

Distribution and ecology of the rare polypore *Pycnoporellus fulgens* in the Czech Republic

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Until 1998, the rare polypore *Pycnoporellus fulgens* (Fungi, Basidiomycetes, *Polyporaceae*) was known in the Czech Republic from 5 localities situated in northeastern Moravia and Silesia. No records from Bohemia (western part of the Czech Republic) were known. At present, 11 localities from Bohemia and 6 from Moravia and Silesia are known, which means that the species has spread rapidly in Bohemia during the last 7 years. The fungus occurs almost exclusively on old decaying trunks in natural forests minimally influenced by man (mostly nature reserves) composed of *Fagus*, *Abies* and *Picea*. It was found mainly in August and September on *Picea*, less frequently on *Fagus* and *Abies*. Most records are situated in submontane and montane belts (alt. 500–1000 m), however, two finds are from areas with climatic inversion (deep stream valleys) in the hilly country. The reported finds from Bohemia fill the gap between the previously known distribution areas in southern Germany and in the Western Carpathians in Moravia, Silesia, Poland and Slovakia. They show that *Pycnoporellus fulgens* is currently well established in Central Europe.

Key words: lignicolous fungi, *Polyporaceae*, natural forests

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Vzácný choroš *Pycnoporellus fulgens* byl do roku 1998 znám v České republice jen z 5 lokalit na severovýchodní Moravě a ve Slezsku. Z Čech nebyly známy žádné nálezy. V současné době víme o 11 lokalitách z Čech a 6 z Moravy, což znamená, že tento nápadný a těžko přehlédnutelný druh se v Čechách v posledních 7 letech rychle rozšířil. Vyskytuje se téměř výhradně na starých tlejících kmenech v lesních porostech jen minimálně ovlivněných člověkem (převážně v rezervacích), tvořených bukem, jedlí a smrkem. Většina nálezů je z podhůří a horských poloh (z nadmořských výšek 500–1000 m), ale dva nálezy pocházejí z pahorkatinného stupně (hluboká údolí potoků ovlivněná klimatickou inverzí). Publikované nálezy vyplňují mezeru mezi dříve známými oblastmi výskytu v jižním Německu a v Západních Karpatech na území Moravy, Slezska, Polska a Slovenska. Zároveň ukazují, že *Pycnoporellus fulgens* je v současné době ve střední Evropě dobře etablován.

INTRODUCTION

Pycnoporellus fulgens (Fr.) Donk (Basidiomycetes, *Polyporaceae*) is an interesting polypore remarkable for the orange colour of its pilei. In Europe, Ryvarden and Gilbertson (1994) characterise it as a "rare continental species apparently

restricted to the natural area of *Picea* and distinctly restricted to old forests with high continuity". Recently, its distribution in Poland and in Europe was summarised by Piątek (2002). The species is also widespread in North America (Gilbertson and Ryvarden 1987) and Asia (see summary by Kotlaba 1984: 107), always in mountains or northern areas.

Older finds from the Czech Republic (CR) were published by Kotlaba (1984: p. 107, map 62). Five localities reported by him are concentrated in natural ("virgin") forests of northeastern Moravia and Czech Silesia (eastern part of the CR). The only published find from Bohemia (western part of the CR) is from Soudný forest near Blatná in southern Bohemia (Kosina 1999: 24). A short note on its occurrence in the Šumava Mts. was published by Holec (2003).

In the last seven years, I collected *Pycnoporellus fulgens* at four new localities in Bohemia and further finds were made by other Czech and Moravian mycologists. The aim of this paper is to summarise the current knowledge on the distribution and ecology of this remarkable species in the Czech Republic.

MATERIAL AND METHODS

Voucher specimens are deposited in herbaria PRM and BRNM and in several private herbaria. Fresh fruitbodies collected by J. Holec were mostly documented by colour slides or digital photographs stored at PRM.

Abbreviations: CR: Czech Republic; dia: the fruitbodies were photographed using colour slides; JH: collection made by Jan Holec; MTB: Central European mapping grid.

RESULTS AND DISCUSSION

Recent finds of *Pycnoporellus fulgens* (Fr.) Donk from the Czech Republic

Bohemia

Šumava Mts. (= Bohemian Forest)

Site called Debrník (part of 1st zone of the Šumava National Park called Medvědí jámy), 1.7 km S of the church in the village of Železná Ruda, SW slope of Debrník mountain, alt. 800 m, MTB 6845, small remnant of an old, natural montane forest composed of *Fagus*, *Abies* and *Picea*, with many fallen trunks in various stages of decay, on decaying fallen trunk of *Picea abies*, 21 Sep. 1998 leg. J. Holec, JH 603/1998, det. Z. Pouzar (PRM 897321).

Dračí skály rocks (1st zone of the Šumava National Park), ca. 1.2 km NNE of site called Čeňkova Pila, 3.5 km NNE of the village of Srní, SWW slope S of the main stone ridge of the rocks, alt. 730 m, MTB 6846, old *Abies* forest on stony slope with admixture of *Picea abies* and *Fagus sylvatica*, on decaying fallen trunk of *Picea abies*, 10 Oct. 2002 leg. et det. J. Holec, JH 459/2002, dia (PRM 900761).

Jilmová skála (nature reserve in the Šumava Protected Landscape Area), Boubín area, ca. 1 km N of the village of Zátoň near Lenora, steep S slope, alt. 980 m, MTB 7048, on fallen trunk of *Picea abies* in a *Picea-Abies* forest, 30 July 2004 leg. et det. Josef Vlasák (private herb. J. Vlasák 0407/29a,b).

Žlebský vrch mountain (1st zone of the Šumava National Park), 0.5 km SW of the village of České Žleby near Lenora, E slope, alt. 950 m, MTB 7148, natural ravine forest (*Acer pseudoplatanus*, *Fagus*, *Picea*, *Sorbus*, *Abies*) on stony slope, on fallen trunk of *Picea abies* without bark, 6 Oct. 2004 leg. et det. A. Vágner (PRM).

Medvědice virgin forest (1st zone of the Šumava National Park), 0.4 km NE of the top of Stožec mountain near Volary, NW part of the 1st zone, NE slope, alt. 920 m, MTB 7148, old managed *Picea* forest with admixture of *Fagus* (at the place of an native montane mixed forest which survived in the vicinity), on fallen trunk of *Picea abies* without bark, 29 March 2003 leg. J. Holec et P. Balda, JH 5/2003, det. J. Holec (PRM 900815).

Malá Niva peat-bog (1st zone of the Šumava National Park), at the SW margin of the 1st zone (48°54'42.2"N, 13°48'44.4"E), c. 1.7 km SE of the centre of Lenora near Volary, alt. 755 m, MTB 7048, moist cultural spruce forest with *Calamagrostis villosa*, *Carex brizoides*, *Pleurozium schreberi*, *Hylocomium splendens*, *Polytrichum formosum* etc., on bottom surface and felling area of fallen trunk of *Picea abies* with bark, 7. Oct. 2004 leg. et det. D. Dvořák (private herb. D. Dvořák).

Černý les mountain (nature reserve in the Šumava Protected Landscape Area), 2 km SEE of the village of Záhvozdí between Volary and Horní Planá, near the top of the mountain, alt. 1000 m, MTB 7149, on fallen trunk of *Picea abies*, 23 Sep. 2002 leg. Petr Balda, det. Petr Vampola (private herb. P. Vampola 41b/02).

Central Bohemia

Chynínské buky Nature Reserve, Brdy hills, 9 km W of Rožmitál pod Třemšínem, 3 km NE of the village of Chynín, SE slope, alt. 750 m, MTB 6448, old natural *Fagus* forest (association *Dentario enneaphylli-Fagetum*) with many fallen and decaying trunks, on freshly fallen, partly decorticated trunk of *Fagus sylvatica*, 2 July 2004 leg. et det. J. Holec, JH 101/2004, digital photo (PRM). – ditto, 28 Aug. 2004: on decaying fallen trunk of *Fagus sylvatica*, JH 121/2004

(PRM); on fallen and decorticated trunk of *Picea abies*, JH 124/2004, dia, digital photo: Figs. 1, 2 (PRM); on decaying fallen trunk of *Picea abies* (not collected); on decaying fallen trunk of *Picea abies*, digital photo: Fig. 3 (not collected); on decaying fallen trunk of *Fagus sylvatica*, digital photo: Fig. 4 (not collected).

Chlumská stráž National Nature Reserve on slopes of Berounka river valley, former Rokycany District, 1 km N of the village of Kladruby, alt. 300 m, MTB 6047, near the confluence of an unnamed stream and Radubice stream, in a deep, moist valley, on fallen trunk of *Picea abies*, 1 July and 17 Sep. 2004 leg. et det. Anna Lepšová, rev. J. Vlasák (private herb. A. Lepšová).

Southern Bohemia

Soudný forest near Staňkovský rybník fish-pond, near the village of Kocelovice, 5 km N of Blatná, alt. 501 m, MTB 6549, on decaying felled trunk of *Picea abies*: moist lower part of the felling area, 20 Sep. 1998 leg. et det. Cyril Kosina (PRM 892759, published by Kosina 1999).

Fabián Nature Reserve, former Jindřichův Hradec District, c. 3.5 km SE of the village of Příbraz near Lásenice, S part of the reserve: Homolka hill, alt. 600 m, MTB 6955, old natural *Fagus* forest (association *Dentario enneaphylli-Fagetum*) with many fallen and decaying trunks, on young, partly decorticated fallen trunk of *Fagus sylvatica*, 7 Sep. 2002 leg. et det. Josef Vlasák (private herb. J. Vlasák 0209/8a,b).

Moravia

Moravian Karst

Vývěry Punkvy National Nature Reserve, Suchý žleb, near the village of Vilémovice near Macocha (49°22'25"N, 16°43'50"E), alt. 350 m, MTB 6666a, mixed forest: *Picea abies*, *Fagus sylvatica*, *Acer pseudoplatanus*, on a fallen trunk of *Picea abies*, 20 Aug. 2000 leg. J. Kramoliš, det. V. Antonín 00.110 (BRNM 652871).

Moravskoslezské Beskydy Mts.

Salajka National Nature Reserve, near the village of Bílá, MTB 6576, on decaying fallen trunk of *Abies alba*, 2 Aug. 2004 leg. et det. V. Antonín (04.151) et D. Janda, dia (BRNM 691388).



Fig. 1. *Pycnoporellus fulgens*, Chyninské buky Nature Reserve, *Picea abies*, JH 124/2004 (PRM), for details on the find see Results.



Fig. 2. *Pycnoporellus fulgens*, Chyninské buky Nature Reserve, *Picea abies*, JH 124/2004 (PRM), for details on the find see Results.



Fig. 3. *Pycnoporellus fulgens*, Chynínské buky Nature Reserve, typical habitat: on old fallen trunk of *Picea abies* in a natural forest (association *Dentario enneaphylli-Fagetum*), not collected.



Fig. 4. *Pycnoporellus fulgens*, Chynínské buky Nature Reserve, typical habitat: on old fallen trunk of *Fagus sylvatica* in a natural forest (association *Dentario enneaphylli-Fagetum*), not collected.

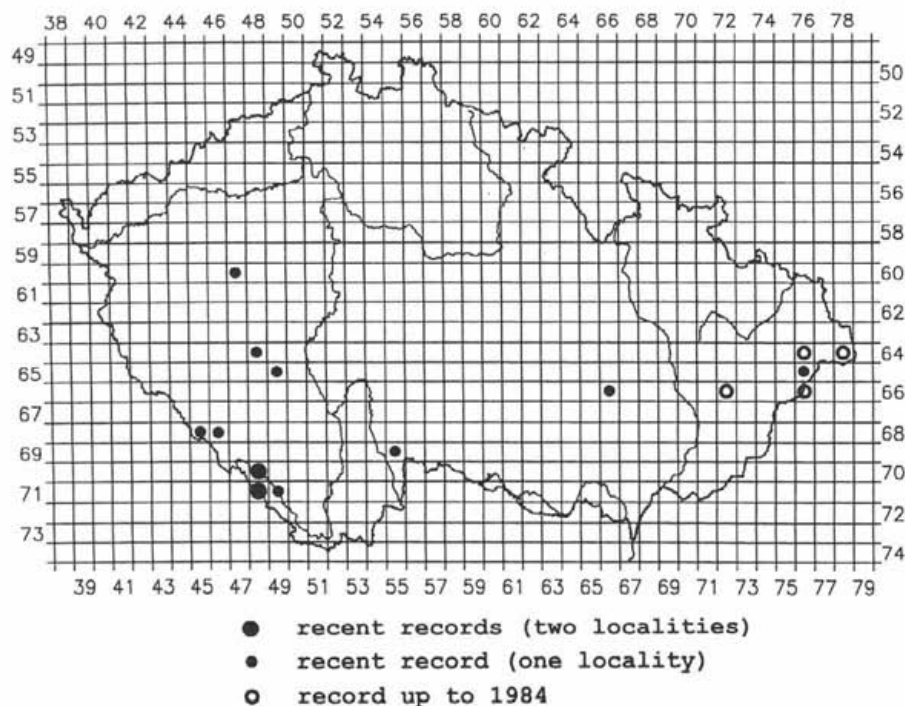


Fig. 5. Distribution of *Pycnoporellus fulgens* in the Czech Republic. Empty dots: localities known till 1984 and mapped by Kotlaba (1984); full dots: localities discovered in the period 1998–2004, small dots: one locality, big dots: two localities. The map uses the MTB grid.

Older records from Moravia and Czech Silesia

5 localities (see below, data kindly provided by F. Kotlaba), mapped by Kotlaba (1984: p. 107, map 62).

Salajka National Nature Reserve, Moravskoslezské Beskydy Mts., near the village of Bílá, alt. 770 m, MTB 6576, on dead trunk of *Picea abies*, 18 Aug. 1966 leg. et det. F. Kotlaba.

Mionší National Nature Reserve, Moravskoslezské Beskydy Mts., near Jablunkov, alt. 850 m, MTB 6478, on fallen trunk of *Abies alba*, 23 Aug. 1966 leg. et det. F. Kotlaba et Z. Pouzar (PRM 628182) – ditto, 7 Sep. 1969 leg. et det. F. Kotlaba (PRM 682069).

Mazák National Nature Reserve, Moravskoslezské Beskydy Mts., near the village of Staré Hamry, alt. 650 m, MTB 6476, on dead trunk of *Abies alba*, 20 Aug. 1966 leg. et det. F. Kotlaba et Z. Pouzar (PRM 628183).

Razula National Nature Reserve, Javorníky Mts., near the village of Velké Karlovice, alt. 750 m, MTB 6676, on fallen trunk of *Fagus sylvatica*, 28 Aug. 1970 leg. et det. F. Soukup.

Stream valley below the site called Hrubá jedle, between cottages Na Tesáku and Troják, Hostýnské vrchy hills, near the village of Hošťálková, alt. 580 m, MTB 6672, on fallen trunk of *Abies alba*, 15 Aug. 1981 leg. A. Vágner, det. A. Černý (BRNM).

Distribution in the Czech Republic

number of localities	Bohemia (western part of the CR)	Moravia and Silesia (eastern part of the CR)
number of localities known before 1984	0	5
current number of known localities	11	6
Total	11	6

Based on 5 Moravian and 8 Slovak localities known at that time (no finds from Bohemia), Kotlaba (1984) wrote that *Pycnoporellus fulgens* has a Carpathian distribution character in the former Czechoslovakia. Kotlaba and Pouzar (1963) considered the species a remarkable polypore of the Slovakian Carpathians. However, in this study 11 recent localities of *Pycnoporellus fulgens* from Bohemia are reported. Consequently, it is necessary to correct Kotlaba's statement and to say that *Pycnoporellus fulgens* is not a Carpathian element in the mycoflora of the Czech Republic. However, the survey of finds from Slovakia made by Škubla (2003) shows that *Pycnoporellus fulgens* really is commoner in the Slovakian Carpathians than in the Czech Republic, but this is due to a higher percentage of natural forests – the appropriate habitat for this species – in Slovakia.

In Bohemia, the richest area of occurrence are the Šumava Mts. (7 localities). In other areas only one or two localities are known (see above): Southern Bohemia (Soudný forest, Fabián), Central Bohemia (Chlumská stráň, Chynínské buky), Central Moravia (Vývěry Punkvy), Javorníky Mts. (Razula) and Hostýnské vrchy hills (below Hrubá jedle). A second area with richer occurrence of *Pycnoporellus fulgens* are the Moravskoslezské Beskydy Mts. in northeastern Moravia (Kotlaba 1984: Mionší, Mazák, Salajka; + recent find from Salajka). The species is not known from Northern and Eastern Bohemia and from Southern and Northwestern Moravia where remnants of near-natural forests are rare. In general, the richest single locality is Chynínské buky Nature Reserve in Brdy hills (Central Bohemia) where the species was found at 6 places in 2004.

It is interesting that *Pycnoporellus fulgens* was never found in Bohemia before the year 1998 in spite of a long and intensive study of polypores made in the

second half of the 20th century especially by Pilát, Kotlaba, Pouzar, Černý, Soukup, and Vampola. Its fruitbodies are so striking that it is almost unthinkable that some of these polyporologists would have overlooked them in the field. *Pycnoporellus fulgens* has enlarged its distribution area, but the reasons remain unclear. A spread of the species (to southern Germany and Les Vosges) was also described by Krieglsteiner (1981). Similarly, Niemelä (1980) observed that *Pycnoporellus fulgens* became less rare in Finland in recent decades. There are several possible explanations. First, the search for it was low in the past and the species was omitted, but this seems unlikely. Second, the spread of *Pycnoporellus fulgens* is a consequence of changing habitat conditions (global climate changes). Last but not least, the spread is a demonstration of the natural dynamics of the species. A detailed and goal-directed study in future decades could help us to resolve this problem. In spite of this fact, *Pycnoporellus fulgens* is included in Red Lists of several European countries, e.g. Germany (Benkert et al. 1992, as strongly endangered), Denmark (Stoltze and Pihl 1998; as endangered), Sweden (Gärdenfors 2000, as a vulnerable species) and the Czech Republic (in preparation; as a vulnerable species). I consider this correct because *Pycnoporellus fulgens* remains a rare species preferring remnants of natural forests which are rare in European nature.

Piątek (2002) concludes that the distribution of *Pycnoporellus fulgens* (in Poland) is determined by climate (either boreal or cold mountainous) and the occurrence of old natural forests. I fully agree with his second statement, but based on data from the CR, I would prefer the microclimate (stable, moist, rather cold; see next paragraph) instead of climate.

The recent finds of *Pycnoporellus fulgens* in Bohemia fill the gap between the published records from the hilly country and mountains of southern Germany (e.g. Enderle 2004; Krieglsteiner 1991, 2000; Luschka 1993) and the Western Carpathians in Moravia, Silesia, Poland and Slovakia (Kotlaba 1984, Piątek 2002, Škubla 2003). It means that *Pycnoporellus fulgens* remains rare but is currently well established in appropriate habitats of Central Europe.

Altitude

	up to 200 (lowlands)	200–500 (hilly country)	500–800 (submontane belt)	800–1100 (montane belt)
number of localities	0	2	9	6

Pycnoporellus fulgens is distributed from altitudes of 300 m to 1000 m, i.e. from the hilly country to the mountains. Most finds are from the submontane to

montane belt (alt. 500–1000). The two finds from the hilly country (alt. 300 and 350 m) originate from deep, moist stream valleys (sites with climatic inversion) with (semi)natural occurrence of *Picea abies* where the presence of *Pycnoporellus fulgens* is probably enabled by a cold microclimate.

Habitats

Concerning the character of localities, almost all finds are from near-natural to natural forests protected in nature reserves (exceptions: Soudný forest near Blatná – cultural forest, Malá Niva – cultural forest at the margin of natural habitats in the 1st zone of the Šumava National Park). Such forest reserves are almost the only sites in the Czech Republic rich in old, fallen trunks in various stages of decay. Fruitbodies of *Pycnoporellus fulgens* occur both on fallen decorticated hard wood trunks and on decaying soft wood trunks. Generally, *Pycnoporellus fulgens* can be considered a species preferring stands with seminatural to natural vegetation. This agrees well with data from other European countries (see e.g. summaries by Ryvar den and Gilbertson 1994, Piątek 2002). Consequently, *Pycnoporellus fulgens* is a useful bioindicator in nature conservation and mapping of ecosystems.

Kotlaba (1984) wrote that *Pycnoporellus fulgens* preferably grows in *Abies-Fagus* virgin forests (in the former Czechoslovakia). This habitat is certainly the best one for *Pycnoporellus fulgens*. However, some finds published here are not from typical mixed virgin forests (*Fagus*, *Abies*, *Picea*) but from slightly man-influenced stands where the tree layer is composed of these species but their ratio is increased in favour of *Picea* or *Abies*.

Substrate

	<i>Picea</i>	<i>Abies</i>	<i>Fagus</i>
number of finds	14	4	5
ratio	61 %	17 %	22 %

Pycnoporellus fulgens clearly prefers the wood of conifers. Kotlaba (1984) mentions *Abies* as the most frequent host species (data from Moravia and from the Slovak Republic). In Bohemia, the species is much more frequent on *Picea* (this paper). In almost pure beech stands (e.g. the nature reserves Chynínské buky or Fabián), *Pycnoporellus fulgens* was found either on *Fagus* only or both on *Fagus* and *Picea*. In Europe, *Pycnoporellus fulgens* is known from conifers (*Picea*, *Abies*,

Pinus) and less frequently from broadleaved trees (*Alnus*, *Betula*, *Fagus*, *Populus*, *Quercus*, *Tilia*) (Ryvarden and Gilbertson 1994, Piątek 2002).

Fructification

month	March	July	August	September	October
number of finds*	1	2	7	5	3

* repeated finds on one day at one locality are not included

Fructification of *Pycnoporellus fulgens* culminates in August and September. The only find in March represents dead, overwintered fruitbodies.

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