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Current occurrence of *Pseudoplectania melaena* (Fungi, Ascomycota) in the Boubínský Prales National Nature Reserve

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Abstract
Nine microlocalities of a rare fungus *Pseudoplectania melaena* in the Boubínský Prales National Nature Reserve (Bohemian Forest, Czech Republic) documented in April 2013 are published. All of them originate from mixed montane forest composed of *Fagus sylvatica* with admixed *Picea abies* and *Abies alba* having a virgin or natural forest character. The species was found on fallen decaying trunks (once on a log) of *Abies alba*. *Pseudoplectania melaena* proved to be relatively frequent in the Boubínský Prales virgin forest. The reserve represents its richest locality in the Czech Republic. It clearly demonstrates the importance of a long-term forest continuity (never completely cut down, no or minor influence of forest management), stable texture (ensured by spontaneous development), large locality area (tens to hundreds of hectars) and high amount of dead wood (especially of *Abies alba*) for survival of this rare species.

Key words: Czech Republic, Bohemian Forest, Šumava, virgin forest, natural forest, *Abies alba*

Introduction

Pseudoplectania melaena (Fr.: Fr.) Sacc. is a rare saprotrophic fungus growing on dead wood of conifers, in Europe mostly on old fallen trunks of *Abies alba*, but also *Picea abies* (e.g. Hansen & Knudsen 2000, Kotlaba et al. 1995, Medardi 2006). It is remarkable by early production of its fruitbodies (brown-black, bowl-shaped apothecia with a short stalk), which takes place in late winter and spring (January–May, most frequently March–May, after the snow melt). Being a threatened species, *Pseudoplectania melaena* is included in the Red book (Kotlaba et al. 1995), the list of fungi protected by law (Antonín & Bieberová 1995, as *P. vogesiaca*), and the Red list of Czech macromycetes (Holec & Beran 2006). Basic information on its biology, occurrence and ecology in the Czech Republic was summarized by Kotlaba et al. (1995) and Holec (2008a). Based on these data, the fruitbodies of *P. melaena* appear in near-natural, natural and virgin forests, either the mixed montane forests composed of *Fagus sylvatica*, *Picea abies* and *Abies alba,* or in the ravine forests with admixed conifers. Most localities are situated in nature reserves. In some of them it is threatened by continuing decay of coniferous wood combined with lacking supply of newly fallen trunks and logs.

To date, *P. melaena* is known from three localities in the Czech part of the Bohemian Forest (Šumava in Czech, Böhmerwald in German): Boubínský Prales virgin forest (e.g. Kubička 1960, 1973; Svrček 1981, as *P. vogesiaca*; Kotlaba et al. 1995), Mt. Černý les eastward of Záhvozdí near Želnava (Balda 1998, as *P. vogesiaca*), and Milešický Prales

Nature Reserve between Mt. Boubín and Mt. Bobík (Zíbarová 2006). In German part, its occurrence is mentioned e.g. by Luschka (1993) and Nuss (1999).

In spring 2013, rich fructification of *P. melaena* was observed in the Boubínský Prales National Nature Reserve. As the locality is the richest one in the Czech Republic, we decided to publish the obtained data on microlocalities and substrates as a first step towards the monitoring of *P. melaena* in the Boubínský Prales National Nature Reserve.

Materials and methods

Fruitbodies of *P. melaena* were searched for during an excursion to the Boubínský Prales National Nature Reserve held on April 24–25, 2013. The core (fenced) area and adjacent E slopes above the Lukenská Cesta forest road (only the stands grown by *Fagus-Abies-Picea* forest) were visited. We carefully searched for the fungus on all fallen trunks of conifers (especially the large ones, having a diameter of 50 cm and more) we saw during our meandering ("zigzag") inspection of the reserve (about 150–200 trunks). We are aware of the fact that this method is not exhaustive (some trunks certainly escaped our attention) and future monitoring should be made more intensively using the detailed maps of all fallen trunks made in 1972 and 1996 (Vrška et al. 2012).

Habitat and substrate conditions of each microlocality were recorded and their position was located using the GPS device Garmin 60CSx (accuracy 3–10 m). Some records were documented photographically and two of them by voucher specimens which are deposited in the Mycological Department, National Museum, Prague (herbarium PRM). The estimation of decay stages follows Heilmann-Clausen (2001): (1) fallen trunks covered with bark without visible signs of decay; (2) decay signs indistinct, wood and bark weakly disrupted; (3) decay of wood distinct, bark partially loosing or cracking; (4) wood strongly damaged, soft, but still with visible structure, in major part without bark; (5) rotten to almost humified trunks. Degrees of naturalness of forest stands are used in accordance with Holec (2008b) who based their characteristics on scale published by Vrška & Hort (2003) and Vrška (2004).

Abbreviations: a.s.l. – above sea level, JH – Jan Holec, MK – Martin Kříž.

Results

Pseudoplectania melaena (Fr.: Fr.) Sacc.
Syn.: *Plectania melaena (Fr.: Fr.) Paden*, *Pseudoplectania vogesiaca Seaver*

Microlocalities – Nine microlocalities of *Pseudoplectania melaena* were found in the Boubínský Prales National Nature Reserve in April 2013 (Table 1, Fig. 1, 2). Six of them are located in southern part of the core (fenced) area of the virgin forest. The remaining three microlocalities are located outside the core area in higher parts of the eastern and north-eastern slopes of the Basumský Hřeben mountain ridge. The altitudinal range of the records is 970–1080 m.

Habitats – All records originate from the same habitat – mixed montane forest composed of *Fagus sylvatica* with admixed *Picea abies* and *Abies alba*. It the core area the vegetation represents a true virgin forest never disturbed by forest management. Outside the core area the forest has been slightly influenced by selective cutting of living or withered trees. Consequently, it has to be classified as a natural forest (not the virgin one).

Substrate – All records of *P. melaena* originate from naturally fallen trunks or logs of *Abies alba*. The trunks are in full contact with soil surface (not hanging above it) and have a

Table 1. Microlocalities of *Pseudoplectania melaena* in the Boubínský Prales virgin forest on April 24–25, 2013. The sites are arranged in the order how they were discovered (chronologically).

Micro-locality	Coordinates	Altitude (m a.s.l.)	Habitat (naturalness)	Substrate	Decay stage, cover of mosses	Voucher specimen, photograph
1	48°58.532‘N 13°48.854‘E	1000	Mixed montane forest (virgin forest)	*Abies alba*: log lying on soil (diam. 20 cm), upper side	2, covered with mosses	JH 13/2013 (PRM)
2	48°58.526‘N 13°48.791‘E	1010	Mixed montane forest (virgin forest)	*Abies alba*: fallen trunk (diam. 60 cm), lateral side	3, covered with mosses	Photo MK
3	48°58.363‘N 13°48.949‘E	970	Mixed montane forest (virgin forest)	*Abies alba*: fallen trunk (diam. 80 cm), upper side	3, covered with mosses	Photo MK
4	48°58.407‘N 13°48.912‘E	970	Mixed montane forest (virgin forest)	*Abies alba*: fallen trunk (diam. 80 cm), upper side	3, no mosses	Photo MK, pale fruit-bodies
5	48°58.359‘N 13°48.652‘E	1050	Mixed montane forest (natural forest)	*Abies alba*: fallen trunk (diam. 80 cm), upper side + curve between trunk and protruding log	3, covered with mosses	–
6	48°58.403‘N 13°48.633‘E	1060	Mixed montane forest (natural forest)	*Abies alba*: fallen trunk (diam. 80 cm), upper + lateral sides	2, partly covered with mosses	JH 19/2013 (PRM), photo JH, MK
7	48°58.619‘N 13°48.448‘E	1080	Mixed montane forest (natural forest)	*Abies alba*: fallen trunk (diam. 50 cm), curve between trunk and protruding log	2, no mosses	–
8	48°58.596‘N 13°48.775‘E	1000	Mixed montane forest (virgin forest)	*Abies alba*: fallen trunk (diam. 60 cm), upper side	3, covered with mosses	–
9	48°58.565‘N 13°48.863‘E	980	Mixed montane forest (virgin forest)	*Abies alba*: fallen trunk (diam. 40 cm), upper side	3, covered with mosses	–

Fig. 1. Geographic position of the Boubínský Prales National Nature Reserve within the Bohemian Forest.

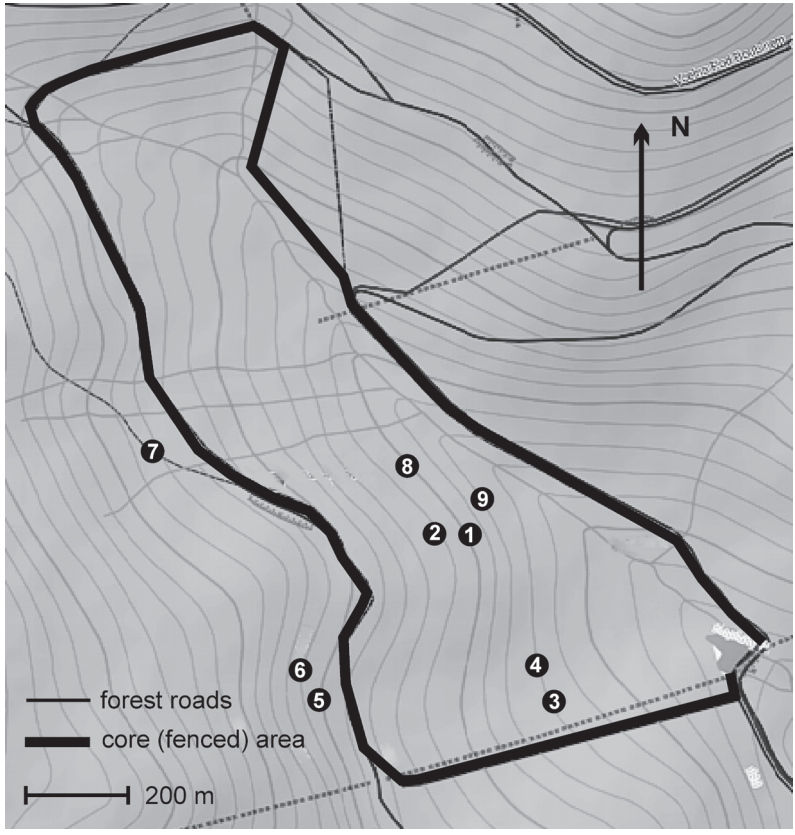

Fig. 2. Microlocalities of *Pseudoplectania melaena* in the Boubínský Prales National Nature Reserve (fenced core area and its nearest vicinity) found on April 24–25, 2013. The numbers of microlocalities agree with those in Table 1.

diameter of 40–80 cm. In most cases they represent old thick individuals of *Abies*. Only in one case the fungus was found on a fallen log having a diameter of 20 cm. *Pseudoplectania melaena* clearly prefers wood in advanced stages of decay, i.e. trunks with soft wood, free of bark, more or less covered with mosses (Table 1). However, it is able to produce fruitbodies also on trunks with hard wood and partial bark cover. The fruitbodies were observed both on upper (Fig. 4) and lateral sides of the trunks, sometimes in curves between trunk and protruding logs. Their number varied from single fruitbodies, small groups (most frequently, see Fig. 3) to tens of fruitbodies covering several meters of a trunk (Fig. 4).

Discussion

Occurrence in the Bohemian Forest

Boubínský Prales

During our visit (April 24–25), *P. melaena* was the most frequent fungal species (of fungi with soft fruitbodies). Generally speaking, it was the dominating fungus of the April fructification aspect in the Boubínský Prales virgin forest. These facts show that *P. melaena*, a very rare species in the Czech Republic (Kotlaba et al. 1995, Holec & Beran 2006, Holec 2008a), is well established at this locality. Other potential sites within the Boubínský Prales National Nature Reserve (not visited by us in April 2013) are the eastern slopes of Mt. Pažení south of the core (fenced) area of the reserve (1000–1100 m a.s.l.) and south-western slopes east of the core area (930–1100 m a.s.l.). They are grown by natural mixed forest with presence of fallen *Abies* trunks. *Pseudoplectania melaena* was not found in northern part of the core area which was caused by minor presence of *Abies* in local forest stands.

Fig. 3. Fruitbodies of *Pseudoplectania melaena* (microlocality 3). The side view (right fruitbody) shows that the apothecia are distinctly stalked. Photo M. Kříž.

According to Vrška et al. (2012: 167–169), *Abies* exhibits a long-term decrease in the Boubínský Prales National Nature Reserve. Living trees represent only 5% of the tree layer (in 1996 there were only 258 living individuals in the core area which is quite unsatisfactory). A logical consequence is the increased number of fallen trunks. It is positive for *P. melaena* currently (high supply of potential substrate), however, the long-term prospect is unclear as the regeneration of *Abies* population is very slow. After some decades there will be a time gap when almost no dead *Abies* trunks will be available for *P. melaena*. This fact supports the importance of *P. melaena* monitoring which should be done regularly and more intensively.

Czech part of the Bohemian Forest

In the years 1996–2006 the first author himself or his collaborators (Z. Pouzar, M. Tomšovský, M. Beran, F. Kotlaba, M. Svrček) visited 185 localities in the Czech part of the Bohemian Forest, rarely also in the its foothills (Holec 2007). Some of them were very promising as for the occurrence of *P. melaena* (natural forests with high number of fallen trunks of *Abies*, e.g. in the following localities: mounts of Zátoňská Hora, Spáleniště, Stožec – see Vrška et al. 2012, site called Debrník near Železná Ruda, etc.). However, the fungus was not found there. The localities differ from the Boubínský Prales National Nature Reserve by their area (small fragments of natural habitats surrounded by man-made forests or clearings), degree of naturalness (they mostly represent naturally regenerated forests replacing partially or completely cut down virgin forests) and smaller number of fallen trunks of conifers, especially *Abies alba*, but also *Picea abies*. The occurrence of *P. melaena* is not excluded in such habitats (Balda 1998: Mt. Černý Les, one microlocality only) but is less probable. The rich occurrence of *P. melaena* in the Boubínský Prales virgin forest confirms the importance of

Fig. 4. Fruitbodies of *Pseudoplectania melaena* on upper side of fallen trunk of *Abies alba* (microlocality 6). More than 30 fruitbodies were observed on this trunk. Photo M. Kříž.

a long-term forest continuity (never completely cut down, no or minor influence of forest management), stable texture (ensured by spontaneous development), large locality area (tens or hundreds of hectars) and high amount of dead wood (which is unusually high in Boubínský Prales, see Vrška et al. 2012) for survival of this rare species. Concerning the occurrence in the Milešický Prales Nature Reserve (Zíbarová 2006), it is very close to the Boubínský Prales locality and could be considered further microlocality in the Boubín–Bobík mountain group (one biogeographic unit).

Bavarian Forest National Park

Luschka (1993) characterized *P. melaena* (under *P. vogesiaca*) as "verbreitet", which represented 6–8 records in the "old" part (Rachel–Lusen area). No particular localities were cited. Habitats and substrates are the same as on the Czech side of the Bohemian Forest. In the new part of the National Park, the rich locality is the Mittelsteighütte Nature Reserve which has a similar character like the Boubínský prales. Nuss (1999) wrote that *P. melaena* was moderately common to common in Mittelsteighütte.

Occurrence and ecology in the Czech Republic

Due to their completeness, the data from the Czech Republic are summarized here (such recent data are lacking from Germany where only distribution map exists, see Krieglsteiner 1993). Most of the recent Czech localities (Kotlaba et al. 1995, Holec & Beran 2006, Holec 2008a: basic data from this exhaustive but unpublished research report are summarized here) have a similar character, i.e. they represent well-preserved natural forests, especially the montane ones: Žofínský Prales National Nature Reserve and Hojná Voda National Nature Monument in the Novohradské Hory Mts. and Salajka National Nature Reserve in the Beskydy Mts. Moreover, *P. melaena* is known from some ravine forests situated in the hilly country (e.g. Býčí Skála National Nature Reserve in the Moravian Karst) and having a near-natural character. The altitudinal range of *P. melaena* in the Czech Republic is 300–1150 m (Holec 2008a) with the highest number of records in the montane belt (800–1100 m). There are 7 current localities (with records after 1995) and 2 historical ones (no records after 1995). The fungus is mostly known from dead wood of *Abies alba* but there are also records on *Picea abies*. In most Czech localities, it is threatened by advancing decay of fallen *Abies* trunks which cannot be replaced by new ones (mature and old *Abies* individuals are rare or missing there).

Pseudoplectania melaena **as an "indicator species"**

Nuss (1999) considers *P. melaena* a species "important for the nature conservation". Blaschke et al. (2009) classify it as an "indicator of nature value". Our data published here also show that *P. melaena* prefers near-natural, natural to virgin forest stands (which is logical – only in such forests it can found its preferred substrate: the slowly decaying wood of naturally fallen conifers). However, we are slightly skeptic concerning the concept of indicator species (at least from the purely scientific point of view). Such species should be carefully tested (at least on European scale) what environmental factor they indicate, e.g. if they really prefer the "virgin" environment (long-term continuity, never cut, stable texture, spontaneous regeneration, almost no impact of human management) or simply the dead wood in optimal stages of decay (without relation to the "virgin" habitats). One example: *P. melaena* was classified as a widespread (although not common) species in Switzerland (Breitenbach & Kränzlin 1984), a country where true virgin forests are very rare. Generally, we are slightly cautious and speak not about "indicator species" but about "species preferring natural to virgin forests". However, in nature conservation praxis, the term "important for the

nature conservation" is fully acceptable.

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