

**A new, conspicuously coloured *Bolbitius* species
from the Czech Republic**

ANTON HAUSKNECHT¹, VLADIMÍR ANTONÍN² and JIŘÍ POLČÁK³

¹Sonndorferstraße 22, A-3712 Maissau, Austria
ahausknecht.oemg@aon.at

²Moravian Museum, Department of Botany, Zelný trh 6, CZ-659 37 Brno, Czech Republic
vantonin@mzm.cz

³Bratrská 8, CZ-755 02 Přerov, Czech Republic
j.polcak@email.cz

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A new species, *Bolbitius psittacinus* Hauskn., Antonín et Polčák, found in the Hostýnské vrchy hills (NW Moravia, Czech Republic) is described. It belongs to subgen. *Bolbitius* and is characterised by having a wrinkled, very variably coloured pileus with green, orange, yellow, ochre, olive and red colours and transitions between them. It grows on *Fagus sylvatica* sawdust and wood remnants. A comparison with some similar extra-European species is given.

Key words: Agaricales, *Bolbitiaceae*, *Bolbitius psittacinus*, new species, Czech Republic, Moravia

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Je popsán nový druh slzečníku z Hostýnských vrchů (sz. Morava, Česká republika), *Bolbitius psittacinus* Hauskn., Antonín et Polčák. Patří do podrodu *Bolbitius* a je charakterizován výrazně vrásčitým, velmi barevně proměnlivým kloboukem zbarveným v zelených, oranžových, žlutých, okrových, olivových a červených barvách se vzájemnými přechody. Roste na pilinách a zbytcích dřeva buku. Jsou rovněž diskutovány rozdíly od podobných mimoevropských druhů. Je pro něj navrženo české jméno slzečník papouščí.

INTRODUCTION

In the period 2001–2006, the third author observed a large, attractively and very conspicuously coloured *Bolbitius* species growing on beech sawdust and wood remnants in a depository close to a charcoal production site in the Hostýnské vrchy hills, Czech Republic. It occurred in numbers of thousands of

basidiocarps. There is no species having similar colours in Europe (up to Arnolds 2005) nor in publications on extra-European taxa (Singer 1978; Watling and Gregory 1981; Pegler 1977, 1983, 1986; Watling 1975, 1976, 1987, 1988, 1992, 1994). Therefore we have decided to describe it as a new species.

MATERIAL AND METHODS

Microscopic features are described from material mounted in Melzer's reagent and Congo Red. For the basidiospores the factor E (quotient of length and width in any one spore) is used. Authors of fungal names are cited according to Kirk and Ansell (1992), colour abbreviations according to Kornerup and Wanscher (1983), herbarium abbreviations follow Holmgren (2003).

RESULTS

Bolbitius psittacinus Hauskn., Antonín et Polčák **spec. nov.** Figs. 1–5

(Mycobank: 510718, GeneBank EF648217 and EF648218)

Pileo 30–95 mm lato, juvenile parabolico vel convexo, mature umbonato, irregulariter undulato, juvenile centro aurantiaco-brunneo, purpureo-brunneo, rubro vel sanguineo, margine nigro, nigro-viridi, nigro-olivaceo, olivaceo-viridi, mature centro rubro, sanguineo, brunneo-rubro nonnunquam viridi (*Hygrocybe psittacina* similibus), in rugulis aurantiaco vel luteo-viridi vel sordide luteo, rugulose undulato, lubricoso. Lamellis sordide albidis vel griseis, mature luteo-brunneis vel luteo-ochraceis. Stipite 25–70 × 3,5–7 mm, cylindraco, sicco, lateraliter compresso, juvenile viridi-luteo vel caeruleo-viridi-luteo, mature ochraceo-luteo, nonnunquam luteo. Basidiosporis 7,0–10 × 4,5–6,0 µm, ellipsoideis, ellipsoideo-nucleiformibus, leviter crassitunicatis, ferrugineo-luteis vel aurantiaco-luteis. Basidiis tetrasporis, raro bisporis. Cheilocystidiis (15–)20–45 × 7,5–12 µm, utriforbibus vel cylindraco-ventricosis. Pseudoparaphysibus praesentibus. Pileipellis hymeniformis, e cellulis 28–35 × 19–29 µm, globosis vel globosopedicellatis. Caulocystidiis usque 100 × 10 µm, cylindracois vel irregulariter cylindracois, cum cellulis ventricosis vel lageniformi-ventricosis mixtis. Hyphis fibulatis. Ad scobes et fragmenta ligni Fagi.

Holotypus: Czechia, Moravia, montes Hostýnské vrchy, Hošťálková, prope Bernátka, 1. IX. 2006 leg. J. Polčák, V. Antonín, H. Deckerová, S. Komínková et L. Tmej (holotypus in herbario BRNM 705079 asservatur, isotypus in herbario WU 27015 asservatur).

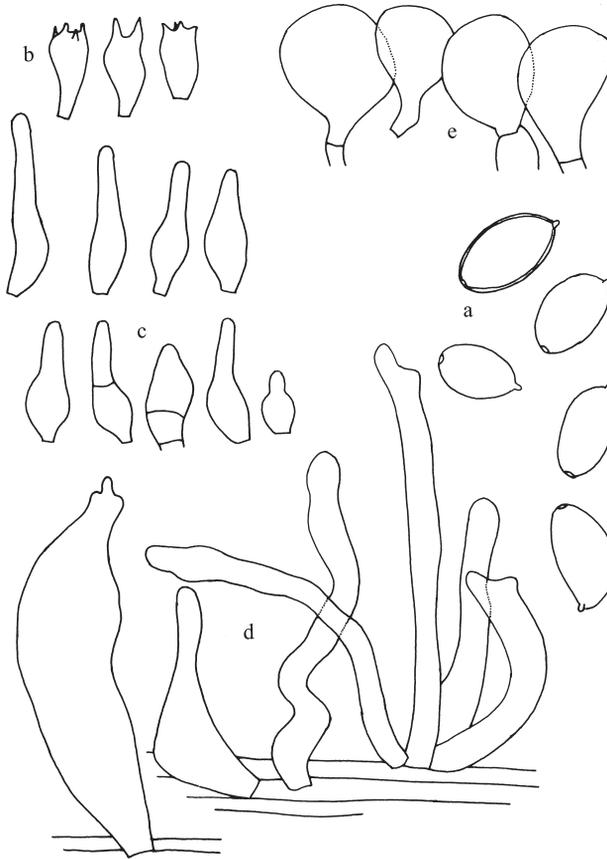


Fig. 1. *Bolbitius psittacinus* (holotype). a – spores, $\times 2000$; b – basidia, $\times 800$; c – cheilocystidia, $\times 800$; d – caulocystidia, $\times 800$; e – pileipellis, $\times 800$. A. Hausknecht del.

Pileus 30–95 mm broad, parabolic to conical when young, then with obtuse umbo, slightly inflexed at margin, irregularly undulate, slightly hygrophanous, at most when old translucently striate at margin; when young orangeous chestnut brown (9–10F7), purplish brown (10–11DE7–8), red to blood red (10BC8) at centre, very variable in colour, sometimes black, black-green, black-olive, olive-green (3D4) or olive with pale green stains (2C–D5), sometimes with orange-yellow (3–4A6, 4–5A4) margin when young; when old mostly red, blood red (10A–C8), also brown-red (9D7), in some basidiocarps even green (4E7–8, similar to *Hygrocybe psittacina*), mostly red, orange to yellow-orange towards margin, but paler, orange (6–7B8), yellow-green to dirty yellow (3–4A4, 4B4 to 3A–B5) in wrinkles, sometimes the entire pileus with an orange to yellow-orange tinge; surface pitted, pitted-wrinkled at centre, wrinkled-undulate at margin, slimy, slightly sticky-slimy when old. Lamellae moderately close, L = 30–35, l = 3–4, adnate

with tooth, rather narrow (up to 5 mm), anastomosing only when old; dirty white to greyish, also with olive tinge (\pm 3B2, 29C4) when young, yellow-brown to yellow-ochre (4B–C5–6) when old, edge slightly paler or concolorous, finely pubescent. Stipe 25–70 \times 3.5–7 mm, cylindrical, laterally compressed and apically slightly broadened in older basidiocarps, not broadened, slightly clavate to almost bulbous at base; green-yellow (30B4) to blue-green-yellow (24–25B4) when young, later ochre-yellow (4A–B5), with blue-green tinge (23–25B3–4) at base, also entire stipe sometimes uniformly yellow (2–3A4); surface longitudinally fibrillose to finely floccose when young, dry. Stipe base strigose-hirsute, basal mycelium white to blue-greenish tinged. Context thin, watery yellow, colour under the pileipellis, \pm yellow (2–3A4) in stipe, with greenish blue tinge in stipe centre, white in stipe base; smell at first indistinctly fungoid, later similar to that of *Scleroderma*, taste mild but unpleasant.

Basidiospores 7.0–10 \times 4.5–6.0 μm , average 9.0 \times 5.2 μm , $E = 1.5$ –1.9, ellipsoid, ellipsoid pip-shaped, never compressed (lentiform), with smooth, slightly thickened wall and c. 1 μm wide germ-pore, rusty yellow to orange-yellow in KOH. Basidia 4-spored, rarely mixed with 2-spored ones, 16–22 \times 8.0–11 μm , mostly distinctly barrel-shaped. Lamellar edge heteromorphic. Cheilocystidia (15–)20–45 \times 7.5–12 μm , mostly utriform, rarely cylindrical-ventricose, with long prolonged apex (4.0–5.0 μm broad). Pleurocystidia absent. Pseudoparaphyses in hymenium present, but often rather difficult to observe. Stipe covering mostly in fascicles, consisting of cylindrical or irregularly cylindrical caulocystidia, up to 100 \times 10 μm , mixed with ventricose, lageniform-ventricose elements, up to 90 \times 25 μm , the latter sometimes with slightly capitate broadened apex or with small projections. Pileipellis hymeniform, composed of 28–35 \times 19–29 μm , globose to globose-pedicellate elements. Pileocystidia absent. Clamp-connections frequently present at bases of basidia and in trama hyphae.

The DNA sequences from ITS and LSU regions of nuclear ribosomal DNA of holotypus are deposited in the NCBI database under accession numbers of EF648217 and EF648218 respectively.

Habitat and distribution: on *Fagus sylvatica* sawdust and wood remnants in an insulated open-air situation at a depository close to a charcoal production site along a road; observed since 2001, in the years 2005–2006 in numbers of thousands of basidiocarps each year (Tab. 1); known only from the type locality in the Czech Republic. Fructifying from June to November (to December in 2006).

Material studied: Czech Republic, Moravia, Hostýnské vrchy hills, Hošťálková, near Bernátka gamekeeper's lodge, 49° 21' 07" N, 17° 47' 25" E, alt. 550–560 m, 10 Sept. 2005 leg. J. Polčák (herb. J. Burel). – Ibid., 23 Sept. 2005 leg. J. Polčák (BRNM 705078). – Ibid., 1 Sept. 2006 leg. J. Polčák, V. Antonín, H. Deckerová, S. Komínková and L. Tmej (BRNM 705079, holotype; WU 27015, isotype). – Ibid., 3 Sept. 2006 leg. J. Burel and J. Polčák (PRM 848057). – Ibid., 21 Oct. 2006 leg. J. Burel (herb. J. Burel).



Fig. 2. *Bolbitius psittacinus* (Hostýnské vrchy hills, Hošťálková): young carpophores. Photo: M. Kříž.



Fig. 3. *Bolbitius psittacinus* (Hostýnské vrchy hills, Hošťálková). Photo: J. Polčák.



Fig. 4. *Bolbitius psittacinus* (Hostýnské vrchy hills, Hošťálková). Photo: V. Antonín.



Fig. 5. *Bolbitius psittacinus* (Hostýnské vrchy hills, Hošťálková). Photo: J. Polčák.

Tab. 1. Number of carpophores seen at the type locality (J. Polčák).

Year	Date	Number of carpophores	Year	Date	Number of carpophores
2001	22 Sept.	3	2005	27 June	12
	12 Oct.	6		16 July	50
	19 Oct.	2		28 July	300
2002	7 Aug.	2		30 Aug.	42
	17 Aug.	3		5 Sept.	70
	2 Sept.	8		18 Sept.	1500
	23 Sept.	22		22 Sept.	600
	26 Sept.	13		9 Oct.	1200
	3 Oct.	4		18 Oct.	800
	19 Oct.	4		24 Oct.	400
	2 Nov.	2	13 Nov.	150	
2003	12 July	19	2006	15 July	34
	14 Aug.	5		30 July	300
	25 Aug.	5		18 Aug.	800
	9 Sept.	9		1 Sept.	4000
	23 Sept.	60		18 Sept.	5000
	30 Sept.	29		23 Sept.	3000
	8 Oct.	16		6 Oct.	8000
	15 Oct.	2		15 Nov.	2500
	20 Oct.	4		27 Nov.	200
	5 Nov.	11		4 Dec.	200
2004	8 July	9	19 Dec.	60	
	15 July	2			
	28 July	8			
	13 Aug.	4			
	1 Sept.	35			
	12 Sept.	150			
	21 Sept.	150			
	29 Sept.	200			
	12 Oct.	25			
25 Oct.	2				

DISCUSSION

Bolbitius psittacinus is especially characterised by its very conspicuously and unusually coloured and large basidiocarps. Due to the massive growth of this new species we could observe the conspicuous changes of colours of especially the pileus during its development from very young basidiocarps to mature and old ones.

It represents a synanthropic species as its habitat at the type locality is under very strong human influence (regularly used depository) and the fungus seems to grow uninterruptedly there. We supposed that it would grow there also in the next years, however, the type locality is in danger now because the company has stopped the production of charcoal, and beech stems are taken off the locality.

In Europe, there is only one *Bolbitius* species possessing reddish colours, viz. *Bolbitius coprophilus* (Peck) Hongo. It is entirely pale pink to orange-white when young, but quickly pallescent and becoming pale brown (Arnolds 2005, Hausknecht and Krisai-Greilhuber 2003). Additionally to the different colours, this species also has distinctly larger basidiospores and differently shaped cheilocystidia.

Only a few taxa with reddish, purplish, at least partly greenish or bluish pileus or stipe colours are known.

Bolbitius incarnatus Hongo, described from Japan (Hongo 1958), is pink-salmon coloured when young, later pale hazelnut brown, and has also a slightly pinkish stipe when young. Having large basidiospores (12.5–16 µm long) and mostly vesiculose cheilocystidia, it is microscopically similar to *Bolbitius coprophilus* and, therefore, differs also from our new species.

Bolbitius glaucopurpureus (Berk. et Broome) Kühner from Sri Lanka (Pegler 1986) has a purplish lilac to bluish tinged pileus and also basidiospores larger (11.5–15 × 4.5–6.2 µm) than in our new species.

Bolbitius malesianus Watling from Malaysia (Watling 1994) was described as having a smaller, up to 37 mm broad and lilac-purplish to purplish umbra-brown pileus. Watling (1994) compared it with *Bolbitius reticulatus* (Pers.: Fr.) Ricken because of having similar colours sometimes. *Bolbitius malesianus* has basidiospores of the same size as *Bolbitius psittacinus*, which are narrower and often distinctly boletoid, its cheilocystidia are more distinctly irregularly shaped and often have a slightly capitate top.

Conspicuity of the North American *Bolbitius callisteus* (Peck) Watling, found only once in dried out water-holes in swamp woods, can be excluded because of the different habitat and colours.

Another North American species, *Bolbitius viscosus* Watling, can easily be distinguished from our new species by its slightly, but distinctly ornamented spores, smaller fruitbodies and more blackish olive to olive-brown, never reddish cap colours.

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