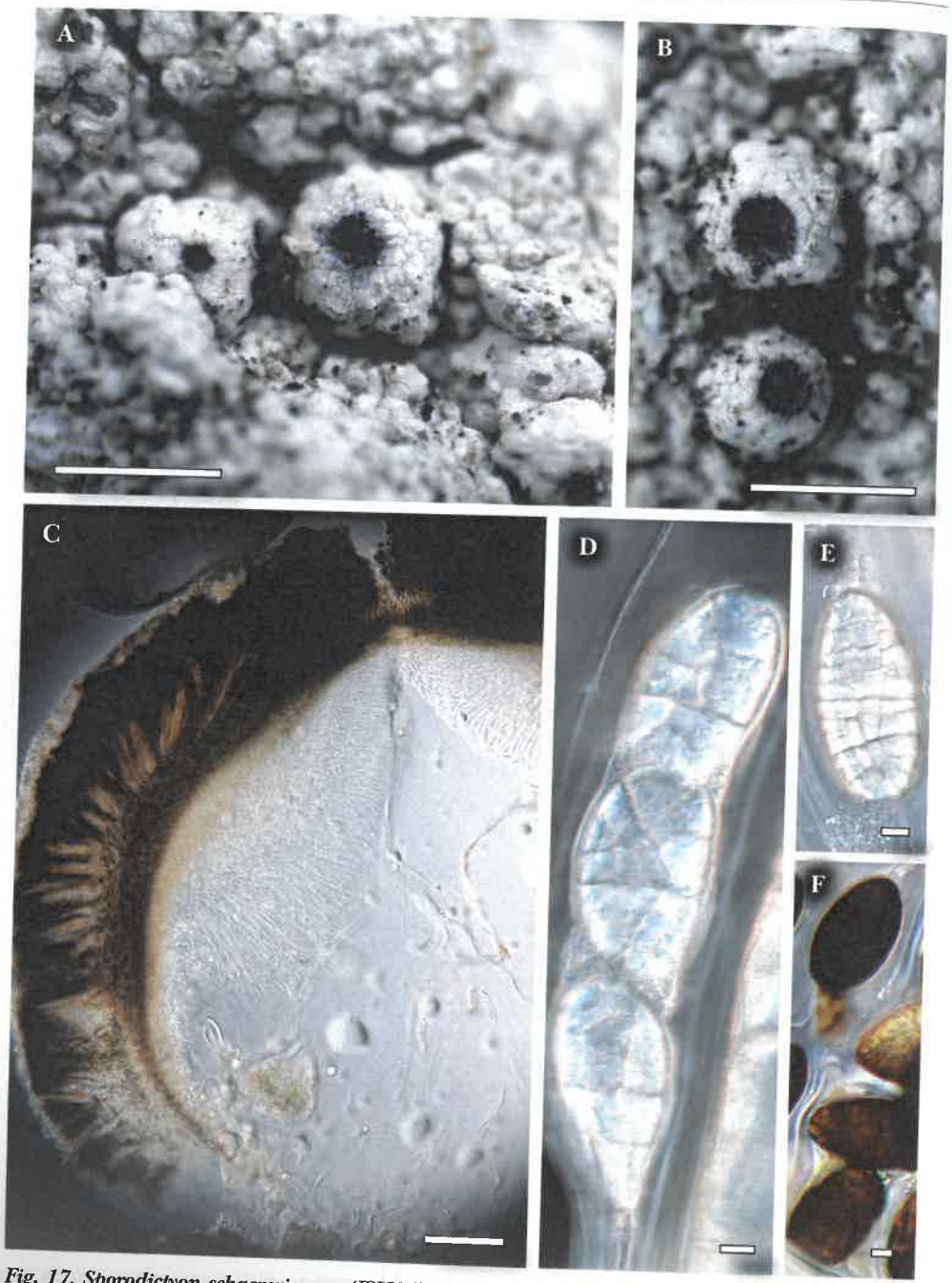


Fig. 17. Sporodictyon schaererianum *(JPH16501). A. Thallus with an ascoma. B. Vertical section of an ascoma. C. Asci with ascospores. D., E. Ascospores. Scale A, B = 1 mm, C = 100 µm, D – F = 10 µm.*

meeting in Železné hory Mts (Czech Republic), September 2009 [Lišejníky zaznamenané během podzimního bryologicko-lichenologického setkání v CHKO Železné hory v září 2009]. – Bryonora, 47: 40–51.

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LIST OF LOCALITIES

1 Grabowski Gully, N50°03'27.51" E017°14'08.30", 1365 m, 23. 8. 2013.
2 Grabowski Gully, N50°03'25.84" E017°14'11.90", 1307 m, 23. 8. 2013.
3 Kruťa Rock, N50°03'28.35" E017°14'14.77", 1330 m, 7. 9. 2011.
4 Kettner Rock, N50°03'25.11" E017°14'06.39", 1359 m, 21. 9. 2007.
5 Kettner Rock, N50°03'24.64" E017°14'07.72", 1338 m, 21. 9. 2007.
6 Kettner Rock, N50°03'25.00" E017°14'08.22", 1337 m, 21. 9. 2007.
7 Šmarda Wall, N50°03'23.99" E017°14'08.54", 1321 m, 7. 9. 2011.
8 Šmarda Wall, N50°03'23.93" E017°14'08.16", 1325 m, 24. 8. 2013.
9 Šmarda Wall, N50°03'24.05" E017°14'07.61", 1333 m, 15. 10. 2007.
10 Šmarda Wall, N50°03'24.04" E017°14'08.21", 1326 m, 21. 9. 2007.
11 Kolenati Rocks, N50°03'24.97" E017°14'12.69", 1307 m, 24. 8. 2013.
12 Kolenati Rocks, N50°03'24.10" E017°14'12.67", 1272 m, 24. 8. 2013.
13 Vitásek Ravine, N50°03'23.18" E017°14'08.88", 1309 m, 24. 8. 2013.
14 Vitásek Ravine, N50°03'22.81" E017°14'07.56", 1324 m, 21. 9. 2007.
15 Vitásek Ravine, N50°03'22.02" E017°14'08.19", 1309 m, 26. 6. 2008.
16 Vitásek Ravine, N50°03'22.43" E017°14'08.30", 1311 m, 15. 10. 2007.

17 Vitásek Ravine, N50°03'22.47" E017°14'09.17", 1299 m, 24. 8. 2013.
18 Vitásek Ravine, N50°03'22.02" E017°14'08.15", 1309 m, 26. 6. 2008.
19 Vitásek Ravine, N50°03'22.04" E017°14'09.08", 1296 m, 15. 10. 2007.
20 Vitásek Ravine, N50°03'22.14" E017°14'09.38", 1293 m, 26. 6. 2008.
21 Vitásek Ravine, N50°03'21.89" E017°14'09.19", 1293 m, 26. 6. 2008.
22 Vitásek Ravine, N50°03'21.61" E017°14'08.38", 11302 m, 24. 8. 2013.
23 Vitásek Ravine, N50°03'21.35" E017°14'09.95", 1277 m, 26. 6. 2008.
24 Vitásek Ravine, N50°03'21.17" E017°14'10.56", 1266 m, 15. 10. 2007.
25 Vitásek Ravine, N50°03'20.40" E017°14'11.05", 1252 m, 15. 10. 2007.
26 Vitásek Ravine, N50°03'20.49" E017°14'11.10", 1252 m, 15. 10. 2007.
27 Vitásek Ravine, N50°03'20.24" E017°14'11.94", 1239 m, 26. 6. 2008.
28 Vitásek Ravine, N50°03'20.12" E017°14'12.68", 1231 m, 24. 8. 2013.
29 Fiek Moulding, N50°03'21.31" E017°14'06.73", 1325 m, 24. 8. 2013.
30 Petřík Rock, metatuff, N50°03'19.37" E017°14'14.85", 1207 m, 20. 8. 2017.
31 A metatuff rock between Petřík Rock and Podpěra Rock, N50°03'18.83" E017°14'14.08", 1209 m, 20. 8. 2017.
32 Ibid., N50°03'18.83" E017°14'14.08", 1209 m, 20. 8. 2017.
33 Podpěra Rock, N50°03'18.32" E017°14'12.61", 1220 m, 20. 8. 2017.
34 Podpěra Rock, N50°03'18.64" E017°14'13.51", 1213 m, 20. 8. 2017.
35 Podpěra Rock, N50°03'18.26" E017°14'12.53", 1220 m, 20. 8. 2017.
36 Podpěra Rock, N50°03'19.11" E017°14'11.70", 1235 m, 15. 10. 2007.
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38 Podpěra Rock, N50°03'18.64" E017°14'13.51", 1213 m, 20. 8. 2017.
39 Podpěra Rock, N50°03'18.26" E017°14'12.53", 1220 m, 20. 8. 2017.
40 An edge of Podpěra Rock and Suza Wall, N50°03'18.15" E017°14'12.18", 1223 m, 20. 8. 2017.
41 An edge of Podpěra Rock and Suza Wall, N50°03'18.15" E017°14'12.18", 1223 m, 20. 8. 2017.
42 Suza Wall, N50°03'18.05" E017°14'12.02", 1224 m, 20. 8. 2017.
43 Suza Wall, N50°03'17.99" E017°14'11.41", 1231 m, 20. 8. 2017.
44 Suza Wall, N50°03'18.05" E017°14'12.02", 1224 m, 20. 8. 2017.
45 Suza Wall, N50°03'17.99" E017°14'11.41", 1231 m, 20. 8. 2017.
46 Suza Wall, a phyllite rock with carbonate extrusion and quartzite, N50°03'17.35" E017°14'10.57", 1241 m, 21. 8. 2017.
47 Ibid., N50°03'17.35" E017°14'10.57", 1241 m, 21. 8. 2017.
48 Hilitzer Rock, N50°03'15.65" E017°14'08.69", 1262 m, 26. 6. 2008.
49 Hilitzer Rock, Pouba Rock, graphitic phyllite with quartzite without carbonate extrusion, N50°03'16.68" E017°14'10.50", 1241 m, 21. 8. 2017.
50 Ibid., N50°03'16.68" E017°14'10.50", 1241 m, 21. 8. 2017.
51 Hilitzer Rock, Eastern side, on a metatuff rock and phyllite with carbonate extrusion, N50°03'15.11" E017°14'08.76", 1260 m, 21. 8. 2017.
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53 Hilitzer Rock, Western side, N50°03'15.65" E017°14'07.71", 1275 m, 26. 6. 2008.
54 Bottom part of Dostál Groove, phyllite, quarzite, N50°03'16.05" E017°14'09.41", 1253 m, 21. 8. 2017.
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57 Roemer Outcrops, calcium enriched, N50°03'14.52" E017°14'08.07", 1268 m, 21. 8. 2017.
58 Laus Landing, N50°03'19.65" E017°14'17.37", 1189 m, 15. 10. 2007.
59 Rathsburg Bank, N50°03'17.63" E017°14'20.85", 1156 m, 15. 10. 2007.
60 Uechtritz Dale, N50°03'13.47" E017°14'24.79", 1142 m, 15. 10. 2007.
61 Uechtritz Dale, on the bank of Moravice river, N50°03'13.42" E017°14'31.33", 1139 m, 15. 10. 2007.

LIST OF SPECIES

	species	localities
VU	*Acarospora badiofusca*	2 (sax) JPH16104, Vězda 1960b
LC	*Acarospora fuscata*	2 JPH10420, 13 JPH10476, 29 JPH10470 (sax), Kovář 1908
LC	*Acarospora nitrophila*	33 (sax) JPH16026
VU	*Acarospora sinopica*	8 (sax) JPH10464, Suza 1927
NT	*Acarospora smaragdula*	27 (sax) JPH16482, 8 (sax) JPH10458
DD	*Agonimia globullifera*	48 (mos) JPH16459
LC	*Agonimia tristicula*	17 (mos) JPH10482, 19 (sax) JPH16527, 42 (mos) JPH16040, 42 (mos) JPH16043
LC	*Arthrorhaphis citrinella*	8 (hum) JPH10469, 28 (hum) JPH10494
NF	*Arthopyrenia punctiformis*	Kovář 1908
LC	*Aspicilia caesiocinerea*	2 (sax) JPH10428, 12 (sax) JPH10441, 30 (sax) JPH16074, 30 (sax) JPH16077, 43 (sax) JPH16050
NT	*Aspicilia cinerea*	2 (sax) JPH10426, 11 (sax) JPH10449
NT	*Aspicilia laevata*	2 (sax) JPH16097, 12 (isr) JPH10443, 25 (sax) JPH16508, 36 (sax) JPH16524, 42 (sax) JPH16036
CR	*Bacidia incompta*	Laus 1910
VU	*Bacidina inundata*	1 (isr) JPH10438, Suza 1929
EN	*Bacidina phacodes*	59 (Sor) JPH16531
LC	*Baeomyces rufus*	11 (sax), 12 (sax), 13 (sax), 17 (sax), 22 (sax), 28 (sax), 29 (sax), 8 (sax)
NT	*Bellemerea alpina*	Vězda 1961
EN	*Belonia russula*	23 (sax) JPH5520, Eitner 1911, Vězda 1959, Pišút 1969
NE	*Biatora vernalis*	Laus 1910
EN	*Bilimbia lobulata*	Kovář 1908, Laus 1910, Pišút 1969
LC	*Bilimbia sabuletorum*	15 (mos) JPH16460, 16462
VU	*Buellia disciformis*	Laus 1910
RE	*Caloplaca ammiospila*	Vondrák & Malíček 2015
NT	*Caloplaca arenaria*	Vězda 1961 (*Caloplaca lamprocheila*), Vondrák & Malíček 2015
CR	*Caloplaca arnoldii*	23 (sax) JPH16466, 30 (sax) JPH16068, 36 (sax) JPH16519, Malíček 2014, Vondrák & Malíček 2015
VU	*Caloplaca cerina*	Vondrák & Malíček 2015
LC	*Caloplaca chlorina*	Vondrák & Malíček 2015
DD	*Caloplaca cerinelloides*	Vondrák & Malíček 2015

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species		localities
NT	*Caloplaca chrysodeta*	2 (sax) JPH10430, Vondrák & Malíček 2015 (*Leproplaca chrysodeta*)
NT	*Caloplaca cirrochroa*	Vězda 1959, 1960
LC	*Caloplaca citrina*	Vondrák & Malíček 2015
NT	*Caloplaca demissa*	Vězda 1960b
LC	*Caloplaca flavocitrina*	Vondrák & Malíček 2015
LC	*Caloplaca holocarpa*	Vondrák & Malíček 2015
	Caloplaca scabrosa	Kovář 1908, Vondrák & Malíček 2015
EN	*Caloplaca sinapisperma*	Vězda 1961, Vondrák & Malíček 2015
VU	*Caloplaca stillicidorum*	Stein 1988, Vondrák & Malíček 2015
CR	*Caloplaca subalpina*	Vondrák & al. 2008, Vondrák & Malíček 2015
	Caloplaca turkuensis	Vondrák & Malíček 2015
NE	*Caloplaca fimbriata*	Eitner 1911
LC	*Candelariella aurella*	2 (sax) JPH10422
LC	*Candelariella vitellina*	1, 2, 8, 10, 11, 12, 13, 17, 22, 28, 29, 32, 35, 40, 52 (sax)
EN	*Catinaria atropurpurea*	Laus 1910
NT	*Cetraria islandica*	2, 50, 56 (hum)
DD	*Cetrelia olivetorum*	Laus 1910
LC	*Cladonia arbuscula*	Kovář 1912
LC	*Cladonia cenotea*	Laus 1910, Kovář 1912
LC	*Cladonia chlorophaea*	31 (hum) JPH16024, 57 (hum) JPH16081, Kovář 1908
LC	*Cladonia coniocraea*	8, 11, 12, 13, 17, 2, 22, 28, 29 (hum)
RE	*Cladonia decorticata*	1(hum) ZP 19865 (PRA), Suza 1928
LC	*Cladonia digitata*	1, 2, 8, 11, 12, 13, 17, 22, 28, 29, 31, 33, 35, 49 (hum), Spitzner 1890a, Laus 1910, Kovář 1912
LC	*Cladonia fimbriata*	2 (hum) JPH10434, 17 (hum) JPH16101, Laus 1910
LC	*Cladonia furcata*	2 (hum) JPH10435, Laus 1910, Kovář 1912
LC	*Cladonia glauca*	Laus 1910
LC	*Cladonia gracilis*	Kovář 1912
DD	*Cladonia humilis*	2 (hum)
LC	*Cladonia macilenta*	5 (hum)
VU	*Cladonia macrophylla*	1 (hum) ZP20278 (PRA), Suza 1929
LC	*Cladonia ochrochlora*	Kovář 1912

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species		localities
LC	*Cladonia pyxidata*	1, 2, 4, 5, 8, 11, 12, 13, 17, 22, 28, 29, 31, 34, 35, 43, 51 (hum), Spitzner 1890a,b, Kovář 1908, Laus 1910, Kovář 1912
LC	*Cladonia squamosa*	Laus 1910
LC	*Cladonia subulata*	2 (hum) JPH10433
VU	*Cladonia symphycarpia*	1 (hum) ZP19864 (PRA), Suza 1928, 1929
NT	*Collema flaccidum*	Malíček 2014
CR	*Collema glebulentum*	22 (sax) JPH10478, 27 (sax) JPH16479, 28 (sax) JPH10493, 36 (sax) JPH16520, Pišút 1967, Vězda 1960b
DD	*Collemopsidium angermannicum*	2 (sax) JPH16098
LC	*Cryptodiscus gloeocapsa*	33 (hum)
NT	*Cystocoleus ebeneus*	12 (sax)
VU	*Dermatocarpon luridum*	7 (sax) JPH16229, 8 (sax) JPH10462, 28 (sax) JPH10492, 42 (isr) JPH16033, 16037, 16038, 49 (isr) JPH16060
NT	*Dermatocarpon miniatum*	42 (sax) JPH16047, 57 (mos) JPH16079, JPH16089, Kovář 1908
DD	*Diploschistes gypsaceus*	Anders 1899
LC	*Diploschistes scruposus*	22 (sax) JPH10477, 23 (sax) JPH16470, 57 (sax) JPH16086
NT	*Diplotomma alboatrum*	16 (sax) JPH10440, Malíček 2014
VU	*Enterographa zonata*	15 (sax) JPH16463, Kovář 1908, Eitner 1911
VU	*Fuscidea austera*	2 (sax) JPH10421
NT	*Fuscidea kochiana*	2 (sax) JPH10424
DD	*Fuscopannaria praetermissa*	13 (sax) JPH10471, 25 (sax) ZP 19958 (PRA)
LC	*Gyalecta jenensis*	46 (isr) JPH16058, Vězda 1958, 1959, 1960, Pišút 1969
RE	*Gyalecta kukriensis*	25 (sax) ZP20574 (PRA), 26 (sax) ZP19870 (PRA), Vězda 1959, 1960, Pišút 1969
VU	*Graphis scripta*	Laus 1910
VU	*Haematomma ochroleucum*	49 (isr) JPH16059
EN	*Henrica melaspora*	25 (sax) JPH16507, 25 (sax) JPH16511
LC	*Hypogymnia physodes*	1, 8, 11, 13, 17, 22, 28, 29 (mos)
LC	*Chrysothrix chlorina*	11, 12 (sax)
EN	*Icmadophila ericetorum*	Laus 1910
VU	*Ionaspis lacustris*	2, 8, 11, 12, 13, 17, 22, 28, 29 (sax)
VU	*Lecanactis dilleniana*	Vězda 1959, 1960, Pišút 1969
LC	*Lecanora albescens*	59 (sax) JPH16515

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species		localities
DD	*Lecanora albula*	Vězda 1961
EN	*Lecanora bicincta*	12 (sax) JPH10440, 57 (sax) JPH16092, 58 (sax) JPH16513, JPH16537, Vězda 1961
NT	*Lecanora cenisia*	2, 8, 11, 12, 13, 17, 22, 28, 29, 32 (sax), Kovář 1908
LC	*Lecanora dispersa*	2 (sax) JPH10413, 30 (sax) JPH16071
VU	*Lecanora epanora*	8 (sax) JPH14118, JPH7573, 12 (sax) JPH10439, 23 (sax) JPH16469, 27 (sax) JPH16474, JPH16476, JPH16481, 36 (sax) JPH16517, JPH16522, Suza 1927, 1929
LC	*Lecanora intricata*	2 (sax) JPH10423
VU	*Lecanora intumescens*	Laus 1910
NT	*Lecanora orosthea*	35 (sax) JPH16032, Vězda 1961
LC	*Lecanora polytropa*	2 (sax) JPH10425, Kovář 1908
LC	*Lecanora rupicola*	2 (sax) JPH10414, 23 (sax) JPH16468, 30 (sax) JPH16094
LC	*Lecanora saxicola*	2 (sax) JPH10429, 30 (sax) JPH16075, Suza 1929
NT	*Lecanora soralifera*	8 (sax) JPH10465, 17 (sax) JPH10485, 28 (sax) JPH10488, Suza 1927
VU	*Lecanora swartzii*	30 (sax)
DD	*Lecania dubitans*	Kovář 1908
NT	*Lecidea confluens*	2 (sax) JPH16100
VU	*Lecidea hypnorum*	8 (mos) JPH10466, 20 (mos) JPH16455, 30 (mos) JPH16069, 42 (mos) JPH16035, 57 (mos) JPH16083, Laus 1910, Malíček 2014
NT	*Lecidea lapicida*	2 (sax) JPH10415
NT	*Lecidea lithophila*	14 (sax) JPH16454, 2 (sax) JPH10418
DD	*Lecidea phaeops*	Kovář 1908
NT	*Lecidea plana*	2 (sax) JPH10417
DD	*Lecidea praenubila*	Suza 1929b
VU	*Lecidea silacea*	8 (sax) JPH16105
LC	*Lecidella carpathica*	8 (sax) JPH10457, 11 (sax) JPH10450, 17 (sax) JPH10487, 30 (sax) JPH16073, Kovář 1908
NT	*Lecidella elaeochroma*	Kovář 1908
LC	*Lecidella stigmatea*	30 (sax) JPH16072, 30 (sax) JPH16076, Vězda 1961
VU	*Lecidoma demissum*	34 (hum) JPH16027
LC	*Lepraria neglecta*	2, 20, 21, 31, 33, 34, 40, 49, 51 (mos), Kovář 1908
LC	*Lepraria vouauxii*	2 (hum) JPH10431, 11 (hum) JPH10453, 12 (hum) JPH10444, 13 (hum) JPH10473, 28 (hum) JPH10489, 30 (sax) JPH16070

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species		localities
VU	*Leproplaca obliterans*	Vondrák & Malíček 2015
VU	*Leptogium gelatinosum*	Suza 1929
LC	*Leptogium pulvinatum*	10 (mos), Vězda 1960b
RE	*Leptogium saturninum*	Stein 1879, Spitzner 1890a
EN	*Leptogium subtile*	15 (mos)
LF	*Leptorhaphis steinii*	Eitner 1911
LC	*Lichenomphalia umbellifera*	43 (hum) JPH16045, JPH16049
CR	*Lobaria pulmonaria*	Kovář 1908, Laus 1910
VU	*Melanelia hepatizon*	8, 11, 12, 22, 29 (sax)
CR	*Melanelixia glabra*	Laus 1910
CR	*Menegazzia terebrata*	Laus 1910
LC	*Micarea lignaria*	8 (sax) JPH10459, 11 (mos) JPH10447, Vězda 1960b
LC	*Micarea micrococca*	43 (sax)
LC	*Micarea sylvicola*	Kovář 1908
VU	*Micarea turfosa*	59 (sax)
VU	*Miriquidica garovaglioi*	2 (sax) JPH10411
EN	*Mycobilimbia tetramera*	Vězda 1959, 1960, Laus 1910
CR	*Nephroma parile*	Suza 1929
CR	*Nephroma resupinatum*	Kovář 1908, Laus 1910
LC	*Opegrapha gyrocarpa*	11 (sax) JPH10446
EN	*Opegrapha viridis*	Laus 1910
RE	*Pannaria conoplea*	Laus 1910
LC	*Parmelia saxatilis*	8, 11, 12, 13, 17, 22, 28, 29 (sax)
NT	*Parmelina tiliacea*	Spitzner 1890a,b
VU	*Peltigera degenii*	59 (mos) JPH16516, Malíček 2014
EN	*Peltigera horizontalis*	Spitzner 1890a,b, Kovář 1909
EN	*Peltigera lepidophora*	10, 42 (hum), Suza 1928, 1929
CR	*Peltigera leucophlebia*	2 (hum) JPH10432, 14 (hum) JPH16453, 20 (hum) JPH16452, Malíček 2014
CR	*Peltigera malacea*	10 (hum)
EN	*Peltigera polydactylon*	11 (hum) JPH10454, 17 (hum) JPH10484, 28 (hum) JPH10491, Kovář 1909, Malíček 2014
NT	*Peltigera praetextata*	17 (hum) JPH10480, Suza 1928, 1929

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species		localities
NT	*Peltigera rufescens*	13 (hum) JPH10475, 35 (hum) JPH16031, 36 (hum) JPH16518, 42 (acs) JPH16041, 43 (acs) JPH16046, Suza 1929
CR	*Peltigera venosa*	17 (hum) JPH10483, Anders 1899, Kovář 1908, Malíček 2014
DD	*Pertusaria amarescens*	23 (sax) JPH16471, 23 (sax) JPH16473, ZP 23708
EN	*Pertusaria hymenea*	Laus 1910
NT	*Pertusaria lactea*	8 (sax) JPH10461
VU	*Pertusaria leioplaca*	Laus 1910
EN	*Pertusaria pertusa*	Laus 1910
NT	*Phaeophyscia sciastra*	Vězda 1961
RE	*Phlyctis agelaea*	Laus 1910
LC	*Physcia caesia*	30, 52 (sax)
LC	*Physcia dubia*	13 (sax) JPH10474, 2 (sax) JPH10412
NT	*Placidium rufescens*	42 (acs) JPH16042, JPH16044, 57 (acs) JPH16090, Kovář 1908
LC	*Placidium squamulosum*	Vězda 1959
VU	*Placopyrenium fuscellum*	42 (sax) JPH16023
LC	*Placynthiella icmalea*	11, 12, 13, 17, 2, 22, 28, 29, 31, 33, 49, 51, 8 (hum)
NT	*Platismatia glauca*	1, 11, 22, 28 (mos)
VU	*Pleopsidium chlorophanum*	2 (sax) JPH10416, 11 (sax) JPH10445, Malíček 2014
NT	*Polyblastia cupularis*	Vězda 1959, Pišút 1969
EN	*Polyblastia peminosa*	19 (sax) JPH16528, 35 (sax) JPH16028, 57 (sax) JPH16084, JPH16085, JPH16088, JPH16093
LC	*Polycauliona candelaria*	Vondrák & Malíček 2015
LC	*Polysporina subfuscescens*	Vězda 1960b
LC	*Porina aenea*	2 (Sor)
DD	*Porina grandis*	11 (isr) JPH10455, 48 (sax) JPH16459
VU	*Porina lectissima*	8 (isr) JPH16096, 57 (sax) JPH16080
RE	*Porina mammillosa*	23 (mos) JPH16465, JPH16467, 48 (mos) JPH16458
DD	*Porina sudetica*	Suza 1928
DD	*Porocyphus coccodes*	7 (sax) JPH16230
EN	*Porpidia cinereoatra*	Kovář 1908
LC	*Porpidia crustulata*	8 (sax) JPH10460, 11 (sax) JPH10452, 28 (sax) JPH10490,
DD	*Porpidia nigrocruenta*	Malíček 2014
VU	*Porpidia ochrolemma*	7 (sax) JPH16228, 8 (isr) JPH10463, Jablonska 2012

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species		localities
VU	*Porpidia speirea*	36 (sax) JPH16521, 48 (sax) JPH16459, 57 (sax) JPH16092, Vězda 1959, 1960, Malíček 2014, Pišút 1969
LC	*Protoblastenia rupestris*	23 (sax) JPH16472
CR	*Protopannaria pezizoides*	13 (sax), 14 (sax), 17 (sax), Kovář 1908, Malíček 2014
LC	*Protoparmelia badia*	2, 8, 11, 12, 13, 17, 22, 28, 29, 30, 32, 40, 43 (sax), Kovář 1908
EN	*Protoparmelia nephaea*	28 (sax) JPH16103
NT	*Protothelenella sphinctrinoidella*	13 (hum) JPH16106, 17 (hum) JPH16102
NT	*Pseudevernia furfuracea*	1, 11, 12, 13, 17, 2, 22, 28, 29, 8 (mos)
LC	*Psilolechia lucida*	30 (sax), 33 (sax), 40 (sax), 49 (sax)
NT	*Ramalina pollinaria*	8, 11, 12, 13, 17, 29 (sax)
NT	*Rhizocarpon alpicola*	8, 11, 12, 13, 17, 29 (sax)
NT	*Rhizocarpon badioatrum*	Suza 1929
NT	*Rhizocarpon disporum*	23 (sax) JPH16464, 28 (sax) JPH10496, 57 (sax) JPH16091, Kovář 1908, Eitner 1911, Malíček 2014
LC	*Rhizocarpon distinctum*	24 (sax) JPH16525
LC	*Rhizocarpon geographicum*	58 (sax) JPH16514, Kovář 1908
NT	*Rhizocarpon hochstetteri*	32 (sax) JPH16078
VU	*Rhizocarpon lavatum*	8 (sax) JPH16099, 51 (sax) JPH16067
LC	*Rhizocarpon lecanorinum*	57 (sax) JPH16082
DD	*Rhizocarpon macrosporum*	Malíček 2014
LC	*Rhizocarpon reductum*	8 (sax) JPH10468, 2 (sax) JPH10427
DD	*Rinodina fimbriata*	42 (sax) JPH16039
RE	*Rinodina mniaraea*	Vězda 1959, 1960
CR	*Rinodina occulta*	Eitner 1911
LC	*Scoliciosporum umbrinum*	59 (sax) JPH16538
LC	*Schaereria fuscocinerea*	Kovář 1908
VU	*Schaereria cinereorufa*	11 (sax) JPH10451
EN	*Solorina saccata*	10 (sax), Kovář 1908, Suza 1929, Vězda 1959, 1960, Pišút 1969, Malíček 2014
NT	*Sporastatia polyspora*	8, 11, 12, 13, 17, 22, 28, 29 (sax)
VU	*Sporodictyon cruentum*	1 (isr) JPH10436, 7 (sax) JPH16226, 11 (isr) JPH16095, 15 (sax) JPH16461, 35 (isr) JPH16029, 49 (isr) JPH16061, Kovář 1908, Malíček 2014
EN	*Sporodictyon schaerianum*	Hilitzer 1927, Vězda 1959, Pišút 1969

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species		localities
	Sporodictyon terrestre	27 (mos) JPH16480
EN	*Staurothele fissa*	46 (sax) JPH16056
EN	*Strigula stigmatella*	Kovář 1908, Laus 1910, Hruby 1914
NT	*Tephromela atra*	1, 10, 30 (sax), Kovář 1908
VU	*Thelidium methorium*	2 (sax) JPH10419, 7 (sax) JPH16225, 8 (isr) JPH10467, 11 (isr) JPH10456, 17 (isr) JPH10486, 25 (sax) JPH16509, 25 (sax) JPH16510, 27 (sax) JPH16478, 28 (isr) JPH10495, 48 (sax) JPH16456, Kovář 1908
VU	*Thelidium papulare*	27 (sax) JPH16475, JPH16477, 36 (sax) JPH16523, Vězda 1960b
LC	*Thelocarpon epibolum*	60 (hum)
CR	*Thelopsis melathelia*	13 (hum) JPH10472, 48 (mos) JPH16457, Vězda 1959
EN	*Thelotrema lepadinum*	Laus 1910
LC	*Toninia sedifolia*	Stein 1879
LC	*Trapelia coarctata*	8, 11, 12, 13, 17, 22, 28, 29, 33, 34, 43, 49 (sax), Suza 1928
LC	*Trapeliopsis granulosa*	2, 8, 11, 12, 13, 17, 2, 22, 28, 29, 31, 33, 43, 49 (hum)
LC	*Trapeliopsis pseudogranulosa*	1, 23 (hum)
EN	*Umbilicaria crustulosa*	Kovář 1908
NT	*Umbilicaria cylindrica*	8, 11, 12, 13, 17, 22, 28, 29, 30, 31 (sax), Kovář 1908
LC	*Umbilicaria deusta*	11 (sax) JPH10448, Anders 1899, Kovář 1908
LC	*Umbilicaria hirsuta*	12 (sax) JPH10442
VU	*Umbilicaria hyperborea*	Suza 1929
LC	*Umbilicaria polyphylla*	30 (sax), Kovář 1908
RE	*Usnea longissima*	Eitner 1911, Keissler 1958–1960
VU	*Vahliella leucophaea*	17 (sax) JPH10481, 49 (sax) JPH16066, Anders 1899, Suza 1929
VU	*Verrucaria aethiobola*	17 (isr) JPH10479
DD	*Verrucaria andesiatica*	46 (isr) JPH16057, JPH16062, JPH16063, JPH16064, JPH16065
VU	*Verrucaria aquatilis*	46 (isr) JPH16053, JPH16054
LC	*Verrucaria dolosa*	7 (sax) JPH16227, 33 (sax) JPH16025, 35 (sax) JPH16030, 42 (sax) JPH16034, 43 (sax) JPH16051, 46 (sax) JPH16055,
VU	*Verrucaria funckii*	1 (isr) JPH10437
VU	*Verrucaria hydrela*	43 (isr) JPH16048
VU	*Verrucaria margacea*	7 (sax) JPH16224, 46 (isr) JPH16052,
LC	*Xanthoria elegans*	8, 11, 12, 13, 17, 2, 22, 28, 29, 8 (sax)
NE	*Xylographa minutula*	Suza 1929

Shortcuts: **acs** – bare ground, **dew** – decaying wood, lying log or stump, **hum** – humus, **isr** – periodicaly inundated rock, **mos** – overgrowing bryophytes, **sax** – siliceous rock, **Sor** – *Sorbus aucuparia*, **JPH** – herbarium sample. **CR** (C1) – critically endangered **EN** (C2) – endangered, **VU** (C3) – vulnerable, **DD** – data deficient, **NT** – near threatened, **LC** – least concern, **NE** – not evaluated, **RE** – extinct, **NF** – nonlich. fungus.

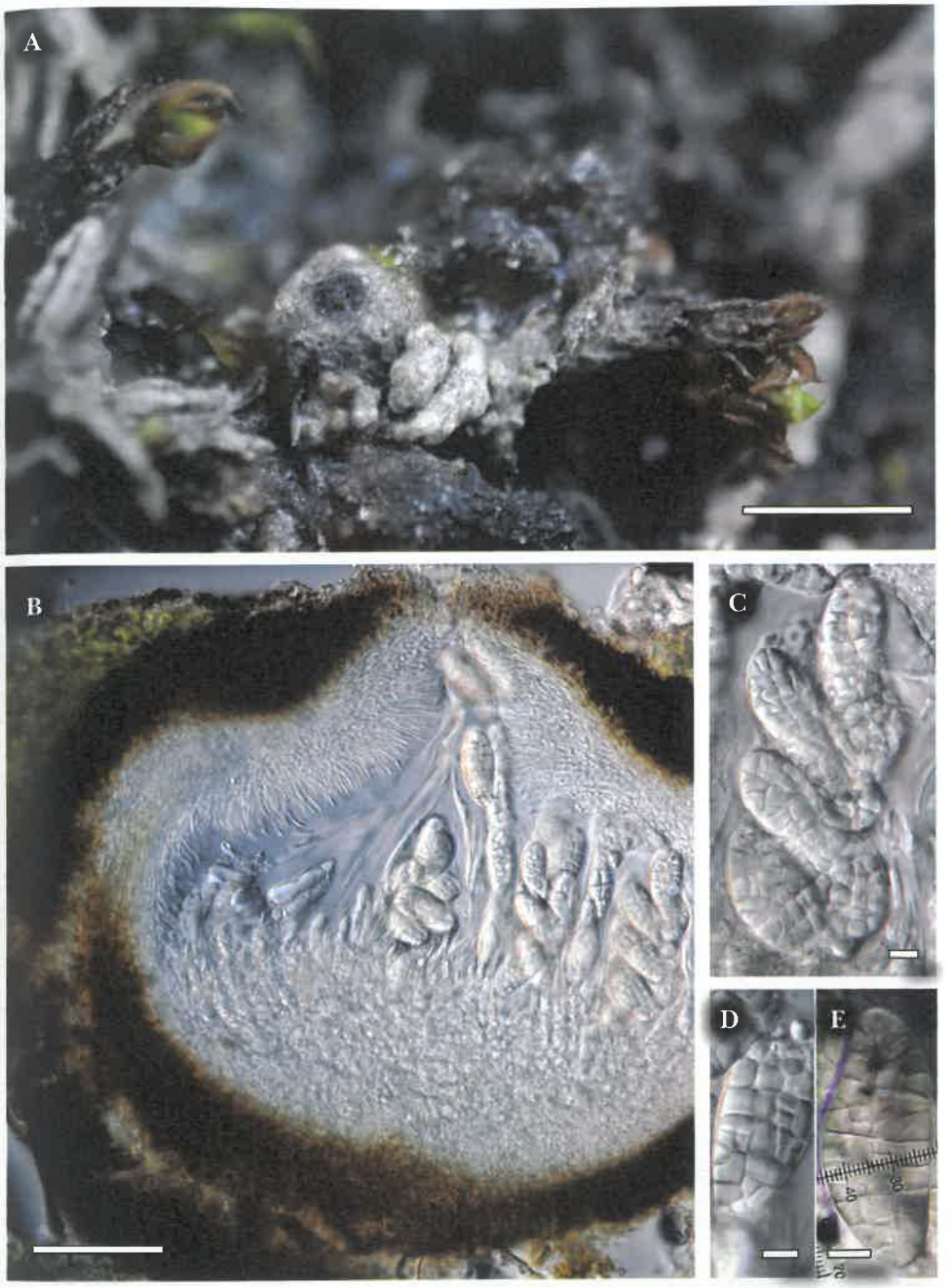

Fig. 18. Sporodictyon terrestre *(Th. Fr.) S. Savic & Tibell (JPH16480). A. Thallus with an ascoma. B. Vertical section. C. Asci with ascospores. D., E. Ascospores. Scale A = 1 mm, B = 100 µm, C – E = 10 µm.*

Fig. 19. Staurothele fissa (JPH16478). A. Thallus with ascomata. B. Vertical section of an ascoma. C. Ascus with ascospores. Scale A = 1 mm, B = 100 µm, C = 10 µm.

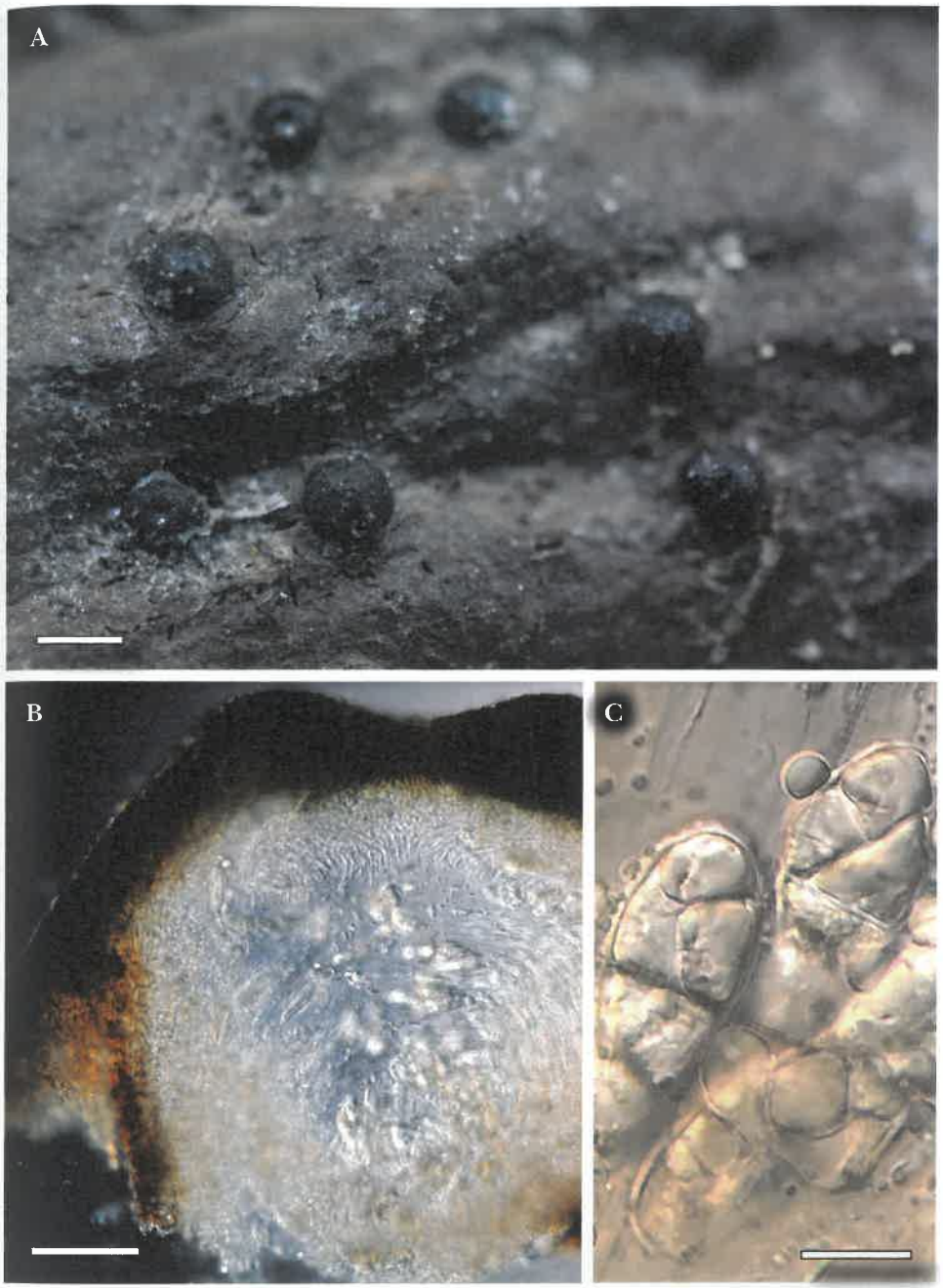

Fig. 20. Thelidium methorium (JPH16225). A. Thallus with ascomata. B. Vertical section of an ascoma. C. Ascospores. Scale A = 1 mm, B = 100 µm, C = 10 µm.

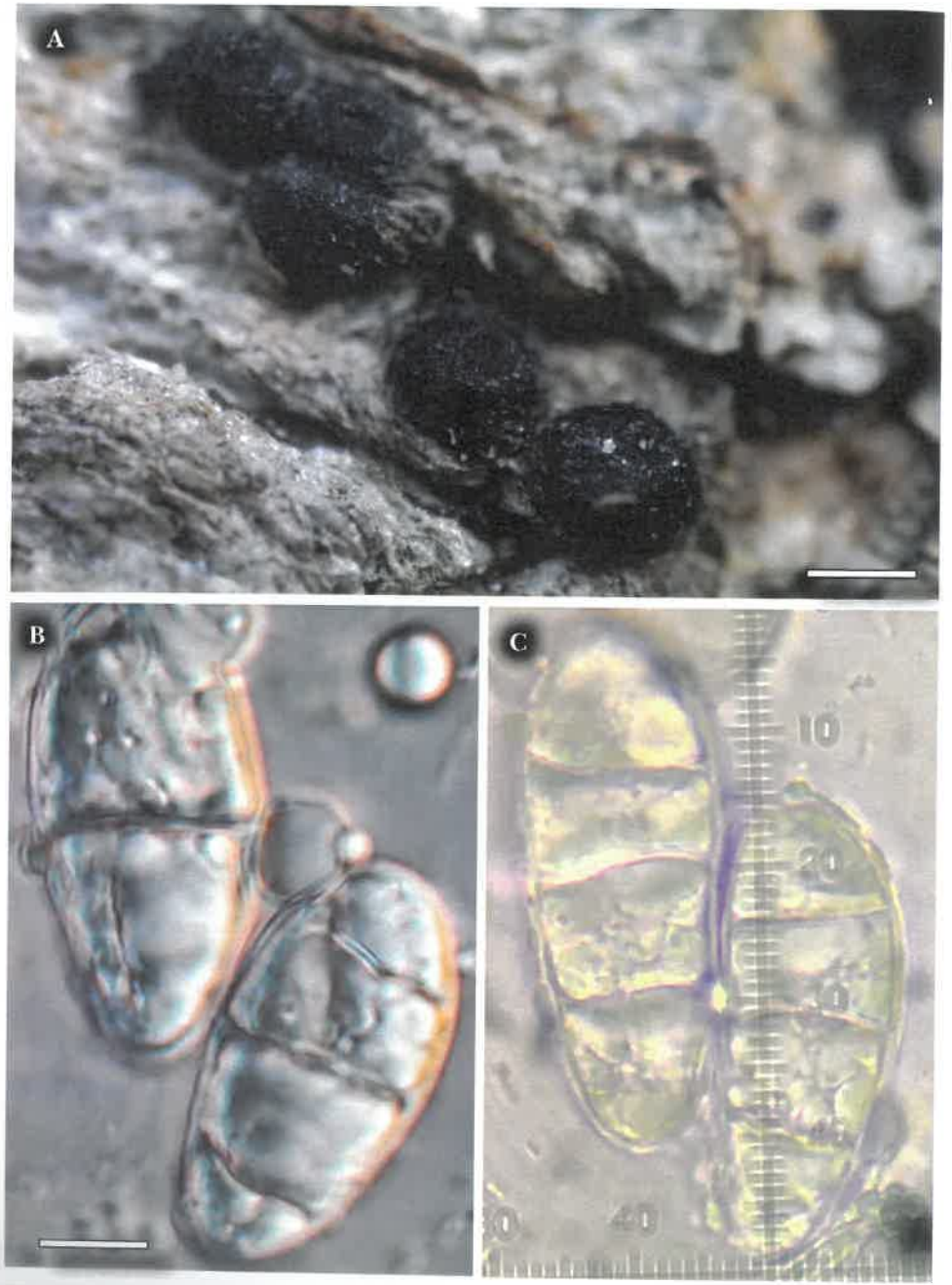

Fig. 21. Thelidium papulare (JPH16477). A. Thallus with ascomata. B, C. Ascospores. Scale A = 1 mm, B = 10 µm, C = 1 µm.

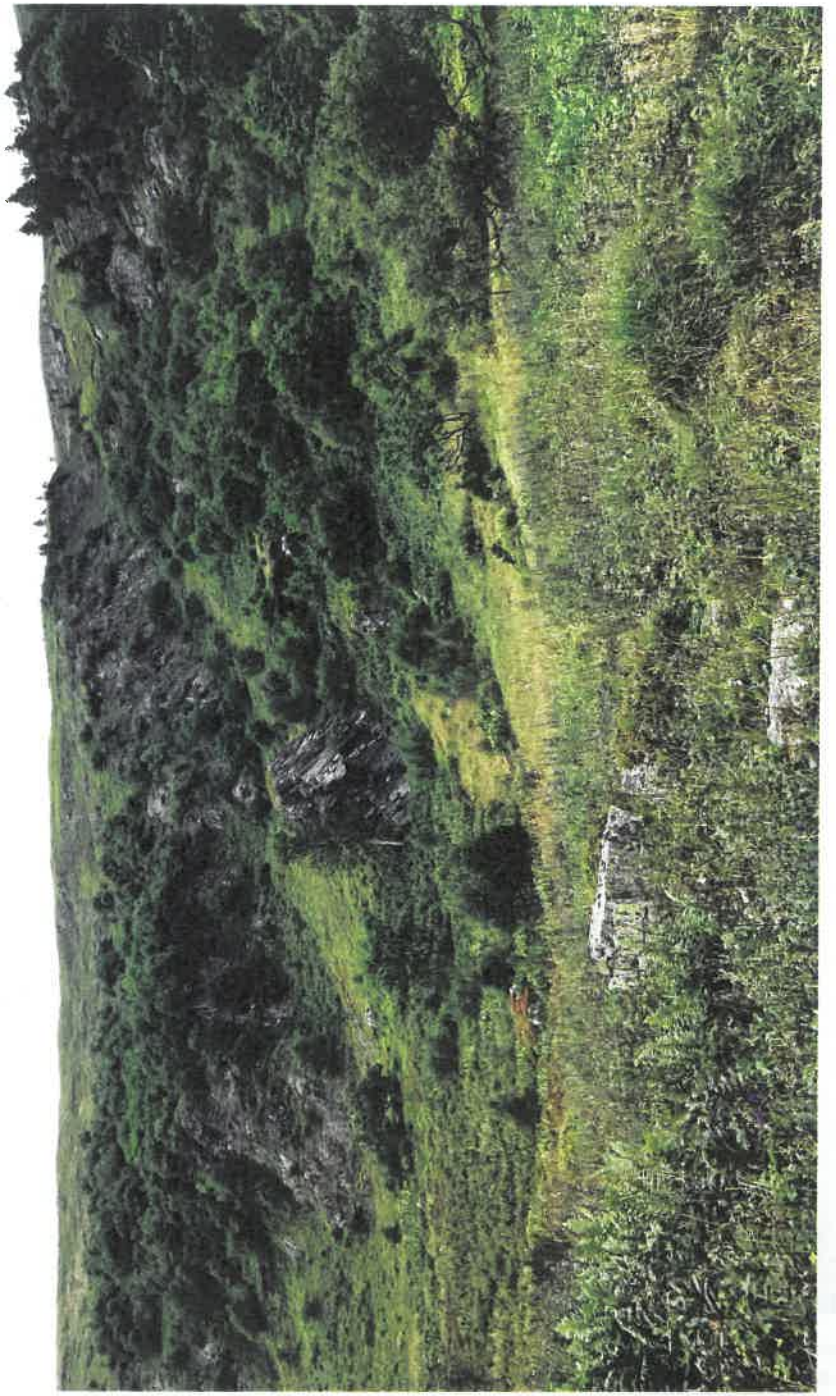

Fig. 22. A view to Velká kotlina glacial cirque from SE (from Laus Landing), 20. 8. 2017.

Figs. 23, 24. Petřík Rock and surroundings with Leo Bureš, Magda Zmrhalová and Josef Halda during a field trip in August, 2017. Foto J. Halda and L. Bureš.

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