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INTERESTING MACROFUNGI IN HUNGARY VI. FOUR RARE BASIDIOMYCETE SPECIES

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Four rare species (*Hygrophorus aureus, Hygrophorus poetarum, Lactarius hysginus, Phaeolepiota aurea*) of the Hungarian red list of macrofungi (Basidiomycetes) are discussed. *Phaeolepiota aurea* is recorded in Hungary *for the first time.*

Key words: Hungary, *Hygrophorus aureus, Hygrophorus poetarum, Lactarius hysginus, Phaeolepiota aurea*, red list of the Hungarian macrofungi

INTRODUCTION

Discussion of rare and interesting macrofungi collected in Hungary were presented in several previous publications (VASAS and ALBERT 1990, VASAS *et al.* 1990, 1991, LOCSMÁNDI *et al.* 1993, VASAS 2002). The present paper is the sixth of the series. The compilation of the Hungarian red list of macrofungi (RIMÓCZI *et al.* 1999) has greatly stimulated the research and publication of the rare redlisted macrofungi of Hungary. Also the List is regularly revised, improved, and updated.

Hygrophorus aureus (Arrh.) Fries

Relatively rare in Hungary, in the Hungarian red list of macrofungi (RIMÓCZI *et al.* 1999) it is listed among the endangered species (EN, category 2). Altogether four specimens are kept in the Hungarian Natural History Museum (BP). The species was known from three localities before 1989 (BABOS 1989), *i.e.* from the Őrség (Farkasfa) and the Sopron Mts (Brennbergbánya) in western Hungary, and from the Visegrád Mts (Pilisszentkereszt) in the central part of the country. *H. aureus* was not reported for 14 years in Hungary, until it was discovered in a coniferous forest at Galgagyörk in November 2003.

H. aureus is a very characteristic species with reddish orange cap and very viscid fruitbody, appearing in coniferous woods in late autumn. The identification is relatively easy because of its characteristic features. There are two similar species: *H. hypothejus* (Fr. ex Fr.) Fr. and *H. speciosus* Peck, however, the latter has not yet been found in Hungary. The colour of the cap is the same as that of *H.*

aureus, but often with some snake-like pattern on the stem, and it grows under larch (*Larix*). *H. hypothejus* differs from *H. aureus* by its colour of the cap and the flesh, even if it is regarded as a variety of *H. hypothejus* by Imler (IMLER 1935) and Krieglsteiner (KRIEGLSTEINER 2000). Candusso argued the concept of Imler (CANDUSSO 1997), stating that the colour illustration in the publication of Imler shows mushrooms painted ochraceous yellowish flesh-coloured, characteristic of *H. hypothejus*, while the flesh of *H. aureus* is white. Krieglsteiner mentions that the cap of *H. hypothejus* is known in various intermediate colours, and *H. aureus* is a bright orange variety only. The present author agrees with most mycologists accepting the 2 above-mentioned species of *Hygrophorus*, however, biochemical investigation would be more convincing to clarify the status of these macrofungi.

This species is mainly distributed in northern Europe, Scandinavia (MOSER 1983), and relatively rare in the Mediterranean region (BON 1990). Interestingly, *H. aureus* is a characteristic species of coniferous woods (CANDUSSO 1997), however it was discovered in and described from a deciduous forest near Uppsala, Sweden by J. P. Arrhenius in 1863. All other authors reported it from coniferous forests.

Cap: 2–8 (12) cm in diam. At first hemispherical, conical, convex, then expanding, finally becoming slightly depressed. The margin incurved at the beginning, then becoming smooth and thin. Surface slimy, reddish yellow, reddish orange, and usually darker in the middle.

Gills: widely adnate to decurrent, sparse, thick. Its colour is sordid whitish, faint yellow, creamy, dull yellow.

Stem: 5–11 cm high, 0.5–1 cm wide, cylindrical, often tapering towards base, elongated, often strongly curved. It is whitish above, becoming pale yellowish towards base, often with small orange spots, the remnants of the outer veil. Its surface is viscid, with a more or less conspicuous, ring-like zone in the upper third part.

Flesh: solid, compact, flexuose, with a bit more lax structure in the cap. Colour sordid whitish, directly under skin of the cap is yellowish rose. No characteristic scent and taste.

Spores: elliptic, 7–9 × 4–5 μm. Spore powder white.

Herbarium specimens: Sopron Mts: Brennbergbánya. Leg.: Gy. Breuer, 27.12.1935. (BP), det.: L. Szemere. – Őrség: Kétvölgy, sub *Pinus*. Leg., det.: L. Albert, 12.11.1983. (BP). – Visegrád Mts: Pilisszentkereszt in *Piceeto*. Leg., det.: L. Albert, 13.11.1989. (BP). – Galgagyörk, in piceeto. Leg.: Gy. Pálfalvi, 12.11.2003. (BP), det.: G. Vasas.

Hygrophorus poetarum Heim

Relatively rare in Hungary, in the Hungarian red list of macrofungi (RIMÓCZI *et al.* 1999) it is recorded among the endangered species (EN, category 2). Only six specimens are deposited in the Hungarian Natural History Museum (BP). Before 1989, the species was known from four localities (BABOS 1989), **i.e.** from the Vendvidék (Szakonyfalu) in western Hungary, from the Buda Mts (Zsíros-hegy) in the central part of the country, and from the Mátra Mts (Parád) and Bükk Mts (Alsóhámor) in northern Hungary.

This species was observed twice in the last 10 years in the Vendvidék (Kétvölgy). Further two recent literature records are known from the Őrség (Szalafő) and Mátra Mts (Mátrafüred) (RIMÓCZI 1994). It was found recently also in the Bükk Mts (Répáshuta, in *Fageto*, Mrs Gortva Gáborné, 12.09.2001., pers. comm.).

Hygrophorus poetarum is a characteristic species of beech woods (CANDUSSO 1997, MOSER, 1983), but forms mycorrhiza with hornbeam and various oak species as well (KRIEGLSTEINER 2000). In Hungary it is also found mostly in beech forests, but two records are from mixed coniferous-deciduous forest from the Vendvidék. Imre Rimóczi has two collections from oak forests (RIMÓCZI 1994).

According to the observations by Krieglsteiner, it is scattered in Germany, and is not regarded as an endangered species. In Europe, the species is widespread, but nowhere is frequent (KRIEGLSTEINER 2000).

The scent of *H. poetarum* is discussed by various authors. In his description of the species Heim, the author, compared its scent to the Peruvian balsam, and that of *Inocybe bongardii* and *I. corydalina*, respectively. Candusso regards it as strong hyacinth-smell, or pleasant soap-smell, or the smell of decaying *Amanita phalloides* (CANDUSSO 1997). According to Bon the scent is similar to that of the Peruvian balsam, benzoin resin, cinnamon, *Inocybe bongardíí* or *Tricholoma sulphurescens* (BON 1990). Moser regards it Peruvian balsam- or fruit-scented (MOSER 1983). *H. poetarum* specimens of our own collection had fruit-like scent, while specimens observed by Gábor Bohus in the Mátra Mts in 1972 had the scent of Peruvian balsam.

Cap: 4–15 cm in diam. At first spherical, conical, then expanded, its margin incurved long when young, later becoming slightly undulate. Surface slightly slimy when damp, silky when touched, tinged if dry. Its main colour is creamy or ivory or pale ochre, and pinkish rose in the centre.

Gills: widely adnate to decurrent, sparse, thick. Its colour is from whitish to creamy, more or less the same as the main colour of the cap.

Stem: 5–10 cm high, 1–2 cm wide, cylindrical, tapering towards base, firm, solid. Colour creamy rose, sordid white, and often ochraceous rose or rosty ochre towards base. It is whitish furfuraceous below the cap, with water droplets exuded in wet climatic conditions.

Flesh: rigid, fibrillose. Colour similar with the outer surface of the fruitbody, rose in the central part of the cap, paler to whitish towards the edges. Scent mostly pleasant, sweet; no characteristic taste.

Spores: elliptic, 7–9 × 5–5.5 µm. Spore powder white.

Herbarium specimens: Vendvidék: Szakonyfalu, *Luzulo-Fagetum*. Leg., det.: G. Bohus and M. Babos, 03.10.1963. (BP). – Bükk Mts: Alsóhámor-Lillafüred, *Melitti-Fagetum subcarp.* Leg., det.: G. Bohus and M. Babos, 09.09.1965. (BP). – Mátra Mts: Vár-hegy versus Parádsasvár, *Luzulo-Fagetum* et *Luzulo-Querceto-Carpinetum*. Leg., det.: G. Bohus and M. Babos, 06.10.1972. (BP). – Buda Mts: prope Zsíros-hegy, "Bükkös-tető". Leg.: A. Frankó, 13.09.1974. (BP), det.: G. Bohus. – Vendvidék: Kétvölgy, in sylva mixta. Leg.: E. Jakucs, 07.10.1995. (BP), det.: G. Vasas. – Vendvidék: Kétvölgy, in sylva mixta. Leg., det.: Cs. Locsmándi and G. Vasas, 05.10.2002. (BP).

Lactarius hysginus (Fries ex Fries) Fries

Very rare in Hungary, in the Hungarian red list of macrofungi (RIMÓCZI *et al.* 1999) it is listed among the critically endangered species near extinction (CR, category 1). Altogether six specimens are kept in the Hungarian Natural History Museum (BP). Up to 1989, this species was known from two localities (BABOS 1989), and it was observed only four times in the last 10 years in Hungary. These were collected in two, isolated regions of Hungary: (1) the Őrség, and the Vendvidék at the foot of the Alps in western Hungary, and (2) the Zemplén Mts in northeastern Hungary at the margin of the Western Carpathians. Although these areas are far from each other geographically (*ca* 600 km), their climatic and edaphic features are similar (e.g. highly acidic soil), therefore the macrofungi compositions of these areas are rather similar.

Lactarius hysginus has a rather wide distribution in the Northern Hemisphere (East Siberia, Japan, North America, West, Central and North Europe), thus it is widespread. However, in this vast area of distribution it is rare and critically endangered and in the areas where it is recorded the state of habitats is declining (KRIEGLSTEINER 2001).

It is found in collin and montane habitats, under conifers and birch (BASSO 1999), preferably in well-lit parts of the forests (forest margin, walking path) and

on highly acidic, nutrient-poor soil (KRIEGLSTEINER 2001). In Hungary it was collected under pines and spruces in well-lit forest margins on highly acidic soil.

Neuhoff suggests that the former distribution data of *L. hysginus* should be reconsidered, since *L. hysginus* and *L. trivialis* are very difficult to separate and specimens belonging to these species are often mistakenly identified (NEUHOFF 1956).

According to BASSO (1999) the two species are mostly misidentified because of their colour: that of the cap of *L. trivialis* is highly variable thus it can be very similar to that of *L. hysginus*. Normally *L. trivialis* has greyish violet cap, especially when it is young. However, *L. hysginus* has a very characteristic smell, which can only be mistaken with that of *L. ilicis* Sarnari growing under *Quercus ilex* in the Mediterranean region (BASSO 1999).

According to NEUHOFF (1956) and MOSER (1983) the milky fluid of *L. trivialis* at first tastes mild, later becomes sharp, then bitter, furthermore it colours the gills greyish-green, and the cap is violet, greyish-blue when young. In contrary, the milky fluid of *L. hysginus* is sharp from the beginning, no colouration is seen on the gills, the colour of the cap is dominantly flesh-coloured, reddish brown also when it is young. There is a difference also between the size of the spores: larger spores belong to *L. trivialis*: 8.5–10.5 × 7–8 µm, while *L. hysginus* has smaller spores: 6.5–7.5 × 5.5–6.5 µm.

L. trivialis has no record from Hungary in the collections of the Hungarian Natural History Museum (BP).

Cap: 4–10 cm in diam. At first spherical, later depressed at the centre, undulate at the margin, lobate. Its surface glutinose, slimy and sticky when wet, shiny when dry. Its colour is brownish pink, reddish brown-violet, or flesh-coloured, paler near the margin, more faint when it is old. More or less zonated, with a dark brownish, reddish pattern.

Gills: adnate to decurrent, with numerous intermingled gills and forked at the stem. Its colour is pale yellow at first, then bright ochraceous yellow.

Stem: 3–5 cm high, 1–2.5 cm wide, cylindrical, tapering towards base. Surface viscid when moist, but in a lesser extent than the cap, pruinose when dry. Colour is paler than that of the cap. Its milky fluid white, remaining unchanged in time, abundant. Taste is very sharp immediately.

Flesh: rigid, brittle, similar with that of the stem surface. Fruit-scented.

Spores: wide elliptic, 6.5–7.5 × 5.5–6.5 µm, thick, ornamented with large papillae and rough with ridges, ribs in between. Spore powder is ochraceous yellow.

Herbarium specimens: Zemplén Mts: Telkibánya, Nagykerek-hegy, in *Pineto* mixto. Leg., det.: G. Bohus and M. Babos, 26.10.1958. (BP). – Őrség: Szalafő, in sylva mixta. Leg., det.: L. Albert, Cs. Locsmándi and G. Vasas,

01.10.1988. (BP). – Őrség: Bajánsenye, in *Pineto*. Leg., det.: Cs. Locsmándi and G. Vasas, 08.10.1995. (BP). – Őrség: Szalafő, in sylva mixta. Leg., det.: Cs. Locsmándi and G. Vasas, 08.10.2000. (BP). – Vendvidék: Kétvölgy, in sylva mixta. Leg., det.: Cs. Locsmándi and G. Vasas, 05.10.2001. (BP). – Vendvidék: Kétvölgy, in sylva mixta. Leg., det.: Cs. Locsmándi and G. Vasas, 03.10.2002. (BP).

Phaeolepiota aurea (Matt. ex Fr.) R. Mre. ex Konr. et Maubl.

The genus *Phaeolepiota* is monotypical with unclear taxonomic position, *Phaeolepiota aurea* is being the only representative. According to recent treatments it is placed closest to genus *Cystoderma* (MOSER 1983, KRIEGLSTEINER 2001). Granulosity of the fruitbody is characteristic of both genera.

Phaeolepiota aurea is very rare in Hungary. In the Hungarian red list of macrofungi (RIMÓCZI *et al.* 1999) it is listed among the endangered species (EN, category 2). Its occurrence in Hungary has not been published so far. Only three specimens are kept in the Hungarian Natural History Museum (BP) and there is one specimen in the private mycological collection of László Albert. All four localities are from low montane areas. This species appeared for the first time in October 1987 in the Bakony Mts (Bakonygyepes), western Hungary, then it was found again a week later, but from the Bükk Mts, northeastern Hungary. 14 years later it was observed again from a different locality in the Mátra Mts (Aranybánya-folyás), northern Hungary. A new location was discovered in September 2003 in the Börzsöny Mts, northern Hungary. The participants of the Annual National Mycological Meeting ("Országos Gombásztalálkozó") found two underdeveloped fruitbodies in spite of the arid period during summer 2003.

Krieglsteiner considers *P. aurea* as a species growing only in anthropogenic, nutrient-rich, nitrofrequent localities. In woods it prefers the tourist paths, places covered by *Urtica* and *Sambucus*, and never found under closed canopy (KRIEGLSTEINER 2001). BREITENBACH and KRÄNZLIN (1991) mention further ruderal places, like roads, roadsides, city-parks, gardens.

On the basis of our collections and observations, we can confirm that this species prefers the ruderal habitats. The collected specimens (except for those from the Bükk Mts, but without exact habitat descriptions) grew on trampled, disturbed forest trails even if they were collected in forests.

Phaeolepiota aurea has a large distribution from the submeridional to the boreal zones, it is not threatened, and no significant decline is observed in its distribution centre (KRIEGLSTEINER 2001). Based on the few records collected in Hungary

it seems so that our country does not belong to the main distribution centre of the species.

Cap: 4–20 (30) cm in diam. At first spherical, bell-shaped, slightly flattened, sometimes slightly umbonate in the middle. Surface dry, finely granular, farinose, minutely granulose, often slightly wrinkled. Its colour is reddish orange, orange, ferrugineus, paler with age.

Gills: free-standing, beige-coloured for long, then rust-yellow, ochraceous brown.

Stem: 5–15 cm high, 1–4 cm wide, cylindrical, thickening towards base, compact, solid. Colour same as the cap. Collar standing up like a funnel, its inner side and the stem above smooth, the outer surface is wrinkled, granulose, farinose, similarly to the stem below.

Flesh: pale yellowish, becoming slightly yellow when cut, smell pleasant spicy, aromatic.

Spores: fusiform, finely granulose, 9–12 × 4–5 µm. Spore powder reddish orange.

Herbarium specimens: Bakony Mts: Bakonygyepes, in *Querceto-Carpinetum*, forest trail. Leg., det.: G. Bohus and G. Vasas, 11.10.1987. (BP). – Bükk Mts. Leg.: E. Bugír, 18.10.1987. (BP), det.: G. Vasas. – Börzsöny Mts: Nagybörzsöny, forest trail. Leg.: anonymous, 20. 09.2003. (BP), det.: G. Vasas. – Mátra Mts: Aranybánya-folyás, in *Fageto*, forest trail. Leg.: M. Göröcs, 27.09.2001. (Hb. L. Albert), det.: L. Albert.

CONCLUSIONS

At the first place *Phaeolepiota aurea* included in the endangered (category 2) species of the Hungarian red list of macrofungi is reported here for the first time from 4 localities of Hungary. Secondly, *Lactarius hysginus* having 6 localities, belongs to the critically endangered (category 1) species. The number of the known localities is increased to 4 in the case of *Hygrophyrus aureus* and to 6 in the case of *H. poetarum*, both species being considered endangered (category 2) species.

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REFERENCES

BABOS, M. (1989): Magyarország kalaposgombáinak (Agaricales s. l.) jegyzéke. (The Agaricales s. l. taxa of Hungary I). – *Mikol. Közlem.* **1989** (1–3): 3–234.

BASSO, M. T. (1999): *Lactarius Pers.* – Fungi Europaei, 7. Mycoflora, Alassio, pp. 138–144.

BON, M. (1990): *Les Hygrophores, Flore Mycologique D'Europe 1.* – CRDP, Amiens, 67 pp.

BREITENBACH, J. and KRÄNZLIN, F. (1991): *Pilze der Schweiz 3.* – Mycologia, Luzern, pp. 222–223.

CANDUSSO, M. (1997): *Hygrophorus s. l.* – Fungi Europaei, 6. Saronno, pp. 222–292.

IMLER, L. (1935): L'Hygrophorus aureus Arrh. riest qu' une variété méconnue de l'Hygrophorus hypothejus Fr. – *Bull. Soc. Myc. France* **50**: 304–306.

KRIEGLSTEINER, G. (2000): *Die Grosspilze Baden-Württembergs.* Band 2. – Stuttgart/Hohenheim, Ulmer, pp. 394–401.

KRIEGLSTEINER, G. (2001): *Die Grosspilze Baden-Württembergs.* Band 3. – Stuttgart/Hohenheim, Ulmer, pp. 77–102, pp. 496–497.

LOCSMÁNDI, CS., VASAS, G. and ALBERT, L. (1993): Über interessante Pilzfunde aus Ungarn IV. (Basidiomycetes, Agaricales). – *Studia bot. hung.* **24**: 23–26.

MOSER, M. (1983): *Die Röhrlinge und Blätterpilze.* – Kleine Kryptogamenflora. Band IIb/2. 5. bearb. Aufl., VEB Gustav Fischer, Jena, 532 pp.

NEUHOFF, W. (1956): *Die Milchlinge (Lactarii).* – Die Pilze Mitteleuropas, Band IIb. Verlag Julius Klinkhardt, Bad Heilbrunn Obb., pp. 138–139.

RIMÓCZI, I. (1994): Nagygombák cönológiai és ökológiai jellemzése. (Coenological and ecological characteristics of Macrofungi in Hungary). – *Clusiana* **33**(1–2): 1–180.

RIMÓCZI, I., SILLER, I., VASAS, G., ALBERT, L., VETTER, J. and BRATEK, Z. (1999): Magyarország nagygombáinak javasolt Vörös Listája. [Hungarian red list of macrofungi]. – *Clusiana* **38**(1–3): 107–132.

VASAS, G. (2002): Interesting macrofungi in Hungary, V. Three rare Russula species (Basidiomycetes, Russulales). – *Studia bot. hung.* **33**: 65–69.

VASAS, G. and ALBERT, L. (1990): Über interessante Pilzfunde aus Ungarn I. (Basidiomycetes, Agaricales). – *Annls hist.-nat. Mus. natn. Hung.* **81**: 49–52.

VASAS, G., LOCSMÁNDI, CS. and ALBERT, L. (1990): Über interessante Pilzfunde aus Ungarn II. (Basidiomycetes, Agaricales). – *Annls hist.-nat. Mus. natn. Hung.* **82**: 61–64.

VASAS, G., LOCSMÁNDI, CS. and ALBERT, L. (1991): Über interessante Pilzfunde aus Ungarn III. (Basidiomycetes, Agaricales). – *Annls hist.-nat. Mus. natn. Hung.* **83**: 87–89.

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