

**A NEW RECORD OF *MYCENA PICTA* (Fr.: Fr.) HARMAJA (*AGARICALES*,
BASIDIOMYCOTA) FROM THE WIGIERSKI NATIONAL PARK (NE POLAND)**

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ABSTRACT: Until recently *Mycena picta* (Fr.: Fr.) Harmaja has been reported only from one locality in Poland, i.e. from the Białowieża Forest. The paper presents the second locality of the species in the country. The recognized fungus grown in an oak-hornbeam forest, on a rotten stump of coniferous tree in the Wigierski National Park. Macro- and micromorphological characters of the recorded specimens are described and illustrated. A historical review of the taxonomic status of *Mycena picta*, the information on its biology, ecology, general distribution, and conservation status are summarized.

KEY WORDS: *Mycena picta*, *Xeromphalina picta*, rare fungi, Wigierski National Park, NE Poland

Introduction

On the basis of its morphological features, *Mycena picta* (Fr.: Fr.) Harmaja was placed in the section *Pictae* (A.H. Sm.) Maas Geest. of the genus *Mycena* (Pers.) Roussel. The species is the monotype of the section and it is readily identified on account of the cylindrical pileus, the horizontal to somewhat decurrent lamellae (with their much greater breadth than their length), which are attached to the hollow and abruptly dilated upper part of the stipe by their inner margins (Maas Geesteranus 1983).

The first description of the present known *Mycena picta* (Fr.: Fr.) Harmaja was almost certainly provided by Schumacher (1803). The author described the fungus from Denmark (Sealand) under the name of *Agaricus phiala* Schumach. It is worth mentioning that Schumacher depicted the species earlier, on an unpublished at that time, watercolour painting dated to 1800th and presented in the paper of Læssøe (1983). The look-alike

picture of *A. phiala* Schumach. was also published on the 1730th plate of Hornemann's "Flora Danica" (1821).

Fries his first description of the fungus provided in 1815 (Fries 1815). He described the collection of *Agaricus pictus* Fr. from southern Sweden (Småland, forest in the vicinity of Femsjö). Later (1821), he accepted (and thus sanctioned) the name *Agaricus pictus* Fr. and included the Schumacher's *A. phiala* from "Enumeratio plantarum" as a synonym of the species. In "Epicrisis systematis mycologici", Fries (1836-1838) ignored the earlier synonym of *A. pictus* derived from Schumacher (1803) and pointed to other sources in that regard, i.e. the mentioned earlier 1730th plate of "Flora Danica" by Hornemann and additionally *A. pictus* Fr. recognized by Weinmann (1836). Afterwards *A. pictus* Fr. has been placed in various genera, such as *Omphalia* (Pers.) Gray (Gillet 1876; Cejp 1936), *Omphalina* Qué. (Quélet 1886) and *Xeromphalina* Kühner & Maire (Smith 1953; Miller 1968). Singer (1975) suggested that the taxon belongs to *Mycena* or some genus other than *Xeromphalina* (Harmaja 1979; Miyamoto *et al.* 1996), and Harmaja (1979) placed it in the genus *Mycena* as *Mycena picta* (Fr.: Fr.) Harmaja. Harmaja (1979) suggested at the same time the relationship of *M. picta* to *Mycena aurantiomarginata* (Fr.: Fr.) Qué. (section *Luculentae* Maas Geest.). Maas Geesteranus (1983) also stated, that *M. picta* in its essential features is quite certainly a *Mycena*, but due to its unique set of characters, the author included it to a new established section *Pictae* (A.H. Sm.) Maas Geest. Furthermore, Redhead (1988) and Antonín and Noordeloos (2004) also supported the approach of including of *A. pictus* Fr. to the genus *Mycena*.

M. picta has been known hitherto only from one locality in Poland. Its presence was noted for the first time in the country in the Białowieża Forest, where the species grown on dry but standing, mossy trunk of black alder, in the phytocoenosis of *Fraxino-Alnetum* W. Mat. (Bujakiewicz 2002). During our investigations of the diversity of macrofungi in the Wigierski National Park in the years 2008-2009, this rare and seldom mentioned in mycological literature species was found once on 30th of June 2009. A few dozen of carpophores were discovered at the time. The specimens, which represent the second record of the species from Poland, are described and illustrated here.

Methods

Material was collected within one locality. The description of macroscopic features is based on fresh material, on 1 collection, comprising 10 basidiomata in all stages of development. The microcharacters of one recorded (mature) basidioma were observed and measured under a light microscope at magnification 2000× (basidiospores, basidia) and 1250× (other features). For microscopic observations, dried pieces of basidioma were placed in 5% NH₄OH for about 2 minutes, than transferred to tap water until they become pliable. Free-hand sections of the rehydrated pieces of basidiomata were examined in 5% NH₄OH, Congo Red and phloxine (in 1% NH₄OH). Amyloidity was tested with the Melzer's reagent. Morphological measurements were made and are presented according to the method used by Breitenbach and Kränzlin (1991). The 95% population limits for the mean were calculated and the lower and upper limits are presented. The minimum and maximum dimensions are given in parentheses additionally. The ratio of basidiospore length to its width (Q) was calculated. The length of basidia was measured excluding sterigmata. The computation was performed with the Statistica software (StatSoft). Terminology of morphological and anatomical features was adopted mainly from Vellinga (1988). Reported size of spores, basidia, cheilocystidia and dimensions

of pileipellis elements, were based on 31, 31, 31 and 11 measurements, respectively. Drawings were made with the aid of a drawing tube, under an oil-immersion objective. The voucher specimens of *Mycena picta* have been deposited in the Herbarium of the Museum of Natural History, Wrocław University in Wrocław, Poland (WRSL).

Description of the specimens and discussion

Mycena picta (Fr.: Fr.) Harmaja, *Karstenia* 19: 52. 1979; syn. *Omphalia picta* (Fr.: Fr.) Gillet, *Omphalina picta* (Fr.: Fr.) Quél., *Xeromphalina picta* (Fr.: Fr.) A.H. Sm. (Maas Geesteranus 1983).

Macroscopic and microscopic features (Fig. 1, Fig. 2)

Pileus 2.0-7.0 mm high, 1.5-6.5 mm in diameter, cylindrical to cylindrical-campanulate, not expanded in age, the apex distinctly umbilicate, clearly translucent-striate, sulcate except at disc, surface glabrous, umbilicus and striae dark brown, the remainder ochre-brown to yellowish, paler toward margin, margin somewhat undulating. Lamellae subdistant (19-22 reach the stipe), cream when young, darker (pale grey or pale buff) when old, \pm in one tier, broadly adnate to subdecurrent, almost smooth lamellar edge extending nearly horizontally from the margin to the stipe. Stipe 8-61 \times 0.5-0.9 mm, hollow, equal but wider in the upper part, filiform, straight to somewhat curved, glabrous, cartilaginous, yellow-brown or fulvous, sometimes darker at the base (red-brown), base with whorl of yellowish brown, smooth, strigose fibrils (anchor hyphae). Context very thin, watery, yellowish to yellowish brown. Odour indistinct. Taste was not analysed. Spores (5.4) 6.8-7.3 (7.9) \times (3.0) 4.0-4.3 (4.7), $Q = (1.46) 1.66-1.74 (1.86) \mu\text{m}$, pip-shaped to broadly pip-shaped, amyloid. Basidia (20.5) 23.4-25.0 (26.6) \times (5.3) 5.8-6.3 (7.0) μm , narrowly clavate, with 4 (rarely with 2) sterigmata. Cheilocystidia usually difficult to see, hyaline in ammonia and faint yellow coloured in Melzer's solution, thin-walled, globose, subglobose, obpyriform or clavate (11.0) 20.5-28.7 (51.7) \times (7.5) 13.3-18.7 (34.1) μm , devoid of clamps, with simple to more rarely somewhat diverticulate excrescences (3.1) 7.0-10.1 (18.3) μm long. Pleurocystidia absent. Pileipellis poorly differentiated, of (7) 10.2-12.5 (17) μm wide, sometimes clamped and smooth hyphae, epicutis (epipellis) not observed. Hyphae of the cortical layer of the stipe smooth, caulocystidia absent. Trama of pileus and lamellae of thick-walled hyphae, yellowish in ammonia and deep red-brown in Melzer's solution (dextrinoid).

Material examined

NE Poland, Wigierski National Park, ca 1.2 km W of Sernetki village (23°12'03"E 54°00'04"N), oak-hornbeam forest (phytocoenosis of *Tilio cordatae-Carpinetum betuli* Tracz.), on rotten stump of coniferous tree (*Picea abies* ?), 30 June 2009, coll. M. Halama (in WRSL).

The macrocharacters (size, shape and colour) of recorded basidiomata of *Mycena picta* fall within the estimated range of variability of the species reported in the literature (cf. Breitenbach and Kränzlin 1991; Miyamoto et al. 1996; Aronsen 2009). Nevertheless, our collection differs from that studied by other authors (e.g. Miller 1968; Maas Geesteranus 1983; Breitenbach and Kränzlin 1991; Miyamoto et al. 1996) as regards of some microcharacters. The differences concern mainly the size of cheilocystidia and the length of the excrescences covering them (Table 1). However, the differences are not conspicuous and the recorded variation mainly concerns the extreme values, while the obtained average ones are barely standing out. Therefore it can be assumed that these

differences occur within the limits of variability of the species. On the other hand, it is difficult to explain some differences in the measurements of hyphae of pileipellis of the species. Cutis composed of a layer of inflated cells beneath the surface layer consisting of filamentous hyphae (less than 4µm wide) was described only by Miyamoto et al. (1996) and Breitenbach and Kränzlin (1991). We didn't observed in studied mature specimen this upper layer of pileipellis (epipellis). Moreover, Miller (1968) also reported the absence of distinctly developed epipellis on the pileus of *M. picta*, except some patches where a thin hyaline pellicle was present. It seems that additional studies of various collections are required to show the real variability of this feature (Table 1).

Habitat requirements and general distribution

Basidiocarps of *M. picta* appear in summer and fall season (July-October), but are found mostly in August (Schumacher 1803; Weinmann 1836; Cejp 1936; Miller 1968; Harmaja 1979; Læssøe 1983; Breitenbach and Kränzlin 1991; Miyamoto et al. 1996; Bujakiewicz 2002; Tolgor Wang and Li 2003). In Germany (Baden-Württemberg) the species has been reported also in May (Gminder and Krieglsteiner 2001). *M. picta* occurs solitary to gregarious (rarely subcaespitose), on many substrates in various woodland habitats (mixed hardwood-conifer forests, hardwood forests), including humus (also on hills inhabited by ants), woody debris and usually strongly decayed conifer or hardwood fallen (rarely standing) trunks, branches and stumps, e.g. *Abies*, *Picea*, *Alnus*, *Betula*, *Fagus* (Schumacher 1803; Weinmann 1836; Fries 1836-1838; Gillet 1890; Cejp 1936; Miller 1968; Harmaja 1979; Miyamoto et al. 1996; Gminder and Krieglsteiner 2001; Bujakiewicz 2002; Emmett et al. 2008). Breitenbach and Kränzlin (1991) reported also the occurrence of the species on mossy base of trunk of a living *Quercus*.

M. picta has been reported from North America (Alaska, Michigan, Oregon and Washington in the United States and Quebec in Canada), Asia (Japan, China and Russia) and Europe (Miller 1968; Miyamoto et al. 1996; Tolgor Wang and Li 2003; Bulakh 2007). In Europe the species is mainly limited to the west, central and northern part of the area (to the 62nd parallel north), and everywhere is considered as a quite rare species (Gminder and Krieglsteiner 2001). Apart from Poland (Bujakiewicz 2002; Bujakiewicz 2003), *M. picta* is known from England, Scotland (Legon et al. 2005), the Netherlands (Arnolds and Veerkamp 2008), Belgium (Noten et al. 2006), Liechtenstein, France (Cejp 1936; Anonymous 2004), Germany (Krieglsteiner 1981; Krieglsteiner 1991; Gminder and Krieglsteiner 2001), Switzerland (Breitenbach and Kränzlin 1991), Czech Republic (Antonín et al. 2006), Denmark, Norway, Sweden and Finland (Harmaja 1979; Læssøe 1983; Emmett et al. 2008). Furthermore, an interesting, isolated record of the species from the northern Spain (Asturias) has been reported recently by Rubio et al. (2006), while its occurrence in Italy, reported by Cejp (1936) is not confirmed by current available sources.

As pointed out by Legon et al. (2005), *Mycena picta* is a small, cryptically coloured species that can be easily overlooked. It's usually hard to determine a real threat or potential decline of the species because of its peculiarity. Nevertheless, as mentioned above, *M. picta* is recognized as a rare species in temperate as well as in boreal zone (Emmett et al. 2008) and it is included in the red lists of a few European countries, where its occurrence was confirmed. In England and Scotland the conservation status of the species was established as vulnerable (Legon et al. 2005). In the Netherlands *M. picta* is treated as a threatened species (Arnolds and Veerkamp 2008), in Germany as a very rare species

with no obvious decline trend at risk (Benkert et al. 1992). The fungus was designated as “data deficient” in Norway due to impossibility of making a scaled evaluation of the risk (Brandrud et al. 2006), while in Finland was classified as “least concern” (Kytövuori et al. 2005). According to Bujakiewicz (2002) *M. picta* should be included in the Polish red list of threatened fungi and classified as vulnerable (V) species.

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Fig. 1. Fruit bodies of *Mycena picta* recorded in the Wigierski National Park (coll. 30.06.2009; photo by M. Halama). Some specimens are infected by zygomycetous fungus of the family *Mucoraceae* (*Spinellus* sp.)

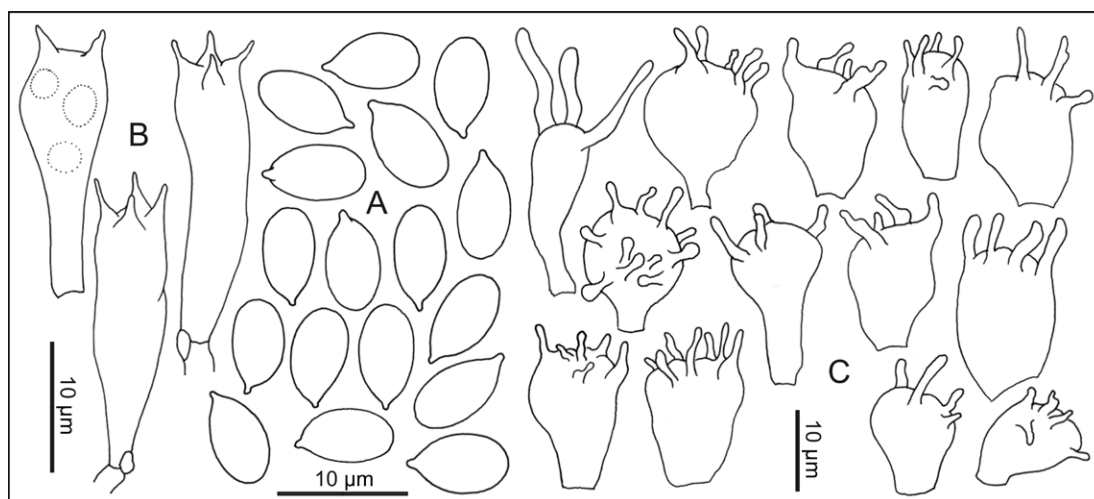


Fig. 2. Basidiospores (A), basidia (B) and cheilocystidia (C) of *Mycena picta* recorded in the Wigierski National Park (coll. 30.06.2009; drawn by M. Halama).

Table 1. Comparison of micromorphological features of *Mycena picta* from eight descriptions.

Reference	Length of spores [μm]	Width of spores [μm]	Q	Cheilocystidia (length \times width) [μm]	Length of excrescences of cheilocystidia [μm]	Width of hyphae of pileipellis [μm]
(Cejp 1936)	6.0-8.0	4.0-4.5	-	-	-	-
(Miller 1968)	6.0-9.0(-10)	3.3-4.4 (-5.0)	-	11-18 \times 8-12	1.5-3.5	-
(Harmaja 1979)	6.0-8.0	3.5-4.2	-	ca. 6 in diameter	up to 25	-
(Læssøe 1983)	(5.1)-6.8-8.5	3.4-4.3	-	-	-	-
(Maas Geesteranus 1983)	-	-	-	13.5-24 \times 9-16	up to 14.5	-
(Breitenbach and Kränzlin 1991)	6.4-9.0	3.8-5.1	1.5-2.0	11-20 \times 10-17	-	(2)6-8
(Miyamoto <i>et al.</i> 1996)	(5.6-)6.4-9.4(-10)	(2.6-)3.3-5.2	-	13.6-20 \times 8-16	0.8-5.6	(3-4)10-20
present study	(5.4) 6.8-7.3 (7.9)	(3.0) 4.0-4.3 (4.7)	(1.46) 1.66-1.74 (1.86)	(11.0) 20.5-28.7 (51.7) \times (7.5) 13.3-18.7 (34.1)	(3.1) 7.0-10.1 (18.3)	(7) 10.2-12.5 (17)

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