

**Xylariaceous pyrenomycetes from Bohemia:
species of *Biscogniauxia* and *Hypoxylon*
new to the Czech Republic, and notes on other rare species**

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Two species of pyrenomycetes, *Biscogniauxia mediterranea* and *Hypoxylon fuscoides*, are reported from the Czech Republic for the first time. Descriptions of both species, based on the authors' collections, are provided together with notes on their distribution and ecology in the Czech Republic and Europe.

Additionally new records and short discussions regarding 20 other less common taxa of pyrenomycetes of the genera *Biscogniauxia*, *Euepixylon*, *Hypoxylon* and *Nemania* (traditionally placed in *Xylariaceae*) in Bohemia, Czech Republic, are supplied, and recommendations for a future version of the Czech Red list of macromycetes are given.

Key words: ascomycetes, ecology, lignicolous fungi, *Xylariales*.

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Dva druhy tvrdohub (pyrenomycetů) – káčovka středozemní (*Biscogniauxia mediterranea*) a dřevomor *Hypoxylon fuscoides* – jsou poprvé zaznamenány z České republiky. Pro oba druhy je uveden popis na základě sběrů autorů spolu s poznámkami k rozšíření a ekologii obou zmíněných druhů v České Republice a Evropě.

Dále jsou uvedeny nové nálezy a krátké diskuze k dalším 20 méně běžným taxonům tvrdohub z rodů *Biscogniauxia*, *Euepixylon*, *Hypoxylon* a *Nemania* (*Xylariaceae* v tradičním pojetí) z území Čech, doplněné o doporučení na zařazení do příští verze Červeného seznamu.

This article is dedicated to the 85th birthday of Zdeněk Pouzar.

INTRODUCTION

An artificial group of fungi called pyrenomycetes is characterised (in a wide sense) by perithecia-type fruitbodies (Samuels & Blackwell 2001), which are in some cases immersed in a complex structure called stroma. Many of the macroscopical, stromata forming genera of pyrenomycetes such as the well-known *Biscogniauxia* Kuntze, *Hypoxylon* Bull. and *Xylaria* Hill ex Schrank were traditionally put into the *Xylariaceae* family (*Xylariales*, Sordariomycetes) (Smith et al. 2003). However the latest results of a molecular phylogeny study (Wendt et al. 2017) have changed this view, as the *Hypoxylaceae* family (including e.g. *Annulohypoxylon*, *Daldinia*, *Entonaema*, *Hypoxylon* and *Jackrogersella*) was separated from the remaining *Xylariaceae*, and the genus *Biscogniauxia* was transferred to the *Graphostomataceae*.

In the Czech Republic, stromatic pyrenomycetes have been mainly studied by Zdeněk Pouzar (e.g. Pouzar 1972, 1978, 1979, 1985a, 1985b, 1986). However, information on species distribution and ecology is frequently limited to his preferred collecting areas (surroundings of Prague, Bohemian Karst, confluence of Morava and Dyje rivers). In addition, numerous new species have been described and taxonomical concepts of old species have been changed since his last publication on the topic in 1986 (see references in notes to particular species).

The aim of this article is to update our knowledge of the distribution and ecology of selected genera of *Xylariaceae* in the traditional sense: *Biscogniauxia* (now *Graphostomataceae*), *Hypoxylon* (now *Hypoxylaceae*), *Euepixylon* and *Nemania* (*Xylariaceae* s.str.) in Bohemia (Czech Republic), based on new collections by both authors as well as material present in relevant herbaria.

MATERIAL AND METHODS

The macroscopic descriptions are based on fresh material supplemented by colour photographs. Microscopic characters were observed on dried herbarium specimens in water, Melzer's solution and in 10% KOH aqueous solution. Measurements were based on Melzer's solution preparations under oil immersion at 1000× magnification. Spore measurements were performed on at least 20 spores freely floating in medium using an optical micrometer. Abnormal or clearly immature spores were omitted from the measurements. KOH-extractable pigments in the genus *Hypoxylon* were observed by immersing small pieces of stroma in a drop of 10% KOH on a microscope slide over white paper (Ju & Rogers 1996).

The studied specimens were dried in a portable dryer within 48 hours after collection. Voucher herbarium specimens were deposited in the herbarium of the National Museum in Prague (PRM), the Museum of Eastern Bohemia (HR), the

Museum of South Bohemia (CB), the department of the second author (abbreviated CBG) and the personal herbarium of the first author (abbreviated 'herb. L.Z.'). For other herbarium acronyms, see Thiers (on-line).

Major herbaria located in Bohemia (CB, HR, PL, PRC, PRM) were inquired about available herbarium material of the species treated here; the number of such specimens for each species is mentioned. Ecological and geographical data were obtained from the labels of these specimens. The distribution in Bohemia indicated in the text using codes of phytogeographical districts (Skalický 1988) is based both on herbarium and our personal records. Lists of host plants for individual species were based on aggregate data from herbarium labels and our personal data. Selected specimens from PRM (mostly identified by Z. Pouzar), PRC and HR were reviewed and compared to material collected by us. Additionally, the abovementioned herbaria were inquired about specimens of *Hypoxylon fuscum* (Pers.) Fr. collected on either birch (*Betula*) or alder (*Alnus*). The selected specimens were revised in search for additional specimens of *Hypoxylon fuscooides* J. Fourn., P. Leroy, M. Stadler & Roy Anderson.

DNA was isolated from the dried specimen of *Hypoxylon fuscooides* (PRM 945432), the extraction procedure corresponding to Vlasák & Kout (2011). The sequence of *Hypoxylon fuscooides* was deposited in GenBank (KY817587). Data from GenBank (<https://www.ncbi.nlm.nih.gov/genbank/>) were used for comparison.

Our research was geographically restricted to Bohemia, Czech Republic, but a few specimens outside Bohemia were revised for comparison as well. Specimens listed are arranged according to region and then geographically from west to east within region. Czech herbarium labels were translated into English, while Latin labels are cited as such. Supplementary information not explicitly mentioned on the labels (such as corresponding district or nearest village) but added by us are given in square brackets. Only the most commonly used synonyms are given. Plant nomenclature follows Kubát (2002).

Abbreviations used: det. – identified by, leg. – collected by, M – Mesophyticum (Skalický 1988), not. – noted by, record not documented by a herbarium specimen, n_{spec} – number of collections from which the average value was calculated, O – Oreophyticum (Skalický 1988), Q – range of measured length/width ratio of spores, Q_{avg} – range of average measured Q values in individual specimens, rev. – revised by, T – Thermophyticum (Skalický 1988).

RESULTS AND DISCUSSION

***Biscogniauxia* Kuntze**

The genus *Biscogniauxia* was monographed by Ju et al. (1998), recognising forty-nine taxa worldwide. Since then, new taxa have been described (e.g. Ju & Rogers 2001, Mugambi et al. 2009, Raimondo et al. 2016, Vasilyeva & Stephenson 2010, Vasilyeva et al. 2012, Whalley et al. 2000). The genus appears paraphyletic (Pažoutová et al. 2010, Peláez et al. 2008, Raimondo et al. 2016) together with other related, but morphologically dissimilar genera, such as *Camillea* Fr., *Obolarina* Pouzar and *Graphostoma* Piroz., forming a clade distant from the species of *Xylaricaeae* in the traditional sense. Accordingly the genus *Biscogniauxia* has been transferred to the *Graphostomataceae* (Wendt et al. 2017).

In the former Czechoslovakia the genus was treated by Pouzar (1979, 1986) who reported six species from the area of the contemporary Czech Republic: *Biscogniauxia cinereolilacina* (J.H. Mill.) Pouzar, *B. marginata* (Fr.) Pouzar, *B. nummularia* (Bull.) Kuntze, *B. querna* Pouzar, *B. repanda* (Fr.) Kuntze and *B. simplicior* Pouzar. Deckerová (2006) provided an updated key to European taxa and reported *B. granmoi* Lar. N. Vassiljeva for the first time from the country. In this study, we have added an eighth species – *B. mediterranea* (De Not.) Kuntze – to the list of *Biscogniauxia* species recorded from the Czech Republic.

Three species known from the Czech Republic are not treated below – two of them are considered too widespread and sufficiently known (*B. marginata*, *B. nummularia*) and one of them (*B. querna*) lacks any new collections since its description by Pouzar (1986) and its type locality lies outside of the studied area.

***Biscogniauxia cinereolilacina* (J.H. Mill.) Pouzar**

Fig. 1a

Selected description. Ju et al. (1998): p. 29.

Biscogniauxia cinereolilacina is a rather striking species within the genus. Apart from its ecology (restricted to lime – *Tilia* spp.), it is characterised by an unusual violaceous/grey shade of its stromata (at least when young), which are appanate and irregular without raised margin (Ju et al. 1998). Microscopically, the most notable characteristics are spores with germ slits on both sides (Ju et al. 1998), a feature only found in *B. repanda* and *B. querna* of the central European species. Both species have stromata with a raised margin.

Herbarium specimens from Bohemia: 7 (HR: 3, PRM: 4). Distribution in Bohemia – T: 6, 8; M: 44. Recorded at colline elevations only; all PRM specimens are from the Bohemian Karst. In our experience, *B. cinereolilacina* is rather rare in the area, but could also be overlooked, as it is typically found in old ravine forests, often occurring on steep inaccessible slopes. Also it might superficially

resemble stromata of *Diatrype stigma* s.l. We have recorded it on recently dead corticated wood, both on thick branches and trunks. Substrates known from the Czech Republic: *Tilia cordata* (3), *Tilia platyphyllos* (4), *Tilia* sp. (3). The species seems to prefer rather warm and dry (micro)localities in the Czech Republic. Our record from the colder Milešovka mountain relates to south-facing slopes.

Inclusion of the species into the next edition of the Czech Red list of macromycetes is to be considered (possibly in the Data Deficient category), as its records are scarce and it is only found in (near-)natural forests. However, possible records from other parts of the country (Moravia and Silesia) should be taken into account first.

Specimens examined

Czech Republic. North-west Bohemia. Pnětluky (Louny District), Pravda hill, 465 m a.s.l., ravine forest, fallen trunk and branches of *Tilia* sp., 30 Jun 2015, leg. & det. L. Zíbarová (HR 103303). – Vinařice (Louny District), Čertovka gorge, 400 m a.s.l., ravine forest, fallen trunk of *Tilia* sp., 14 May 2015, leg. & det. L. Zíbarová (HR 103310). – Milešov near Velemín (Litoměřice District), Milešovka National Nature Reserve, 730 m a.s.l., ravine forest, fallen trunk of *Tilia* sp., 15 May 2016, leg. & det. L. Zíbarová (HR 103323). – Central Bohemia. In monte Velká hora apud Karlštejn [Beroun District], ad truncum stantem emortuum *Tiliae platyphyllos*, 13 Nov 1998, leg. & det. Z. Pouzar (PRM 83814). – [Praha – Zadní Kopanina], Radotínské údolí, Kopaninský les, declive contra Brejchův mlýn, *Tilia platyphyllos*, trunculus iacens, 27 Oct 2000, leg. & det. Z. Pouzar (PRM 894707).

Biscogniauxia granmoi Lar. N. Vassiljeva

Fig. 1b

Selected description. Læssøe et al. 1999: p. 140.

A species restricted to *Prunus* (especially *Prunus padus*). Macromorphologically, the species resembles the common *Biscogniauxia nummularia*, type species of the genus, which is however specific to *Fagus*. If the identity of the substrate is uncertain, the slightly raised stromatal margin, umbilicate ostioles, more tubular perithecia, paler and more slender ascospores ($Q = 2-2.3$) may help identification (Læssøe et al. 1999). Deckerová (2006) published the first record of this species from the Czech Republic. In Europe it is also known from Austria, Latvia, Norway and Poland (Læssøe et al. 1999).

Herbarium specimens from Bohemia: 9 (CB: 2, CBG: 1, HR: 2, PRM: 4). Distribution in Bohemia – T: 11b, 15c; M: 37e, 37l, 66; at lowland to colline elevations. We add five new localities in Bohemia to the published ones (Deckerová 2006), suggesting that the species is more widespread than previously assumed. Moreover, the species is known from at least two localities in Moravia (R. Maňák in litt.). However, we were unable to find any further specimens despite intensive searches in suitable habitats.

All our records come from riparian forests with high humidity, which is a rather unusual habitat for other *Biscogniauxia* species known from the Czech Republic, which seem to prefer drier habitats. All Czech specimens known to us are from

Prunus padus as in the rest of Europe. It was collected on *Prunus asiatica* (= *Prunus padus* var. *pubescens*) in the Russian Far East (Læssøe et al. 1999).

The species seems to be rare in the area of study, preferring natural habitats and therefore inclusion of the species into the Data Deficient category of the next edition of the Czech Red list of macromycetes is to be considered.

Specimens examined

Austria. Steiermark, Oststeiermark, Murtal, c. 1.5 km SE of Bad Radkersburg, 0.5 km S of the village of Laafeld, near orographically left bank of river Mur (exact citation of the label), alt. 205 m, softwood floodplain forest with *Populus nigra*, on bark of dead trees of *Prunus padus*, 21 Feb 1996, leg. D. Prelicz (PRM 901305).

Czech Republic. West Bohemia. Plzeň-Bolevec (Plzeň-město District), Kamenný rybník Nature Reserve, fallen trunk of *Prunus* cf. *padus*, Oct 2011, leg. & det. J. Kout (PRM 945429). – Central Bohemia. Libice na Cidlinou (Nymburk District), Libický luh National Nature Reserve, 190 m a.s.l., fringe of alluvial forest, trunk of *Prunus padus*, 4 Nov 2013, leg. & det. L. Zibarová (CB 19451). – East Bohemia. Uhersko (Pardubice District), Bažantnice v Uhersku Nature Reserve, 250 m a.s.l., wood of *Prunus padus*, 28 Feb 2017, leg. & det. P. Brůžek (HR 102251). – Maleč near Chotěboř (Havlíčkův Brod District), riparian forest along Doubrava river, wood of *Prunus padus*, 21 May 2016, leg. & det. P. Brůžek (HR 102252). – South Bohemia. Strakonice (Strakonice District), Bažantnice u Pracejovic Nature Reserve, 395 m a.s.l., riparian forest, on wood with bark of *Prunus padus*, 4 Jun 2009, leg. & det. J. Kout (PRM 945428); *ibid.*, on fallen trunk of *Prunus padus*, 17 Mar 2012, not. L. Zibarová. – Vyšný (Český Krumlov District), Vyšenské kopce National Nature Reserve, on hardwood, 27 Oct 2002, leg. & det. J. Kout (CBG). – In collibus “Vyšenské kopce [National Nature Reserve]” ap. Český Krumlov [Český Krumlov District], *Prunus avium* (= *Prunus padus*) trunc. iacens (synonym on the label erroneous, probably should be *Padus avium* = *Prunus padus*), 28 Apr 2003, leg. H. Deckerová, det. Z. Pouzar (PRM 845959). – Větřní (Český Krumlov District), approx. 4 km south of Větřní, bank of Vltava river, on *Prunus* cf. *padus*, 6 May 2006, leg. & det. J. Kout (PRM 945427).

Biscogniauxia mediterranea (De Not.) Kuntze

Figs. 1c, d

Description. Stromata applanate, up to 150 mm long and 2.5 mm wide, up to 1 mm thick, carbonaceous, mature surface black, shiny, with coarsely papillate ostioles, margin raised or not. Perithecia obovoid 150–250 × 450–600 μm, several per ostiolar channel. Asci cylindrical, short stipitate, spore-bearing part 85–120 × 8–10 μm, stipes 20–25 μm long, apical apparatus discoid, amyloid in Melzer’s solution, approx. 5 × 3 μm. Ascospores ellipsoid, slightly inequilateral, ends narrowly rounded, without appendages, dark brown, 14.0–21.0 × 6.5–8.5 μm (avg. 16.70–16.75 × 7.26–7.29 μm, $n_{\text{spec}} = 2$), $Q = 1.8–3.0$ ($Q_{\text{avg}} = 2.29–2.31$), germ slit spore-length, straight.

Notes. Ju et al. (1998) reported *B. mediterranea* from Europe (Austria, France, Georgia, Germany, Italy, Portugal, Russia, Ukraine) as well as from other parts of the world (Mauritania, Nigeria, Mexico, USA). This species has been reported from most of southern Europe (see below), but rarely from northern latitudes. This is in accordance with our findings, as our records come from south-facing slopes in the area of thermophilous flora (Thermophyticum; Skalický 1988).

The spectrum of hosts of *B. mediterranea* seems rather wide, but with preference for genera of the families *Fagaceae*, such as *Castanea* (Spooner 1986), *Fagus*, *Lithocarpus*, *Quercus* (Ju et al. 1998), and *Betulaceae*: *Carpinus* and *Corylus* (Fournier & Magni 2004a). However, its stromata have also been reported from woody plants of other genera, such as *Acer*, *Eucalyptus*, *Juglans*, *Pisonia* (Ju et al. 1998) and *Fraxinus* (Ragazzi et al. 2012). In this regard, our collections (from *Corylus* and *Fagus*) do not deviate from previously published data.

Although both our collections were very similar in microscopic characters, there were differences in stroma morphology (Figs.1c, d). Stromata from hazel (*Corylus avellana*) were more regular and rounded in shape without any raised margin. On the other hand, stromata found on beech (*Fagus sylvatica*) had an irregular shape and notably raised margin. The occasional presence of a raised margin was noted previously, too (Fournier & Magni 2004a). We ascribe this feature to differences in mechanical characteristics of the bark of host plants rather than being of any significant taxonomic value.

Apart from the typical variety, there are two varieties described from *B. mediterranea* based on spore dimensions (Ju et al. 1998): var. *microspora* (J.H. Mill.) Y.M. Ju & J.D. Rogers and var. *macrospora* (J.H. Mill.) Y.M. Ju & J.D. Rogers, neither of which has been reported from Europe yet. Later, Vasilyeva & Stephenson (2010) introduced a new species, *Biscogniauxia alnophila* Lar. N. Vassiljeva & S.L. Stephenson, from the West Coast of North America and the Russian Far East for *B. mediterranea* var. *microspora*, based, apart from spore measurements, on substrate vicariance. According to the authors, true *B. mediterranea* is restricted to *Quercus* spp., while *B. alnophila* is associated with other hosts, namely *Betulaceae* (*Alnus* spp., *Corylus heterophylla*). However, they apparently ignored numerous reports of autonomous variety from diverse substrata (Ju et al. 1998 and references above) and moreover did not provide molecular data supporting the introduction of the new species. The spore dimensions measured on our specimens overlap both those of var. *mediterranea* and var. *microspora*, therefore we refrain from identifying them to the variety level.

In southern European and Middle East countries, *B. mediterranea* is an economically important pathogen of several species of oak, especially *Quercus cerris* (Vannini et al. 1996) and *Q. suber* (Henriques et al. 2012), causing so-called charcoal disease. The fungus could be spread both by means of aerial dispersion of spores (Henriques et al. 2014), as well as by insect vectors (Inácio et al. 2011, Martín et al. 2005). Vertical transport by means of seeds was not confirmed (Henriques et al. 2014, Mazzaglia et al. 2001). The susceptibility of hosts to colonisation (Capretti & Battisti 2007) as well as the damage (Vannini & Scarascia Mugnozza 1991) caused by *B. mediterranea* have been associated with water stress. The real distribution of the species may be much wider, since it lives as an endophyte in otherwise symptom-free oaks (Luchi et al. 2005). In fact, the strategy

of “latent invaders” could be more widespread within the genus (Nugent et al. 2005), because many xylariaceous fungi have been detected as endophytes (Petrini & Petrini 1985, Whalley 1996). Similarly to *B. mediterranea*, also other species of the genus *Biscogniauxia* have been associated with charcoal disease (Raimondo et al. 2016) or decline of their hosts, especially on the edge of the natural occurrence of these hosts (Granata & Sidoti 2004).

In stands surrounding the sites of our records, however, we did not observe any indications of disease. In both cases, our stromata were found on parts that were broken off from the rest of a healthy looking plant. The pathogenicity of *B. mediterranea* may be reduced on the edge of its distribution range, but there is no guarantee that this remains so in the future, for reason of global climate change. In fact, the geographical range of *B. mediterranea* seems to have increased in the past decade as there are new reports of the fungus or the associated charcoal disease (see above) e.g. from Slovenia (Jurc & Ogris 2006) and Iran (Mirabolfathy et al. 2011). Global changes towards a warmer and drier climate, and consequent increase of water stress with hosts, could be the main reason of spreading. Therefore, it may not be a coincidence that the fungus was found in the Czech Republic for the first time in 2015, an exceptionally hot and dry year. Furthermore, the south-facing orientation of the localities and the occurrence of well-drained rocky soils (“rendzina” soils) on calcareous sandstone had possibly contributed to water stress of the hosts.

Distribution in Bohemia – T: 6; at colline elevations. Substrata known from the Czech Republic: *Corylus avellana* (1), *Fagus sylvatica* (1).

Specimens examined

Bulgaria. Bulg. mer.-or., in valle rivuli (pars. infer.) inter Vlas et Slančev Briag ap. Burgas, montes Eminska planina, ad truncum emort. *Quercus cerris*, 13 Aug 1982, leg. & det. F. Kotlaba (PRM 841848). – Montes Stara planina, supra Slančev Briag ap. Nesebr, cca 150 m s.m., ad truncum iacentem *Quercus cerris*, 8 Aug 1979, leg. F. Kotlaba, det. Z. Pouzar (PRM 821131).

Czech Republic. North-west Bohemia. Tuchořice (Louny District), Kozinecká stráň Nature Monument, 470 m a.s.l., thermophilous oak forest, broken, recently died trunk of *Corylus avellana* still attached to the tree, 2 May 2015, leg. & det. L. Zibarová (HR 103301). – Vinařice (Louny District), Teplá stráň, 380 m a.s.l., calciphilous beech forest, broken branch of *Fagus sylvatica* lying on the ground, 8 Sep 2015, leg. & det. L. Zibarová (HR 103312).

Italy. Monte Gennaro, cca 1200 m, in corticibus *Fagi sylvaticae*, Feb 1902, leg. D. Saccardo, det. Z. Pouzar (PRM 704341).

Biscogniauxia repanda (Fr.) Kuntze

Fig. 1e

Selected descriptions. Ju et al. (1998): p. 51; Chlebicki & Bujakiewicz (1994): p. 54–55.

Biscogniauxia repanda is characterised by discoid stromata with an irregularly raised margin and spores with germ slits on both sides (Ju et al. 1998). Morphologically, *Biscogniauxia simplicior* is very similar, but this species has spores with a germ slit on one side only and is restricted to *Rhamnus* (Pouzar 1979).

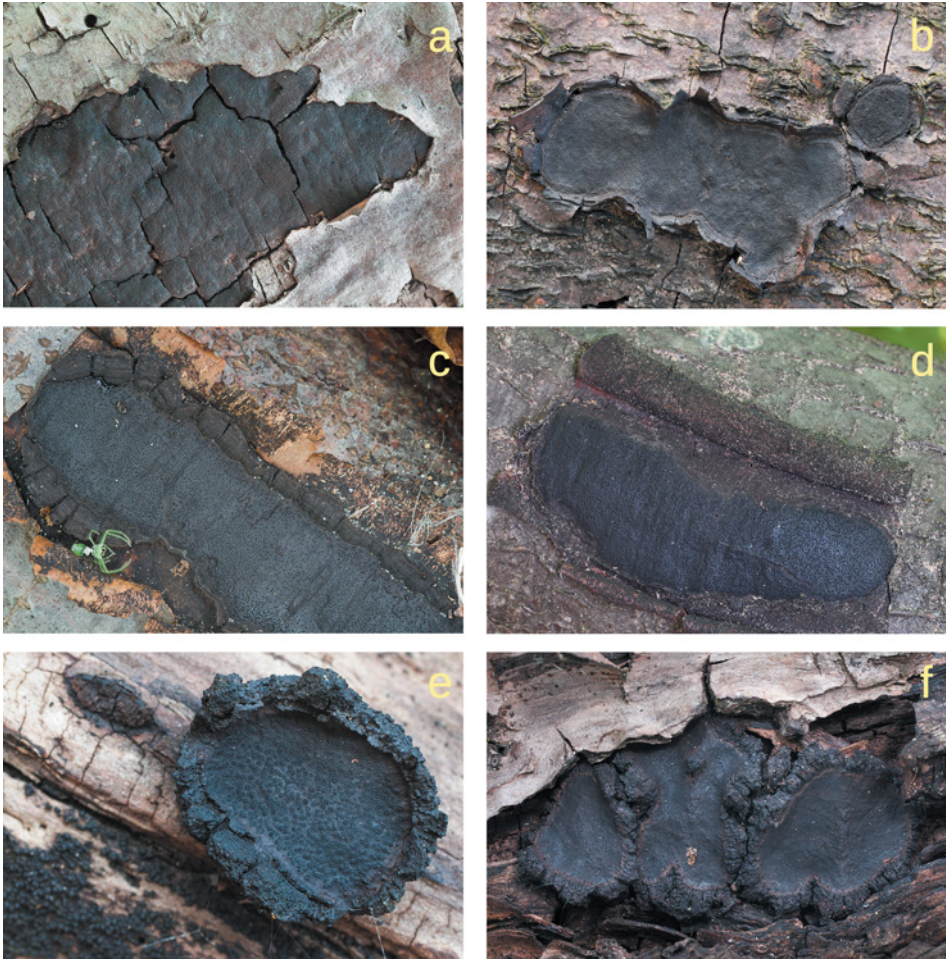


Fig. 1. Stromata of *Biscogniauxia* species: **a** – *B. cinereotilacina* (HR 103303), **b** – *B. granmoi* (CB 19451), **c** – *B. mediterranea* (HR 103301), **d** – *B. mediterranea* (HR 103312), **e** – *B. repanda* (CB 20674), **f** – *B. simplicior* (Vinařice, Teplá stráň, 12 May 2015, not documented by a voucher). Photos by L. Zíbarová.

Herbarium specimens from Bohemia: 27 (HR: 11, PL: 1, PRC: 1, PRM: 14). Distribution in Bohemia – T: 1, 4c, 6, 8; M: 24a, 28f, 29, 31a, 32, 34, 37a, 37m, 41, 44, 50, 66; O: 87, 88a, 88d, 88h, 93b; at colline to montane elevations. Deckerová (2006) mentions *Sorbus aucuparia* as the sole host in the Czech Republic and accordingly we have only records from this host. We have however found a wider range of substrates mentioned on labels of herbarium specimens in HR, PRC and PRM: *Acer campestre* (1), *Betula* sp. (1), *Fraxinus excelsior* (1), *Sorbus aria* (2),



Fig. 2. Stromata of *Hypoxylon* species: **a** – *H. cercidicola* (herb. L.Z. 6303), **b** – *H. fuscoides* (HR 103314), **c** – *H. fuscoides* (HR 103319), **d** – *H. petrinae* (HR 103335), **e** – *H. ticinense* (CB 19137), **f** – *H. vogesiacum* (HR 103311). Photos by L. Zibarová.

Sorbus aucuparia (12), *Sorbus* sp. (1), *Ulmus glabra* (1, as *U. montana*). However, it is uncertain if the host identity has always been identified correctly by the collectors, but *Sorbus aria* was already reported as a host by Pouzar (1979), and Granmo et al. (1989) also gave other rare hosts in Nordic countries, such as *Betula*, *Prunus*, *Malus*, *Quercus*, *Alnus* and *Tilia*.

Although Pouzar (2006a) claimed that this species prefers relatively high altitudes in the Czech Republic, we have recorded many collections from low colline

elevations. Granmo et al. (1989) also noted that the species “does not seem to require specific ecological situations”, which is confirmed by our observations.

In the current Czech Red list of macromycetes (Holec & Beran 2006), *Biscogniauxia repanda* is included in the Endangered category (Pouzar 2006a). However, based on our field experience, we consider this species rather common wherever a suitable host (mostly rowan – *Sorbus aucuparia*) is present, so that we have refrained from documenting every new locality with a herbarium collection. Based on the numerous new records and the wide range of recorded habitats, inclusion of the species in the next edition of the Red list will be in our opinion unnecessary.

Specimens examined

Czech Republic. West Bohemia. Konstantinovy Lázně (Tachov District), Hradišský vrch, northern part of the hill, along nature trail, fallen decorticated trunk of *Sorbus* cf. *aucuparia*, 28 Apr 2017, leg. & det. J. Kout (PL BH 112). – Plzeň (Plzeň-město District), Kamenný rybník Nature Reserve, fallen trunk of broadleaved tree, 1 Apr 2011, leg. & det. J. Kout (CBG). – Velhartice (Klatovy District), Borek u Velhartic Nature Reserve, edge of blockfield, wood of *Sorbus*, 30 May 2009, leg. & det. J. Kout (PRM 945430). – Kynšperk nad Ohří (Sokolov District), Boží Požehnaní mine spoil, 445 m a.s.l., fallen trunk of *Sorbus aucuparia*, 24 Apr 2017, leg et det. L. Zíbarová & A. Lepšová (HR 103558). – North-west Bohemia. Okounov, Kotvína (Chomutov District), Černý vrch, 565 m a.s.l., ravine forest, fallen trunk of *Sorbus aucuparia*, 15 Jul 2014, leg. & det. L. Zíbarová (HR 103330). – Brodce near Kadaň (Chomutov District), Lipová hill, 480 m a.s.l., oak-hornbeam forest, fallen thin trunk of *Sorbus aucuparia*, 28 Jun 2013, leg. & det. L. Zíbarová (HR 103327). – Domoušice (Louny District), Rovina hill, 490 m a.s.l., herb-rich beech forest, trunk of *Sorbus aucuparia*, 1 Jun 2014, leg. & det. L. Zíbarová (HR 103329). – Solopysky near Domoušice (Louny District), ravine forest, thin trunk of *Sorbus aucuparia*, 14 Jul 2014, leg. et det. L. Zíbarová (herb. L.Z. 2626). – Vinařice (Louny District), Malý a Velký Štít National Nature Reserve, 440 m a.s.l., ravine forest, thin trunk of *Sorbus aucuparia*, 2 Mar 2014, leg. & det. L. Zíbarová (CB 20936). – Kozojedy (Rakovník District), Pochválovská stráž National Nature Reserve, 460 m a.s.l., ravine forest, thin trunk of *Sorbus aucuparia*, 2 Mar 2014, leg. & det. L. Zíbarová (CB 20674). – Milešov near Velemín (Litoměřice District), Milešovka National Nature Reserve, ravine forest, fallen trunk of *Sorbus aucuparia*, 15 May 2016, leg. & det. L. Zíbarová (HR 103318). – Zahorany near Křešice (Litoměřice District), Holý vrch Nature Reserve, 205 m a.s.l., thermophilous scrub, snag of *Sorbus* sp., 8 Apr 2013, leg. & det. L. Zíbarová (HR 103316). – North Bohemia. Líska near Česká Kamenice (Děčín District), Zlatý vrch National Nature Reserve, 625 m a.s.l., mixed forest, dead branch of *Sorbus* sp., 4 Sep 2011, leg. Z. Egertová & M. Sochor, det. Z. Egertová (HR 87953); *ibid.*, 590 m a.s.l., ravine forest, fallen trunk of *Sorbus aucuparia*, 22 Oct 2016, leg. & det. L. Zíbarová & M. Vašutová (herb. L.Z. 6153). – Špindlerův Mlýn (Trutnov District), Labský důl – Pančavská jáma, bank of Elbe river, 1030 m a.s.l., on fallen dead trunk of *Sorbus aucuparia*, 28 Jun 2016, leg. & det. T. Tejklová (HR 99438). – Central Bohemia. Hradištko (Praha-západ District), Medník National Nature Monument, 300 m a.s.l., ravine forest, snag of *Sorbus aucuparia*, 15 Apr 2014, leg. & det. L. Zíbarová (HR 103328). – East Bohemia. Pohled (Havlíčkův Brod District), dead fallen trunk of angiosperm, 27 Apr 2016, leg. P. Souček, det. L. Zíbarová (HR 102276). – South Bohemia. České Žleby near Stožec (Prachatice District), Žlebský vrch, 985 m a.s.l., former pastures encroached with scrub and trees, snag of *Sorbus aucuparia*, 17 Sep 2013, leg. & det. L. Zíbarová & V. Pouska (HR 103325). – Záhvozdí near Želnavá (Prachatice District), 750 m a.s.l., line of rowan trees along road, half-dead standing trunk of *Sorbus aucuparia*, 22 Sep 2013, leg. & det. L. Zíbarová (herb. L.Z. 2126). – [Přední Výtoň (Český Krumlov District)], Šumava Mts., Vítkův kámen, on branch of *Betula* sp., 17 Aug 1956, leg. & det. O. Fassatiová (PRC 3391).

Finland. Helsinki, wood of *Sorbus* lying on the ground, 4 May 2013, leg. & det. J. Kout (CBG).

***Biscogniauxia simplicior* Pouzar**

Fig. 1f

Selected descriptions. Pouzar (1979): p. 210–211; Ju et al. (1998): p. 54.

Biscogniauxia simplicior is a species close to *B. repanda* in appearance, but differing chiefly by spores with a germ slit on only one side and host affiliation restricted to *Rhamnus* (Ju et al. 1998, Fournier & Magni 2004b). For a more detailed discussion, see Pouzar (1979).

Herbarium specimens from Bohemia: 18 (HR 1, PRM 17). Colline elevations. Distribution in Bohemia – T: 4b, 6, 8; M: 32. In the Czech Republic the species is currently protected by law and included in the Red list of macromycetes (Holec & Beran 2006) in the Endangered category. Deckerová (2006) mentions seven localities known from the Czech Republic (five in Bohemia). We report a new cluster of localities in the area of Džbán Nature Park, where the species had been previously unknown. There is also an unpublished record from the České středohoří area (D. Dvořák in litt., specimen in BRNU).

Our records were always located on sunny, south to south-west facing slopes, mostly on dying or recently died individuals of *Rhamnus cathartica*. As noted by Fournier & Magni (2004b), the ecological amplitude of *B. simplicior* is narrower than that of its host. In our experience it is mostly found on warm and dry habitats in the Czech Republic.

Specimens examined

Czech Republic. North-west Bohemia. Solopysky near Domoušice (Louny District), 435 m a.s.l., *Pinus nigra* plantation, branch of *Rhamnus cathartica*, 12 May 2015, leg. & det. L. Zibarová (HR 103302). – Hřivice (Louny District), Okrouhlík hill, 430 m a.s.l., thermophilous oak forest, branch of *Rhamnus cathartica*, 24 May 2015, not. L. Zibarová. – Vinařice (Louny District), Teplá stráň, 375 m a.s.l., ravine forest, branch of *Rhamnus cathartica*, 12 May 2015, not. L. Zibarová.

***Euepixylon* Füsting**

Only the type species has been reported from Europe and is treated here. A *Geniculosporium*-like anamorph of *Euepixylon* suggests its affinity to *Nemania*, but *Euepixylon* deviates by having a discoid apical apparatus (cylindrical in *Nemania*) (Læssøe & Spooner 1993). A close phylogenetic relationship to *Nemania* has been confirmed by molecular methods (Daranagama et al. 2015, Wendt et al. 2017).

***Euepixylon udum* (Pers.) Læssøe & Spooner**

Fig. 4h

Synonym: *Hypoxyylon udum* (Pers.) Fr.

Selected descriptions. Breitenbach & Kränzlin (1984): p. 272 (as *Hypoxyylon udum*); Granmo et al. (1999): p. 35–36.

Superficially, *Euepixylon udum* resembles some of the *Nemania* species with small stromata, e.g. *Nemania confluens* (Tode) Læssøe & Spooner. However,

already in the field the wide sterile margin of the stroma may provide a hint to its true identity. Microscopically, the large spores [(23)25–32(35) × 8–12 µm (Granmo et al. 1999)] with clearly visible germ pore allow for an easy identification.

We have only found a single report in the literature regarding *E. udum* from the Czech Republic (Svrček 1959, as *Hypoxylon udum*). The species has been obviously overlooked by mycologists, since in our experience the species is certainly not rare here. Herbarium specimens from Bohemia: 9 (HR: 5, PRM: 4). Distribution in Bohemia – T: 6, 7a, 8; M: 24b, 39, 41, 53a; at colline elevations.

In our observed specimens, stromata were formed on decorticated, often well-decayed wood; however, Granmo et al. (1999) also mentioned rare records on bark. We have always found it on branches of up to approx. 5 cm in diameter, never on trunks or thick branches. Granmo et al. (1999) list *Corylus*, *Fagus* and *Quercus* as hosts, the latter being the most numerous (over 77% of their records), which roughly corresponds to our experience and herbarium records of the substrate: *Quercus* spp. (10), *Corylus* sp. (1). Our records are from colline elevations. It is probably missing from more elevated and cooler parts of Bohemia following its preferred host, oaks. We found the species both in semi-natural as well as completely man-made habitats (e.g. an afforested mine spoil).

Specimens examined

Czech Republic. West Bohemia. Lítov near Habartov (Sokolov District), Lítovská výsypka Mine Spoil, 510 m a.s.l., broadleaved tree plantation, fallen branch of *Quercus rubra*, 21 Jun 2016, leg. L. Zíbarová, A. Lepšová & M. Kříž, det. L. Zíbarová (HR 103343). – North-west Bohemia. Pnětluky (Louny District), Pravda hill, 460 m a.s.l., thermophilous oak forest, fallen branch of *Quercus* sp., 30 Jun 2015, leg. & det. L. Zíbarová (herb. L.Z. 4276). – Stradonice near Peruc (Louny District), V Hlubokém Nature Reserve, 315 m a.s.l., thermophilous oak forest, fallen branch of *Quercus* sp., 15 Feb 2016, leg. & det. L. Zíbarová (HR 103339). – North Bohemia. Zahrádky (Česká Lípa District), Peklo National Nature Monument, 250 m a.s.l., alluvial ash-alder forest, fallen branch of *Quercus* sp., 23 May 2016, leg. & det. L. Zíbarová (HR 103344). – Central Bohemia. Srbsko (Beroun District), Karlštejn National Nature Reserve, 275 m a.s.l., oak-hornbeam forest, branch of *Corylus avellana*, 14 Jun 2016, leg. & det. L. Zíbarová (HR 103346). – South Bohemia. Ostrovec prope Písek [Písek District], *Quercus*, 21 Aug 1967, leg. M. Svrček (PRM 937649). – Vlkov prope Veselí nad Lužnicí [Tábor District] in colle arenoso “Písečný přesyp” dicto, *Quercus*, 16 May 1971, leg. & det. M. Svrček (PRM 937663). – West Moravia. Třešť (Jihlava District), Špičák hill, 615 m a.s.l., acidophilous oak forest, fallen branch of *Quercus*, 8 Apr 2016, leg. J. Burel & L. Zíbarová, det. L. Zíbarová (HR 103341). – South Moravia. [Milovice (Břeclav District)], Pavlovské kopce, in silva Milovický les, ad ramum iacent. *Quercus*, 25 May 1955, leg. M. Svrček (PRM 937622).

Hypoxylon Bull.

The genus *Hypoxylon* is treated here in a restricted sense (Hsieh et al. 2005, Wendt et al. 2017), i.e. excluding members of genera *Annulohypoxylon* Y.-M. Ju, J.D. Rogers & H.-M. Hsieh and *Jackrogersella* Wendt, Kuhnert & M. Stadler. The most recent comprehensive treatment of the genus was performed by Ju & Rogers (1996), but many new species have since then been described worldwide, and

molecular and chemotaxonomical methods implemented as useful tools for their characterisation (Granmo 2001, Stadler et al. 2004, Stadler et al. 2008, Fournier et al. 2010). Most recently the *Hypoxyylon* clade has been separated from the rest of the *Xylariaceae* and included into the *Hypoxyylaceae* family (Wendt et al. 2017).

Some well-known species which are common in Bohemia are not treated here in detail, namely *Hypoxyylon howeanum* Peck, *H. fragiforme* (Pers.) J. Kickx, *H. fuscum* (Pers.) Fr., *H. macrocarpum* Pouzar, and *H. rubiginosum* (Pers.) Fr. *Hypoxyylon perforatum* (Schwein.) Fr. is not treated here in detail, as we discussed its ecology and distribution in our previous paper (Kout & Zíbarová 2016). Another two species of the genus, *Hypoxyylon fraxinophilum* Pouzar and *H. submonticulosum* Y.M. Ju & J.D. Rogers, are known from the Czech Republic, but not from Bohemia (Pouzar 1972, 2006b).

Hypoxyylon cercidicola (Berk. & M.A. Curtis ex Peck) Y.M. Ju & J.D. Rogers

Fig. 2a

Synonym: *Hypoxyylon moravicum* Pouzar.

Selected descriptions. Ju & Rogers (1996): p. 96 (as *H. cercidicolum*); Pouzar (1979): p. 134 (as *H. moravicum*).

A striking species for its erumpent stromata with stellate margin and restriction to ash (*Fraxinus* spp.) (Ju & Rogers 1996, Pouzar 1972). In our experience the stromata are frequently sterile, i.e. without mature perithecia, more so than in other *Hypoxyylon* species.

Specimens from Bohemia found in herbaria: 7 (HR: 6, PRM: 1). Distribution in Bohemia – T: 11b, 15b, 15c; M: 34, 56e, 62; at lowland to colline, rarely submontane elevations. Curiously (but in accordance with Pouzar’s epithet *moravicum*) there are no historical specimens of *H. cercidicola* from Bohemia deposited in PRM, PL or CB. All six specimens deposited in HR are rather recent (the oldest one from 2011) and originate from East Bohemia. This suggests that the species is currently spreading westward. However, there are still areas where the species is yet to be found (North and South Bohemia). Our records indicate a wider distribution and broader ecological preferences of the species in the Czech Republic.

All specimens mentioned by Pouzar (1972) are from *Fraxinus angustifolia* ssp. *danubialis*. However, only *Fraxinus excelsior* is native to Bohemia and it is therefore almost certain that all records from the area have been collected on *F. excelsior*. Ju & Rogers (1996) also list a wider range of *Fraxinus* species for *H. cercidicola*.

Specimens examined

Czech Republic. West Bohemia. Měcholupy (Plzeň-jih District), approx. 0.5 km east of Chejlava National Nature Reserve, approx. 580 m a.s.l., deciduous forest, broadleaved tree with bark, 17 Apr 2011, leg. & det. J. Kout (PRM 945431). – Central Bohemia. Křinec (Nymburk District), Chotuc Nature Monument, 250 m a.s.l., thermophilous deciduous forest, wood of *Fraxinus excelsior* with bark lying on the ground, 3 Apr 2010, leg. & det. J. Kout (CBG). – East Bohemia. Vysoké Chvojno (Pardubice District), U Parku Nature Reserve, 290 m a.s.l., herb-rich beech forest, fallen

branch of *Fraxinus excelsior*, 2 Nov 2015, leg. & det. S. Flekrová, T. Tejtklová & L. Zíbarová (herb. L.Z. 6303, dupl. HR 97602). – Vraclav (Ústí nad Orlicí District), 285 m a.s.l., oak-hornbeam forest, fallen branch of *Fraxinus excelsior*, 7 Mar 2016, leg. & det. S. Flekrová, T. Tejtklová & L. Zíbarová (HR 98806).

Hypoxylon fuscoides J. Fourn., P. Leroy, M. Stadler & Roy Anderson Figs. 2b, c

Description. Stromata pulvinate when growing on bark, sometimes slightly depressed at centre, somewhat constricted at base, 2–4 mm in diameter, 1–2 mm high, separate or sometimes confluent, irregularly effused when growing on decorticated wood, then up to 1 cm long), perithecial contours inconspicuous. Ostioles umbilicate, surface pruinose, vinaceous brown to purple-brown. KOH-extractable pigments violaceous purple to greyish violaceous. Subsurface granules yellowish to orange brown in water. Perithecia subspherical to obovoid, 300–420 × 130–200 µm. Asci cylindrical, short stipitate, 90–103 × 7–8 µm, spore-bearing part 63–75 µm long, stipes 20–34 µm long, apical apparatus discoid, amyloid in Melzer’s solution, approx. 3 × 1 µm. Ascospores ellipsoid, distinctly inequilateral, ends narrowly rounded, without appendages, medium brown, 10.0–13.0 × 4.5–5.5 µm (avg. 10.79–11.50 × 4.80–5.16 µm, $n_{\text{spec}} = 9$), $Q = 2.0\text{--}2.7$ ($Q_{\text{avg}} = 2.11\text{--}2.35$), germ slit conspicuous, spore-length, located on the more convex side, distinctly sigmoid, epispore smooth, perispore dehiscent in 10% KOH.

Notes. The species is characterised by its small spores with a distinctly sigmoid germ slit, purplish KOH-extractable pigments (Fig. 3) and its restriction to *Alnus* and *Betula* (Fournier et al. 2010). We have added a molecular identification, which is missing from the original description. The sequenced ITS region of the ribosomal genes showed a 98% identity and query coverage to deposited sequences of the closely related *H. fuscum* (JN979424.1, JN979422.1).

Hypoxylon fuscum is also frequently recorded on alders and birches and has spores with a sigmoid germ slit just like *H. fuscoides*, but possesses usually slightly larger spores and amber to grey-olivaceous KOH-extractable pigments. However, we have observed that the brightness of violaceous pigments in *H. fuscoides* fades in herbarium specimens: when we reexamined stromata a year and a half after collection, the pigments had become duller (grey with just a subtle tint of violet). This possibly partly explains why our search in Czech herbaria for older specimens of *H. fuscoides* was fruitless. Regarding spore size, it should be noted that Ju & Rogers (1996) gave an enormous range in spore size for *Hypoxylon fuscum* (8–20 × 4–8 µm) as a result of their broad concept of the species, including tropical records. But even in Europe a wide range of ascospore sizes has been noted, particularly correlating with the identity of the host species (Petrini et al. 1988). Moreover, records of *H. fuscum* from different hosts frequently show different HPLC profiles (Quanq et al. 2004, Stadler & Fournier 2006, Stadler et al. 2007) and also yield different shades of KOH-extractable pigments.

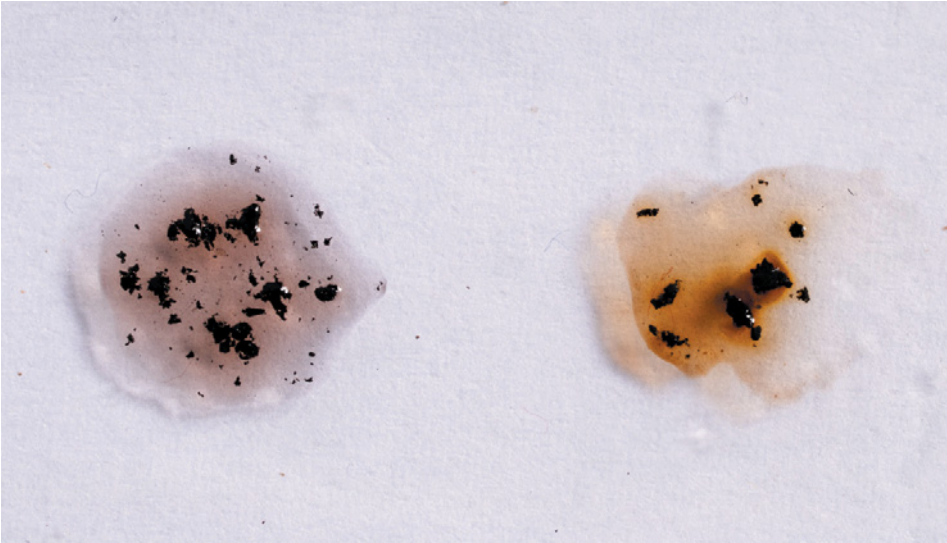


Fig. 3. KOH-extractable pigments of *Hypoxylon fuscooides* (left) and *Hypoxylon fuscum* (right). Photo by L. Zibarová.

In line with these results we have observed amber to yellowish pigments in specimens from *Corylus*, whereas brownish to olivaceous ones from those recorded on *Alnus* and *Betula*.

We observed that when growing on bark, the pulvinate circular stromata of *H. fuscooides* appeared to be smaller than stromata of *H. fuscum*. However, as the size of stromata varies within and among specimens in both species, we consider this at best a supportive field character. We believe that stromata of *H. fuscooides* can be mistaken for undeveloped stromata of *H. fuscum*.

Violaceous KOH-extractable pigments are also found in other European *Hypoxylon* species (at least in young stromata), such as *Hypoxylon carneum* Petch, *Hypoxylon submonticulosum* Y.M. Ju & J.D. Rogers and *Hypoxylon vogesiacum* (Pers. ex Curr.) Sacc., of which the latter two have been reported from the Czech Republic (see Pouzar 2006b for data on *H. submonticulosum*). *Hypoxylon vogesiacum* is easily distinguished by its conspicuously larger spores (18)20–25 × 8–10 µm in size (Ju & Rogers 1996). *Hypoxylon carneum* has similarly sized spores [(7.5)8–11.5 × 4.5–5 µm], but they are nearly equilateral with a straight germ slit (Ju & Rogers 1996). Finally, *H. submonticulosum* has spores of 9–12(13.5) × 4–5 µm in size with a straight to slightly oblique germ slit which is shorter than the spore length (Ju & Rogers 1996).

Most identified specimens of *H. fuscooides* were collected from black alder (*Alnus glutinosa*, seven specimens) and one from birch (*Betula* sp.). Based on

our records, *Hypoxylon fuscooides* seems to prefer substrates of lower diameters (branches, thin trunks). It has been found to grow more frequently on bark, but we have collected it also on decorticated wood. It has been found both in natural habitats of alder carrs and alluvial alder-ash forests as well as in anthropogenic habitats (afforested mine spoils), so the species does not seem to have high requirements as for the degree of naturalness of its habitat.

Distribution in Bohemia – T: 11a, 15c; M: 24b, 52, 53a, 69a. The localities are situated in the lowlands up to colline elevations (altitude range of records: 186–510 m a.s.l.). *Hypoxylon fuscooides* is not rare in the Czech Republic. In suitable habitats with the right hosts it seems to be almost as frequent as its look-alike *Hypoxylon fuscum*. In Europe, the species has been reported from France and Great Britain (Fournier et al. 2010).

Specimens examined

Czech Republic. West Bohemia. Sokolov (Sokolov District), reclaimed mine spoil named Antonín, 428 m a.s.l., young alder plantation, fallen corticated branch of *Alnus glutinosa*, 28 Jul 2015, leg. L. Zíbarová & A. Lepšová, det. L. Zíbarová (herb. L.Z. 4698, PRM 945432; GenBank no. KY817587). – Habartov (Sokolov District), reclaimed mine spoil named Lítovská výsypka, 510 m a.s.l., young alder plantation, fallen corticated branch of *Alnus glutinosa*, 1 Jun 2016, leg. L. Zíbarová & A. Lepšová, det. L. Zíbarová (HR 103326). – North Bohemia. Zahrádky (Česká Lípa District), Peklo National Nature Monument, 250 m a.s.l., alluvial alder-ash forest, fallen corticated branch of *Alnus glutinosa*, 23 Jun 2015, leg. & det. L. Zíbarová (herb. L.Z. 5892); *ibid.*, 249 m a.s.l., alder carr, fallen, partly decorticated thin trunk of *Alnus glutinosa*, 20 Jul 2015, leg. & det. L. Zíbarová (HR 103314). – Bělá pod Bezdězem (Mladá Boleslav District), Klokočka National Nature Monument, 225 m a.s.l., relatively dry edge of alder carr, heap of cut branches, branch of *Alnus glutinosa*, 24 Aug 2015, leg. & det. L. Zíbarová (herb. L.Z. 4733). – Central Bohemia. Mělnická Vrutice (Mělník District), approx. 300 m east of train station, 186 m a.s.l., alluvial alder-ash forest, fallen branch of *Alnus glutinosa*, 27 Feb 2016, leg. & det. L. Zíbarová (HR 103319). – East Bohemia. Lázně Bohdaneč (Pardubice District), canal named Rajská strouha, 216 m a.s.l., alluvial alder-ash forest, fallen branch of *Alnus glutinosa*, 9 Feb 2016, leg. L. Zíbarová & T. Tejklová, det. L. Zíbarová (herb. L.Z. 5453). – Proseč near Skuteč (Chrudim District), Maštale National Nature Reserve, 455 m a.s.l., stream bank, fallen branch of *Betula* sp., 20 Feb 2014, leg. T. Tejklová & S. Flekrová, det. T. Tejklová & H. Deckerová (as *Hypoxylon fuscum*), rev. L. Zíbarová (HR 94169).

Hypoxylon petriniae M. Stadler & J. Fourn.

Fig. 2d

Selected description. Stadler et al. (2004): p. 198–199.

Hypoxylon petriniae is closely related to *H. cercidiola* and *H. rubiginosum*, but can be distinguished from the latter by its effused vinaceous brown stromata with a dark margin, orange KOH-extractable pigments and a preference for *Fraxinus* as its host (Stadler et al. 2004). Despite being rather conspicuous in appearance, only four specimens have been collected in Bohemia so far, all from western parts of the area, suggesting that *H. petriniae* could be an oceanic element in the Czech Republic. However, further revision of herbarium material of the *H. rubiginosum* complex may provide additional records.

Herbarium specimens from Bohemia: 5 (CBG: 1, HR: 2, PRM: 2). Distribution in Bohemia – T: 4b; M: 25a, 44; at colline to submontane elevations. All specimens from the Czech Republic had *Fraxinus* (almost certainly *F. excelsior*, due to its distribution range) as their substrate.

Specimens examined

Czech Republic. West Bohemia. Pocinovice (Domažlice District), Jezvinec Nature Reserve, approx. 720 m a.s.l., fallen broadleaved tree (probably *Fraxinus excelsior*), 11 May 2008, leg. & det. J. Kout (CBG). – North-west Bohemia. Meziboří (Most District), Pekelské údolí Valley, 600 m a.s.l., alluvial ash-alder forest, branch of *Fraxinus excelsior*, 15 Jun 2015, leg. & det. L. Zíbarová (HR 103335). – [Milešov near Velemín (Litoměřice District)], Milešovka National Nature Reserve, on dead branch of probably *Fraxinus*, 25 Oct 2013, leg. & det. M. Kříž (PRM 923536). – Velemín (Litoměřice District), Liščí vrch, 410 m a.s.l., fallen branch of *Fraxinus excelsior*, 25 Apr 2017, leg. & det. L. Zíbarová (HR 103556). – [Litoměřice (Litoměřice District)], Bílé stráně National Nature Monument, *Fraxinus* branch lying on the ground, 5 Apr 2011, leg. & det. M. Kříž (PRM 859964).

***Hypoxylon ticinense* L.E. Petrini**

Fig. 2e

Selected description. Ju & Rogers (1996): p. 195.

The distribution and ecology of this striking species in the Czech Republic was recently reviewed by Maňák (2016). Here, we supplement his data with another record from Kostomlaty, which was not mentioned in his article (i.e. the second record from Bohemia). Distribution in Bohemia – T: 11b, 13a; at lowland to colline elevations.

The species is included in the Data Deficient category of the current Czech Red list of macromycetes (Holec & Beran 2006). In our opinion, since there are only eight localities currently known, the Endangered category would be more appropriate. In contrast, the species is rather common in floodplain forests along the Danube River in southwest Slovakia (Ripková & Hagara 2003, T. Tejklková in litt.).

Specimens examined

Czech Republic. Central Bohemia. Kostomlaty nad Labem (Nymburk District), southwest of the village, in forest nearby Elbe river, dead standing trunk of broadleaved shrub, on wood and bark, 4 Apr 2009, leg. & det. J. Kout (CBG). – Kněžičky (Nymburk District), Kněžičky National Nature Reserve, 225 m a.s.l., thermophilous oak forest, 28 May 2013, leg. & det. L. Zíbarová (CB 19137).

***Hypoxylon vogesiacum* (Pers. ex Curr.) Sacc.**

Fig. 2f

Selected description. Ju & Rogers (1996): p. 200–201.

Violaceous KOH-extractable pigments were only observed in younger stromata. Old stromata yielded no pigments and therefore identifying this species based on this character is somewhat precarious.

Specimens from Bohemia found in herbaria: 14 (HR: 1, PRM 13). Distribution in Bohemia – M: 25a; O: 88b, 88d; at submontane to montane elevations. Our investigation of herbarium material has shown that in Bohemia the species is re-

stricted to enclaves of well-preserved natural forests in the Šumava Mts. Our single collection documents a surprising location in the eastern part of the Krušné hory (Ore) Mts., outside the currently known distribution in the Czech Republic. Interestingly, the locality lies just a few kilometres from the “moon landscape” of coal strip mining, as well as from stands destroyed by acid rain in the 1980s. Another very rare pyrenomycete, *Lopadostoma pouzarii* Granmo & L.E. Petrini, was found on the same trunk, and some other rare lignicolous macromycetes were discovered at the same and nearby localities, suggesting a high conservation value of the eastern Ore Mts., despite all the environmental burden in the past.

Recorded hosts in the Czech Republic are: *Acer pseudoplatanus* (3), *Fraxinus excelsior* (7), *Ulmus glabra* (11), *Ulmus* sp. (2). The species should be strongly considered for inclusion in a next edition of the Czech Red list.

Specimen examined

Czech Republic. North-west Bohemia. Osek (Teplice District), Skalní údolí Valley, 675 m a.s.l., ravine forest, fallen trunk of *Ulmus* sp., 28 May 2015, leg. & det. L. Zíbarová (HR 103311).

***Nemania* Gray**

In its current concept this genus was first introduced by Pouzar (1985a), when he segregated species around *Hypoxyylon serpens* (Pers.) Fr. from the rest of genus *Hypoxyylon*. In contrast to *Hypoxyylon*, stromata of *Nemania* are carbonaceous, have papillate ostioles and yield no pigments in KOH solution. Microscopically, the different shape of the apical apparatus is the most easily observable feature – it is tubular in *Nemania* and discoid in *Hypoxyylon* (Pouzar 1985a). In fact, *Nemania* can also be easily distinguished from *Hypoxyylon* by its anamorph, which is *Geniculosporium*-like (whereas the anamorph of *Hypoxyylon* is typically *Nodulisporium*-like), and molecular phylogenetic studies have shown that *Hypoxyylon* and *Nemania* are very distant clades within the *Xylariaceae* in traditional sense (Hsieh et al. 2005, Sánchez-Ballesteros et al. 2000).

Ecologically, most of the *Nemania* taxa appear later in substrate succession than those of *Hypoxyylon*, often on decorticated wood. However, its *Geniculosporium*-like anamorphs have been detected also as endophytes in living plants (Petrini & Petrini 1985, Whalley 1996). *Nemania* species seem to be more plurivorous than species of *Hypoxyylon*, some of which are restricted to a single plant genus or family (Ju & Rogers 1996).

More recent treatments of the genus were compiled by Granmo et al. (1999) and Ju & Rogers (2002). Since then, some new species have been described (e.g. Ju et al. 2005, Rogers & Ju 2002, Vasilyeva & Stephenson 2015).

Based on Pouzar’s abovementioned works (1985a, 1985b), seven species have been reported from the former Czechoslovakia: *Nemania aenea* (Nitschke) Pouzar, *Nemania atropurpurea* (Fr.) Pouzar, *Nemania carbonacea* Pouzar,

Nemania diffusa (Sowerby) Gray [as *Nemania bipapillata* (Berk. & M.A. Curtis) Pouzar], *Nemania chestersii* (J.D. Rogers & Whalley) Pouzar, *Nemania illita* (Schwein.) Pouzar and *Nemania serpens* (Pers.: Fr.) Gray. However, his concept of *N. serpens* was wider than in Ju & Rogers (2002), including *Nemania aenea* var. *macrospora* (J.H. Mill.) Y.M. Ju & J.D. Rogers.

Of *Nemania* species known to us from Bohemia, only the most common and widespread *Nemania serpens* var. *serpens* is not treated here, in contrast to its other two varieties (var. *aureolutea* and var. *hydnicola*), which are less common in our experience.

Nemania aenea* (Nitschke) Pouzar var. *aenea

Selected description. Granmo et al. (1999): p. 39.

The taxon is characterised by medium-sized spores with a distinct germ slit and amyloid apical apparatus (Pouzar 1985b, Ju & Rogers 2002). All our specimens tentatively identified as *N. aenea* turned out to be var. *aureolutea* after more intensive examination (see below).

All specimens listed by Pouzar (1985b) from the former Czechoslovakia are from southern Slovakia. We found a single specimen (PRM 71525) from South Moravia, Czech Republic. However, in our opinion the specimen differs from *Nemania aenea* ss. Ju & Rogers (2002) by the germ slit being located on the more convex side of the ascospores, as already noted by Granmo et al. (1999). A similar germ slit position is found in *Nemania subaenea* Y.-M. Ju & J.D. Rogers, described from Guyana (Ju & Rogers 2002), but its identity with Pouzar's above-mentioned specimens is uncertain in our opinion. A further taxonomic study combined with molecular methods may solve this issue in the future.

***Nemania aenea* var. *aureolutea* (L.E. Petrini & J.D. Rogers) Y.M. Ju & J.D. Rogers** Fig. 4a

Selected description. Granmo et al. (1999): p. 45 (as *N. aureolutea*).

This taxon was considered to be a separate species by Granmo et al. (1999), but demoted to variety level by Ju & Rogers (2002). It differs from the type variety by smaller stromata, a less distinct spore germ slit, shorter ascus stipes and an inamyloid or weakly amyloid apical apparatus in Melzer's solution (Ju & Rogers 2002). In our specimens, a yellow-green anamorph was often present, as already noted by Fournier & Magni (2004d), but we were unable to confirm a yellow discoloration of the underlying wood, as mentioned by the same authors.

No specimens from Bohemia were found in the herbaria which we inquired. Distribution in Bohemia – T: 6, 9; at colline elevations only. Hosts known from the

Czech Republic are: *Acer pseudoplatanus* (1), *Quercus* sp. (1), *Tilia* sp. (1). Possibly a rather thermophilous species in the Czech Republic.

Specimens examined

Czech Republic. West Bohemia. Kokašice (Tachov District), Krasíkov Nature Monument, wood of *Corylus avellana*, 11 Jun 2006, leg. & det. J. Kout (CBG). – North-west Bohemia. Tuchořice (Louny District), Kozinecká stráň Nature Monument, 440 m a.s.l., ravine forest, fallen branch of *Tilia* sp., 11 Jul 2015, leg et det. L. Zíbarová (HR 103336). – Solopysky near Domoušice (Louny District), site named Na stráni, 430 m a.s.l., thermophilous oak forest, fallen branch of *Quercus* sp., 26 Jun 2016, leg. & det. L. Zíbarová (herb. L.Z. 4158, HR 103334). – Central Bohemia. Roztoky (Praha-západ District), Roztocký háj – Tiché údolí Nature Reserve, 187 m a.s.l., alluvial ash-alder forest, fallen branch of *Acer pseudoplatanus*, 25 Mar 2016, leg. & det. L. Zíbarová (HR 103342).

Switzerland. Canton of Zürich, Hönningerberg, *Quercus*, 31 Oct 1984, leg. L. Petrini (PRM 869040).

***Nemania aenea* var. *macrospora* (J.H. Mill.) Y.M. Ju & J.D. Rogers**

Synonym: *Nemania serpens* var. *macrospora* (J.H. Mill.) Pouzar.

Differing from the typical variety among others by a less distinct spore germ slit, reminding the slit of *Nemania serpens*, inconspicuous perithecial mounds, and larger perithecia (Ju & Rogers 2002, Fournier & Magni 2004c). All specimens labelled as *Nemania serpens* var. *macrospora* in PRM originate from Slovakia. However, in our opinion PRM 841745 (Central Bohemia, Bohemian Karst, Velká hora near Karlštejn, 13 Oct 1978, labelled as *Hypoxyylon tiliacea* Pouzar) is close to the concept of *Nemania aenea* var. *macrospora*, but further study is needed.

***Nemania atropurpurea* (Fr.) Pouzar**

Fig. 4b

Selected descriptions. Granmo et al. (1999): p. 41; Pouzar (1985a): p. 19–20.

The comparatively large and applanate stromata help identify the species already in the field. Microscopically, the relatively small and dark spores with a short but conspicuous germ slit are characteristic (Ju & Rogers 2002, Pouzar 1985a).

Specimens from Bohemia found in herbaria: 30 (HR: 9, PRM: 21). Distribution in Bohemia – T: 11a; M: 25a, 29, 32, 33, 41, 46c, 58c, 64b, 69a; O: 87, 88d, 89, 95a. Rare at lowland and montane elevations, widely distributed at colline to submontane elevations.

We consider this species a typical element of old beech stands, often found fructifying on the underside of trunks or its fragments. *Fagus sylvatica* seems to be the preferred host in the Czech Republic, as all but one of our records were collected from wood of *Fagus* only. However, it has been reported from other substrata such as *Populus nigra*, *Tilia platyphyllos* and *Ulmus* spp. by Pouzar (1985a). Substrata known from the Czech Republic: *Fagus sylvatica* (32), *Fraxinus angustifolia* ssp. *danubialis* (2), *Populus nigra* (1), *Tilia platyphyllos*

(1), *Salix* sp. (1), *Ulmus minor* (1), *Ulmus* sp. (1). The species is included in the Vulnerable category of the current Czech Red list (Holec & Beran 2006), which we consider more or less appropriate.

Specimens examined

Czech Republic. West Bohemia. Ostrovec-Lhotka (Rokycany District), Kohoutov National Nature Reserve, herb-rich beech forest, fallen trunk of *Fagus sylvatica*, 22 Sep 2015, leg. & det. L. Zíbarová (HR 103306). – North-west Bohemia. Okounov, Kotvina (Chomutov District), Černý vrch Hill, 465 m a.s.l., herb-rich beech forest, fallen trunk of *Fagus sylvatica*, 15 Jul 2015, leg. & det. L. Zíbarová (HR 103305). – Meziboří (Most District), Šumný důl Valley, 620 m a.s.l., herb-rich beech forest, fragment of fallen trunk of *Fagus*, 15 Jun 2015, leg. & det. L. Zíbarová (HR 103304). – Osek (Teplice District), Vlčí důl Nature Reserve, 720 m a.s.l., acidophilous beech forest, fallen trunk of *Fagus sylvatica*, 21 Jul 2015, leg. & det. L. Zíbarová (herb. L.Z. 4669). – Osek (Teplice District), Skalní údolí Valley, 650 m a.s.l., herb-rich beech forest, underside of fallen trunk of *Fagus sylvatica*, 28 May 2015, leg. & det. L. Zíbarová (HR 103308). – Moldava, Nové Město (Teplice District), Bouřňák hill, 800 m a.s.l., acidophilous beech forest, fallen trunk of *Fagus sylvatica*, 12 Jun 2015, leg. & det. L. Zíbarová (herb. L.Z. 4244). – Duchcov (Teplice District), 200 m east of Dubský pond, 220 m a.s.l., alluvial ash-alder forest, fragment of *Salix* sp. trunk, 8 May 2017, leg. & det. L. Zíbarová (herb. L.Z. 6402). – Central Bohemia. Sylva Úpor apud Mělník, ad ligna *Populi nigrae* ad terram iacentem, 16 Nov 1978, leg. & det. Z. Pouzar (PRM 831739). – East Bohemia. Choltice (Pardubice District), Choltická obora Nature Reserve, 250 m a.s.l., urban forest, partly charred fragment of fallen *Fagus sylvatica* trunk, 29 Mar 2017, leg. L. Zíbarová & T. Tejklová, det. L. Zíbarová (HR 102263). – Seč (Chrudim District), Oheb Nature Reserve, 550 m a.s.l., acidophilous beech forest, fragment of *Fagus sylvatica* trunk, 20 Aug 2015, leg. L. Zíbarová & T. Tejklová, det. L. Zíbarová (HR 103331). – Horní Bradlo (Chrudim District), Polom Nature Reserve, herb-rich beech forest, fallen trunk of *Fagus sylvatica*, 5 Jun 2016, leg. & det. L. Zíbarová (HR103370). – Rožmitál (Náchod District), Cikánský kopec, 600 m a.s.l., herb-rich beech forest, fallen trunk of *Fagus sylvatica*, 14 Apr 2016, leg. L. Zíbarová, T. Tejklová & M. Novotný, det. L. Zíbarová (HR 99284). – South Bohemia. [Stožec (Prachatic District)], montes Šumava, loco Medvědice in monte Stožeček apud Lenora, ad truncum iacentem putridum *Fagi sylvaticae*, 24 Oct 1990, leg. & det. Z. Pouzar (PRM 670442).

Nemania carbonacea Pouzar

Fig. 4c

Selected descriptions. Granmo et al. (1999): p. 50; Pouzar (1985a): p. 22.

Differing from *N. diffusa* by conspicuous perithecial mounds and blackish stromata, from *N. atropurpurea* by a spore-length germ slit (Ju & Rogers 2002, Pouzar 1985a).

Specimens from Bohemia found in herbaria: 23 (HR: 1, PRM: 22). Distribution in Bohemia – T: 4b, 7c, 6, 8, 10a, 12; M: 32, 41; at lowland to colline elevations. Substrata known from the Czech Republic: *Carpinus betulus* (7), *Fagus sylvatica* (3), *Fraxinus excelsior* (6), *Quercus petraea* (1), *Quercus robur* (1), *Salix alba* (1), *Salix* sp. (1), *Sorbus aucuparia* (1), *Sorbus* sp. (1), *Tilia cordata* (1), *Tilia platyphyllos* (1). According to Pouzar (1985a) it is a thermophilic species, which is in accordance with our few records.

Specimens examined

Czech Republic. North-west Bohemia. Domoušice (Louny District), Čihadlo hill, 460 m a.s.l., ravine forest, fragment of *Sorbus aucuparia* trunk, 17 Jul 2015, leg. & det. L. Zíbarová

(HR 103322); *ibid.*, 470 m a.s.l., ravine forest, fragment of *Fagus sylvatica* trunk, 27 Oct 2015, leg. & det. L. Zíbarová (herb. L.Z. 5354). – North Bohemia. Řehlovice, Habří (Ústí nad Labem District), Rač Nature Reserve, 205 m a.s.l., alluvial ash-alder forest, fragment of *Salix alba* trunk, 12 Feb 2016, leg. & det. L. Zíbarová (herb. L.Z. 5441). – Central Bohemia. Area tuta “Vaškov” ap. Karlštejn [Beroun District], ad truncum iacentem *Carpinus betulus*, 4 Sep 2002, leg. & det. Z. Pouzar (PRM 896586). – Praha, Vínofský park (pars meridionalis) ad truncum iacetem *Fraxini excelsioris*, 25 Oct 1996, leg. & det. Z. Pouzar (PRM 893720).

Nemania chestersii (J.D. Rogers & Whalley) Pouzar

Fig. 4e

Selected description. Granmo et al. (1999): p. 50.

Nemania chestersii is included in the Endangered category of the current Red List of fungi of the Czech Republic (Holec & Beran 2006), but it may be frequently overlooked because it is recognised chiefly by means of microscopic features – longitudinally striate spores (best visible in Melzer’s solution under an immersion lens) are the most essential character. In contrast to most species of *Nemania*, the species can be identified even if perithecia no longer bear asci, which is due to its unique spores. Macroscopically, the stromata are hardly distinguishable from those of the common species *Nemania serpens*.

Two varieties of *N. chestersii* are described, based on spore dimensions, from tropical America: *Nemania chestersii* var. *microspora* (J.D. Rogers & Samuels) Y.M. Ju & J.D. Rogers and *Nemania chestersii* var. *submicrospora* J.D. Rogers, Y.M. Ju & I. López (Ju & Rogers 2002, Ju et al. 2005). Both have smaller spores than *Nemania chestersii* var. *chestersii* and neither of them has been recorded in Europe as yet. Despite some variation in spore size among the specimens, all our collections corresponded to the type variety.

Specimens from Bohemia found in herbaria: 23 (CBG: 1, HR: 7, PRM: 15). Distribution in Bohemia – T: 6, 7a, 13a, 15c; M: 26, 31a, 32, 33, 41, 44, 53a, 58c, 63a, 69b; O: 87, 88d. The species seems to be widely distributed from the lowlands to submontane elevations, showing little preference for climatic conditions, occurring in both warm, sunny localities as in cold and wet gorges.

Substrata recorded in the Czech Republic: *Carpinus betulus* (1), *Corylus avellana* (6), *Fagus sylvatica* (21), *Fraxinus angustifolia* ssp. *danubialis* (1), *Quercus* sp. (3), *Populus tremula* (1), *Prunus avium* (1), *Sorbus aucuparia* (2). It should however be noted that many collections from *Fagus* in PRM are from a single locality (Ve Studeném National Nature Reserve). We have not observed a marked substrate preference: most of our specimens were collected on *Fagaceae* and *Betulaceae* (mainly *Corylus* and *Fagus*, but also *Carpinus* and *Quercus*), but also on *Rosaceae* (*Prunus avium*, *Sorbus*) and *Salicaceae* (*Populus*). Based on our new records and broad ecological requirements, the current Endangered category in the Red list should be revised in the next edition (possibly included into the Near Threatened category).

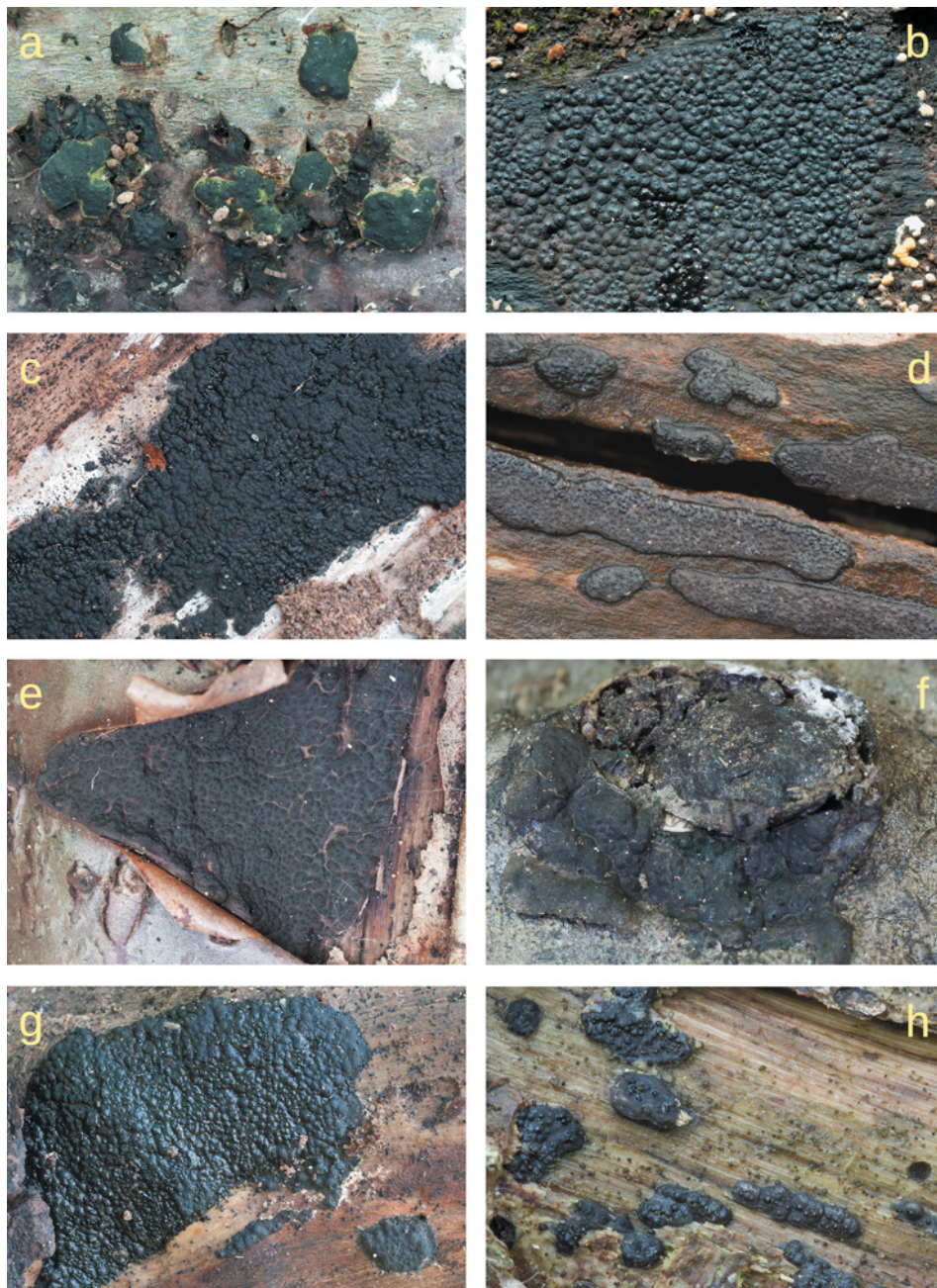


Fig. 4. Stromata of *Euepixylon* and *Nemania* species: **a** – *N. aenea* var. *aureolutea* (HR 103336), **b** – *N. atropurpurea* (HR 103304), **c** – *N. carbonacea* (HR 103322), **d** – *N. diffusa* (HR 103315), **e** – *N. chestersii* (HR 103313), **f** – *N. serpens* var. *hydnicola* (HR 103345), **g** – *N. serpens* var. *colliculosa* (CB 19136), **h** – *Euepixylon udum* (HR 103343). Photos by L. Zibarová.

Specimens examined

Czech Republic. West Bohemia. Orlovice u Pocinovic (Domažlice District), Jezvinec Nature Reserve, approx. 700 m a.s.l., beech forest, on dead wood of *Fagus sylvatica*, 11 May 2008, leg. & det. J. Kout (CBG). – Plzeň-Bolevec (Plzeň-město District), Kamenný rybník Nature Reserve, standing dead *Sorbus* sp., 18 Mar 2017, leg. & det. J. Kout (PRM 945433). – Ostrovec-Lhotka (Rokycany District), Kohoutov National Nature Reserve, herb-rich beech forest, fallen trunk of *Fagus sylvatica*, 3 Aug 2015, leg. & det. L. Zíbarová (HR 103307). – North-west Bohemia. Pnětluky (Louny District), Pravda hill, 470 m a.s.l., thermophilous oak forest, fallen thin trunk of *Corylus avellana*, 30 Jun 2015, leg. & det. L. Zíbarová (herb. L.Z. 4336); *ibid.*, 435 m a.s.l., hazel thicket, fallen thin trunk of *Corylus avellana*, 15 May 2015, leg. & det. L. Zíbarová (HR 103313). – Domoušice, Solopysky (Louny District), 425 m a.s.l., thermophilous oak forest, fallen branch of *Quercus* sp., 3 Sep 2015, leg. & det. L. Zíbarová (herb. L.Z. 4834). – Vinařice (Louny District), Teplá stráň Hill, 350 m a.s.l., thermophilous oak forest, fallen branch of *Corylus avellana*, 26 Jun 2015, leg. & det. L. Zíbarová (herb. L.Z. 4223). – Peruc, Stradonice (Louny District), V Hlubokém Nature Reserve, 310 m a.s.l., thermophilous oak forest, fallen branch of *Quercus* sp., 15 Feb 2016, leg. & det. L. Zíbarová (HR 103320). – Mšené-lázně, Podbradec (Litoměřice District), Údolí Podbradeckého potoka Nature Monument, 255 m a.s.l., oak-hornbeam forest, trunk of *Sorbus aucuparia*, 2 Aug 2016, leg. & det. L. Zíbarová (HR 103317). – North Bohemia. Zahrádky (Česká Lípa District), Peklo National Nature Monument, 250 m a.s.l., alluvial ash-alder forest, fallen trunk of *Populus tremula*, 31 May 2015, leg. & det. L. Zíbarová (herb. L.Z. 4573). – Central Bohemia. Blichov (Kladno District), Smradovna Nature Monument, 355 m a.s.l., alluvial ash-alder forest, thin trunk of *Corylus avellana*, 14 Mar 2016, leg. & det. L. Zíbarová (herb. L.Z. 5518). – Hradištko (Praha-západ District), Medník National Nature Monument, 250 m a.s.l., oak-hornbeam forest, fallen thin trunk of *Carpinus betulus*, 7 Jul 2013, leg. & det. L. Zíbarová (HR 103324). – Chocerady, Samechov (Benešov District), Ve Studeném National Nature Reserve, 340 m a.s.l., herb-rich beech forest, fallen trunk of *Fagus sylvatica*, 26 Apr 2013, leg. & det. L. Zíbarová (herb. L.Z. 1281). – Loučeň, Studce (Nymburk District), Čtvrté National Nature Reserve, 230 m a.s.l., oak-hornbeam forest, fallen thin trunk of *Quercus* sp., 8 Jun 2012, leg. & det. L. Zíbarová (HR 103321). – East Bohemia. Horní Bradlo (Chrudim District), Polom Nature Reserve, beech-fir forest, fallen trunk of *Fagus sylvatica*, 3 Jun 2016, leg. L. Zíbarová, S. Fleková & T. Tejklová, det. L. Zíbarová (HR 103471). – Pardubičky (Pardubice District), Nemošická stráň Nature Monument, 225 m a.s.l., broadleaved forest, dead trunk of cf. *Carpinus betulus* lying on the ground, 5 Nov 2015, leg. J. Kramoliš, det. L. Zíbarová (HR 98818); *ibid.*, broadleaved forest, standing dead trunk of *Prunus avium*, 25 Mar 2015, leg. T. Tejklová, det. L. Zíbarová (HR 98100). – Litice nad Orlicí (Ústí nad Orlicí District), Hradní kopec Litice Nature Monument, 400 m a.s.l., beech forest, dead trunk of *Fagus sylvatica* lying on the ground, 21 May 2016, leg. T. Tejklová, S. Fleková & M. Stráníková, det. T. Tejklová (as *N. serpens*), rev. L. Zíbarová (HR 91533). – Rožmitál (Náchod District), Rožmitál mine, 500 m a.s.l., hollow way, dead branch of *Corylus avellana*, 25 Jun 2015, leg. T. Tejklová, det. L. Zíbarová (HR 99019).

Nemanía diffusa (Sowerby) Gray

Fig. 4d

Synonym: *Nemanía bipapillata* (Berk. & M.A. Curtis) Pouzar s. Pouzar (1985a, 1985b) non s. orig. Selected description. Granmo et al. (1999): p. 61.

The stromata of this species are typically brownish, even at maturity, and possess inconspicuous perithecial mounds permitting identification already in the field. Microscopically, it is similar to *Nemanía carbonacea*, whose stromata blacken early in its development and bear conspicuous perithecial mounds (Pouzar 1985a). Pouzar (1985a, 1985b) introduced the name *Nemanía bipapillata* (Berk. & M.A. Curtis) Pouzar for this species, but Ju and Rogers (1996)

investigated the type specimen of *N. bipapillata* concluding that it is a different species with a tropical distribution.

Specimens from Bohemia found in herbaria: 14 (CB: 2, CBG: 1, HR: 1, PRM: 10). Distribution in Bohemia – T: 5a, 7a, 8, 9, 10a, 11b, 12, 15c; M: 31a, 32. Lowlands to colline elevations. Substrata known from the Czech Republic: *Acer platanoides* (1), *Acer pseudoplatanus* (1), *Carpinus betulus* (2), *Corylus avellana* (3), *Fraxinus excelsior* (2), *Quercus petraea* (2), *Quercus robur* (3), *Quercus pubescens* (1), *Quercus* sp. (1), unidentified angiosperm (1). Apparently, it is a thermophilic species in the Czech Republic, which was also noted by Pouzar (1985a). Moreover, its ecological amplitude seems to be rather wide, ranging from wet riparian forests to dry thermophilic oak forests, and shows little substrate preference as observed in some other *Nemania* species.

Specimens examined

Czech Republic. West Bohemia. Předence (Plzeň-jih District), Pod Smutným koutem Nature Monument, dead wood of *Quercus* sp., 14 May 2005, leg. & det. J. Kout (CBG). – North-west Bohemia. Peruc, Stradonice (Louny District), V Hlubokém Nature Monument, 310 m a.s.l., thermophilous oak forest, fallen branch of *Quercus* cf. *pubescens*, 15 Feb 2016, leg. & det. L. Zíbarová (herb. L.Z. 5457). – Doksany (Litoměřice District), Loužek Nature Reserve, 154 m a.s.l., floodplain forest, fallen trunk of *Acer pseudoplatanus*, 19 Feb 2016, leg. & det. L. Zíbarová (HR 103315). – Central Bohemia. In valle inter Velká hora et Dřínová hora apud Srbsko, pr. Beroun [Beroun District], ad truncum iacentem *Coryli avellanae*, 2 Oct 1981, leg. & det. Z. Pouzar (PRM 831753, as *Nemania bipapillata*). – Praha, Divoká Šárka, in valle rivi Šárecký potok prope locum Želivka, *Corylus avellana*, 9 Mar 1993, leg. M. Svrček, det. Z. Pouzar (PRM 937600). – Praha, sylva “Vinořský park” (pars borealis), ad truncum iacentem *Aceris platanoidis*, 7 Nov 1998, leg. & det. Z. Pouzar (PRM 983505). – Libice nad Cidlinou (Nymburk District), Libický luh National Nature Reserve, 190 m a.s.l., floodplain forest, fallen trunk of *Fraxinus excelsior*, 17 Jul 2013, leg. & det. L. Zíbarová (CB 19277); *ibid.*, fallen trunk of *Fraxinus excelsior*, 21 Aug 2013, leg. & det. L. Zíbarová (CB 19311). – East Bohemia. Lány u Dašic (Pardubice District), Přesyp u Malolánského Nature Monument, 230 m a.s.l., mixed forest, fallen branch of broadleaved tree, 4 Aug 2016, leg. T. Tejklová, det. L. Zíbarová (HR 101394).

Nemania serpens var. *colliculosa* (Schwein.) Y.M. Ju & J.D. Rogers Fig. 4g

Synonyms: *Nemania colliculosa* (Schwein.) Granmo, *Nemania prava* Granmo, Læssøe & T. Schumacher.

Selected description. Granmo et al. (1999): p. 53 (as *Nemania colliculosa*).

Over 80% of our collections of *Nemania* species were *Nemania serpens* var. *serpens*, which is characterised above all by a negative reaction of the apical apparatus in Melzer’s solution and dextrinoid in Lugol’s solution. In var. *colliculosa*, in contrast, the apical apparatus strongly blues in both abovementioned solutions. Based on our experiences, it is also significantly rarer than the typical variety. It has been treated as a separate species – *Nemania colliculosa* (Schwein.) Granmo by Granmo et al. (1999), but was later demoted to the variety rank by Ju & Rogers (2002). Its taxonomic rank, as well as that of var. *hydnicola* (see below), should further be evaluated by means of molecular methods, which is how-

ever beyond the scope of this work. Specimens of var. *colliculosa* in PRM are mostly labelled as *Nemania serpens* var. *amyloidea* Pouzar ined. (i.e. not validly published).

Another closely related taxon is *Nemania prava* Granmo, Læssøe & T. Schumach., which was described by Granmo et al. (1999). In their concept, *N. prava* has larger perithecia and a different colour of ascospore deposit on stromata. However, as ranges of perithecium size overlap, Ju & Rogers (2002) did not find support for treating these taxa as separate species and synonymised *N. prava* with *N. serpens* var. *colliculosa*. We follow their concept here.

Specimens from Bohemia found in herbaria: 9 (HR: 5, PRM: 4). Distribution in Bohemia – T: 4b, 6, 7a, 7c, 8, 9, 10a, 13a; M: 32; in lowland to colline level. Substrata known from the Czech Republic: *Acer campestre* (1), *Betula pendula* (1), *Carpinus betulus* (3), *Corylus avellana* (1), *Fagus sylvatica* (2), *Fraxinus excelsior* (1), *Populus alba* (1), *Quercus cerris* (1), *Quercus petraea* (2), *Quercus* sp. (1). According to our data, this variety shows preference for warm localities but little host preference.

Specimens examined

Czech Republic. North-west Bohemia. Peruc, Stradonice (Louny District), V Hlubokém Nature Monument, 310 m a.s.l., oak-hornbeam forest, fallen branch of *Carpinus betulus*, 11 Jul 2014, leg. & det. L. Zíbarová (HR 103333). – Nová Ves (Louny District), Teplá stráň Hill, 385 m a.s.l., calciphilous beech forest, fallen branch of *Fagus sylvatica*, 12 Aug 2014, leg. & det. L. Zíbarová (HR 103332). – Domoušice, Solopysky (Louny District), site named Na Pískách, 430 m a.s.l., hazel thicket, thin trunk of *Corylus avellana*, 6 Sep 2015, leg. & det. L. Zíbarová (HR 103337). – Hřivice (Louny District), 410 m a.s.l., herb-rich beech forest, fallen branch of *Fagus sylvatica*, 3 Sep 2015, leg. & det. L. Zíbarová (HR 103338). – North Bohemia. Ústí nad Labem, Církvice (Ústí nad Labem District), western slope of Deblík hill, 245 m a.s.l., thermophilous oak forest, fallen branch of *Quercus*, 12 Mar 2017, leg. & det. L. Zíbarová (herb. L.Z. 6321). – Central Bohemia. Týřovické skály, apud Skryje [Rakovník District], ad truncum iacentem *Quercus petraea*, 14 Sep 1970, leg. & det. Z. Pouzar (PRM 815203). – Praha, area tuta Chuchelský háj, declina supra viam ferream, *Carpinus betulus*, trunc. iacens, 26 Oct 2002, leg. & det. Z. Pouzar (PRM 843254). – Praha, silva “Vinořský park” (distr. Praha 9), pars centralis, *Fraxinus excelsior*, ad truncum iacentem in *Alneto glutin.*, 25 Apr 1996, leg. & det. Z. Pouzar (PRM 894650). – Roztoky (Praha-západ District), Roztocký háj – Tiché údolí Nature Reserve, 225 m a.s.l., oak-hornbeam forest, thin trunk of *Carpinus betulus*, 25 Mar 2016, leg. & det. L. Zíbarová (HR 103340). – Kněžičky (Nymburk District), Kněžičky National Nature Reserve, 240 m a.s.l., thermophilous oak forest, fallen branch of *Acer campestre*, 18 Jul 2013, leg. & det. L. Zíbarová (CB 19136). – South Moravia. Loco “Rendezvous” ap. Valtice [Břeclav District], sylv. Boří les, ad truncum iacentem *Quercus cerris*, 14 Oct 1985, leg. & det. Z. Pouzar (PRM 870703).

Nemania serpens* var. *hydnicola (Schwein.) Y.M. Ju & J.D. Rogers Fig. 4f

Synonym: *Nemania reticulata* (P. Karst.) Granmo.

Selected description. Granmo et al. (1999): p. 69 (as *Nemania reticulata*).

This variety is mostly found on dead basidiomata of polypores, mainly *Fomitopsis pinicola*, but was also once reported from *Phellinus igniarius* (Granmo et al. 1999). It is a rather interesting taxon, as it is (albeit indirectly) one

of the few *Nemania* species associated with gymnosperms. It differs from the typical variety of *N. serpens* particularly by more brownish, less carbonaceous stromata, smaller perithecia, more pointed spores and an amyloid apical apparatus (Granmo et al. 1999, Ju & Rogers 2002).

Nemania serpens var. *hydnicola* is common in the Nordic countries and reported from Finland, Norway and Sweden (Granmo et al. 1999), but also occurs at higher altitudes in France (Fournier & Magni 2004e). Furthermore, it is reported from the USA (Ju & Rogers 2002) and Canada (Callan 2008), but had not yet been recorded in the Czech Republic.

No specimens labelled as *N. serpens* var. *hydnicola* or of any other *Nemania* taxon on polypores were found in the herbaria we inquired. Distribution in Bohemia – M: 53a. The locality of our Bohemian record (Peklo National Nature Reserve) is located on the bottom of a deep sandstone gorge with an inverse cold and humid microclimate, together with some lignicolous fungi typically occurring at higher altitudes, such as *Camarops tubulina* and *Phlebia centrifuga*.

Specimens examined

Czech Republic. North Bohemia. Zahrádky (Česká Lípa District), Peklo National Nature Reserve, 250 m a.s.l., alluvial ash-alder forest, old fruitbody of *Fomitopsis pinicola*, 23 May 2016, leg. & det. L. Zibarová (HR 103345). – North Moravia. Malá Morávka (Bruntál District), Praděd National Nature Reserve, 1270 m a.s.l., mountain spruce forest, old fruitbody of *Fomitopsis pinicola*, 31 May 2017, leg. & det. L. Zibarová (herb. L.Z. 6417).

CONCLUSIONS

Two species of xylariaceous pyrenomycetes are reported from the Czech Republic for the first time. While *Biscogniauxia mediterranea* seems to be a new addition to the mycobiota of the country due to its expansion northwards possibly in connection to climatic changes, *Hypoxyton fuscooides*, as a recently described species, had possibly been overlooked for a long time.

Despite the new data provided, the knowledge of xylariaceous pyrenomycetes in the Czech Republic is far from complete as yet. Our effort was focused on selected genera and the territory of Bohemia, therefore extension of research including both taxonomic studies and systematic revisions of selected herbarium material to the rest of the country (Moravia and Silesia) and omitted genera (e.g. *Daldinia*, *Lopadostoma*, *Rosellinia*, *Xylaria*) would be a logical step and may be the aim of our further studies. We also hope to encourage other field mycologists to study this frequently overlooked group of fungi.

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