

Rare and interesting fungi from the Vydra–Otava River valley in the Šumava National Park (Bohemian Forest, Czech Republic)

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Abstract

Interesting finds of fungi (macromycetes) from the Vydra–Otava River valley in Šumava National Park (Bohemian Forest, Czech Republic) are reported. Four species (*Albatrellus cristatus*, *A. subrubescens*, *Cortinarius phoeniceus*, and *Hygrophorus pudorinus*) are reported for the first time from the whole mountain range including its German part. *Tricholoma pessundatum* and *Tremiscus helvelloides* are new for the Czech part of the mountains. *Boletopsis grisea*, *Hydnellum peckii*, and *Lactarius albocarneus* were found here after 47–65 years. *Cortinarius bolaris* is a rare symbiont of *Fagus* in various habitats and altitudes. The distribution and ecology of the species in the Bohemian Forest is evaluated. Generally, the Vydra–Otava river valley represents a natural biocorridor in the mountains for fungi growing preferably at lower altitudes and in areas with a warmer climate.

Key words: fungi, macromycetes, distribution, ecology

INTRODUCTION

Since 1992, the author has carried out to an intensive mycofloristic investigation of the Czech part of the Bohemian Forest (for summary overview of papers prior to 2000, see HOLEC 2000; for recent publications see HOLEC 2001a, 2001b, 2001c, 2003a, 2003b, 2003c, HOLEC & SUKOVÁ 2002, HOLEC et al. 2002). This important mountain range is situated on the border between the Czech Republic on the one side and Germany and Austria on the other (Fig. 1). The local name of the Czech part is “Šumava”. The most valuable area is protected in the “Šumava National Park”; on the German side in the “Nationalpark Bayerischer Wald”. The mycoflora of the German national park has been thoroughly described by LUSCHKA (1993). Records from the Czech part are published in numerous smaller contributions by various authors (e.g. Hilitzer, Kavina, Velenovský, Pilát, Herink, Kubička, Svrček, Kotlaba, Pouzar, Holubová-Jechová, Réblová, Prášil, Nováková, Lepšová, Váňová, Kubátová, Marková, Tomšovský, Suková etc.). Short and incomplete overviews of these works were published by SVRČEK (1965), VAŇA (1996) and HOLEC (2000).

Many rare, interesting or even new species of fungi are found in the Bohemian Forest every year. One of the most interesting areas is the deep valley of the Vydra and Otava Rivers (the Otava originates at the confluence of the Vydra and Křemelná Rivers near a site called “Čeňkova Pila”) in the central part of the Bohemian Forest (Fig. 1). The area (between a site called “Antýgl” and the village of Rejštejn) is unique for its variable geomorphology and rich patchwork of habitats. The following units of potential natural vegetation are found here

(NEUHÄUSLOVÁ 2001): herb-rich beech forests (*Dentario enneaphylli-Fagetum*), alluvial grey alder woodlands (*Alnetum incanae*), the same unit with birch (community *Alnus incana-Betula pubescens*), and (sub)mountain relict birch-pine woodlands (*Betulo carpaticae-Pinetum*). As the vegetation is more or less influenced by man at present, these communities are often changed into man-made spruce, pine, fir or mixed forests. The geological background is formed by granitoids covered by acidic soils with variable amount of rock fragments (LOŽEK in NEUHÄUSLOVÁ 2001). The habitats and history of mycological investigations are described in a previous paper (HOLEC 2001a).

The aim of this paper is to present Bohemian Forest fungi, which are known almost exclusively from the Vydra–Otava River valley. In the years 1996–2003, I personally visited 174 locations in the Bohemian Forest, most of them several times, but the species presented here were found only in this valley (with rare exceptions).

MATERIAL AND METHODS

The fieldwork was carried out in the years 1996–2003 under several projects (see Acknowledgements). Voucher specimens are deposited in the mycological herbarium of the National Museum, Prague. This is indicated by the PRM code and the herbarium number; if the number has not yet been assigned, then only by the PRM; moreover, a collector's number in the format of e.g. JH 345/2001 is added and also printed on the herbarium labels). Fresh fruitbodies were mostly documented by colour slides; this fact is indicated by the word “dia” in the specimens examined.

In the whole paper, the term “Bohemian Forest” is used for the Czech part of the mountain range (see also the information in Introduction and Fig. 1).

Abbreviations – JH: collection made by Jan Holec; not.: notavit, a record which is not documented by herbarium material; NP: Šumava National Park; PRM: mycological herbarium of the National Museum, Prague.

RESULTS AND DISCUSSION

Albatrellus cristatus (Schaeff.: Fr.) Kotl. et Pouzar

Dračí Skály rocks (1st zone of the NP) in the Otava River valley – slopes S of the ridge of the rocks, ca. 1.2 km NNE of a site called Čeňkova Pila, 3.5 km NNE of the village of Srní, SWW slope, old *Abies* forest on stony slope with admixed *Picea abies*, *Fagus sylvatica*, alt. 730 m, in needles under *Abies alba*, 10 Oct 2002, leg. et det. J. Holec, JH 465/2002, PRM 900762, dia.

Vydra River valley (“Povydří” – 1st zone of the NP) between site called Čeňkova Pila and Turnerova Chata cottage, slope near a large curve, 1.5 km SSE of a site called Čeňkova Pila near the village of Srní, S slope, old forest composed of *Picea abies*, *Abies alba*, *Ulmus glabra*, *Pinus sylvestris*, alt. 780 m, under *Picea* and *Abies* on a forest path, 28 Oct 2002, not. J. Holec, dia.

First finds of this species in the whole mountain range including its German part (the species is not mentioned by LUSCHKA 1993 and not reported from the Bohemian Forest by KOTLABA 1984: 166). In the Czech Republic, *Albatrellus cristatus* is a common species, but occurs especially in uplands and in the submontane belt (especially in Central Bohemia, see KOTLABA 1984: map 111). This is probably the reason why does not occur in higher parts of the Bohemian Forest. The finds presented here are from the lowest parts of the Bohemian Forest.

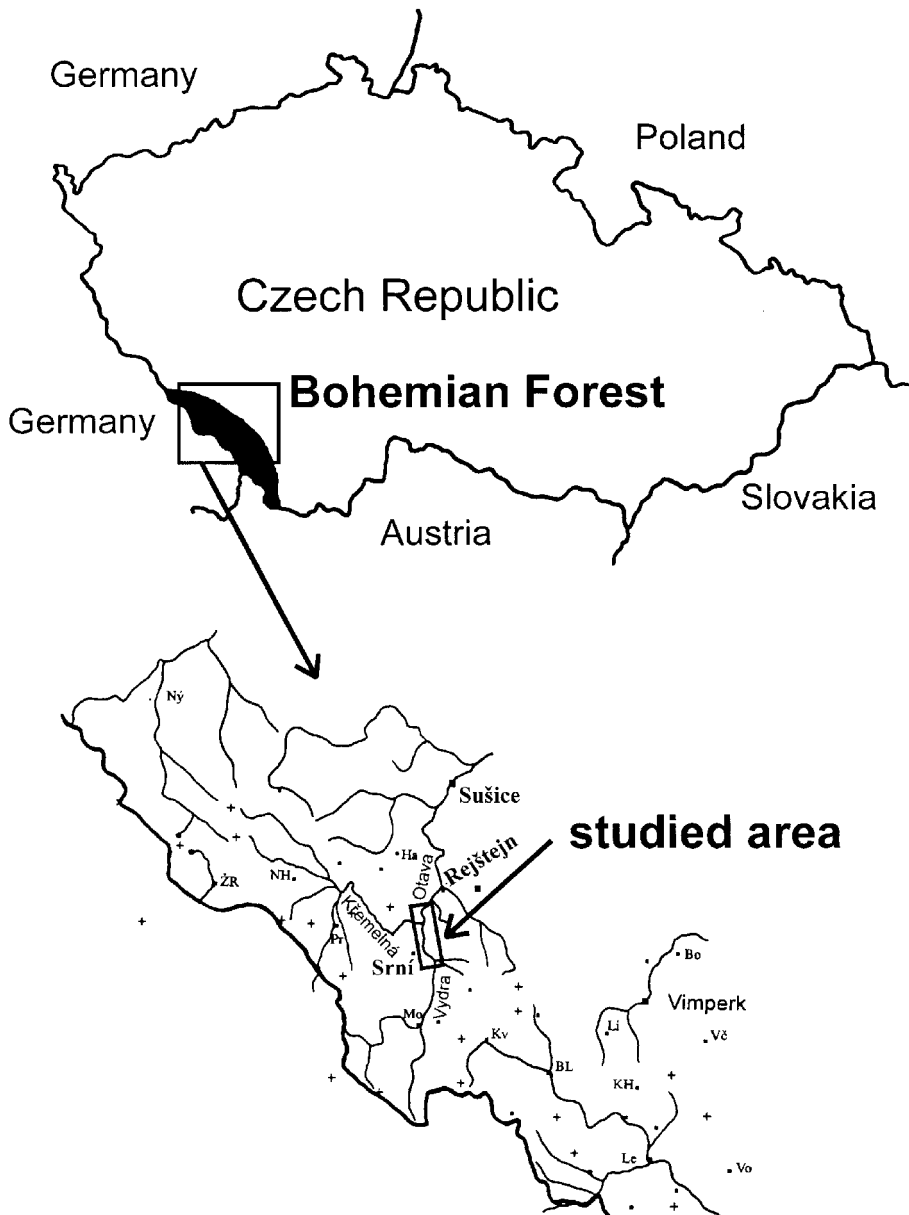


Fig. 1. Geographic position of the Bohemian Forest and the Vydra–Otava River valley (indicated as “studied area”).

***Albatrellus subrubescens* (Murrill) Pouzar**

Dračí Skály rocks (1st zone of the NP) in the Otava River valley – SW slope under the rocks, between Srní and Rejštejn villages, *Picea-Pinus* forest with admixed *Abies* and rarely *Fagus*, alt. 640 m, under *Picea* and *Pinus*, 29 Sep 2001, leg. et det. Z. Pouzar, collection JH 552/2001, PRM, dia.

Dračí Skály rocks (1st zone of the NP) in the Otava River valley – stony ridge of the rocks, lower part, 3.8 km NNE of the village of Srní, W slope, relict rocky pine woodland (*Pinus sylvestris*, *Betula*) surrounded by a mixed forest (*Pinus*, *Abies*, *Picea*, *Fagus*), alt. 690 m, 10 Oct 2002, leg. et det. J. Holec, JH 467/2002, PRM 900763, dia.

This is the first find of *Albatrellus subrubescens* from the whole mountain range including its German part (the species is not mentioned by LUSCHKA 1993 and not given from the Bohemian Forest by KOTLABA 1984: 167–168). The finds published by POUZAR (1974: 93; Hrádek hill N of Vimperk, 2 Oct 1967; Čábuz near Vacov, 30 Sep 1967) are from the Bohemian Forest foothills. In the Czech Republic, *Albatrellus subrubescens* is a scattered species, which occurs especially in uplands and in the submontane belt [especially in Central and Southern Bohemia, see KOTLABA (1984: map 113)]. This is probably the reason why it does not occur in higher parts of the Bohemian Forest. The finds presented here are from the lowest parts of the Bohemian Forest.

***Boletopsis grisea* (Peck) Bondartsev et Singer**

Dračí Skály rocks (1st zone of the NP) in the Otava River valley – SW slope under the rocks, between Srní and Rejštejň villages, *Picea-Pinus* forest with admixed *Abies* and rarely *Fagus*, alt. 640 m, in needles, 3 Oct 2001, leg. et det. J. Holec, JH 602/2001, PRM, dia.

This is the second find of *Boletopsis grisea* in the Bohemian Forest in 47 years (!). The first locality was discovered by F. Kotlaba in 1955 [Kráví Hora hill near the town of Horní Planá, alt. 750 m, see KOTLABA (1984: 24); remark: in KOTLABA (1956: 194), the species is mentioned under name *B. leucomelas*]. The species is not known from the German part of the mountain range (LUSCHKA 1993). *Boletopsis grisea* is rare in the Czech Republic (KOTLABA 1984: map 4) and belongs to endangered fungi. It has been recently selected for the list of species, which should be protected by law in the Czech Republic [in the category of strongly endangered species, see HOLEC & BERAN (2004)]. Moreover, it was included in the list of 33 threatened fungi in Europe, which should be added to Appendix I of the Bern Convention (DAHLBERG & KRONEBORG 2003).

***Cortinarius bolaris* (Pers.: Fr.) Fr.**

Dračí Skály rocks (1st zone of the NP) in the Otava River valley – stony ridge of the rocks, lower part, 3.8 km NNE of the village of Srní, W slope, relict rocky pine woodland (*Pinus sylvestris*, *Betula*) surrounded by a mixed forest (*Pinus*, *Abies*, *Picea*, *Fagus*), alt. 690 m, under *Fagus sylvatica*, 29 Sep 2001, leg. et det. J. Holec, JH 544/2001, PRM, dia. Ditto, 10 Oct 2002, leg. et det. J. Holec, JH 466/2002, PRM 900668, dia.

This is the third locality of *Cortinarius bolaris* in the Bohemian Forest (the two others are listed below). In the German part of the mountain range, *C. bolaris* is “zerstreut” (LUSCHKA 1993: 187), which means that it was found 4–5 times there. These data show that *C. bolaris* is not a common species in the mountain range. The Czech finds are from various forests with *Fagus* (mixed montane forest with *Fagus*, *Picea*, *Abies*; young *Fagus* forest; under single *Fagus* growing on a rock covered by relict rocky pine woodland) at altitudes 690–1050 m, both at dry (Dračí Skály) and moist (Debrník) sites. Generally, *C. bolaris* can be characterised as a rare symbiont of *Fagus* in various habitats and altitudes (except for the highest parts of the mountains).

Further finds from the Bohemian Forest: 1) Medvědí Potok valley on slope of Smrčina Mt., 1–2 km E of the top of Smrčina near the village of Nová Pec, E slope, young, man-made *Fagus* forest with *Picea*, alt. 1050 m, in leaves, 29 Aug 2003, leg. et det. J. Holec, JH 72/2003, PRM. 2) Debrník (“Medvědí Jámy”, 1st zone of the NP), 1.7 km S of the church in the centre of the village of Železná Ruda, SW slope of Debrník Mt., old mixed natural montane forest

(*Fagus*, *Abies*, *Picea*), alt. 800 m, under *Fagus sylvatica*, 16 Oct 1997, leg. Z. Pouzar, det. J. Holec et Z. Pouzar, JH 833/1997, PRM 898625.

Cortinarius phoeniceus (Bull.) Maire

= *Dermocybe phoenicea* (Bull.) M.M. Moser

Dračí Skály rocks (1st zone of the NP) in the Otava River valley – slopes S of the ridge of the rocks, ca. 1.2 km NNE of a site called Čeňkova Pila, 3.5 km NNE of the village of Srní, SWW slope, old *Abies* forest on stony slope with admixed *Picea abies* and *Fagus sylvatica*, alt. 730 m, in needles under *Abies alba*, 29 Sep 2001, leg. et det. J. Holec, JH 542/2001, PRM, dia.

This species seems to be very rare in the whole mountain range as it is not cited in any Czech publication and also lacks in the work by LUSCHKA (1993). I personally found it for the first time after 5 years of intensive field work in the Bohemian Forest. This is probably due to its preference for sites with lower altitudes and a milder climate. BERAN (2003) characterises it as an uncommon species growing on poor acidic soils, mostly in coniferous and mixed forests (*Picea*, *Pinus*, *Betula*), but also in deciduous forests (*Fagus*, *Quercus*).

Hydnellum peckii Banker

Dračí Skály rocks (1st zone of the NP) in the Otava River valley – stony ridge of the rocks, lower part, 3.8 km NNE of the village of Srní, W slope, relict rocky pine woodland (*Pinus sylvestris*, *Betula*) surrounded by a mixed forest (*Pinus*, *Abies*, *Picea*, *Fagus*), alt. 690 m, under *Picea* and *Pinus*, 29 Sep 2001, leg. et det. J. Holec, JH 549/2001, PRM, dia.

Boubínský Prales virgin forest (National Nature Reserve), ca. 3.5 km NNE of the village of Zátoň near Lenora, near Kaplické Jezírko small reservoir (W of it), E slope, natural *Picea* forest with admixed *Abies* and *Fagus*, alt. 940 m, under *Picea* and *Abies*, 2 Oct 2001, leg. J. Holec, det. Z. Pouzar, JH 568/2001, PRM, dia.

The first find is from the Otava River valley, which is a new area for the species in the Bohemian Forest. The second find is the second one from Boubínský Prales in 65 years (first one: old *Picea* forest, alt. 1100 m, 25 Aug 1936, leg. J. Herink, PRM). The species is not mentioned by LUSCHKA (1993) from the German part of the mountains. At present, *Hydnellum peckii* is a rare species in the Czech Republic with a decreasing number of localities when compared with the past (HROUDA 1992, 1999). My find from the Boubínský praes virgin forest is briefly discussed by HROUDA (2002: 49).

Hygrophorus pudorinus (Fr.: Fr.) Fr.

Dračí Skály rocks (1st zone of the NP) in the Otava River valley – slopes S of the ridge of the rocks, ca. 1.2 km NNE of a site called Čeňkova Pila, 3.5 km NNE of the village of Srní, SWW slope, old *Abies* forest on stony slope with admixed *Picea abies*, *Fagus sylvatica*, alt. 730 m, under *Abies alba*, 10 Oct 2002, leg. et det. J. Holec, JH 463/2002, PRM 900669, dia.

Dračí Skály rocks (1st zone of the NP) in the Otava River valley – slope N of the stony ridge of the rocks, 4 km NNE of the village of Srní, NW slope, *Abies* forest with *Picea*, managed by man, alt. 680 m, 3 Oct 2001, leg. Z. Pouzar, det. J. Holec et Z. Pouzar, JH 611/2001, PRM, dia.

Dračí Skály rocks (1st zone of the NP) in the Otava River valley – SW slope under the rocks, between the villages of Srní and Rejštejn, *Picea-Pinus* forest with admixed *Abies* and rarely *Fagus*, alt. 640 m, in needles under *Abies alba*, 10 Oct 2002, leg. et det. J. Holec, JH 469/2002, PRM 900765, dia.

Vydra River valley (“Povydrří” – 1st zone of the NP) between site called Čeňkova Pila and Turnerova Chata cottage, 0.1–0.5 km S of a site called Čeňkova Pila, surrounding of a forest

path along the right bank of the river, W slope, mixed forest on slope near the river (*Picea*, *Abies*, *Fagus*, *Alnus*, *Salix*, *Acer*, *Corylus*, *Betula*, *Pinus*), alt. 670 m, in needles under *Abies alba*, 28 Oct 2002, not. J. Holec, dia.

The finds are the first ones for the mountain range. *Hygrophorus pudorinus* is neither mentioned by any Czech authors nor by LUSCHKA (1993) from the German side. The finds are from almost pure *Abies* forests (with admixed *Picea* and *Fagus*) and from mixed forests with presence of *Picea*, *Pinus*, *Fagus* etc. and admixed *Abies*. In all cases, the forests represent a man-made or man-influenced substitute of the original community – herb-rich beech forest with *Dentaria enneaphyllos*, as classified by NEUHÄUSLOVÁ (2001). It is rather surprising that *H. pudorinus* grows here on the acidic bedrock (granite) as it is usually found on limestone or on basic soils. Its occurrence in the Vydra–Otava River valley is apparently enabled by rich soils in the forests on stony slopes, which contain quality humus of the “mull” type.

***Lactarius albocarneus* Britzelm.**

= *L. glutinopallens* F.H. Møller et J.E. Lange

Otava River valley below site called Čeňkova Pila, right bank, slopes between Čeňkova Pila and Dračí Skály rocks, 0.8 km NNE of Čeňkova Pila, 3.2 km NNE of the village of Srní, NWW slope, old, managed coniferous forest (*Picea*, *Abies*, at places with *Larix*), alt. 700 m, under *Abies alba*, 29 Sep 2001, leg. et det. J. Holec, JH 527/2001, PRM, dia.

Second find of the species in the Bohemian Forest. The first one was made by J. Herink in the Boubínský Prales virgin forest in 1948 (PRM 608991, as *L. glutinopallens*). One record is reported from the German part of the mountain range (LUSCHKA 1993: 229, Kl. Arbersee, as *L. glutinopallens*). These data show that *L. albocarneus* belongs to the rarest fungi in the area. According to HEILMANN-CLAUSEN et al. (1998), the species has a preference for rich and calcareous soils. The finds from the Bohemian Forest are not from calcareous soils but from moderately acidic soils. However, it is known that humus under *Abies* is richer than under *Picea*, which may enable the growth of *L. albocarneus* on such soils.

***Tricholoma pessundatum* (Fr.: Fr.) Quél.**

Povydrí area (1st zone of the NP), between Hrádecký Potok stream and site called Čeňkova Pila, 0.9 km NE of the village of Srní, NE slope, lower part, old, man-made *Picea* forest, soil covered with needles, at places with mosses, alt. 740 m, 10 Oct 2002, leg. et det. J. Holec, JH 472/2002, PRM 900674, dia.

Second find for the Bohemian Forest. One record is given by LUSCHKA (1993) from the German part of the mountains (under *Picea* and *Betula* at a margin of a mixed montane forest). In both cases, the species was found under *Picea*, which is a less frequent host of *T. pessundatum*, which usually grows under *Pinus* (but records in *Picea* forests are known from literature). The first find from the Czech side (Volyňka River valley above Vimperk, 27 Sep 1967, leg. et det. Z. Pouzar, PRM 710550) is from a *Pinus* forest on a rock. *Tricholoma pessundatum* is characteristic of forests in the lowlands and hills where the climate is warmer. This is probably the reason why it is so rare in the mountainous areas of the Bohemian Forest.

***Tremiscus helvelloides* (DC.: Fr.) Donk**

Horskokvildská Slat' peat bog, non-asphalted forest road between the sites called Vydří Most and Ranklovská Rovina, 0.8–1.5 km E of the centre of the village of Horská Kvilda, on the forest road surrounded by man-made *Picea* forests, alt. 1100 m, 19 Sep 1996, leg. et det. J. Holec, JH 594/1996, PRM, dia.

Vydra River valley (“Povydrí” – 1st zone of the NP) between site called Čeňkova Pila and

Turnerova Chata cottage, 1–1.5 km S of Čeňkova Pila, *Picea* forest with admixed *Abies* and *Fagus* along forest road made of calcareous gravel, alt. 700 m, 11 Oct 1997, leg. et det. J. Holec, JH 724/1997, PRM 898529, dia. Ditto, 25 Sep 1999, not. J. Holec, dia.

Vydra River valley (“Povydrí” – 1st zone of the NP) between site called Čeňkova Pila and Turnerova Chata cottage, 0.9 km NW of estate Buchingrův dvůr, ca. 2.2 km NEE of the village of Srní, W slope, old, man-made *Picea* forest, alt. 860 m, on a forest path, 9 Oct 2000, leg. et det. J. Holec, JH 209/2000, PRM 897876, dia.

Two records are mentioned by KRIEGLSTEINER (1991) from the German part of the mountains, however, no detailed ecological data are available. All the finds listed above are from margins of non-asphalted forest roads strengthened by calcareous gravel. Limestone is not present in the mountainous areas of the Bohemian Forest. The sources of limestone for the strengthening of forest roads probably are the quarries between the towns of Horažďovice and Sušice in the Bohemian Forest foothills. *Tremiscus helvelloides* is known from this limestone area (KLUZÁK 1987; near Rejštejn, collection CB4318). The occurrence of *T. helvelloides* on generally acidic soils of the Bohemian Forest is enabled by this human activity as *T. helvelloides* is known as a calciphilic species. Generally, the spread of calciphilic organisms in the Bohemian Forest is undesirable from the viewpoint of nature conservation as such species are not autochthonous to the area.

The first find of *T. helvelloides* in the Bohemian Forest was published by KLUZÁK (1987: 65; Františkov near Kvilda, on an old ruin of an estate, 10 Sep 1986, leg. A. Lepšová, collection CB 4740). Also this find is of synanthropic nature.

CONCLUSIONS

The species treated here are rare in the Bohemian Forest. Four of them are reported for the first time from the whole mountain range including its German part (*Albatrellus cristatus*, *A. subrubescens*, *Cortinarius phoeniceus*, *Hygrophorus pudorinus*). *Tricholoma pessundatum* and *Tremiscus helvelloides* are new for the Czech part of the mountains. *Boletopsis grisea*, *Hydnellum peckii* and *Lactarius albocarneus* were found here for the first time after 47–65 years. This survey clearly shows the importance of the Vydra–Otava River valley for the biodiversity of fungi in the Bohemian Forest.

Some of the species prefer the warmer climate of the lowlands and hills, where they are common to scattered (*Albatrellus subrubescens*, *A. cristatus*, *Dermocybe phoenicea*, *Tricholoma pessundatum*). Their occurrence in the Bohemian Forest is enabled by the fact that the lower parts of the Vydra River valley and the Otava River valley represent sites with the lowest altitudes (640–850 m) in the Šumava National Park (which covers the most valuable parts of the Bohemian Forest). Generally, the Vydra–Otava River valley represents the only “island” for their occurrence in the Bohemian Forest and a natural biocorridor in the mountains for fungi growing preferably in areas with lower altitudes and a warmer climate.

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