CZECH MYCOL. 61(1): 13–26, 2009

Unusual occurrence of *Phellinus nigrolimitatus* in man-influenced habitats at low altitudes in the České Švýcarsko National Park, Czech Republic

JAN HOLEC

National Museum, Mycological Department, Václavské nám. 68, 115 79 Praha 1, Czech Republic
jan_holec@nm.cz

Holec J. (2009): Unusual occurrence of *Phellinus nigrolimitatus* in man-influenced habitats at low altitudes in the České Švýcarsko National Park, Czech Republic. – Czech Mycol. 61(1): 13–26.

In the Czech Republic, *Phellinus nigrolimitatus* mostly occurs in the montane and supramontane, less frequently submontane old-growth forests. However, in the České Švýcarsko (Bohemian Switzerland) National Park (N Bohemia), it grows at altitudes of 180–270 m, namely in the Kamenice river canyon (deep valley in sandstone rocks) and its side gorges. In 2008 the species was observed there at 18 microlocalities distributed over 4 localities, growing on rather thin dead trunks of *Picea abies*, both naturally fallen and felled, sometimes even machined ones (used for stabilising forest paths). The habitats comprise both near-natural mixed stands and man-influenced to man-made *Picea* forests, *Picea* copses and small open places within *Picea* stands. Consequently, the generally accepted value of *P. nigrolimitatus* being a bioindicator of natural habitats decreases somewhat. The most important factors enabling the local occurrence of *P. nigrolimitatus* are the relatively cold and humid microclimate at the bottom of the canyon (climatic inversion) and the continuous *Picea* occurrence at this site.

Key words: fungi, polypores, *Hymenochaetaceae*, ecology, distribution, Central Europe.

Holec J. (2009): Neobvyklý výskyt druhu *Phellinus nigrolimitatus* v člověkem ovlivněných biotopech a v nízké nadmořské výšce národního parku České Švýcarsko. – Czech Mycol. 61(1): 13–26.

Ohňovec ohraničený – *Phellinus nigrolimitatus* se v České republice většinou vyskytuje v horských, méně často podhorských přirozených lesích. V národním parku České Švýcarsko však roste v nadmořské výšce 180–270 m, a sice v pískovcové soutěsce říčky Kamenice a v několika bočních roklích této soutěsky. V roce 2008 zde byl pozorován na 18 mikrolokalitách soustředěných do 4 lokalit. Byl nalezen na tenčích mrtvých kmenech smrku, jak přirozeně padlých, tak pokácených a někdy dokonce využitých pro zpevnění pěšin. Biotopy zahrnovaly jak poměrně přirozené smíšené porosty, tak člověkem ovlivněné až umělé smrčiny, smrkové mlaziny a malá otevřená místa ve smrkových porostech. Tyto nálezy poněkud zmenšují hodnotu druhu coby bioindikátora přirozených porostů. Nejdůležitější faktory umožňující výskyt *P. nigrolimitatus* v soutěsce Kamenice jsou poměrně chladné a vlhké mikroklima na dně soutěsky a bočních roklí (klimatická inverze) a zdejší kontinuální výskyt smrku.

INTRODUCTION

Phellinus nigrolimitatus (Romell) Bourdot et Galzin (= *Phellopilus nigrolimitatus* (Romell) Niemelä et al.) is a saprotrophic polypore growing on fallen trunks of conifers. In the Czech Republic (CR) it grows especially on wood of *Picea abies*, less frequently of *Abies alba* (Kotlaba 1984). It is known there from old-growth forests (i.e. near-natural, natural and virgin forests; for an explanation of these terms, see Holec 2008b) in the montane and above all supramontane belts, less frequently in the submontane belt (Kotlaba 1984, Kotlaba et al. in Holec and Beran 2006). It is rarely known from the colline belt (S Bohemia, Vltava river valley, Karvanice nature reserve; see Vlasák in Papoušek 2004, Vlasák 2009). The species is included in the Red List of fungi of the CR (Holec and Beran 2006: category NT – near threatened). It is not included in the list of fungi protected by law (Antonín and Bieberová 1995) but belongs to the species which should be added to its future update (Holec and Beran 2004a, b).

Phellinus nigrolimitatus was first found in the České Švýcarsko National Park (NP) by A. Vágner and J. Čáp in 1998 (Čáp 2002), namely in the Kamenice river canyon (alt. 180 m) NW of Dolský mlýn mill near the village of Jetřichovice. Later the species was collected at the same locality by J. Holec (herb. PRM 902200). *P. nigrolimitatus* belongs to the most valuable species of fungi in the NP (Holec 2008a) where it has its lowest localities in the CR. The occurrence at altitudes of 180–270 m is enabled by the cold and humid microclimate at the bottom of the sandstone river canyon and adjacent gorges (climatic inversion).

Fig. 1. Geographic position of the České Švýcarsko National Park.

The aim of this work is to evaluate the current distribution of *P. nigrolimitatus* in the České Švýcarsko NP, to document its ecology in the area in detail and to compare it with data from the rest of Europe.

METHODS

Phellinus nigrolimitatus was searched during seven visits in 2008 (4 July, 5 July, 21 Aug., 22 Aug., 23 Aug., 4 Sep., 5 Sep.), especially at cold and wet localities with fallen trunks of *Picea* (canyons of the Kamenice and Křinice rivers and surrounding gorges). Other areas of the NP were searched in the years 2002–2007, however, the fungus was not found there. All finds in 2008 were made by J. Holec. They were documented in the following way: 1. establishing their exact geographic position (outdoor GPS device Garmin GPSmap 60CSx, for coordinates, see Tab. 1), 2. taking photographs of the substrate and habitat, 3. recording detailed data on number of fruitbodies, accompanying fungal species, substrate, habitat, and geomorphology (see Tab. 2), 4. taking voucher specimens (kept in the herbarium PRM).

The degree of naturalness of forest stands is described using the terms (for detailed explanation, see Holec 2008b) virgin forest, natural forest and near-natural forest (these categories represent so-called old-growth forests), man-influenced forest and man-made forest.

Abbreviations: BRNM: herbarium of the Moravian Museum, Brno; CR: Czech Republic, JH: Jan Holec, LSG: Landschaftsschutzgebiet, MJ: herbarium of the Muzeum Vysočiny, Jihlava, Czech Republic; NP: National Park, PLA: Protected Landscape Area, PRM: herbarium of the National Museum, Mycological Department, Prague.

RESULTS

Phellinus nigrolimitatus – current occurrence in the České Švýcarsko NP

All visited localities are enumerated and the presence or absence of *Phellinus nigrolimitatus* is cited. They are arranged from west to east. The localities where *P. nigrolimitatus* was found appear in bold face. The microlocalities hosting *P. nigrolimitatus* are described in detail in Tabs. 1 and 2.

Kamenice river canyon

Area from the village of Hřensko to the western boat stop in Edmundova (Tichá) soutěska canyon, west part: left bank of the Kamenice, east part: right bank of the Kamenice; *P. nigrolimitatus* not found (4 July 2008).

Area from eastern boat stop in Edmundova (Tichá) soutěska canyon to western boat stop in Divoká soutěska canyon, left bank of the Kamenice; *P. nigrolimitatus* not found (4 July 2008).

Area from eastern boat stop in Divoká soutěska canyon to Soorgrund side gorge, right bank of Kamenice; *P. nigrolimitatus* not found (4 July 2008).

Area from side gorge named Kostelní stezka trail (connecting the villages of Kamenická Stráň and Vysoká Lípa) to Dolský mlýn mill and the confluence with Jetřichovická Bělá stream, right bank of the Kamenice; *P. nigrolimitatus* not found (5 Sep. 2008).

Ferdinandova soutěska canyon, northern part (up to 0.5 km S of Dolský mlýn mill), left bank of the Kamenice; *P. nigrolimitatus* not found (21 Aug. 2008).

Ferdinandova soutěska canyon, southern part (2.5 km N of the church in the village of Srbská Kamenice), right and left banks of the Kamenice; *P. nigrolimitatus* found (22 Aug. 2008): **microlocalities 17 and 18** (Tabs. 1 and 2).

Area from Ptačí kámen rock W of the village of Vysoká Lípa to side gorge named Kostelní stezka trail (connecting the villages of Kamenická Stráň and Vysoká Lípa), right bank of the Kamenice; *P. nigrolimitatus* found (5 July 2008, 21 Aug. 2008): **microlocalities 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and 15** (Tabs. 1 and 2).

Side gorges facing the Kamenice river canyon

Písečná rokle gorge NE of the village of Janov, left bank of the Kamenice; *P. nigrolimitatus* not found (23 Aug. 2008).

Dlouhý důl gorge, 1.7 km NE of the village of Janov, left bank of the Kamenice; *P. nigrolimitatus* not found (23 Aug. 2008).

Gorge from the village of Mezná to Mezní můstek bridge in Kamenice canyon (green-marked tourist track), right bank of the Kamenice; *P. nigrolimitatus* not found (23 Aug. 2008).

Gorge from Mezní můstek bridge in Kamenice canyon facing the village of Růžová (green-marked tourist track), left bank of the Kamenice; *P. nigrolimitatus* not found (23 Aug. 2008).

Gorge of the Kachní potok stream (lower part up to 0.5 km S of Kamenice canyon) NE of the village of Růžová, left bank of the Kamenice; *P. nigrolimitatus* not found (22 Aug. 2008).

Soorgrund gorge S of the village of Mezní Louka (yellow-marked tourist track), right bank of the Kamenice; *P. nigrolimitatus* not found (4 July 2008).

Gorge 0.35 km SSE of Ptačí kámen rock, right bank of the Kamenice; *P. nigrolimitatus* found (5 July 2008): **microlocalities 1 and 2** (Tabs. 1, 2).

Gorge named Kostelní stezka trail from Kamenická Stráň village to Kamenice canyon, left bank of the Kamenice; *P. nigrolimitatus* not found (22 Aug. 2008).

Tab. 1. Microlocalities of *Phellinus nigrolimitatus* in Kamenice river canyon and adjacent gorges.

micro-locality	locality
1	Gorge 0.35 km SSE of Ptačí kámen rock, right bank of the Kamenice
2	Gorge 0.35 km SSE of Ptačí kámen rock, right bank of the Kamenice
3	Kamenice river canyon: from Ptačí kámen rock W of the village of Vysoká Lípa to side gorge named Kostelní stezka trail
4	Kamenice river canyon: from Ptačí kámen rock W of the village of Vysoká Lípa to side gorge named Kostelní stezka trail
5	Kamenice river canyon: from Ptačí kámen rock W of the village of Vysoká Lípa to side gorge named Kostelní stezka trail
6	Kamenice river canyon: from Ptačí kámen rock W of the village of Vysoká Lípa to side gorge named Kostelní stezka trail
7	Kamenice river canyon: from Ptačí kámen rock W of the village of Vysoká Lípa to side gorge named Kostelní stezka trail
8	Kamenice river canyon: from Ptačí kámen rock W of the village of Vysoká Lípa to side gorge named Kostelní stezka trail
9	Kamenice river canyon: from Ptačí kámen rock W of the village of Vysoká Lípa to side gorge named Kostelní stezka trail
10	Kamenice river canyon: from Ptačí kámen rock W of the village of Vysoká Lípa to side gorge named Kostelní stezka trail
11	Kamenice river canyon: from Ptačí kámen rock W of the village of Vysoká Lípa to side gorge named Kostelní stezka trail
12	Kamenice river canyon: from Ptačí kámen rock W of the village of Vysoká Lípa to side gorge named Kostelní stezka trail
13	Kamenice river canyon: from Ptačí kámen rock W of the village of Vysoká Lípa to side gorge named Kostelní stezka trail
14	Kamenice river canyon: from Ptačí kámen rock W of the village of Vysoká Lípa to side gorge named Kostelní stezka trail
15	Kamenice river canyon: from Ptačí kámen rock W of the village of Vysoká Lípa to side gorge named Kostelní stezka trail
16	gorge of Kostelní stezka path from Kamenice river canyon to the village of Vysoká Lípa
17	Kamenice river canyon: Ferdinandova soutěska – S part, between the villages of Srbská Kamenice and Vysoká Lípa
18	Kamenice river canyon: Ferdinandova soutěska – S part, between the villages of Srbská Kamenice and Vysoká Lípa

Gorge named Kostelní stezka trail from Kamenice canyon to the village of Vysoká Lípa, right bank of the Kamenice; *P. nigrolimitatus* found (21 Aug. 2008): **microlocality 16** (Tabs. 1, 2).

Valley of Jetřichovická Bělá stream

Area between Dolský mlýn mill and national park boundary at W margin of the village of Jetřichovice, *P. nigrolimitatus* not found (5 Sep. 2008).

Křinice river canyon

Former village of Zadní Jetřichovice (meadows, solitary trees), left bank of the Křinice; *P. nigrolimitatus* not found (5 Sep. 2008).

Křinice river canyon 0.3–1.2 km E of former village of Zadní Jetřichovice, left bank of the Křinice; *P. nigrolimitatus* not found (5 Sep. 2008).

Side gorges of the Křinice river canyon, part from the former village of Zadní Jetřichovice to Hraniční most bridge

Gorge at curve of Křinice river facing Jankův kopec hill, 1.3 km ESE of the former village of Zadní Jetřichovice, left bank of the Křinice; *P. nigrolimitatus* not found (5 Sep. 2008).

Valley of Jetřichovický potok stream (= lower part of Hluboký důl gorge), part from Česká silnice forest road to the former village of Zadní Jetřichovice, left bank of the Křinice, *P. nigrolimitatus* not found (5 Sep. 2008).

Gorge with N-S direction S of site called Černá brána, 1–1.4 km NW of Vosí vrch hill near the village o Doubice, left bank of the Křinice; *P. nigrolimitatus* not found (4 Sep. 2008).

Gorge of Červený potok stream up to 0.7 km from the Křinice river, 2 km S of Hraniční most bridge, left bank of the Křinice; *P. nigrolimitatus* not found (4 Sep. 2008).

	latitude (N)	longitude (E)	alt.	date	voucher specimen
	50° 51.377′	14° 20.214′	270	5 July 2008	PRM 909894
	50° 51.372′	14° 20.199′	270	5 July 2008	PRM 909895
	50° 51.380′	14° 20.064′	200	5 July 2008	PRM 909896
	50° 51.256′	14° 20.106′	190	5 July 2008	PRM 909897
	50° 51.263′	14° 20.113′	190	5 July 2008	PRM 909898
	50° 51.264′	14° 20.103′	190	5 July 2008	PRM 909899
	50° 51.245′	14° 20.173′	190	5 July 2008	PRM 909901
	50° 51.273′	14° 20.202′	190	5 July 2008	PRM 909902
	50° 51.245′	14° 20.224′	190	5 July 2008	PRM 909903
	50° 51.249′	14° 20.238′	190	21 Aug. 2008	not documented
	50° 51.231′	14° 20.335′	190	21 Aug. 2008	not documented
	50° 51.263′	14° 20.416′	190	21 Aug. 2008	not documented
	50° 51.197′	14° 20.390′	190	21 Aug. 2008	not documented
	50° 51.163′	14° 20.375′	190	21 Aug. 2008	not documented
	50° 51.107′	14° 20.555′	190	21 Aug. 2008	not documented
	50° 51.110′	14° 20.669′	230	21 Aug. 2008	not documented
	50° 50.556′	14° 21.313′	200	22 Aug. 2008	PRM 909907
	50° 50.590′	14° 21.252′	200	22 Aug. 2008	not documented

Gorge W of Hadí pramen spring, 1.2 km S of Hraniční most bridge, left bank of the Křinice; *P. nigrolimitatus* not found (4 Sep. 2008).

Tab. 2. Numbers of fruitbodies, characters of trunks, habitats and geomorphology at individual microlocalities of *Phellinus nigrolimitatus*.

microlocality	**1**	**2**	**3**	**4**	
fruitbodies: number	1	5	9	4	
fruitbodies: pileate		X		X	
fruitbodies: semipileate	X	X	X	X	
fruitbodies: resupinate			X		
fruitbodies: size in cm	10	<3	5–10	10–15	
trunk: diameter in cm	25	25	30	25	
trunk: lying on soil	X	X		X	
trunk: above ground (leaning on neighbouring trunks or rocks)			X		
trunk: stage of decay (2: without bark, with hard wood, 3: without bark, with soft wood, 4: very soft wood, falling apart)	3	3–4	2–3	2–3	
trunk: covered by mosses (coverage in %)		20	20	70	
trunk: spontaneously fallen	X	X	X	X	
trunk: felled or machined, used for stabilising paths					
trunk: other fungi	X		X		
neighbouring trunks as potential substrate (number)	10	10	2	5	
habitat: man-influenced mixed forest outside rocks	X	X			
habitat: man-influenced spruce forest (sometimes with *Fagus*)					
habitat: man-made spruce forest with admixed *Fagus*					
habitat: man-made spruce forest				X	
habitat: spruce copse					
habitat: near-natural mixed riverine stand (*Fagus, Picea, Alnus*)					
habitat: near-natural mixed riverine stand (*Fagus, Picea, Tilia*)					
habitat: near-natural mixed riverine stand (*Acer, Picea, Corylus*)					
habitat: near-natural mixed riverine stand (*Acer, Sorbus, Picea*)					
habitat: open place in spruce forest					
habitat: near-natural forest stand among rocks (*Pinus, Picea*)			X		
habitat: tree canopy (%)	80	90	20	30	
geomorphology: broadsided gorge facing the Kamenice river	X	X			
geomorphology: narrowsided gorge facing the Kamenice river					
geomorphology: among rocks above the Kamenice river			X		
geomorphology: slope between rocks and the Kamenice river				X	
geomorphology: narrow platform between rocks and the Kamenice river					
geomorphology: broad platform between rocks and the Kamenice river					
distance from the Kamenice river	?	?	15	20	
height above the Kamenice river	?	?	10	10	
slope exposure	W	W	SW	SW	

Gorge facing former Český mlýn mill, 0.4 km SSW of Hraniční most bridge, left bank of the Křinice; *P. nigrolimitatus* not found (4 Sep. 2008).

	5	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
	3	2	2	3	3	6	4	3	1	2	4	1	4	6
		X						X			X			
			X	X	X	X		X	X	X			X	X
	X			X		X	X					X	X	X
	10	<5	15	<10	<20	5–10	7	5–10	15	10–15	10–15	20	10–20	5–10
	15	15	12	12	20	12	15	15	25	30	20	25	25	40
		X	X		X	X	X	X	X		X	X	X	
	X			X						X				X
	2–3	2–3	2–3	3	3	3	3	3	3	3	3	3	2	3
	10	90	30	40				10	30	30	40	10	50	80
	X	X								X		X	X	X
			X	X	X	X	X	X	X		X			
	X													
	8	7	5	3	6	7	8	2	2	0	4	20	1	0
								X			X	X		
			X				X							
	X													
										X				
				X		X								
					X									
													X	
														X
		X							X					
	30	0	50	80	90	80	60	50	10	50	70	30	90	10
												X		
	X	X	X	X			X				X			
					X	X							X	X
								X	X	X				
	20	15	10	7	4	2	6	8	8	13	1	80	5	2
	10	8	2	3	1	1	5	4	2	2	1	35	1	1
	SW	SW	S	SSE	—	SSE	SSW	SW	SSW	SSW	WSW	WSW	E	NNE

DISCUSSION

Distribution in the České Švýcarsko NP

Before 2008, *Phellinus nigrolimitatus* was known only from 2–3 microlocalities in the Kamenice river canyon (area between Dolský mlýn mill and Ptačí kámen rock: Čáp 2002 – BRNM 642652; PRM 902200 and field notes by J. Holec from the period 2002–2007). During a detailed search in 2008 the species was observed at 18 microlocalities distributed over 4 localities. The richest locality is situated in the canyon between Ptačí kámen rock and Kostelní stezka trail leading from the village of Vysoká Lípa (the same locality as in the past), where the species was found at 13 microlocalities (= 13 fallen trunks of *Picea*). Another locality situated directly in the Kamenice river canyon is in a gorge called Ferdinandova soutěska (2 microlocalities). The remaining 3 microlocalities are situated in the vicinity of the richest locality, but in side gorges at the right bank of the main Kamenice canyon (gorge facing SSE from Ptačí kámen rock to the Kamenice canyon, gorge named Kostelní stezka trail from the Kamenice to the village of Vysoká Lípa).

These data show that *Phellinus nigrolimitatus* is well established in the Kamenice river canyon between the villages of Srbská Kamenice and Vysoká Lípa. However, this area represents only a small part of the canyon. In addition, this part is strongly influenced by man (the vegetation is mostly formed by man-made to man-influenced habitats; near-natural habitats are rare here). Surprisingly, the species was not found in the parts of the canyon which are covered by better preserved natural vegetation represented especially by mixed forests (area between Soorgrund gorge to the village of Hřensko).

Fifteen out of eighteen finds were made in the close vicinity of the Kamenice river (up to 20 m from the river bank and up to 10 m above the water-level; they are mostly represented by slopes or narrow platforms between the river and the neighbouring sandstone rocks). The remaining 3 microlocalities are situated in side gorges open to the main Kamenice canyon.

It is remarkable that *Phellinus nigrolimitatus* was not observed in the Křinice river canyon (the second largest canyon of the České Švýcarsko NP) and its side gorges. Visually, this area is very similar to the microlocalities in the Kamenice river canyon. However, the knowledge of the mycobiota of the Křinice canyon is less complete, and, thus, there is still a chance that the species will be discovered there. A detailed search for *P. nigrolimitatus* is planned in the seasons to come.

Distribution in the neighbouring areas of the CR

The nearest localities of *P. nigrolimitatus* are situated in mountains of the northern part of the CR (Kotlaba 1984), but only in those where remnants of old-

Fig. 2. Decaying trunk of *Picea* – typical substrate of *P. nigrolimitatus* (microlocality 9).

Fig. 3. Decaying fallen trunk (right) covered with mosses on slope between the Kamenice river and sandstone rocks – typical substrate and habitat of *P. nigrolimitatus* (microlocality 4).

Fig. 4. Trunk used for stabilising a forest path along the Kamenice river – substrate of *P. nigrolimitatus* (microlocality 13).

Fig. 5. Broad gorge from Ptačí kámen rock to the Kamenice river. The fallen trunk is inhabited by *P. nigrolimitatus* (microlocality 2).

growth forests are preserved: Krkonoše Mts. (NP), Králický Sněžník Mts., Hrubý Jeseník Mts. (PLA), Slavkovský les Mts. (PLA). The remaining Czech sites (Kotlaba 1984; Vlasák 2009; collections in PRM, BRNM, MJ) are situated in mountains and highlands of the central part (Žďárské vrchy hills: PLA), southern part (Šumava Mts.: NP and PLA; Novohradské hory Mts.; Českomoravská vrchovina highlands) and northeastern part (Beskydy Mts.: PLA) of the country. Its occurrence in the colline belt (alt. 200-500 m) in southern Bohemia is discussed below. These data show that *P. nigrolimitatus* is restricted to several (mostly montane) areas and its occurrence in the České Švýcarsko NP is exceptional by its low altitude and richness in microlocalities.

Ecology in the České Švýcarsko NP

The ecology of *Phellinus nigrolimitatus* in the České Švýcarsko NP considerably differs from the situation known in the submontane, montane and supramontane belts (altitude above 500 m) of the Czech Republic. In these areas, *P. nigrolimitatus* mostly grows on thick, old (0.5–1.5 m in diameter) fallen trunks of *Picea* and *Abies* in near-natural, natural and virgin forests (Kotlaba 1984, Kotlaba et al. in Holec and Beran 2006, Vlasák in Papoušek 2004, personal field data by J. Holec, numerous collections by J. Holec in PRM).

However, in the Kamenice river canyon (Tab. 2), the species grows on thinner dead trunks of *Picea abies* (diameter 0.15–0.4 m), both lying on soil and above the ground (trunks leaning on neighbouring trunks or sandstone rocks), both on naturally fallen trunks and trunks felled for stabilising forest paths. The trunks are in later stages of decay, mostly having soft wood and being more or less covered by mosses. The habitats are represented by a broad spectrum of stands, from near-natural mixed stands along the river (*Fagus*, *Picea*, *Alnus*, *Tilia*, etc.) to man-influenced or man-made *Picea* forests, *Picea* copses or even small open places within *Picea* stands. The forest canopy is very variable, too (from 0 to 90 %, i.e., the stands vary from open places to dense stands).

The most important factors enabling the occurrence of *P. nigrolimitatus* at such low altitudes (180–270 m) are the relatively cold and humid microclimate at the bottom of the sandstone canyon (climatic inversion) and the natural occurrence of *Picea abies* at such sites (Pokorný et al. 2008). The second Bohemian locality in the colline belt (S Bohemia, Vltava river valley, site called Boky, Karvanice nature reserve, steep slope covered by old beech forest with spruce and fir, alt. c. 400 m; see Vlasák in Papoušek 2004, Vlasák 2009) is similar with respect to the natural occurrence of *Picea*, however, the Vltava river valley is much wider and the effect of climatic inversion is smaller there.

The finds from the České Švýcarsko NP show that *P. nigrolimitatus* is able to grow not only on thick and naturally fallen trunks in old-growth forests, but also

on thinner and felled to machined trunks in man-influenced to man-made habitats. This corresponds with the fact that its fruitbodies are sometimes found on decaying coniferous beams in ruins of old houses in former montane villages (e.g. Šumava Mts. – specimen in PRM: JH 258/2008; Vlasák in Papoušek 2004) and even on wood in inhabited houses (Hansen and Knudsen 1997; J. Klán, lecture on wood-destroying fungi in buildings, Prague, 2009). Therefore, *P. nigrolimitatus* cannot be considered a relict species confined exclusively to remnants of natural vegetation almost untouched by man. It clearly prefers old-growth forests but rarely occurs also in cultivated tree stands. Its value as a bioindicator of natural habitats (old-growth forests) and long ecological continuity was thoroughly discussed by Holec (2008c) based on data from a range of European countries. Records from man-influenced to man-made habitats in the České Švýcarsko NP (and from buildings, see above) somewhat decrease the bioindicator status of *P. nigrolimitatus*. However, the occurrence of *P. nigrolimitatus* in man-influenced stands of the Kamenice river canyon and its side gorges certainly represents a continuation of its presence in formerly natural vegetation – broadleaved forests (mostly composed of *Fagus* and *Abies*) with admixed *Picea* (Pokorný et al. 2008).

Generally, *Phellinus nigrolimitatus* is currently well established in the Kamenice river canyon and some surrounding gorges and its future occurrence seems to be ensured there. Almost all its microlocalities (= individual fallen trunks of *Picea*) are surrounded by similar trunks (Tab. 2) which will offer a suitable substrate when the currently inhabited trunks will be already decayed.

Distribution and ecology in the European context

In Europe, *P. nigrolimitatus* mostly occurs in the mountains and in boreal forests of northern Europe (e.g. Kotlaba 1984, Ryvarden and Gilbertson 1994, Hansen and Knudsen 1997). Concerning the neighbouring countries of the CR, the species is known from the mountains in West Germany (the Alps, Bayerischer Wald; see Krieglsteiner 1991), Austria (Krieglsteiner 1991) and Slovakia (Škubla 2003). In Oberlausitz (Upper Lusatia), a neighbouring part of Germany situated north of the České Švýcarsko NP, *P. nigrolimitatus* is not known (Dunger 1987). However, I. Dunger did not study the sandstone area (Sächsische Schweiz NP and LSG) neighbouring with the České Švýcarsko NP, and, thus, it cannot be excluded that the fungus also lives in the German part of the sandstone massif. However, Prof. Hans-Jürgen Hardtke from the working group of Saxon mycologists (AG Sächsischer Mykologen) informed me (pers. comm. 2009) that *P. nigrolimitatus* is not known from the Sächsische Schweiz NP. There are neither voucher specimens of *P. nigrolimitatus* from the Sächsische Schweiz in the nearest herbarium (GLM: Staatliches Museum für Naturkunde Görlitz; pers. comm. by H. Boyle, curator of the GLM, 2009).

In Poland, *P. nigrolimitatus* is known from old-growth forests in the submontane to supramontane belts but there are also records from the Puszcza Augustowska and Puszcza Białowieska primeval forests (Wojewoda 2003) which are located in the lowlands (altitude 135–190 m). There are also records from the Netherlands (Arnolds et al. 2009), an exclusively lowland country. This means that the low-situated records from the České Švýcarsko NP are unique in the Czech Republic but there are similar cases in Europe.

ACKNOWLEDGEMENTS

I want to thank P. Vampola (Smrčná, Czech Republic), H. Boyle (Görlitz, Germany) and H.-J. Hardtke (Possendorf, Germany) for information on the occurrence of *P. nigrolimitatus* in some areas. The study was financially supported by the Administration of the České Švýcarsko NP and by the Ministry of Culture of the Czech Republic (MK00002327201).

REFERENCES

ANTONÍN V. and BIEBEROVÁ Z. (1995): Chráněné houby ČR (Fungi protected by law in the Czech Republic). – 88 p. Praha. (in Czech)

ARNOLDS E., KUYPER T. W. and NOORDELOOS M. E., eds. (1995): Overzicht van de paddestoelen in Nederland. – 872 p. Wijster.

ČÁP J. (2002): Zajímavosti z mykoflóry Labských pískovců (Interesting mycoflora of the Labské pískovce sandstone area). – Mykol. Sborn. 79(1): 16–18.

DUNGER I. (1987): Kartierung der Porlinge (porige Polyporales und Poriales) der Oberlausitz. I. Verbreitung und Ökologie der Arten. – Abhandlungen und Berichte des Naturkundemuseums Görlitz 60(11): 1–160.

HANSEN L. and KNUDSEN H., eds. (1997): Nordic macromycetes. Vol. 3. Heterobasidioid, aphyllophoroid and gastromycetoid Basidiomycetes. – 444 p. Copenhagen.

HOLEC J. (2008a): Zajímavé a vzácné houby Národního parku České Švýcarsko (Interesting and rare fungi of the České Švýcarsko National Park). – In: Bauer P., Kopecký V. and Šmucar J., eds., Labské pískovce – historie, příroda a ochrana území, p. 61–66, AOPK ČR, Správa CHKO Labské pískovce, Děčín. (in Czech)

HOLEC J. (2008b): Ecology of the rare fungus *Hydropus atramentosus* (Basidiomycota, *Agaricales*) in the Czech Republic and its potential value as a bioindicator of old-growth forests. – Czech Mycol. 60(1): 125–136.

HOLEC J. (2008c): Interesting macrofungi from the Eastern Carpathians, Ukraine and their value as bioindicators of primeval and near-natural forests. – Mycologia Balcanica 5: 55–67.

HOLEC J. and BERAN M. (2004a): Seznam druhů hub na doplnění vyhlášky o zvláště chráněných druzích organismů (List of fungi for addition to the public notice on specially protected species of organisms in the Czech Republic). – Mykol. Listy 87: 4–14. (in Czech)

HOLEC J. and BERAN M. (2004b): Seznam druhů hub na doplnění vyhlášky o zvláště chráněných druzích organismů (dokončení) (List of fungi for addition to the public notice on specially protected spe-

cies of organisms in the Czech Republic. 2nd part). – Mykol. Listy 88: 6–16. (in Czech with English summary)

HOLEC J. and BERAN M., eds. (2006): Červený seznam hub (makromycetů) České republiky (Red list of fungi (macromycetes) of the Czech Republic). – Příroda 24: 1–282. (in Czech with English summary)

KOTLABA F. (1984): Zeměpisné rozšíření a ekologie chorošů (Polyporales s. l.) v Československu (Geographical distribution and ecology of polypores (Polyporales s. l.) in Czechoslovakia). – 194 p. Praha. (in Czech with English summary)

KOTLABA F. et al. (1995): Červená kniha ohrozených a vzácnych druhov rastlín a živočíchov SR a ČR. Vol. 4. Sinice a riasy. Huby. Lišajníky. Machorasty (Red book of threatened and rare species of the Slovak and Czech Republics). – 221 p. Bratislava. (in Czech with English and German summaries)

KRIEGLSTEINER G. J. (1991): Verbreitungsatlas der Großpilze Deutschlands (West). Band 1: Ständerpilze. Teil A: Nichtblätterpilze. – 416 p. Stuttgart.

PAPOUŠEK T., ed. (2004): Velký fotoatlas hub z jižních Čech (Large atlas of mushroom photographs from southern Bohemia). – 820 p. České Budějovice. (in Czech with German, French and English summary)

POKORNÝ P., KUNEŠ P. and ABRAHAM V. (2007): Holocenní vývoj vegetace v Českém Švýcarsku (Holocene development of vegetation in the České Švýcarsko area). – In: Bauer P., Kopecký V. and Šmucar J., eds., Labské pískovce – historie, příroda a ochrana území, p. 35–49, AOPK ČR, Správa CHKO Labské pískovce, Děčín. (in Czech)

RYVARDEN L. and GILBERTSON R. L. (1994): European polypores. Part 2. *Meripilus – Tyromyces*. – In: Synopsis Fungorum, vol. 7, p. 388–743, Oslo.

ŠKUBLA P. (2003): Mycoflora slovaca. – 1103 p. Šaľa.

VLASÁK J. (2009): Polypores. Collection of Dr. Josef Vlasák, Hluboká nad Vltavou, Czech Republic. Edition 1. I. 2009. – http://mykoweb.prf.jcu.cz/polypores/list_phellinus.html [accessed 3 April 2009].

WOJEWODA W. (2003): Checklist of Polish larger basidiomycetes. – 812 p. Kraków.