

New records of corticioid fungi in the Bohemian Forest (Czech Republic)

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During a survey of 121 plots in the Czech part of the Bohemian Forest (Šumava Mts.) 1168 records of 174 taxa of corticioid fungi were obtained in the years 2017 and 2018. Occurrences of red-listed, rare or otherwise interesting taxa are reviewed. *Athelopsis subinconspicua*, *Cabalodontia subcretacea*, *Hyphoderma* aff. *crassescens* nom. prov., *Kneiffiella cineracea*, *Lawryomyces capitatus*, *Oliveonia* sp., *Phlebia* aff. *ryvardenii*, *Phlebia serialis*, *Phlebia subulata*, *Subulicystidium perlongisporum* and *Xylodon pruinosus* are described, illustrated and their taxonomy and ecology is discussed in detail. Data on elevation, host tree species and decay stage of the substrate for all species recorded is summarised in electronic supplement.

Key words: *Corticiaceae*, Šumava, deadwood, distribution, macrofungi, rare species.

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Při průzkumech na 121 plochách v české části Šumavy v letech 2017 a 2018 bylo získáno 1168 záznamů o výskytu 174 taxonů kornatcovitých hub. Článek poskytuje přehled o výskytu druhů z červených seznamů a vzácných nebo pro Šumavu jinak zajímavých taxonů. Detailně jsou uvedeny popisy, ilustrace a podrobnější diskuse k taxonomii a ekologii druhů *Athelopsis subinconspicua*, *Cabalodontia subcretacea*, *Hyphoderma* aff. *crassescens* nom. prov., *Kneiffiella cineracea*, *Lawryomyces capitatus*, *Oliveonia* sp., *Phlebia* aff. *ryvardenii*, *Phlebia serialis*, *Phlebia subulata*, *Subulicystidium perlongisporum* a *Xylodon pruinosus*. Pro všechny druhy je v elektronické příloze uveden souhrn údajů o nadmořské výšce, druzích hostitelských dřevin a stupni rozkladu substrátu.

INTRODUCTION

The Bohemian Forest (Šumava Mountains, Böhmerwald) is a large forested mountain range on the border of the Czech Republic, Germany and Austria. Relative remoteness, conservation efforts (some dating to the mid-19th century) and the largely depopulated area since the 1950s has allowed for the persistence of some forest refugia with minimal human influence, the most famous of which is the Boubínský prales Virgin Forest. The Czech part of the mountain range has been protected as the Šumava Protected Landscape Area (PLA) since 1963. In 1991, the Šumava National Park (NP) was established in a part of the original PLA. Likewise, the German part is protected as the Bayerischer Wald National Park since 1970.

The Bohemian Forest is one of the most significant areas regarding the occurrence and consequently conservation of rare lignicolous fungi in the Czech Republic, namely those with a boreo-montane distribution and preference for undisturbed natural forests. This is stressed by the fact that the Bohemian Forest is the only locality in the country of several lignicolous species, namely *Amylocystis lapponica* (Romell) Bondartsev & Singer, *Antrodia piceata* Runnel, Spirin & Vlasák, *Junghuhnia luteoalba* (P. Karst.) Ryvarden, *Laurilia sulcata* (Burt) Pouzar, *Odonticium romellii* (S. Lundell) Parmasto, *Oligoporus simanii* (Pilát) Bernicchia, *Perenniporia subacida* (Peck) Donk, *Suillosporium cystidiatum* (D.P. Rogers) Pouzar, *Tubulicrinis angustus* (D.P. Rogers & Weresub) Donk (Holec & Beran 2006).

While some parts of the Šumava NP and PLA have been the subject of intensive mycological research for a long time – namely Boubínský prales Virgin Forest (Holec et al. 2015, 2020), there is significantly less published data from most other parts (see Holec 2000 for concise history of mycological research in the Šumava Mts.). This is particularly the case of corticioid species, for which only very limited published data is available from the area. Some rare (and mostly conspicuous) species from this group are listed e.g. by Holec et al. (2015, 2020), Lepšová & Pouska (2014), Pouska et al. (2015) or Tomšovský (2001). In contrast to the Šumava National Park, a checklist of fungi in the Bavarian Forest National Park (Bässler et al. 2011) including many corticioid species has been published.

During our work on ‘Silva Gabreta Monitoring’ (Křenová & Seifert 2018) we collected a large dataset regarding lignicolous (wood-inhabiting) fungi, including corticioid fungi, often outside mycologically well-explored areas of the Bohemian Forest. The aim of the present work is to use a subset of these data to update our knowledge of the distribution and ecological preferences of corticioid species in the Bohemian Forest with special regard to red-listed taxa, and to present and illustrate some of the most interesting records.

MATERIAL AND METHODS

Field survey. The data were collected during a multidisciplinary project named Silva Gabreta Monitoring (Křenová & Seifert 2018) in 121 circular permanent plots 36 m in diameter in the Šumava National Park and Protected Landscape Area. Each plot was inspected once between the second half of July and first half of November. Most of the plots were visited in 2017, a small fraction in 2018. A representative sample of objects (snags, lying trunks, stumps and branches; usually around 15) of various size, decay stage and tree species from each plot was examined for all sporocarps of macrofungi present at the time of the visit. This corresponds to the method used in Bavaria (e.g. Bässler et al. 2010). This article deals with a subset of data only including corticioid species sensu Bernicchia & Gorjón (2010), and the resupinate genus *Tulasnella* J. Schröt. (*Cantharellaceae*), previously often included in the Heterobasidiomycetes. Specimens which were not readily identifiable in the field were collected for later identification. Decay stage was recorded on a five-degree scale as follows: 0 – living tree; 1 – deadwood with bark firmly attached on most of its surface; 2 – bark loosely attached or absent, wood still hard; 3 – wood soft and partly disintegrated; 4 – original shape lost (Albrecht 1990). The terms ‘trunks’ and ‘branches’ denote objects fallen on the ground, if not stated otherwise.

All plots were placed in currently unmanaged forest stands. However, their land use history differs, ranging from stands of successional origin on abandoned pastures (now mostly dominated by *Alnus incana*) or military shooting ranges, through forests managed in various degrees in the past, to natural forests with minimal direct human influence in the past. However, no plots lacking any human influence in the past were included. The natural vegetation of the plots spans a broad spectrum of habitats: eutrophic beech(-fir) forests, montane beech forests, montane, water-logged and bog spruce forests, and peat bogs. Some spruce forests were heavily affected by wind and bark beetle before 2009 (shortened as ‘disturbed mountain spruce forest’ in the text). The altitudinal range of the surveyed plots was 600–1340 m a.s.l.

Morphological study. Macro- and microscopical features are presented for selected less known taxa. The macroscopic descriptions were based on fresh material (where available) supplemented with colour photographs. Microscopic features were examined in Melzer’s solution, Cotton Blue in lactophenol, Congo Red in 10% ammonia and 5% KOH solution at 1000× magnification under an oil immersion lens. Microscopic observations including measurements were carried out on dried material. Dimensions of spores were derived from measurements of 20 individual spores in Cotton Blue. The spores were measured directly under an optical microscope using an eyepiece micrometer.

The taxonomic concepts of Bernicchia & Gorjón (2010) are generally used, supplemented with more recent literature for some taxa. For the species complex of *Athelia epiphylla* (including *A. acrospora*, *A. epiphylla*, *A. nivea* and *A. salicum*) data in the Electronic supplement were pooled as *Athelia epiphylla* agg., since we were not able to reliably identify most of the material to particular species. Likewise, we pooled data for clampless *Botryobasidium* specimens with small but relatively wide (sub)navicular spores not accompanied by the anamorph – most probably either *Botryobasidium aureum* Parmasto or *Botryobasidium candidans* J. Erikss. – into a single ‘*Botryobasidium* indet.’ category. In the Electronic supplement, data for records identified with uncertainty (‘cf.’ – mostly specimens in poor shape, too young or overmature) are included under the species in question.

Distribution data. Distribution data in the Bohemian Forest are based on available literature, national on-line databases – NDOP (AOPK ČR on-line), Pilze Deutschland (DGfM on-line), Datenbank der Pilze Österreichs (ÖMG on-line) – and for the Czech part also on voucher specimens deposited in the major herbaria of the Czech Republic (CB, HR, PRC, PRM). For species included in the Austrian (Dämon & Krisai-Greilhuber 2017), Czech (Holec & Beran 2006) and German (Dämmrich et al. 2016) Red Lists, a threat category is indicated (Least Concern, Data Deficient and equivalent categories are omitted). The Bavarian Red List (Karasch & Hahn 2010), although locally appropriate, was not utilised, as virtually no corticioid fungi are included.

Herbarium labels were translated into English by the authors; additional information on voucher specimens not present on the original herbarium labels is given in square brackets. Voucher specimens are deposited in the herbaria of the Museum of South Bohemia, České Budějovice (CB) and the Museum of West Bohemia, Plzeň (PL).

Abbreviations used: aff. – species close to a particular species but with a significant difference; AU – species present in the Austrian checklist (Dämon & Krisai-Greilhuber 2017); CB – herbarium of the Museum of South Bohemia, České Budějovice; cf. – species determined with some uncertainty (mostly due to suboptimal condition of the specimen) but probably belonging to the species; CZ – species included in the Czech Red List (Holec & Beran 2006); DE – species present in the German Red List (Dämmrich et al. 2016); det. – identified by; DS – decay stage; herb. L.Z. – private herbarium of the first author; HR – herbarium of the Museum of East Bohemia, Hradec Králové; leg. – collected by; NM – Nature Monument; NNR – National Nature Reserve; NR – Nature Reserve; not. – noted by, record not documented with a herbarium specimen; PL – herbarium of the Museum of West Bohemia, Plzeň; PLA – Protected Landscape Area; PRM – herbarium of the National Museum, Prague; Q – range of measured length/width ratio of spores, Q_{avg} – range of average Q values measured in individual specimens; SAC – Special Area of Conservation; SLO – herbarium of Comenius University, Bratislava.

RESULTS AND DISCUSSION

GENERAL RESULTS

A total of 1168 records of 174 taxa of corticioid fungi were obtained during the study (see Electronic supplement). The most abundant taxa were *Botryobasidium subcoronatum* (present on 92 objects), *Stereum sanguinolentum* (48), *Xylodon asperus* (45), *Stereum rugosum* (41) and *Peniophorella praetermissa* (41). A significant portion of the species (64, i.e. 36.4%) were found on one object only. A total of 1872 objects were examined. Corticioid fungi were found on 921 (49.1%) of them. The records originated from the wood of three coniferous (*Abies*, *Picea*, *Pinus*) and eleven broadleaf (*Acer*, *Alnus*, *Betula*, *Corylus*, *Fagus*, *Frangula*, *Fraxinus*, *Lonicera*, *Salix*, *Sambucus*, *Sorbus*) genera (Fig. 1). In some cases, the substrate could only be determined as conifer (16 records) or broadleaf (6) wood or not at all (1).

Most records of corticioid fungi were from substrates in decay stages 2 and 3. These records tend to be associated with more advanced stages of decay than expected by the distribution of decay stages ($\chi^2 = 69.15$, $D_f = 4$, $p < 0.0001$; Fig. 2). However, some corticioid species showed pronounced preference for earlier stages of decay, e.g. *Cylindrobasidium evolvens*, *Peniophora* spp., *Stereum* spp. and *Vuilleminia comedens*.

Several corticioid species included in the national Red Lists of Austria (10 in total; 3 EN, 3 VU, 4 NT), the Czech Republic (15 in total; 3 ?EX, 1 CR, 8 EN, 1 VU, 2 NT) and Germany (8 in total; 3 CR, 1 EN, 1 NT, 3 R) were recorded.

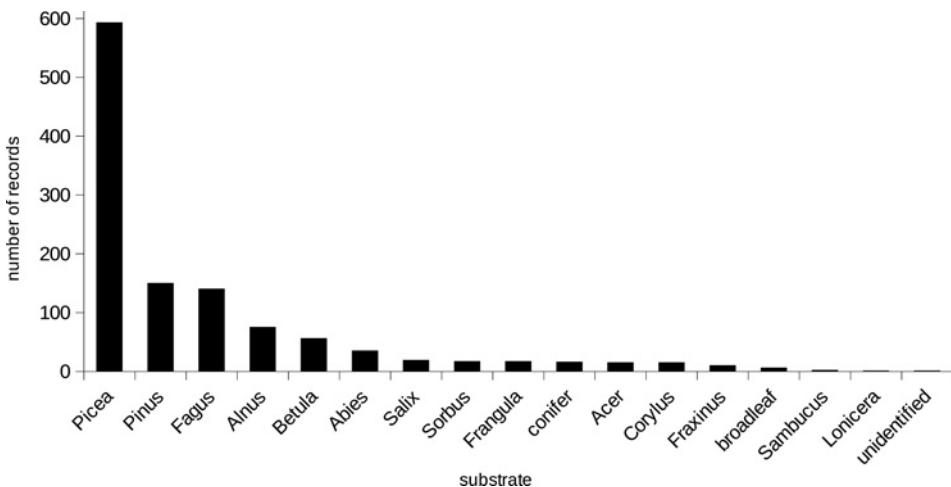


Fig. 1. Number of records of corticioid fungi per tree genus.

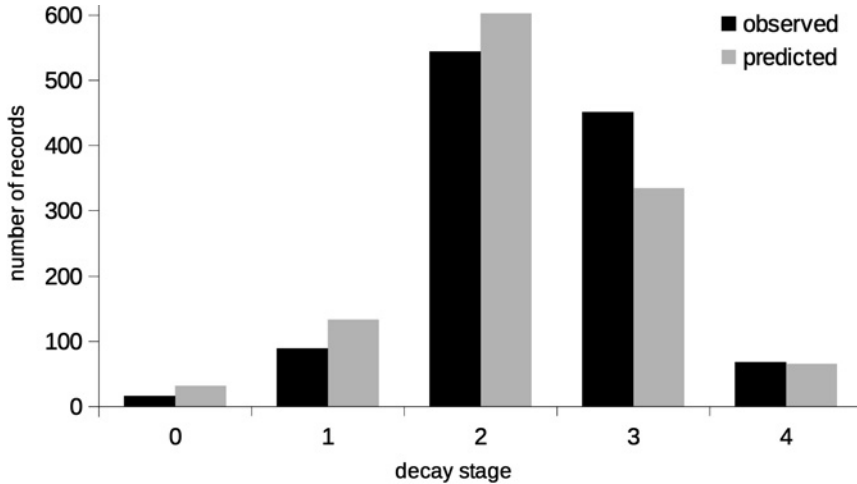


Fig. 2. Number of records of corticioid fungi grouped by decay stage (observed) and predicted values for numbers of records based on the distribution of decay stages of all objects examined (predicted).

DETAILS ON NOTEWORTHY SPECIES

Asterostroma medium Bres.

CZ: VU

Notes. According to Pouzar (2006), in the Czech Republic, *Asterostroma medium* has its centre of distribution in the Carpathians, which corresponds with the ample material from Moravia deposited in PRM. Although this is the first published record from the Bohemian Forest, it was previously recorded here in Zátoňská hora NR (PRM 924579) by J. Holec and in the nearby Novohradské hory Mts. (Žofínský prales Virgin Forest, PRM 803294) by Z. Pouzar. It is not included in the checklists of Austria (Dämon & Krisai-Greilhuber 2017) or Germany (Ostrow & Dämmrich 2010), but it was possibly not distinguished from *A. cervicolor* (Berk. & M.A. Curtis) Masee, a species described from North America. While Hallenberg & Eriksson (1985) synonymised these two species, later authors have kept them separate (Boidin et al. 1997, Bernicchia & Gorjón 2010), a position also recently supported by molecular data (Liu et al. 2017).

All records of *Asterostroma medium* from the Czech Republic are from the wood of *Abies alba* either in more or less natural beech-fir forests (Pouzar 2006) or in ravine forests with climate inversion (Běťák 2015), but outside of central Europe it was recorded on different substrata including broadleaves and even on a telephone pole (Boidin et al. 1997, Bernicchia & Gorjón 2010).

New record from Bohemian Forest

Šumava NP, Radvanovický hřbet, 2.4 km south of Lenora, plot L046, 875 m a.s.l., beech-fir forest, close to forest spring, underside of bark of a trunk of *Abies alba* (uprooted and cut), DS 2, soc. *Flavophlebia sulfureoisabellina*, 17 Aug 2017 leg. L. Zíbarová & A. Lepšová, det. L. Zíbarová (CB 22208).

Other specimens studied

Czech Republic. Šumava PLA, Zátoňská hora NR, Zátoň, 0.2–0.5 km southwest of summit of Mt. Zátoňská hora, 960 m a.s.l., natural mixed mountain forest (*Fagus*, *Picea*, *Abies*, *Acer pseudo-platanus*, *A. platanoides*) on local ravine slope, lying branch of *Abies alba*, 25 Sep 2014 leg. J. Holec, det. Z. Pouzar (PRM 924579). – Novohradské hory Mts., Žofínský prales Virgin Forest near Pivonice, trunk of *Abies alba*, 18 Oct 1967 leg. & det. Z. Pouzar (PRM 803249).

Athelopsis subinconspicua (Litsch.) Jülich

AU: VU, CZ: ?EX

= *Athelopsis hypochnoidea* Jülich

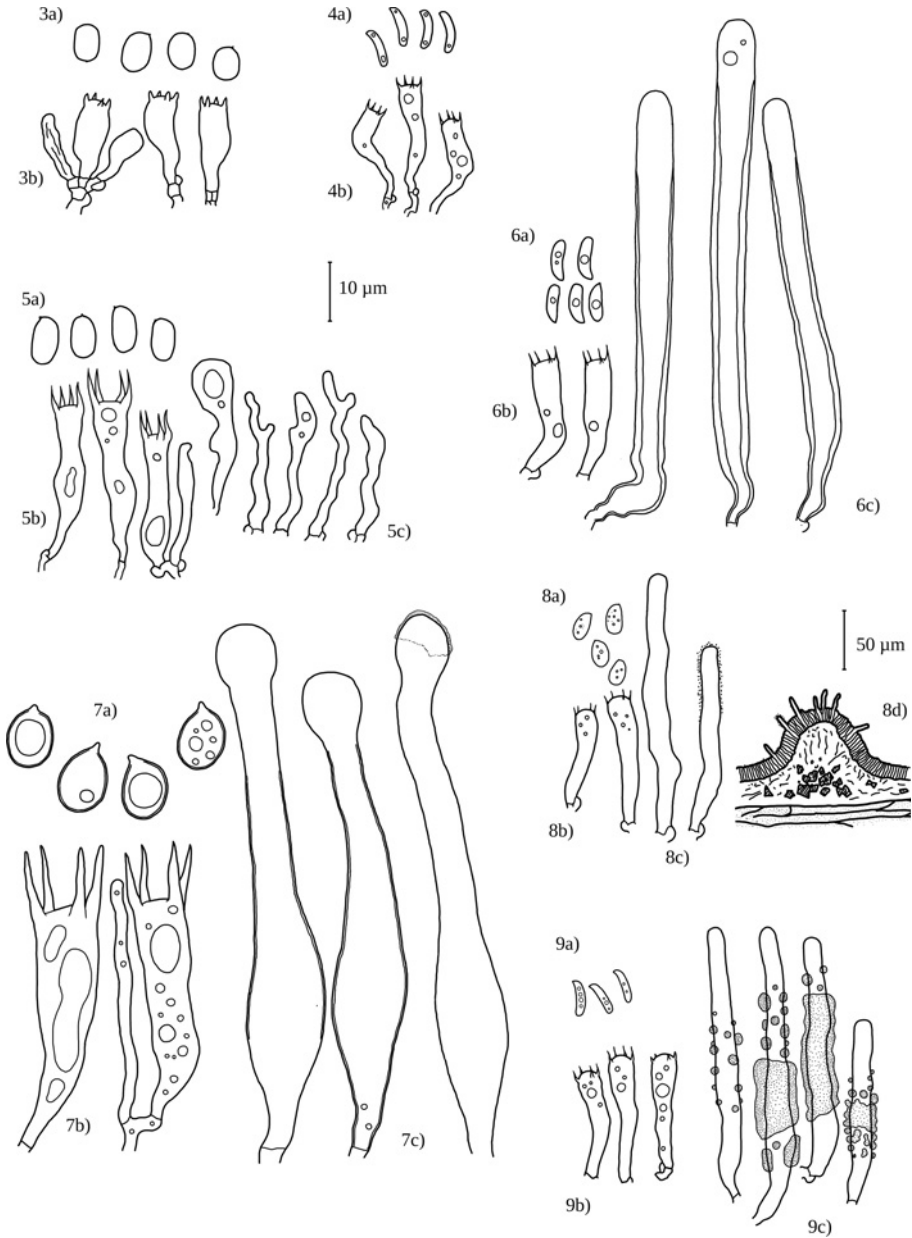
Figs. 3, 14

Macroscopic characters. Basidiomata effused, adnate, thin, at first porulose later subpellicular; hymenophore smooth, whitish, yellowish or very pale olivaceous, matt, continuous, margin undifferentiated, thinning out. KOH reaction negative.

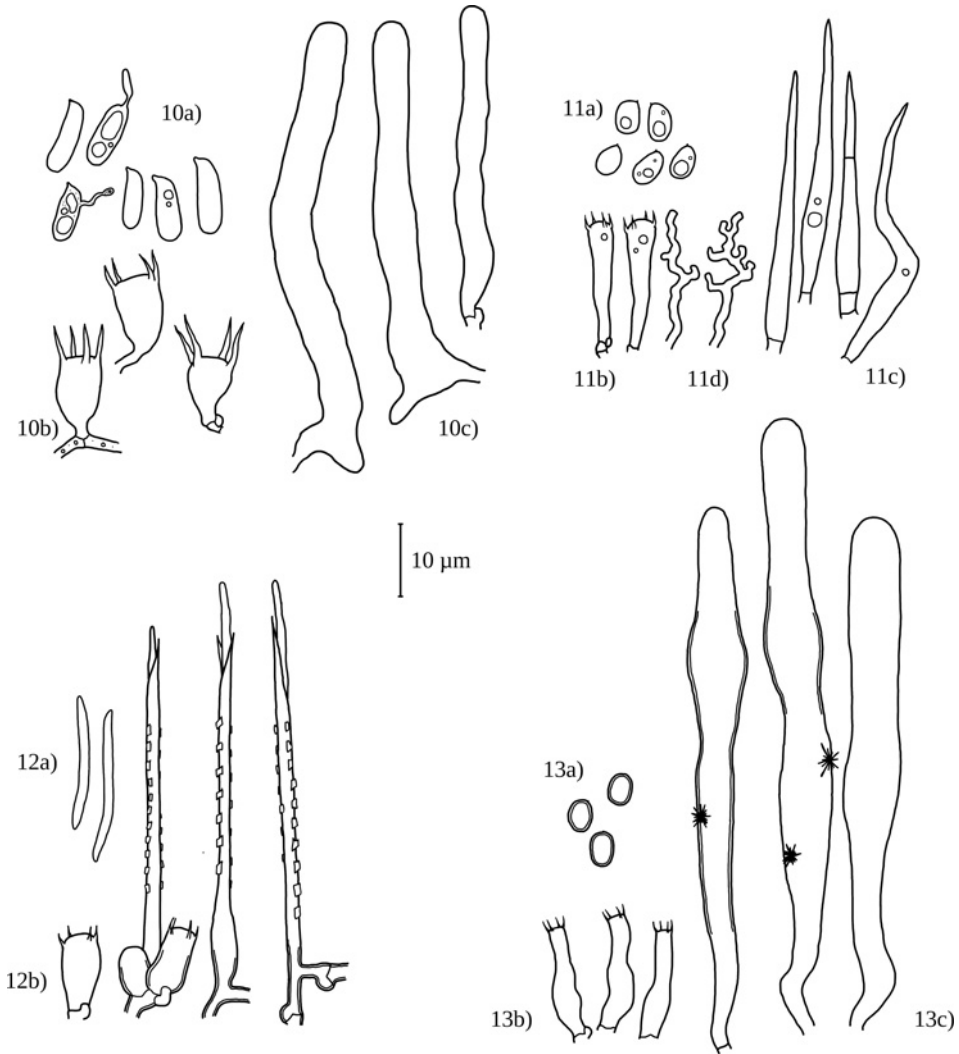
Microscopic characters. Hyphal system monomitic. Hyphae in subiculum loosely and irregularly arranged, sparsely branched, branches often originating from clamps at septa, with a few to numerous small crystals, thin-walled, 2–3(3.5) μm in diameter, septa with clamps. Hyphae in subhymenium slightly less loosely but still irregularly arranged, often branched and short-celled, with numerous small crystals in KOH, but mostly smooth in Melzer's solution, thin-walled, 2–2.5 μm in diameter, septa with clamps.

Cystidia absent. Basidia arranged in a loose palisade, clavate or clavate-pedunculate, clamped, tetrasterigmatic, without inclusions, 13–16 \times 5–6 μm . Basidiospores ellipsoid, thin-walled, smooth, hyaline, eguttulate, inamyloid, indextrinoid, cyanophilic, 5–7.5 \times 3.25–4.25 μm (avg. 5.8 \times 3.7 μm), Q = 1.4–1.9 (Q_{avg} = 1.61).

Notes. The current species name of *Athelopsis subinconspicua* (*subinconspicua* = almost not conspicuous) could be somewhat deceiving, as its basidiomata are usually visible with the naked eye. However, macromorphologically it has hardly any striking characters – the greenish tint often mentioned in the literature (Jülich 1971, Eriksson & Ryvar den 1973, Kotiranta & Saarenoksa 2005b) was not consistently present in any of our collections. Compared to similar athelioid fungi, *Athelopsis subinconspicua* is characterised by its ellipsoid, slightly thick-walled and cyanophilic spores, somewhat stalked basidia and often short-celled segments of hyphae in the subhymenium (Kotiranta & Saarenoksa 2005b). In fact, ellipsoid and cyanophilic spores are anomalous in *Athelopsis*. Correspondingly, *A. subinconspicua* is phylogenetically distant from the generic



Figs. 3–9. Line drawings of microscopic characters – a) spores, b) basidia, c) cystidia, d) schematic section of basidioma. **Fig. 3.** *Athelopsis subinconspicua* (CB 22219). **Fig. 4.** *Cabalodontia subcretacea* (CB 22206). **Fig. 5.** *Hyphoderma* aff. *crassescens* (CB 22201). **Fig. 6.** *Kneiffiella cineracea* (CB 22210). **Fig. 7.** *Lawrynomycetes capitatus* (CB 22215). **Fig. 8.** *Phlebia* aff. *ryvardenii* (CB 22205). **Fig. 9.** *Phlebia serialis* (CB 22224). Scale bar = 10 µm, except for 8d), where scale bar = 50 µm. Del. L. Zibarová.



Figs. 10–13. Line drawings of microscopic characters – a) spores, b) basidia, c) cystidia, d) apical parts of hyphidia. **Fig. 10.** *Oliveonia* sp. (CB 22212). **Fig. 11.** *Phlebia subulata* (CB 22213). **Fig. 12.** *Subulicystidium perlongisporum* (CB 22202). **Fig. 13.** *Xylodon pruinosus* (CB 22214). Scale bar = 10 µm. Del. L. Zíbarová.

type, *A. glaucina* (Bourdot & Galzin) Oberw. ex Parmasto (Binder et al. 2010) and its taxonomic position is still unclear. Just as Kotiranta & Saarenoksa (2005b), we observed that the spores are consistently smaller than mentioned by Eriksson & Ryvarden (1973; 6.5–8 × 4–4.5 µm), but in other regards our specimens agree well with the above-mentioned descriptions.

Athelopsis subinconspicua has a worldwide distribution (Jülich & Stalpers 1980, Laursen et al. 2002, Greslebin & Rajchenberg 2003), and was recorded in Europe both from northern (Eriksson & Ryvarden 1973, Kotiranta & Saarenoksa 2005b) and southern (Ortega & Lorite 2000) parts of the continent. In central and southern Europe, it seems to have a mostly montane distribution (Bernicchia & Gorjón 2010, Dämon & Krisai-Greilhuber 2017). It is included in the Czech Red List in the Probably Extinct (?EX) category, since the last and only known record from the Czech Republic was collected in 1924 in Radotínské údolí Valley near Prague (Pouzar 2006). However, we (L.Z.) revised the corresponding specimen (PRM 663208, labelled by W. Jülich as ‘*Fibulomyces hypochnoideus* Jülich’) and concluded it was clearly misidentified: the thick-walled and strongly dextrinoid spores point to *Leucogyrophana* Pouzar, possibly *Leucogyrophana romellii* Ginns, based on the spore size. Nevertheless, there are two more recent records of *Athelopsis subinconspicua* (Rachelsee, Mittelsteighütte) in the neighbouring Bavarian Forest NP in Germany (Bässler et al. 2011, DGfM on-line).

Apart from our records from permanent plots, we accidentally made additional collections at two other localities in the Bohemian Forest in 2018. While the records from the plots were all situated in disturbed montane spruce forests (although still below the natural altitudinal maximum of beech, which would be intermixed under natural conditions) at elevations about 1200 m a.s.l., our other records were from natural mixed beech-spruce-fir forests at slightly lower elevations. While it seems that *A. subinconspicua* is not particularly rare in the Bohemian Forest, all our records are from more or less natural stands of high conservation value. Likewise, Kotiranta & Saarenoksa (2005b) observed that *A. subinconspicua* is mainly restricted to old-growth forests in Finland. Therefore, the species should be retained in the next edition of the Czech Red List, albeit in a different category.

New records from Bohemian Forest

Šumava NP, Nad Plesem peak, 3.6 km west-southwest of Prášily, plot L107, 1210 m a.s.l., disturbed mountain spruce forest, trunk of *Picea abies* (crown break), DS 2 (CB 22219); *ibid.*, trunk of *Picea abies*, DS 3 (cut and peeled trunk), 9 Aug 2018 leg. V. Pouska, det. L. Zíbarová (CB 22220). – Šumava NP, Nad Plesem, 3.2 km west of Prášily, plot L105, 1205 m a.s.l., disturbed mountain spruce forest currently mixed with *Betula* and *Sorbus*, trunk of *Picea abies* (uprooted), DS 3, 9 Aug 2018 leg. V. Pouska, det. L. Zíbarová (CB 22218). – Šumava NP, between Mt. Vysoký hřeben and Mt. Trístoličník, 5.7 km south-southeast of Nové Údolí train station, plot L113, 1265 m a.s.l., disturbed mountain spruce forest, trunk of *Picea abies*, DS 2, 4 Sep 2018 leg. V. Pouska, det. L. Zíbarová (CB 22221). – Šumava NP, Mt. Žlebský vrch, 530 m south-southeast of České Žleby, 990 m a.s.l., ravine forest, trunk of *Picea abies*, soc. *Mucronella calva*, 5 Sep 2018 leg. T. Tejklová & L. Zíbarová, det. L. Zíbarová (HR B003498). – Šumava PLA, Milešický prales NR, 8.5 km south-southeast of Vimperk, 1120 m a.s.l., old-growth beech-fir-spruce forest, trunk of *Picea abies*, DS 2, 20 Sep 2018 leg. A. Lepšová & L. Zíbarová, det. L. Zíbarová (HR B003497).



Fig. 14. Basidioma of *Athelopsis subinconspicua*, Milešický prales NR, 20 Sep 2018 (HR B003497). Photo L. Zíbarová.

Other specimen studied

Poland. Białowieża, powiat hajnowski, Białowieżski Park Narodowy, on lying decayed trunk of *Picea* (BW 34), 18 Sep 2017 leg. & det. M. Kříž (PRM 951634).

Botryobasidium intertextum (Schwein.) Jülich & Stalpers AU: NT, CZ: NT

Notes. *Botryobasidium intertextum* is among species of the genus which are relatively easy to identify due to its very narrow navicular spores and presence of clamps limited to some hyphae (Langer 1994). Moreover, its often bright white colour could give a clue about its identity already in the field.

In the Bohemian Forest it was previously only reported from Boubínský prales Virgin Forest (Holec et al. 2015); we also found it on Mt. Trojmezna (see below). In contrast, there are several localities on the German side (DGfM on-line, Bässler et al. 2011). Our data show that it is more widespread in the Czech part of the Bohemian Forest than previous data suggested. In our experience, it seems to prefer trunks of conifers (rarely broadleaves) in later stages of decay, often overgrowing brown cubical rot, and is rather common in relatively natural forests of higher elevations.

New records from Bohemian Forest

Šumava NP, Mt. Kamenná, 1.8 km south-southeast of Nové Údolí train station, plot L065, 955 m a.s.l., beech-fir forest, cut and peeled trunk of *Picea abies*, DS 3, 23 Aug 2017 leg. L. Zíbarová & A. Lepšová, det. L. Zíbarová (CB 22388). – Šumava NP, Býčí louka, 3 km south-southwest of Srní, plot L068, 970 m a.s.l., water-logged spruce forest, trunk of *Picea abies*, DS 4, 17 Jul 2017 not. L. Zíbarová, A. Lepšová & V. Pouska. – Šumava NP, Mt. Žlebský vrch, 0.5 km south-southwest of České Žleby, plot L072, 980 m a.s.l., ravine forest, trunk of *Picea abies*, DS 3–4, 22 Aug 2017 not. A. Lepšová & L. Zíbarová. – Šumava NP, Mt. Žlebský vrch, 605 m southwest of České Žleby, 995 m a.s.l., ravine forest, trunk of *Picea abies*, DS 3, 5 Sep 2018 leg. T. Tejklová & L. Zíbarová, det. L. Zíbarová (HR B003500). – Šumava NP, Radvanovický hřbet, 1.8 km north-northeast of České Žleby, plot L075, 995 m a.s.l., montane beech forest, trunk of *Picea abies*, DS 4, 22 Aug 2017 not. A. Lepšová & L. Zíbarová. – Šumava NP, Tmavý potok, 1.5 km northwest of Javoří Pila, plot L084, 1065 m a.s.l., disturbed mountain spruce forest, trunk of *Picea abies*, DS 3, 27 Jul 2017 leg. V. Pouska, L. Zíbarová & J. Kout, det. L. Zíbarová (PL BH 306). – Šumava PLA, Milešický prales NR, 8.5 km south-southeast of Vimperk, 1110 m a.s.l., old-growth beech-fir-spruce forest, fragment of a trunk of *Picea abies*, 20 Sep 2018 leg. L. Zíbarová & A. Lepšová, det. L. Zíbarová (HR B005199).

Other specimens studied

Czech Republic. Šumava NP, Mt. Trojmezna, plot T3/2, 1250 m a.s.l., mountain spruce forest, trunk of *Picea abies*, DS 3, 8 May 2015 leg. L. Zíbarová & V. Pouska, det. L. Zíbarová (CB 20103). – Železné hory PLA, Horní Bradlo, Polom NR, 592 m a.s.l., spruce-beech forest, trunk of *Fagus sylvatica*, DS 4, 5 Jun 2015 leg. & det. L. Zíbarová (HR 103443). – Orlické hory PLA, Trčkov NNR, 860 m a.s.l., spruce-beech forest, trunk of *Picea abies*, 22 Jul 2016 leg. V. Samková, T. Tejklová & L. Zíbarová, det. L. Zíbarová (HR 99595). – Jeseníky PLA, Mezikotlí, plot J82, 1165 m a.s.l., montane spruce forest, fallen trunk of *Picea abies*, DS 4, 23 Sep 2017 leg. L. Majdanová & V. Pouska, det. L. Zíbarová (herb. L.Z.). – Beskydy PLA, Velká Vranča near Nový Hrozenkov, 535 m a.s.l., tall herb vegetation, stem of *Sambucus ebulus*, 30 Jun 2019 leg. T. Tejklová & L. Zíbarová, det. L. Zíbarová (HR B006485).

Slovačk. Svätý Jur, Šúr NNR, 130 m a.s.l., alder carr, fallen branch of *Alnus*, 10 Apr 2017 leg. T. Tejklová, L. Zíbarová & I. Kautmanová, det. L. Zíbarová (HR 104627). – Tatra NP, Tichá dolina NNR, 1245 m a.s.l., mountain spruce forest, fragment of a trunk of *Picea abies*, 20 Aug 2019 leg. T. Tejklová, L. Zíbarová & M. Kolényová, det. L. Zíbarová (HR B002961).

***Botrybasidium medium* J. Erikss.**

CZ: EN

Notes. This species was published from Boubínský prales Virgin Forest in the Czech part of the Bohemian Forest by Holec et al. (2015), but there are no other records from this area. We managed to find it at just one locality. In contrast, it has been found at several localities on the German side of the Bohemian Forest (DGfM on-line, Bässler et al. 2011). In central Europe, it is distributed from lowland to montane elevations (Hagara 2007), but in our experience its optimum lies in ravine forests at medium elevations. It is thus not a typical montane species, which might be the reason why it is rarer in the climatically colder Czech part of the Bohemian Forest. On the other hand, while the plot of the record has the lowest elevation of all plots surveyed, it is situated in the microclimatically cold valley of the Otava river.

New record from Bohemian Forest

Šumava NP, near Paštěcký most, 2.1 km north of Čeňkova Pila, plot L001, 600 m a.s.l., ravine forest, trunk of *Abies alba*, DS 3, 29 Jul 2017 leg. L. Zíbarová, V. Pouska & J. Kout, det. L. Zíbarová (PL BH 329).

Other specimens studied

Czech Republic. Krušné hory Mts., Osek, Vlčí důl NR, 575 m a.s.l., ravine forest, trunk of *Ulmus laevis*, 21 Jul 2015 leg. & det. L. Zíbarová (herb. L.Z. 4674). – Oderské hory Mts., Lipník nad Bečvou, Mt. Obírka, ravine forest, trunk of *Abies alba*, 15 Aug. 2016 leg. L. Zíbarová & A. Lepšová, det. L. Zíbarová (herb. L.Z. 5930). – Lužické hory PLA, Studený vrch NR, 600 m a.s.l., ravine forest, trunk of conifer (*Abies?*), 9 Aug 2019 leg. & det. L. Zíbarová (herb. L.Z. 7698).

***Cabalodontia subcretacea* (Litsch.) Piątek**

Fig. 4

≡ *Jacksonomyces subcretaceus* (Litsch.) Jülich, *Phlebia subcretacea* (Litsch.) M.P. Christ.

Macroscopic characters. Basidioma effused, adnate, subceraceous; hymenophore smooth to slightly tuberculate, continuous; margin undifferentiated, thinning out. Reaction with KOH negative. Exsiccata thin, tough, white, somewhat reminding of dried *Exidiopsis calcea* (Pers.) K. Wells.

Microscopic characters. Hyphal system monomitic. Subiculum and subhymenium poorly differentiated. Hyphae loosely arranged, occasionally agglutinated in groups and difficult to discern, irregularly arranged, often tortuous, sparsely branched, smooth, thin-walled, frequently guttulate, 1.5–2 µm in diameter, septa with clamps. Some rhomboid crystals present.

Cystidia absent. Basidia arranged in palisade, subcylindrical to clavate, often with long narrow and tortuous basal part, clamped, tetrasterigmatic, often with several inclusions, 20–26 × 4–5 µm. Basidiospores allantoid, thin-walled, smooth, hyaline, frequently with two guttules at each end, inamyloid, indextrinoid, not cyanophilic, 6–8 × 1.5–2 µm (avg. 6.8 × 1.8 µm), Q = 3.0–4.7 (Q_{avg} = 3.81).

Notes. The narrow allantoid spores and the absence of cystidia make *Cabalodontia subcretacea* easy to identify. The exsiccata of *C. subcretacea* may be occasionally chalk-white, as in our specimen, and then resemble *Cabalodontia cretacea* (Romell ex Bourdot & Galzin) Piątek (not yet recorded from the Czech Republic), but that species possesses capitate hymenial cystidia. However in other cases, *C. subcretacea* could also be yellowish, greyish or ochraceous (Eriksson et al. 1981). Piątek (2004) moved both species from the genus *Phlebia* to a newly created genus *Cabalodontia* Piątek, based on the different nuclear behaviour, but supporting molecular data for both species are still lacking.

This is the first published record of the species from the Czech Republic, although there is an unpublished record by Z. Pouzar (PRM 872372) from the current Podyjí National Park in south Moravia. It was originally described from Austria (Litschauer 1939) and is also present in Germany (Ostrow & Dämmrich 2010), but without any records from the Bohemian Forest.

The ecology of *C. subcretacea* is somewhat enigmatic. It has a worldwide distribution and is present in both Nordic countries and the tropics (Eriksson et al. 1981, Hjortstam & Ryvarden 2007). In central Europe it is mostly found on dead wood of conifers, less often on broadleaves (Krieglsteiner 2000, Dämon 2001). Krieglsteiner (2000) reports it from a wide range of habitats: hard-wood riparian forests, oak-hornbeam, beech, pine and spruce forests, while Dämon (2001) considers it a typical species of montane spruce-beech-fir forests in the calcareous Alps and its foothills. Due to its wide distribution, broad ecology and rather anonymous characters, cryptic species could be present.

New record from Bohemian Forest

Šumava NP, Křemelná river valley, 3.2 km northwest of Srní, plot L027, 760 m a.s.l., relict pine forest, fallen branch of *Pinus sylvestris*, DS 3, 13 Oct 2017 leg. J. Kout & A. Lepšová, det. L. Zíbarová (CB 22206).

Other specimen studied

Czech Republic. [Podyjí NP], Čížov near Znojmo, Hardecká stráň, trunk of *Tilia*, forest steppe site, 20 Jul 1988 leg. & det. Z. Pouzar (PRM 872372).

Crustomyces subabruptus (Bourdot & Galzin) Jülich AU: NT, CZ: EN, DE: CR
= *Cystostereum pini-canadense* subsp. *subabruptum* (Bourdot & Galzin) Chamuris

Notes. *Crustomyces subabruptus* is a striking species already by its macro-morphology: the thick, hard and perennial odontoid basidiomata make identification already possible in the field. As for micromorphological features, the presence of branched hyphidia and gloeocystidia in hymenium is distinctive.

In our experience, *C. subabruptus* is a typical, yet rare species of *Fagus* trunks in old-growth forests. It occurs mostly in early stages of decay, which is an unusual feature in most corticioid species. According to Pouzar (2006), it is more common in the Carpathian part of the Czech Republic. He also mentions *C. subabruptus* from the Bohemian Forest but gives no locality. There are specimens from three localities in the Bohemian Forest in PRM: Spáleníště near České Žleby (PRM 894678), Debrník near Železná Ruda (PRM 894655) and Koňský vrch near Nová Pec (PRM 897729); it was also recently noted by J. Běťák (pers. comm.) in the core area of Boubínský prales Virgin Forest. Moreover, there are two other localities on the German side of the mountain range (Bavarian Forest NP): Mittelsteighütte and Watzlikhain (DGfM on-line), but none on the Austrian side.

New record from Bohemian Forest

Šumava NP, U černého pařezu, 5.4 km southwest of Nová Pec, plot L079, 1025 m a.s.l., beech-fir forest, trunk of *Fagus sylvatica*, DS 2, 19 Jul 2017 leg. L. Zíbarová, V. Pouska & A. Lepšová, det. L. Zíbarová (CB 22244).

Other specimens studied

Czech Republic. Novohradské hory Mts., Hojná voda NNM, beech-fir natural forest, small fallen trunk of *Fagus sylvatica*, 16 Sep 2017 leg. & det. L. Zíbarová (HR B000104). – Novohradské

hory Mts., Žofínský prales NNR, 805 m a.s.l., spruce-fir forest, branch of *Fagus sylvatica*, 30 Apr 2017 leg. & det. L. Zíbarová (HR B004547). – Železné hory PLA, Polom NR, 616 m a.s.l., spruce-beech forest, trunk of *Fagus sylvatica*, 2 Nov 2015 leg. & det. L. Zíbarová (HR 103360). – Beskydy PLA, Salajka NNR, 780 m a.s.l., beech-fir forest, fallen branch of *Fagus sylvatica*, 22 Jun 2019 leg. L. Hejl, det. L. Zíbarová (HR B003608).

Slova k i a. Svätý Jur, Šúr NNR, 130 m a.s.l., alder carr, fallen branch of *Alnus*, 25 May 2019 leg. T. Tejklová & L. Zíbarová, det. L. Zíbarová (HR B002589).

***Cyrtidiella albomellea* (Bondartsev) Parmasto**

CZ: ?EX

= *Auriculariopsis albomellea* (Bondartsev) Kotl., *Phlebia albomellea* (Bondartsev) Nakasone
 = *Cyrtidiella melzeri* Pouzar

Notes. *Cyrtidiella albomellea* is a rare cupulate to effused-reflexed corticioid fungus, with unclear generic position (Nakasone 1996, Kotlaba 2011), currently placed in *Irpicaceae* Spirin & Zmitr. (Justo et al. 2017). Although it is included in the Czech Red List in the Probably Extinct (?EX) category (Pouzar 2006), several new records in south (Kotlaba 2011, Zíbarová 2012), west (Kout 2016) and north Bohemia (Zíbarová & Kříž 2017) have been made in the past decade. However, it had previously not been reported from the Bohemian Forest.

The habitat and substrate of our current record – a raised bog, attached branch of *Pinus* – is in line with some previous records from southern Bohemia, namely Červené blato NNR and Soběslavská blata (Kotlaba 2011, Zíbarová 2012), but its ecological range is wider in the Czech Republic, as it has also been found in e.g. the reclaimed part of a sand pit (Zíbarová & Kříž 2017). Interestingly, the elevation of the locality in the Bohemian Forest is the highest in the Czech Republic to date.

New record from Bohemian Forest

Šumava NP, Vltavský luh, ca 900 m east of Záhvozdí, plot L013, 730 m a.s.l., raised bog with sparse scrubby pines, dead branch attached to living *Pinus rotundata*, DS 1, 18 Aug 2017 leg. L. Zíbarová & A. Lepšová, det. L. Zíbarová (CB 22203).

Other specimens studied

Czech Republic. Třeboňsko PLA, Červené blato NNR, 3.7 km north of Nové Hradý train station, 475 m a.s.l., raised bog, attached branch of *Pinus* cf. *rotundata*, 22 Sep 2012 leg. & det. L. Zíbarová (CB 18746). – Kokořínsko – Máchův kraj PLA, Provodín, 600 m northwest of Jestřebí train station, 250 m a.s.l., reclaimed sand pit, snag of *Pinus sylvestris*, 2 Oct 2014 leg. & det. L. Zíbarová (herb. L.Z. 5690).

***Flavophlebia sulfureoisabellina* (Litsch.) K.H. Larss. & Hjortstam**

= *Cerocorticium sulfureoisabellinum* (Litsch.) Jülich & Stalpers AU: EN, CZ: EN, DE: CR

Notes. *Flavophlebia sulfureoisabellina* is a distinctive species with yellow-ochre ceraceous basidiomata superficially resembling some *Phlebia* species, but differing in comparatively large, broadly elliptic spores and broad basidia (Hjortstam & Larsson 1977, Bernicchia & Gorjón 2010).

The species is very rare in Bohemia – the only previous records are from Boubínský prales Virgin Forest in the Bohemian Forest (PRM 848842) and Žofínský prales Virgin Forest in the Novohradské hory Mts. (PRM 803305), both by Z. Pouzar, but there are more localities in Moravia (Pouzar 2006, see also Other specimen studied). There are no localities of *F. sulfureoisabellina* known on the German or Austrian part of the Bohemian Forest.

This species is restricted to *Abies* (Hjortstam & Larsson 1977) and accordingly all records from the Czech Republic are from *Abies alba*. In our experience, it prefers trunks in early stages of decay, often growing directly on bark in natural forests.

New records from Bohemian Forest

Šumava NP, Radvanovický hřbet, 2.4 km south of Lenora, plot L046, 870 m a.s.l., beech-fir forest, close to forest spring, underside of bark of uprooted *Abies alba* trunk, 17 Aug 2017 leg. L. Zíbarová & A. Lepšová, det. L. Zíbarová (CB 22209). – Šumava PLA, Milešický prales NR, 8.5 km south-southeast of Vimperk, 1115 m a.s.l., old-growth beech-fir forest, on bark of *Abies alba* trunk, DS 1, 20 Sep 2018 leg. A. Lepšová & L. Zíbarová, det. L. Zíbarová (HR B006597).

Other specimen studied

Czech Republic, Moravský kras PLA, U Nového hradu NR, 260 m a.s.l., oak-hornbeam forest, trunk of *Abies alba*, DS 2, 13 May 2017 leg. T. Tejklová, J. Hrabáková & L. Zíbarová, det. L. Zíbarová (HR 104815).

***Globulicium hiemale* (Laurila) Hjortstam**

CZ: CR

Fig. 15

Notes. While the actual basidiomata of *Globulicium hiemale* are typically rather inconspicuous, resembling whitish pruina, there are conspicuous patches of sharply delimited, discoloured wood typically present underneath (Fig. 15). Later in the season, only such patches might persist on the substrate, while the basidiomata have already disappeared. Moreover, there are frequently algae present on – or even within – the basidiomata, so they might resemble a lichen (the possibility that there are some symbiotic relations between both organisms should not be discounted) and are not collected by mycologists. While the microcharacters are also distinct – large (sub)globose spores, incrustated hyphidia (sometimes with crystal aggregates resembling astrocystidia in *Resinicium bicolor*) – its macro-morphology usually gives a good hint about its identity even in the field.

Possibly due to its peculiar character it was underrecorded in the Czech Republic in the past – Pouzar (2006) mentions only one locality of *Globulicium hiemale* in the Czech Republic: Mlynářská slať in the Bohemian Forest. Later, Lepšová & Pouska (2014) published another record from the Bohemian Forest, from Mt. Trojmezná. But in recent years, the species has been found in many mountain ranges in the Czech Republic – e.g. Krkonoše Mts., Hrubý Jeseník Mts., Orlické hory Mts. and Železné hory Mts. (Cudlín 2017, see also Other specimens



Fig. 15. Basidioma of *Globulicium hiemale*, Mt. Žlebský vrch, 5 Sep 2018 (HR B003187). Photo L. Zíbarová.

studied below). However, the possibility that the species was negatively affected by acid rains during the second half of the 20th century and is actually reclaiming its lost habitats in recent years must not be discounted, supported by the fact that there are not yet any records known to us from mountain ranges (Krušné hory Mts., Jizerské hory Mts.) most heavily impacted by air pollution in the past. Several records of *G. hiemale* have been made on the German side of the Bohemian Forest (Bässler et al. 2011), where the species is not rare (H. Ostrow pers. comm.).

In contrast to the specimen from the site Mlynářská slat' (fallen branch of *Pinus mugo* in a raised bog), most of the new records in the Czech Republic are from mountain spruce forests or beech-fir forests at higher elevations (but it was also found at a low elevation at the bottom of a canyon of the Lužnice river, see Other specimens studied). In our experience (and in contrast to its being Critically Endangered in the Czech Red List), it is actually a rather common species on decorticated wood (outside the study area we also have recorded it on the underside of bark) of still attached or fallen branches or less often also trunks of gymnosperms, particularly *Picea abies* in habitats within the natural distribution

of spruce. In addition to *Picea* and *Pinus*, we have also recorded the species on *Fagus*. Although this is certainly not typical, Eriksson & Ryvar den (1975) and Larsson (2019) mention that *Globulicium hiemale* rarely occurs also on angiosperm wood (e.g. *Salix*).

New records from Bohemian Forest

Šumava NP, near Paštěcký most, 2.1 km north of Čeňkova Pila, plot L001, 600 m a.s.l., ravine forest, snag of *Picea abies*, DS 1–2, 29 Jul 2017 not. L. Zíbarová, V. Pouska & J. Kout. – Šumava NP, Vltavský luh, 1.6 km southeast of Záhvozdí, plot L015, 730 m a.s.l., semi-cultural water-logged *Picea* forest, attached dead branch of living *Picea abies*, DS 2, 18 Jul 2017 not. L. Zíbarová, V. Pouska & A. Lepšová. – Šumava NP, V mokřinách, 2.8 km north-northeast of Prášily, plot L038, 855 m a.s.l., water-logged *Picea* forest, branch attached to a snag of *Picea abies*, DS 2, 15 Aug 2017 leg. L. Zíbarová & V. Pouska, det. L. Zíbarová (PL BH 299); *ibid.*, branch of a thin trunk of *Picea abies*, DS 2, 15 Aug 2017 not. L. Zíbarová & V. Pouska. – Šumava NP, Novohůrecké slatě, 760 m northeast of Nová Hůrka, plot L043, 870 m a.s.l., water-logged *Picea* forest, thin trunk of *Picea abies*, DS 2, 15 Aug 2017 leg. L. Zíbarová & V. Pouska, det. L. Zíbarová (PL BH 360). – Šumava NP, Býčí louka, 3 km south-southwest of Srní, plot L068, 970 m a.s.l., semi-cultural *Picea* forest, snag of *Fagus sylvatica*, DS 2, 17 Jul 2017 not. L. Zíbarová, V. Pouska & A. Lepšová. – Šumava NP, below Trojmezí, plot L097, 5.8 km south-southeast of Nové Údolí train station, 1153 m a.s.l., disturbed montane spruce forest, trunk of *Picea abies*, DS 2, 20 Oct 2017 leg. V. Pouska & A. Lepšová, det. L. Zíbarová (CB 22217). – Šumava NP, Mt. Trojmezská, plot L114, 6.2 km south-southeast of Nové Údolí train station, 1270 m a.s.l., disturbed montane spruce forest, uprooted trunk of *Picea abies*, DS 2, 5 Nov 2017 leg. J. Kout & V. Pouska, det. L. Zíbarová (CB 22222). – Šumava NP, Mt. Trojmezská, plot L115, 6.5 km south-southeast of Nové Údolí train station, 1270 m a.s.l., trunk of *Picea abies*, DS 3, 5 Nov 2017 not. J. Kout & V. Pouska. – Šumava NP, Mt. Žlebský vrch, 430 m south-southeast of České Žleby, 980 m a.s.l., ravine forest, branch attached to trunk of *Picea abies*, 5 Sep 2018 leg. T. Tejklová & L. Zíbarová, det. L. Zíbarová (HR B003187). – Šumava PLA, Milešický prales NR, 8.5 km south-southeast of Vimperk, 1120 m a.s.l., old-growth beech-fir-spruce forest, trunk of *Abies alba*, DS 2, 20 Sep 2018 leg. A. Lepšová & L. Zíbarová, det. L. Zíbarová (HR B003503).

Other specimens studied

Czech Republic. South Bohemia, Dražičky near Tábor, Údolí Lužnice a Vlášnického potoka SAC, 380 a.s.l., ravine forest, attached branch of *Picea abies*, 26 Sep 2019 leg. & det. L. Zíbarová (CB). – Krkonoše NP, Harrachov, Lysá hora, site named Krakonošova snídaň, plot AL-HK2, 1105 m a.s.l., cultural montane spruce forest, trunk of *Picea abies*, 24 Sep 2016 leg. & det. L. Zíbarová (HR B004864). – Železné hory PLA, Velká Střítež, Polom NR, 550 m a.s.l., herb-rich beech forest, thin trunk of *Picea abies*, 14 Jun 2018 leg. & det. L. Zíbarová (HR B005655). – Orlické hory PLA, Říčky v Orlických horách, Komáří vrch NR, 940 m a.s.l., montane beech forest, 15 Jul 2018 leg. T. Tejklová & L. Zíbarová, det. L. Zíbarová (HR B006706). – Jeseníky PLA, Břidličná NR, plot J32, 1150 m a.s.l., montane spruce forest, inner side of bark on snag of *Picea abies*, DS 2, 26 Sep 2017 leg. V. Pouska, det. L. Zíbarová (herb. L.Z.).

***Hymenochaete cruenta* (Pers.) Donk**

CZ: NT, DE: NT

Notes. This strikingly purple-coloured species grows typically on corticated branches of *Abies*, less often *Picea* (Pouzar 2006, Corfixen & Parmasto 2018). Tomšovský (2001) lists 30 localities in the Czech part of the Bohemian Forest (all with *Abies alba* as substrate). It is present there in natural as well as conventionally managed forests, at least where some *Abies* is present (Holec & Tomšovský

1999, Tomšovský 2001). The mountain ranges of South Bohemia are the centre of the distribution of this species in Bohemia, as it is significantly rarer or absent elsewhere. There are several records of *H. cruenta* also on the German side (Bässler et al. 2011, DGfM on-line).

New record from Bohemian Forest

Šumava PLA, Jasánky NM, 2 km east-northeast of Sankt Oswald bei Haslach, plot L127, 680 m a.s.l., semi-cultural mixed forest, fallen branch of *Abies alba*, DS 2, 21 Aug 2017 not. L. Zíbarová & A. Lepšová.

***Hymenochaete fuliginosa* (Pers.) Lév.**

CZ: EN, DE: EN

Notes. *Hymenochaete fuliginosa* is a species growing on gymnosperm wood (*Picea abies*, *Abies alba*) mostly at higher elevations (Tomšovský 2001, Pouzar 2006), but there are also rare records from angiosperms (Corfixen & Parmasto 2018; also see Other specimens studied). Several records have been published from the Bohemian Forest both in the Czech Republic (Tomšovský 2001, Lepšová & Pouska 2014, Holec et al. 2015, Pouska et al. 2015) and Germany (Bässler et al. 2011). One specimen was recorded on an *Abies* trunk together with *Botryobasidium medium* (see above).

New records from Bohemian Forest

Šumava NP, near Paštěcký most, 2.1 km north of Čeňkova Pila, plot L001, 600 m a.s.l., ravine forest, trunk of *Abies alba*, DS 3, 29 Jul 2017 leg. L. Zíbarová, V. Pouska & J. Kout, det. L. Zíbarová (PL BH 328). – Šumava NP, Novohůrecká slať, 1.5 km north-northeast of Nová Hůrka, plot L042, 865 m a.s.l., dense young spruce forest, fallen branch of *Picea abies*, DS 3, 15 Aug 2017 not. L. Zíbarová & V. Pouska. – Šumava NP, below Mt. Ždánidla, 2 km west-southwest of Prášily, plot L110, 1235 m a.s.l., disturbed mountain spruce forest, fallen branch of *Picea abies*, DS 3, 16 Aug 2017 not. L. Zíbarová & V. Pouska. – Šumava PLA, Milešický prales NR, 8.5 km south-southeast of Vimperk, 1105 m a.s.l., old-growth beech-fir-spruce forest, branch of *Picea abies*, 15 Apr 2019 leg. & det. L. Zíbarová (HR B005799).

Other specimens studied

Czech Republic. Krkonoše NP, Labský důl, Pančavská jáma, 1075 m a.s.l., subalpine vegetation dominated by *Betula carpatica*, branch of *Betula carpatica*(?), 16 Jun 2016 leg. T. Tejklková & L. Zíbarová (HR 102147). – Jeseníky PLA, Praděd NNR, Eustaška, 1260 m a.s.l., montane spruce forest, fallen trunk of *Picea abies*, 31 May 2017 leg. & det. L. Zíbarová (HR B006415).

Slovakia. Tatra NP, Tichá dolina NNR, 1245 m a.s.l., mountain spruce forest, fallen branch of *Picea abies*, 20 Aug 2019 leg. T. Tejklková, L. Zíbarová & M. Kolényová, det. L. Zíbarová (HR B002982).

***Hyphoderma* aff. *crassescens* Laurila ex K.H. Larss., nom. prov.** Figs. 5, 16

Macroscopic characters. Basidioma effused, adnate, subceraceous; hymenophore smooth to slightly tuberculate, cream, matt, continuous; margin undifferentiated, thinning out; context whitish. Reaction with KOH negative. Exsiccata hard, cracking, not discolouring.

Microscopic characters. Hyphal system monomitic both in subiculum and subhymenium. Hyphae in subiculum loosely and irregularly arranged or



Fig. 16. Basidioma of *Hyphoderma* aff. *crassescens*, Čeňkova Pila, near Paštěcký most, 29 Jul 2017 (CB 22201). Photo L. Zíbarová.

subparallel to the substrate, branched, smooth, thin to slightly thick-walled, 3.5–5.5 μm in diameter, septa with clamps, some irregular crystals present in KOH. Hyphae in subhymenium densely arranged, perpendicular to the substrate, subparallel, often branched, smooth, thin-walled, 3–4 μm in diameter, septa with clamps.

Cystidia absent. Hyphidia (or cystidioles) scattered among basidia, cylindrical or subfusiform, unbranched to sparingly branched to the first order, not projecting. Basidia arranged in a palisade, clavate to suburniform, often with a median constriction, occasionally stalked, clamped, tetrasterigmatic, occasionally with several inclusions, 24–30(42) \times 6–7 μm . Basidiospores ellipsoid to subcylindrical, slightly thick-walled, smooth, hyaline, mostly eguttulate, inamyloid, indextrinoid, weakly cyanophilic, 7–8.5 \times 3.75–4.5 μm (avg. 7.7 \times 4.0 μm), $Q = 1.8\text{--}2.0$ ($Q_{\text{avg}} = 1.88$).

Notes. The relatively small spores, lack of true cystidia and thick basidioma leads towards *Hyphoderma crassescens* Laurila ex K.H. Larss., nom prov. While

still formally not described, *H. crassescens* was reported from Italy, Norway and Sweden (Bernicchia & Gorjón 2010), Russia (Shiryaev & Kotiranta 2015) and Finland (Kunttu et al. 2018). It grows on charred wood of *Pinus* in primeval forests in Finland, where it may be locally common (Kunttu et al. 2018). It is also reported from *Abies* in Sasso Frantino Integral Nature Reserve, Italy (Bernicchia & Gorjón 2009, 2010), a habitat and substrate closer to our record. Although the plot in which the specimen was collected has the lowest elevation of all plots visited, it is positioned at the bottom of a deep gorge and is microclimatically colder than would correspond to its elevation. Nevertheless, there are relict pine forests on the rocks above.

In contrast to the illustration by Bernicchia & Gorjón (2010, p. 338), showing numerous and distinctly fusoid cystidioles in *H. crassescens*, we found some similar elements but less differentiated and numerous in our specimen. Therefore, we are somewhat cautious to ascribe our record to this taxon. *Hyphoderma sibiricum* (Parmasto) J. Erikss. & Å. Strid, which is also somewhat similar in microcharacters, has completely different, very thin basidiomata (Eriksson & Ryvarden 1975).

New record from Bohemian Forest

Šumava NP, near Paštěčský most, 2.1 km north of Čejkova Pila, plot L001, 600 m a.s.l., ravine forest, fallen branch of *Pinus sylvestris*, DS 3, 29 Jul 2017 leg. L. Zíbarová, V. Pouska & J. Kout, det. L. Zíbarová (CB 22201).

Other specimen studied

Slovakia. Poľana PLA, Zadná Poľana NNR, plot POL001, 1200 m a.s.l., beech-fir forest, fallen trunk of *Picea abies*, DS 4, 12 Oct 2019 leg. & det. L. Zíbarová (herb. L.Z. 8342).

***Irpex lacteus* (Fr.) Fr.**

CZ: EN

Notes. *Irpex lacteus* is an uncommon species in the Czech Republic, morphologically intermediate between a polypore and a corticioid species with a hydroid hymenophore. In our experience it is most frequent on dead but still standing *Frangula alnus* in wet habitats (bogs, alder carrs), but has a rather broad ecology. It is also present on the German side of the Bohemian Forest (Bässler et al. 2011).

New records from Bohemian Forest

Šumava PLA, Rašeliňště Borková NR, 2 km southwest of Dolní Vltavice, plot L012, 730 m a.s.l., raised bog, snag of *Frangula alnus*, DS 1, 16 Oct 2017 not. A. Lepšová. – Šumava NP, Vltavský luh, 350 m north of Pěkná railway station, plot L016, 730 m a.s.l., transitional mire, snag of *Frangula alnus*, DS 2, 18 Jul 2017 leg. A. Lepšová, L. Zíbarová & V. Pouska, det. L. Zíbarová (CB 22394). – Šumava PLA, Kyselovský les NR, 2.6 km southwest of Dolní Vltavice, plot L122, 735 m a.s.l., raised bog, thin trunk of *Frangula alnus*, DS 2, 16 Oct 2017 not. A. Lepšová; *ibid.*, snag of *Frangula alnus*, DS 2, 16 Oct 2017 leg. A. Lepšová, det. L. Zíbarová (CB 22395); *ibid.*, snag of *Frangula alnus*, DS 1, 16 Oct 2017 not. A. Lepšová. – Šumava PLA, Amálino údolí NR, 1 km northwest of Řetenice, plot L123, 785 m a.s.l., uprooted trunk of *Alnus incana*, DS 1–2, 30 Jul 2017 not. L. Zíbarová & J. Kout.

Kneiffiella cineracea (Bourdot & Galzin) Jülich & Stalpers AU: NT, DE: R
 = *Hyphodontia cineracea* (Bourdot & Galzin) J. Erikss. & Hjortstam Fig. 6

Macroscopic characters. Basidioma thin, effused, adnate, porulose; hymenophore smooth to slightly tuberculate, matt; margin undifferentiated, thinning out. Exsiccata whitish, cracked.

Microscopic characters. Hyphal system monomitic both in subiculum and subhymenium. Hyphae in subiculum loosely and irregularly arranged, often branched, smooth, slightly thick-walled, 3–5 µm in diameter, septa with clamps. Hyphae in subhymenium densely arranged, more or less perpendicular to the surface, subparallel, branched at sharp angles, smooth, slightly thin- to slightly thick-walled, 2.5–4.5 µm in diameter, septa with clamps.

Cystidia of subhymenial origin, abundant, tubular, thick-walled in median part, walls 1–2.25 µm wide, apex blunt, thin-walled, 72–97 × 6–8 µm, projecting up to 50 µm. Basidia arranged in a dense palisade, clavate, cylindrical to suburniform, occasionally with median constriction, clamped, tetrasterigmatic, occasionally with several inclusions, 17–23 × 5–6 µm. Basidiospores suballantoid to allantoid, thin-walled, smooth, hyaline, mostly with one large guttule, inamyloid, indextrinoid, not cyanophilic, 6–7.5 × 2.5–3 µm (avg. 6.9 × 2.8 µm), $Q = 2\text{--}2.8$ ($Q_{\text{avg}} = 2.48$).

Notes. This species is characterised by a smooth hymenium, numerous thick-walled cystidia with thin-walled apex and basal clamp, and allantoid spores wider than 2.5 µm. There are other species of *Kneiffiella* with allantoid spores in Europe (Bernicchia & Gorjón 2010) such as *Kneiffiella subalutacea* (P. Karst.) Jülich & Stalpers and *K. floccosa* (Bourdot & Galzin) Jülich & Stalpers, both with narrower spores (up to 2 µm wide), and *K. altaica* (Parmasto) Hjortstam & Ryvarde, with shorter spores (up to 6 µm long). The first two species – or varieties of a single species in the concept of Hagara (2003) – also tend to form a tuberculate or odontoid hymenium in contrast to a smooth hymenium in *K. cineracea*. The latest molecular data keep the species in the genus *Kneiffiella* P. Karst. (Riebesehl & Langer 2017).

Kneiffiella cineracea is a rare species in central Europe with records mostly from well-preserved natural forests at higher elevations. Accordingly, the only previous record in the Bohemian Forest is from Mittelsteighütte virgin forest in Germany (DGfM on-line). This is the second record of the species from the Czech Republic. It was previously collected by D. Dvořák (pers. comm.) in Šerák-Keprník NNR in the Hrubý Jeseník Mts. It is rare in Germany (Ostrow & Dämmrich 2010), but more abundant in Austria (Dämon & Krisai-Greilhuber 2017), especially in the Alps. There is also one published record from Slovakia (Dobročský prales Virgin Forest; Hagara 2004). While *K. cineracea* is found in the central part

of Europe mostly on conifers (*Picea*, *Pinus*), rarely on hardwoods (*Alnus*) (Breitenbach & Kränzlin 1986, Krieglsteiner 2000, Hagara 2003), its ecology outside the area is wider: originally it was described from *Erica arborea* (Bourdot & Galzin 1913) and reported from junipers (*Juniperus* spp.; Doğan et al. 2011, Sell & Kotiranta 2011) and even *Nothofagus* (Greslebin & Rajchenberg 2003).

New record from Bohemian Forest

Šumava NP, Novohůrecká slaf, 2.1 km northeast of Nová Hůrka, plot L051, 885 m a.s.l., water-logged spruce forest, thin trunk of *Picea abies*, DS 2, 15 Oct 2017 leg. A. Lepšová & J. Kout, det. L. Zíbarová (CB 22210).

Lawrynomyses capitatus (J. Erikss. & Å. Strid) Karasiński AU: NT, CZ: EN
 = *Hyphoderma capitatum* J. Erikss. & Å. Strid Fig. 7

Macroscopic characters. Basidioma thin, effused, adnate, porulose; hymenophore smooth, pruinose; margin undifferentiated, thinning out. Exsiccata greyish white.

Microscopic characters. Hyphal system monomitic both in subiculum and subhymenium. Hyphae in subiculum loosely and irregularly arranged, sparsely branched, smooth, thin-walled, 2–3 µm in diameter, septa without clamps. Hyphae in subhymenium tightly packed, arranged more or less perpendicular to the surface, branched at sharp angles, often short-celled, smooth, thin-walled, 2.5–4 µm in diameter, septa without clamps.

Cystidia of subhymenial origin, abundant, lageniform to fusoid with capitate apex, thin-walled or slightly thick-walled especially in median part, 80–110 × 9.5–13 µm, neck 5.5–7 µm wide, capitulum 7–8.5 µm wide, projecting up to 55 µm; apex occasionally with thin resinous cap. Basidia arranged in loose palisade, clavate, often with median constriction, stalked, without clamps, with four stout sterigmata, often with numerous yellowish inclusions, 36–55 × 9–10.5 µm. Basidiospores subglobose to broadly elliptic, with prominent apiculus, slightly thick-walled, smooth, hyaline, mostly with one large guttule or less often with several smaller ones, inamyloid, indextrinoid, weakly cyanophilic, 9.5–14.5 × 8–11 µm (avg. 11.3 × 9.4 µm), Q = 1.1–1.4 (Q_{avg} = 1.20).

Notes. *Lawrynomyses capitatus* is macromorphologically inconspicuous. Its basidiomata superficially resemble e.g. the common *Kurtia argillacea* (Bres.) Karasiński. It is nevertheless an easily identifiable species by the presence of clampless hyphae, large, subcapitate cystidia, pedunculate basidia with stout sterigmata and large subglobose spores. The monotypic genus *Lawrynomyses* Karasiński was erected (Karasiński 2013) to accommodate this species deviating both in morphological characters and phylogenetic data from core *Hyphoderma* species (Larsson 2007).

Lawrynomycetes capitatus is a species with a boreo-montane distribution in Europe, mostly known from well-decayed wood of conifers, mostly *Picea* and *Pinus* (Eriksson & Ryvarden 1975, Breitenbach & Kränzlin 1986, Pouzar 2006, Karasiński 2013). It is locally common in Sweden (Eriksson & Ryvarden 1975) but rare in central Europe. In the Bohemian Forest, records of *L. capitatus* have been published from Boubínský prales Virgin Forest (Holec et al. 2015). Another, unpublished record is known from Debrník near Železná Ruda (PRM 847482). Although collected at several localities throughout the Czech Republic until the early 1970s, the Bohemian Forest was the only area with records of this species for decades after that. However, it has recently also been found in the Hrubý Jeseník Mts. (Eustaška) and Moravskoslezské Beskydy Mts. (Mionší) (Běťák et al. 2016). It has moreover been found in the German part of the Bohemian Forest, near Spiegelau (DGfM on-line, Bässler 2011).

New record from Bohemian Forest

Šumava NP, U černého pářezu, saddle between Mt. Plechý and Mt. Studničná, 5.8 km southwest of Nová Pec, plot L078, 1020 m a.s.l., beech-fir forest, stump of *Abies alba*, DS 3, 19 Oct 2017 leg. A. Lepšová & V. Pouska, det. L. Zibarová (CB 22215).

***Oliveonia* sp.**

Figs. 10, 17

Macroscopic characters. Basidioma effused, adnate, very thin; hymenophore smooth, dark grey with violet tinges, pruinose, discontinuous; margin undifferentiated, thinning out. Reaction with KOH not noted. Exsiccata hardly visible, resembling dark grey pruina.

Microscopic characters. Hyphal system monomitic. Subiculum and subhymenium poorly differentiated. Hyphae irregularly arranged, often branched at right angles, smooth, thin-walled, 3–4.5(5) μm in diameter, septa with clamps. Some hyphae in subiculum conspicuously widened ($\sim 9 \mu\text{m}$) and with short-celled segments without(?) septa.

Cystidia scattered to abundant, cylindrical, thin-walled, apex blunt, at base often with basal protuberance, smooth, hyaline, younger ones with homogeneous yellowish, somewhat refractive content (Melzer's solution), 40–65 \times 6.5–8 μm , projecting up to 40 μm . Basidia not forming continuous hymenial layer, broadly clavate, obovoid to obpyriform, clamped, terminal or pleural, (bi-)tetrasterigmatic, without inclusions, 11.5–15 \times 6–8 μm . Basidiospores variable in shape, narrowly ellipsoid, cylindrical to subreniform, producing secondary spores, thin-walled, smooth, hyaline, eguttulate or with two or more small guttules, inamyloid, indextrinoid, not cyanophilic, 8–13 \times 3–4.5 μm (avg. 9.9 \times 3.6 μm), $Q = 2.3\text{--}3.8$ ($Q_{\text{avg}} = 2.74$).



Fig. 17. Basidioma of *Oliveonia* sp., Mt. Kamenná, 23 Aug 2017 (CB 22212). Photo L. Zíbarová.

Notes. *Oliveonia* Donk is a small genus with only three widely accepted cystidiate species – *O. pauxilla* (H.S. Jacks.) Donk, *O. fibrillosa* (Burt) Donk and *O. termitophila* (Oberw. & Ryvar den) P. Roberts (Roberts 1998). Of these, only the first two species are known from Europe (Bernicchia & Gorjón 2010). While *O. pauxilla* has narrow spores and lacks clamps, *O. fibrillosa* has wider spores and possesses clamps (Olive 1957, Talbot 1965, Kotiranta & Saarenoksa 2005a, Bernicchia & Gorjón 2010). Other micromorphological traits such as size and type of (gloeo-)cystidia are inconsistent among authors. However, this makes the specimen treated here impossible to identify, as it has clamped hyphae like *O. fibrillosa*, but a spore shape and size that clearly match *O. pauxilla*. The clamps were rather difficult to find in our specimen, but could be confirmed on most septa including bases of basidia and cystidia. However, also some hyphae with broad and short segments, apparently without clamps (secondary septation?), seemed to be present. An attempt to obtain a sequence from the specimen failed (V. Spirin pers. comm.), so that additional collections are needed to disentangle its identity.

New record from Bohemian Forest

Šumava NP, Mt. Kamenná, 1.9 km south-southeast of Nové Údolí train station, plot L063, 955 m a.s.l., semi-cultural spruce forest, trunk of *Picea abies*, DS 3, 23 Aug 2017 leg. A. Lepšová & L. Zíbarová, det. L. Zíbarová (CB 22212).

Phlebia centrifuga P. Karst.

AU: VU, CZ: EN, DE: CR

= *Phlebia mellea* Overh.

Notes. Well-known and striking species easy to identify according to its macromorphological features in well-developed basidiomata. Even though it seems to have been spreading to lower elevations in the past decade, it is known mostly from natural mountain beech-fir forests in the Czech Republic (Pouzar 2006). This is also the case in the Bohemian Forest (e.g. Holec 2000, Lepšová & Zíbarová 2012, Lepšová & Pouska 2014, Holec et al. 2015), where most localities are clustered around Boubín and České Žleby. In addition, there are several localities on the German side of the Bohemian Forest (Mittelsteighütte, areas around Bayerisch Eisenstein, Spiegelau and Finsterau) (DGfM on-line, Bässler et al. 2011), but no locality is known on the Austrian side.

New records from Bohemian Forest

Šumava NP, Mt. Spáleníště, 1.3 km east of České Žleby, plot L060, 935 m a.s.l., ravine forest, conifer trunk, DS 4, 20 Jun 2017 not. A. Lepšová, L. Zíbarová & V. Pouska; *ibid.*, 915 m a.s.l., branch attached to fallen trunk of conifer, DS 2, 4 Sep 2018 leg. & det. L. Zíbarová & T. Tejklová (HR B003501). – Šumava NP, below Trojmezí, 5.4 km south-southeast of Nové Údolí train station, plot L091, 1115 m a.s.l., disturbed mountain spruce forest, trunk of *Picea abies*, DS 2, 5 Nov 2017 not. V. Pouska & J. Kout. – Šumava NP, Mt. Žlebský vrch, 606 m southwest of České Žleby, 995 m a.s.l., ravine forest, trunk of *Picea abies*, DS 2, 5 Sep 2018 not. T. Tejklová & L. Zíbarová. – Šumava PLA, Mt. Černý les, 1.8 km east-north east of Záhvozdí, 900 m a.s.l., ravine forest, trunk of *Fraxinus*(?), 22 Sep 2013 leg. & det. L. Zíbarová (herb. L.Z. 1585).

Other specimen studied

Czech Republic. Novohradské hory Mts., Žofínský prales NNR, 805 m a.s.l., beech-fir virgin forest, trunk of *Picea abies*, 30 Apr 2017 leg. & det. L. Zíbarová (HR B000369).

Phlebia cremeoalutacea (Parmasto) K.H. Larss. & Hjortstam AU: NT, DE: R

Notes. In the Bohemian Forest, *Phlebia cremeoalutacea* has been found in the Boubínský prales Virgin Forest (Holec et al. 2015) in the Czech part, and near Bayerisch Eisenstein (DGfM on-line, Bässler 2011) in Germany. Apart from this, it was previously collected mostly from beech-fir forests with a high level of naturalness, e.g. Žofínský prales (PRM, CB) and Hojná voda (HR) virgin forests in the Novohradské hory Mts., Salajka (PRM) and Mionší (D. Dvořák pers. comm.) virgin forests in the Moravskoslezské Beskydy Mts., Trčkov NNR in the Orlické hory Mts. (HR), Polom virgin forest in the Železné hory Mts. (PRM), Praděd NNR in the Hrubý Jeseník Mts. (D. Dvořák pers. comm.) and V Klučí NR in Jihlavské vrchy

Hills (PRM). Being apparently restricted to natural forests, it is a suitable candidate for inclusion into further revisions of the Czech Red List.

New record from Bohemian Forest

Šumava NP, U černého pařezu, 5.4 km southwest of Nová Pec, plot L079, 1025 m a.s.l., beech-fir forest, cut trunk of *Abies alba*, DS 3, 19 Jul 2017 leg. L. Zíbarová, V. Pouska & A. Lepšová, det. L. Zíbarová (CB 22216).

Other specimens studied

Czech Republic. Novohradské hory Mts., Hojná voda NNM, 3.3 km southeast of Staré Hutě, 865 m a.s.l., old-growth natural beech-fir forest, trunk of *Abies alba*, 16 Sep 2017 leg. & det. L. Zíbarová (HR B000097). – Novohradské hory Mts., Žofínský prales NNR, 770 m a.s.l., beech-fir virgin forest, trunk of *Abies alba*, 17 Sep 2017 leg. & det. L. Zíbarová (HR B000373). – Orlické hory PLA, Trčkov NNR, 4.7 km east-northeast of Deštné v Orlických horách, 825 m a.s.l., montane beech forest, trunk of *Picea abies*?, 22 Jul 2016 leg. L. Zíbarová, T. Tejklová & V. Samková, det. L. Zíbarová (HR 99565).

***Phlebia* aff. *ryvardenii* Hallenb. & Hjortstam**

Figs. 8, 18

Macroscopic characters. Basidioma effused, adnate, up to 65 mm long; hymenophore densely odontoid; aculei up to 0.35 mm long, apex smooth to somewhat fimbriate, cream in young stage, ochraceous in older parts; subiculum between aculei sparse, concolorous, margin undifferentiated, thinning out. Reaction with KOH negative. Exsiccata hard and brittle, not discolouring.

Microscopic characters. Hyphal system monomitic both in subiculum and subhymenium. Hyphae in subiculum loosely packed, not or only slightly agglutinated, irregularly arranged, often branched, smooth, slightly thick-walled, 3–6(8) µm in diameter, often irregularly swollen, septa with clamps. Hyphae in the core of the aculei tightly packed, partly gelatinised, individual hyphae difficult to discern, only sparsely branched, smooth, thin-walled, 2.5–4 µm in diameter, septa with clamps, at the base of the aculei often with crystals. Hyphae in subhymenium tightly packed, agglutinated, individual hyphae difficult to discern, arranged more or less perpendicular to the surface, subparallel, branched at sharp angles, smooth, thin-walled, 2.5–4 µm in diameter, septa with clamps, segments often short-celled, brown resinous masses present in older parts of the specimen.

Cystidia of hymenial origin, scattered, cylindrical, thin-walled, apex blunt, smooth or covered by finely granulose substance (Melzer's solution), 35–90 × 4–5.5 µm, projecting up to 45 µm; terminal elements in the tips of the aculei similar to cystidia, 4–5 µm in diameter. Basidia arranged in a palisade, cylindrical to narrowly clavate, occasionally with median constriction, clamped, tetrasterigmatic, 16–23 × 4–5 µm. Basidiospores irregular in shape, broadly ellipsoid to almost cylindrical, thin-walled, smooth, hyaline, with numerous guttules, inamyloid, indextrinoid, not cyanophilic, 3.5–5.25 × 2–2.5(3) µm (avg. 3.9 × 2.3 µm), $Q = 1.3\text{--}2.0$ ($Q_{\text{avg}} = 1.70$).



Fig. 18. Basidioma of *Phlebia* aff. *ryvardenii*, Velká Niva NNR, 17 Aug 2017 (CB 22205). Photo L. Zíbarová.

Notes. This specimen is close to *Phlebia ryvardenii* in most macro- and micromorphological characters, but the average spore size is smaller than given in the original description: $4.5\text{--}5 \times 2.5\text{--}3$ μm (Hallenberg & Hjortstam 1988). Another similar species is *Phlebia odontoidea* Wu, described from Taiwan, with even longer spores (up to 6 μm) and shorter cystidia (Wu 1990). Since our specimen is in a rather poor condition (a large portion is collapsed), more collections are needed to ascertain if it is an anomalous, small-spored individual of *Phlebia ryvardenii* or possibly an undescribed species.

Phlebia ryvardenii was described from *Picea abies* in Sweden and another specimen from *Pinus* in Spain is mentioned in the original article (Hallenberg & Hjortstam 1988). *Phlebia ryvardenii* is also known from *Salix* cf. *alba* in a lowland riverine forest in Slovakia (Ripková & Hagara 2003). Although the habitats are very different, there are several lignicolous macrofungi common to both montane elevations and riverine forests along the Danube river (Tejklová & Zíbarová 2018). However, the first author examined the Slovak specimen (SLO 000234) and found it in very poor condition (no hymenial elements or spores

were distinguishable in microscopic examination). Nevertheless, its macromorphological aspect (almost smooth hymenium with few disperse granules and even with some veins in some parts) leaves us uncertain about its original identification. Bernicchia & Gorjón (2010) also mention the species from Denmark and Switzerland. Outside Europe it is known from Cameroon and East Asia (Hjortstam et al. 1993).

New record from Bohemian Forest

Šumava PLA, Velká Niva NNR, 1.3 km north-northwest of Soumarský most, plot L025, 754 m a.s.l., raised bog, uprooted trunk of *Pinus rotundata*, DS 3–4, 17 Aug 2017 leg. L. Zíbarová & A. Lepšová, det. L. Zíbarová (CB 22205).

Other specimen studied

Slovenská Podunajská nížina Lowland, Bratislava, Karlova Ves, Sihof Island, floodplain forest, 136 m a.s.l., on wood of fallen rotten trunk of *Salix cf. alba*, 21 May 1998 leg. S. Jančovičová, det. L. Hagara (SLO 000234).

***Phlebia serialis* (Fr.) Donk**

AU: EN, DE: R
Figs. 9, 19

Macroscopic characters. Basidioma effused, adnate, ceraceous; hymenophore smooth, beige to ochraceous, pruinose, continuous; margin undifferentiated, thinning out. Reaction with KOH purple. Exsiccata hard and tough, discolouring to brown with violet shades.

Microscopic characters. Hyphal system monomitic both in subiculum and subhymenium. Hyphae in subiculum densely packed, agglutinated, irregularly arranged or parallel to the substrate, often branched, smooth, thin- to slightly thick-walled, 3–4 µm in diameter, septa with clamps. Hyphae in subhymenium tightly packed, agglutinated, parallel, individual hyphae difficult to discern, arranged more or less perpendicular to the surface, branched at sharp angles, smooth, thin-walled, 2.5–3(4) µm in diameter, septa with clamps, segments often short-celled.

Cystidia of subhymenial origin, scattered to abundant, cylindrical to subfusoid, 30–65 × 3.75–5 µm, thin-walled, apex blunt, rarely smooth, mostly covered with resinous matter, projecting up to 25 µm, older cystidia enclosed, recognisable as lumps of resinous matter. Basidia arranged in a palisade, narrowly clavate, clamped, tetrasterigmatic, often with numerous inclusions, 23–28 × 3.5–4.5 µm. Basidiospores suballantoid, thin-walled, smooth, hyaline, with two or more guttules, inamyloid, indextrinoid, not cyanophilic, 4.5–6.25 × 1.25–1.75 µm (avg. 5.3 × 1.5 µm), Q = 2.9–4.8 (Q_{avg} = 3.48).

Notes. While macromorphologically unremarkable, *Phlebia serialis* is an easily identifiable species by its striking violet reaction with KOH – still persisting in our exsiccates – and presence of cylindrical cystidia which gradually

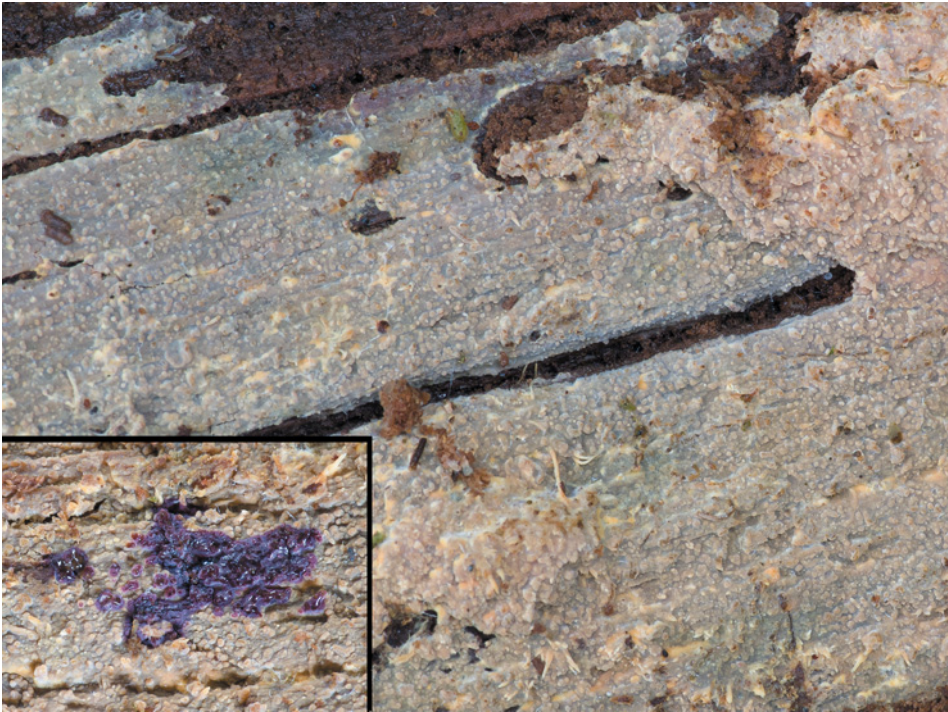


Fig. 19. Basidioma of *Phlebia serialis*, Velká Niva NNR, 7 Sep 2018 (HR B003499). Inset: reaction with 5% KOH on hymenium (same specimen). Photo L. Zibarová.

become embedded and dissolve in lumps of resinous material in older parts of the basidioma (Eriksson et al. 1981).

No previous record of the species either published or deposited in Czech herbaria has been found. Therefore, the present records are not only the first for the Bohemian Forest but most probably from the country as a whole. Only a single record has been published from both Germany (Ostrow & Dämmrich 2010) and Austria (Dämon & Krisai-Greilhuber 2017), both in the Alps. Apparently, it is a boreal species which is rare in central Europe, but it is locally quite frequent in north-eastern parts of Fennoscandia and also in Estonia (Eriksson et al. 1981).

The two Czech localities are rather different – while Velká Niva NNR is a well-preserved raised bog with a rim of water-logged spruce forests, the habitat of the record at Jasánky is a rather unexceptional (yet currently unmanaged), rather dry, planted mixed forest (pine, spruce, birch). Curiously, *Hypoxylon fraxinophilum* Pouzar – a thermophilic species – was found in a neighbouring plot at Jasánky (Zibarová 2018).

New records from Bohemian Forest

Šumava PLA, Velká Niva NNR, 1.7 km east of Lenora, plot L024, 750 m a.s.l., water-logged spruce forest, thin trunk of *Picea abies*, DS 3, 17 Aug 2017 leg. L. Zibarová & A. Lepšová, det. L. Zibarová (CB 22204). – Šumava PLA, Velká Niva NNR, 1.6 km east-southeast of Lenora, 760 m a.s.l., *Pinus rotundata* dominated raised bog, small trunk of *Picea abies*, DS 3, 7 Sep 2018 leg. T. Tejklová, M. Bartůšek & L. Zibarová, det. L. Zibarová (HR B003499). – Šumava PLA, Jasánky NM, 1.3 km north-northeast of Sankt Oswald bei Haslach, plot L126, 690 m a.s.l., semi-cultural mixed forest, fallen trunk of conifer, DS 4, 21 Aug 2017 leg. L. Zibarová & A. Lepšová, det. L. Zibarová (CB 22224).

***Phlebia subulata* J. Erikss. & Hjortstam**

AU: EN
Figs. 11, 20

Macroscopic characters. Basidioma effused, adnate, subceraceous; hymenophore smooth to slightly tuberculate in parts, cream, pruinose, continuous; margin undifferentiated, thinning out. Reaction with KOH negative. Exsiccate thin, tough, whitish to cream, not detaching from the substrate.

Microscopic characters. Hyphal system monomitic both in subiculum and subhymenium. Hyphae in subiculum loosely arranged, agglutinated in groups, irregularly arranged or parallel to the substrate, often branched, smooth, thin- to slightly thick-walled, 2–3 µm in diameter, septa with clamps. Hyphae in subhymenium tightly packed, agglutinated, subparallel, individual hyphae difficult to discern, arranged more or less perpendicular to the surface, branched at sharp angles, smooth, thin-walled, 2–2.5(3) µm in diameter, septa with clamps, segments often short-celled. Rhomboid crystals present.

Cystidia of subhymenial origin, scattered, narrowly fusiform, often bent or flexuous, thin-walled, occasionally with transversal septum, apex acute, smooth, without incrustations, 31–47 × 3–4 µm, projecting up to 35 µm. Hyphidia-like, simple or branched hyphae present among basidia, 2.5–3 µm in diameter, their abundance variable from very rare to scattered. Basidia arranged in dense palisade, narrowly clavate, clamped, tetrasterigmatic, rarely with inclusions, 18–24 × 3.5–4 µm. Basidiospores broadly ellipsoid, thin-walled, smooth, hyaline, occasionally with two or more guttules, inamyloid, indextrinoid, not cyanophilic, 3.5–5 × 2.5–3 µm (avg. 4.3 × 2.8 µm), $Q = 1.3\text{--}1.8$ ($Q_{\text{avg}} = 1.55$).

Notes. *Phlebia subulata* is a member of a complicated morphological complex of leptocystidiolate *Phlebia* s.l. species (Duhem 2008). It is however rather distinct by the very abundant, narrow, non-incrusted, thin-walled subulate cystidia, and most strikingly by the small, broadly ellipsoid to subglobose spores (Bernicchia & Gorjón 2010, Eriksson et al. 1981). *Phlebia diaphana* Parmasto ex K.H. Larss. & Hjortstam has similar microcharacters but a hard corneous consistency when dry (Duhem 2008). Also *Phlebia lacteola* (Bourdot) M.P. Christ. is somewhat similar and possesses ellipsoid spores, but completely lacks cystidia (Eriksson et al. 1981). Other European species such as *Phlebia livida* (Pers.)



Fig. 20. Basidioma of *Phlebia subulata*, Mt. Spáleníště, 4 Sep 2018 (HR B003057). Photo L. Zíbarová.

Bres., *Phlebia tuberculata* (Hallenb. & E. Larss.) Ghob.-Nejh. and *Phlebia subserialis* (Bourdot & Galzin) Donk all have longer, cylindrical to suballantoid spores (Bernicchia & Gorjón 2010, Ghobad-Nejhad & Hallenberg 2012).

Our specimens agree well with the description apart from the presence of sometimes branched hyphidia-like hyphae in the hymenium. However, this character seems to be rather variable – while such structures are not uncommon in our specimen from Kamenná, it is very rare in the specimen from Spáleníště. It could represent variability caused by different development stages of the basidioma or by climatic conditions.

It is a species generally rare in Europe, Eriksson et al. (1981) note that the species is known only from virgin forests in Nordic countries. There are two localities in the Austrian Alps (Dämon 2000, Dämon & Krisai-Greilhuber 2017), but it has not been yet recorded in Germany. In Slovakia, it is known from Badínsky prales Virgin Forest (Hagara 2014) and Zadná Poľana NNR (J. Běťák in litt.). There is an unpublished specimen (PRM 716205) from the Bohemian Forest (Velká Niva peat bog) from 1970 and it was recently (2019) collected there by J. Běťák (Mt. Stožec, J. Běťák pers. comm.). Outside the area, it is known from

Žofínský prales Virgin Forest in the nearby Novohradské hory Mts. (PRM) and Mionší in the Moravskoslezské Beskydy Mts. (Běťák et al. 2016).

New records from Bohemian Forest

Šumava NP, Mt. Kamenná, 1.9 km south-southeast of Nové Údolí train station, plot L063, 955 m a.s.l., semi-cultural spruce forest, cut and peeled trunk of *Picea abies*, DS 3, 23 Aug 2017 leg. A. Lepšová & L. Zíbarová, det. L. Zíbarová (CB 22213). – Šumava NP, Mt. Spáleníště, 1.4 km east of České Žleby, ravine forest, fallen trunk of conifer, 925 m a.s.l., 4 Sep 2018 leg. T. Tejklová & L. Zíbarová, det. L. Zíbarová (HR B003057).

Other specimens studied

Czech Republic. South Bohemia, Šumava Mts. [Šumava PLA], in Velká Niva peat bog near Lenora, *Pinus uliginosa*, 6 Sep 1970 leg. M. Svrček, det. Z. Pouzar (PRM 716205). – Novohradské hory Mts., Žofínský prales Virgin Forest, trunk of *Picea abies*, 9 Oct 1968 leg. & det. Z. Pouzar (PRM 904333).

***Steccherinum oreophilum* Lindsey & Gilb.**

CZ: EN

Notes. While quite distant in phylogenetic trees (Miettinen et al. 2012), *Steccherinum oreophilum* is similar in morphological characters to *Irpex lacteus*, which however (among others) lacks clamps on the generative hyphae. Confusingly, both species seem to have a largely overlapping ecology to the point that they were found both in a single plot and on the same substrate (compare above).

Despite being classified in the Endangered category in the Red List (Pouzar 2006), *Steccherinum oreophilum* is not uncommon but rather an overlooked species in the Czech Republic. In our experience, it grows here on attached or recently fallen branches (not rarely just up to 1 cm thick) still in the bark of various angiosperms (typically *Frangula*, *Alnus* or *Betula*) in diverse habitats, preferentially with a humid microclimate, both natural and man-made. It was not previously reported from the actual Bohemian Forest, but collected in its foothills in Opolenec NR near Vimperk. Not reported from either the German or Austrian parts of the Bohemian Forest.

New record from Bohemian Forest

Šumava PLA, Rašeliniště Borková NR, 2 km southwest of Dolní Vltavice, plot L012, 725 m a.s.l., raised bog, living *Frangula alnus*, DS 0, 16 Oct 2017 leg. A. Lepšová, det. L. Zíbarová, rev. J. Kout (CB 22291).

Other specimens studied

Czech Republic. West Bohemia, Opolenec NR, near Sudslavice near Vimperk, ca 610 m a.s.l., on lying branch of *Salix caprea*, 10 Oct 1996 leg. & det. Z. Pouzar (PRM 890455). – Rabí near Sušice, 490 m a.s.l., abandoned quarry, thin trunk of *Pinus*, 2 Jun 2018 leg. & det. L. Zíbarová (HR B004426). – South Bohemia, Řepeč near Opařany, Údolí Lužnice a Vlášnického potoka SAC, 375 m a.s.l., ravine forest, branch of *Ulmus laevis*, 24 Oct 2019 leg. & det. L. Zíbarová (CB). – North Bohemia, Jestřebí, Jestřebské slatiny NNM, 260 m a.s.l., young water-logged spruce plantation, branch of *Frangula alnus*, 3 Apr 2018 leg. & det. L. Zíbarová (HR B005298).

Subulicystidium perlongisporum Boidin & Gilles

Fig. 12

Macroscopic characters. Basidioma effused, adnate, thin, hymenophore smooth to porulose, whitish, pruinose; margin undifferentiated, thinning out. Exsiccata whitish.

Microscopic characters. Hyphal system monomitic. Subiculum and subhymenium not differentiated. Hyphae irregularly and loosely arranged, not agglutinated, often branched at right angles, smooth, thin- to slightly thick-walled (walls up to 0.5 μm), 2–3 μm in diameter, septa with clamps.

Cystidia terminal or intercalary, abundant, cylindrical, occasionally widened at base, thick-walled (walls up to 0.5 μm), apex acute and thin-walled, covered with two regular strings of crystals, 56–72 \times 2–3.5 μm . Basidia arranged in clusters, broadly cylindrical, ovoid to obpyriform, clamped, tetrasterigmatic, 9–12 \times 4.5–5 μm . Basidiospores acicular, sometimes slightly bent or sigmoid, thin-walled, smooth, hyaline, without guttules, inamyloid, indextrinoid, not cyanophilic, 20–23 \times 1.75–2 μm (avg. 20.9 \times 1.9 μm), $Q = 10\text{--}12.6$ ($Q_{\text{avg}} = 10.77$).

Notes. According to Boidin & Gilles (1988) *Subulicystidium perlongisporum* differs from the widespread *Subulicystidium longisporum* (Pat.) Parmasto by both absolutely and relatively longer basidiospores. Preliminary molecular results showed that both species are distinct (Volobuev 2016). However, a recent work by Ordynets et al. (2018) hints that the picture is more complex, as both specimens of *S. perlongisporum* used in their phylogenetic analysis did not form a well-supported clade in phylograms and one specimen of *S. perlongisporum* even clusters with *S. boidinii* in one of them. Nevertheless, as the above-mentioned study was focused mostly on short-spored taxa of *Subulicystidium*, only a very limited number of species with acicular spores was analysed. Two other species with long acicular ($Q > 7$) spores – *Subulicystidium cochleum* Punugu and *Subulicystidium curvisporum* Gorjón, Gresl. & Rajchenb. are known only from very sparse records outside Europe (Punugu et al. 1980, Gorjón et al. 2012).

To our knowledge, this is the first record of *S. perlongisporum* from the Bohemian Forest and the first one published from the Czech Republic. The unclear taxonomy makes any generalisations about its ecology and distribution hard to infer, but it seems to prefer a humid microclimate.

New record from Bohemian Forest

Šumava PLA, Jasánky NM, 1.4 km northeast of Sankt Oswald bei Haslach, plot L003, 690 m a.s.l., semi-cultural mixed forest, fallen branch of *Acer pseudoplatanus*, DS 2–3, 21 Aug 2017 leg. A. Lepšová & L. Zíbarová, det. L. Zíbarová (CB 22202).

Other specimens studied

Czech Republic. Bílichovské údolí NNM, 2.3 km west-southwest of Bílichov, 400 m a.s.l., herb-rich beech forest, fallen branch of *Fraxinus*, 22 May 2014 leg. & det. L. Zíbarová (herb. L.Z.

2409). – Křivoklátsko PLA, Kohoutov NNR, 4.6 km south of Skryje, 475 m a.s.l., herb-rich beech forest, trunk of *Fagus*, DS 3, 21 May 2015 leg. & det. L. Zíbarová (herb. L.Z. 842/C2).

Slovakia. Dunajské luhy PLA, Rusovce, hard-wood floodplain forest, fallen branch of *Fraxinus* sp., soc. *Xenasma parvisporum*, 4 Nov 2017 leg. T. Tejklová & L. Zíbarová, det. L. Zíbarová, (HR 105267, deposited under *Xenasma parvisporum*).

Poland. Twardy Róg, near Augustów, trunk of *Alnus glutinosa*, 11 Sep 1974 leg. & det. Z. Pouzar (PRM 845709).

Tubulicrinis globisporus K.H. Larss. & Hjortstam

AU: VU, CZ: ?EX

Notes. According to Pouzar (2006), the last records of *Tubulicrinis globisporus* known in the Czech Republic (Krkonoše and Šumava Mts.) date to the 1960s, so it was classified as Possibly Extinct. However, we found two specimens deposited in PRM collected in the Bohemian Forest from later dates than given by Pouzar (2006), possibly not known during the creation of the Czech Red List. In addition, several recent records have been made from the Šumava NP (Mt. Trojmezna; Pouska et al. 2015), Krkonoše Mts. (Růžová hora, see Other specimens studied), Moravskoslezské Beskydy Mts. (Mionší; Běťák et al. 2016) and Hrubý Jeseník Mts. (Eustaška; Běťák et al. 2016). All above-mentioned recent records are from intensive surveys in permanent plots, suggesting that the species is possibly more widespread than previously thought but its unremarkable macromorphology and often small basidioma size make it easy to overlook in the field. All plots were in natural spruce forest at high elevations.

In the Bohemian Forest, it was also found in Germany, on Großer Arber (DGfM on-line), but there are no records published from the Austrian part of the area.

New record from Bohemian Forest

Šumava NP, Mt. Vysoký hřeben, 6 km south-southeast of Nové Údolí train station, plot L119, 1310 m a.s.l., disturbed montane spruce forest, on roots of an uprooted trunk of *Picea abies*, DS 3, 4 Nov 2017 leg. V. Pouska & J. Kout, det. L. Zíbarová (CB 22223).

Other specimens studied

Czech Republic. Šumava Mts. [Šumava NP], Cikánská slaf bog near Modrava, 1070 m a.s.l., trunk of *Picea abies*, 9 Oct 1998 leg. & det. Z. Pouzar (PRM 843855). – [Šumava NP], Mt. Blatný vrch, near Březník, fragment of fallen trunk of *Picea abies*, 5 Sep 1970 leg. & det. Z. Pouzar (PRM 845310). – Krkonoše NP, Mt. Růžová hora, 300 m north of Růžohorky chalet, plot MD-HP2, 1280 m a.s.l., montane spruce forest, fallen branch of *Picea abies*, 4 Oct 2017 leg. & det. L. Zíbarová (HR B004917).

Tubulicrinis medius (Bourdot & Galzin) Oberw.

CZ: NT

Notes. According to Pouzar (2006) several localities of *Tubulicrinis medius* are known from the Bohemian Forest (Boubínský prales Vvirgin Forest and along the Vydra river). However, in our opinion the specimen from Boubínský prales Virgin Forest (PRM 895655) is misidentified and was for unknown reason omitted also from the article by Holec et al. (2015), even if there was no indica-

tion of a previous revision of it. There are no records of the species published for the German or Austrian part of the Bohemian Forest.

In addition, we collected other species of the genus recorded in plots, namely *Tubulicrinis accedens* (Bourdot & Galzin) Donk, *T. borealis* J. Erikss., *T. calothrix* (Pat.) Donk, *T. glebulosus* (Fr.) Donk, *T. strangulatus* K.H. Larss. & Hjortstam and *T. subulatus* (Bourdot & Galzin) Donk, all species (perhaps with exception of the last one) being uncommon to rare in the Czech Republic in our experience and mostly found at humid localities at higher elevations. Records of additional species are to be expected in the Bohemian Forest.

New records from Bohemian Forest

Šumava NP, U Zettlovy hůrky, 2.4 km east of Nová Hůrka, plot L036, 840 m a.s.l., successional plot on former military shooting range, fallen branch of *Pinus sylvestris*, DS 3, 14 Oct 2017 leg. A. Lepšová & J. Kout, det. L. Zibarová (CB 22207). – Šumava NP, near former hamlet of Slunečná, 2.4 km east-south-east of Prášíly, 920 m a.s.l., plot L058, birch mire forest, wounded part of living trunk of *Pinus sylvestris*, DS 0, 15 Oct 2017 leg. A. Lepšová & J. Kout, det. L. Zibarová (CB 22211).

***Xylodon pruinosus* (Bres.) Spirin & Viner**

Fig. 13

= *Odontia pruinosus* Bres.

Macroscopic characters. Basidioma effused, adnate; hymenophore smooth to odontoid in parts; aculei scattered, apex smooth; whitish, margin undifferentiated, thinning out. Reaction with KOH negative. Exsiccata whitish, not discolouring.

Microscopic characters. Hyphal system monomitic both in subiculum and subhymenium. Hyphae in subiculum loosely and irregularly arranged, often branched, smooth, slightly thick-walled, 3–5 µm in diameter, septa with clamps. Hyphae in subhymenium loosely arranged, more or less perpendicular to the surface, subparallel, often branched, smooth, thin- to slightly thick-walled, 2–3(4) µm in diameter, septa with clamps, segments often short-celled.

Cystidia of subhymenial origin, abundant, clavate to subcylindrical, often with one or two constrictions, slightly thick-walled in median part, walls up to 0.5 µm wide, apex capitate, thin-walled, 72–97 × 7–9 µm, projecting up to 40 µm. Basidia arranged in dense palisade, cylindrical to suburniform, often with median constriction, clamped, tetrasterigmatic, usually without inclusions, 13–16 × 3.5–4 µm. Basidiospores subglobose to broadly ellipsoid, slightly thick-walled, smooth, hyaline, eguttulate, inamyloid, indextrinoid, weakly cyanophilic, 4–5.25 × 3.25–4.5 µm (avg. 4.7 × 4.0 µm), Q = 1.1–1.5 (Q_{avg} = 1.17).

Notes. *Xylodon pruinosus* (Bres.) Spirin & Viner was recently ‘resurrected’ by Viner et al. (2018). It had long been synonymised with *Lagarobasidium detriticum* (Bourdot) Jülich (e.g. Eriksson & Ryvarden 1976) – now *Xylodon detriticus* (Bourdot) K.H. Larss., Viner & Spirin. This species differs from

X. detriticus by wider spores in Cotton Blue, cystidia frequently with intercalary inflation and preference for dead wood as the substrate (Viner et al. 2018).

There are no other records of either *Xylodon pruinosis* (or *X. detriticus*) in the entire Bohemian Forest known to us. However, based on our records it does not seem to have strong preference for natural forests or even specific habitats (perhaps apart for a humid microclimate). In contrast, all our recent records of *Xylodon detriticus* are from strongly disturbed localities (mine spoil heaps, sand pits).

New record from Bohemian Forest

Šumava NP, Mt. Žlebský vrch, 0.5 km south-southwest of České Žleby, plot L072, 980 m a.s.l., ravine forest, trunk of *Sorbus aucuparia*, DS 3–4, 22 Aug 2017 leg. A. Lepšová & L. Zíbarová, det. L. Zíbarová (CB 22214).

Other specimens studied

Czech Republic. České středohoří PLA, Babinské louky NM, 420 m west-northwest of Čeřeniště, 525 m a.s.l., wet willow scrub, lying branch of *Salix* sp., 16 Oct 2017 leg. & det. L. Zíbarová (herb. L.Z. 6446). – Krkonoše NP, Malá Úpa river valley, 2.3 km south-southwest of Horní Malá Úpa, 905 m a.s.l., semi-cultural montane spruce forest, trunk of *Picea abies*, DS 3, soc. *Alutaceodontia alutacea*, 26 Oct 2016 leg. & det. L. Zíbarová (herb. L.Z. 6128). – South Bohemia, ruins of Loužek castle, in Malše river valley, not far from Kaplice, lying branch of *Acer pseudoplatanus*, 29 Jul 1971 leg. M. Svrček, det. Z. Pouzar (as *Hyphodontia detritica* Bourd.), rev. L. Zíbarová (PRM 815779).

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