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INTERESTING MACROFUNGI IN HUNGARY, IV. THREE RARE *RUSSULA* SPECIES (BASIDIOMYCETES, RUSSULALES)

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Three very rare *Russula* species (*R. viscida*, *R. paludosa*, *R. cicatricata*) of Hungary are presented. All of them are regarded as critically endangered species in Hungary.

Key words: Hungary, *Russula cicatricata*, *Russula paludosa*, *Russula viscida*

Russula viscida Kudøna 1919

Records and observations about its habitat features vary by authors. According to ROMAGNESI (1967) and MOSER (1983) it grows in coniferous forests (under spruce), while SCHAEFFER (1952) mentioned among species growing on acidic soil in deciduous and coniferous forests. EINHELLINGER (1985) regarded it montane, high montane species based on several records from acidic soil in spruce forest and basic soil in mixed woods (*Fagus* and *Abies*). GALLI (1996) observed it most frequently in beech wood, but also found under conifers (*Picea* and *Abies*). KRIEGLSTEINER (2001) regarded it a typically beech wood species. Seldom he also found it in fir forests, and very rarely in deciduous, hornbeam-oak woods. Based on his measurements soil pH demand of *R. viscida* was considered as 5.5–7.5. Soils poor in nutrients and humus, somewhat acidic only on the surface are favoured by the species.

The species is very rare in Hungary. The proposal for protection and the Red List of macrofungi (RIMÓCZI et al. 1999) include it among the critically endangered species. Until 2001 only 3 records were known from Hungary (BABOS 1989): on basic soil in beech woods in the Buda Mts (at Normafa), on acidic soil in oak wood in the Aggtelek National Park, and also on acidic soil in oak wood in the Visegrád mountains (at Tahi) (VASAS 1991). Recently, in summer 2001 several fruitbodies were found on acidic soil in a humid beech wood in the Mátra Mts (near Mátraháza).

The similarity with *Russula atropurpurea* caused difficulties during identification. Both species have the same features of the cap: original colour, appearance of yellow-brown spots with age, reddish rose colour of the margin of the cap. However, the cap of *R. viscida* is dark purple-brown, purple-olive, then ochraceous brown, olivaceous yellow, and that of *R. atropurpurea* is black-purple, wine-red or

sometimes also olivaceous green-brown. The surface of the cap of both species is shiny, and somewhat slimy when damp. No real difference in the colour of gills of the entirely developed fungi: it is pale cream for both. However, the gills of *R. viscida* are never pure white when young, and they have brownish yellow patches later. The stem of *R. viscida* usually widens towards the base, stout, and flecked with yellowish brown with age or if pressed. The stem of *R. atropurpurea* is very rarely widens towards the base, becoming slightly greyish with age, and sometimes ochre or rust-coloured patches might appear mostly at the base. Macroscopically the two species can be distinguished on the basis of the colour changing of the flesh: *R. viscida* turns to be yellowish brown, brown when cut or with age, while *R. atropurpurea* turns to slightly greyish with age. The microscopic characters of the spores are also very similar at the two species: granularity, the pattern of the network seems to be the same. Spores of *R. viscida* are somewhat larger (7.5–11 × 7–9.5 μm) than those of *R. atropurpurea* (6.5–9 × 6–7.5 μm).

Cap: 8–14 cm in diam. At first spherical, convex, later expanded and finally depressed at the centre. The skin and the flesh are in a firm connection and so it is difficult to peal it off. The surface is shiny, glistening when dry, sticky when damp. Its colour is variable, lilac-wine-red, blackish red or purple-olive, darker in the centre, often flecked with ochre.
Gills: brittle, crowded, rounded at the stem. At first whitish, pale cream, later flecked with brown.
Stem: 2–3 cm wide, stout, widened towards the base, clavate or bulbous, covered by a rust-coloured granulose pattern which more dense towards the base. Flecked with rust-colour in older specimens.
Flesh: firm, solid, turns yellow-brown when cut or with age. Scented like fruit or honey. Its taste is mild in the cap, but hot in the gills and the stem.
Spores: wide elliptic, 7.5–11 × 7–9.5 μm, ornamented by large confluent warts. Spore powder pale cream.

Herbarium specimens (BP): Buda Mts: Normafa, in Fageto. Leg., det.: L. Albert, 28.08.1987. – Aggtelek karst: Varbóc, Szén-völgy-tető, in Querceto. Leg., det.: Cs. Locsmándi and G. Vasas, 10.09.1988. – Visegrád Mts: Tahi, in Fageto. Leg: L. Albert, G. Bohus, Cs. Locsmándi and G. Vasas, 30.09.1994, det.: G. Vasas. – Mátra Mts: Mátraháza, in Fageto. Leg., det.: Cs. Locsmándi and G. Vasas, 01. 08. 2001.

Russula paludosa Britzelmayr 1891

This species favours definitely acidic soils. It usually grows in damp, mossy spruce and fir forests (with *Vaccinium*) and in peaty coniferous forests (with *Sphagnum*), rarely it occurs in beech woods (with *Luzula*). Fresh, damp, peaty soils of poor in nutrients, and podsolizated brown forest soils (KRIEGLSTEINER 2001). According to EINHELLINGER (1985) it can be twice frequent on soils with

pH 3.7–4.3 than on soils with pH 4.5–6.5. Its mass occurrence was observed in Scots pine wood (with *Vaccinium*) of excellent water supply.

Occurrence of this species in Hungary was really surprising. Also its relationship with *Quercus* was discovered for the first time. It was found in an oak wood (with *Luzula*) in Sopronhorpács in July 1993, and in a beech forest of damp, acidic soil in the Mátra Mts (near Mátraháza) in August 2001. This species being very rare in Hungary is regarded as critically endangered species in the proposed Red List (RIMÓCZI et al. 1999).

Its taxonomic position at section level is argued. MARCHAND (1977) suggested to place it into Section Decolorantes, since the colour of the spore powder and the pigment of the cap-skin of *R. paludosa* are the same as those of the other species of this group. In opinion of SINGER (1975) only the specimens with small and pale cap are likely to be mistaken for species of Section Decolorantes, entirely developed specimens are clearly different. However, the flesh of species of Section Decolorantes turns grey, later black, while that of *R. paludosa* remains unchanged. Unfortunately, some illustrations in SCHAEFFER'S (1952) monograph may result in misunderstandings, since the stem of *R. paludosa* is painted grey, the same grey as those of *R. vinosa* and *R. chloroflava* belonging to Section Decolorantes shown on the same table. However, in the case of *R. decolorans* no grey colour is seen.

Cap: 6–15 (20) cm in diam., at first convex, later expanded and finally depressed at the centre. Its surface sometimes rough, in older specimens the margin might be slightly sulcate. Cap-skin can be easily peeled off up to the centre, glutinous viscid when damp, glistening when dry. Its colour bright red, blood red, orange red, might be flecked with cream-ochre with age.
Gills: somewhat brittle, crowded, adnate or free, with numerous intermingled gills. It is creamy, dirty white when young, and turns to cream ochre later. Its edge often reddish at the cap margin.
Stem: 6–18 cm tall, 1–4 cm wide, solid, fleshy, cylindrical or clavate. Exceptionally pure white, flecked with pale rose.
Flesh: solid, turning soft with age. Its taste is mild, its scent uncharacteristic or somewhat like fruits.

Herbarium specimens (BP): Sopronhorpács, in Querceto. Leg., det.: Cs. Locsmándi and G. Vasas, 10.07.1993. – Mátra Mts: Mátraháza, in Fageto. Leg., det.: Cs. Locsmándi and G. Vasas, 01.08.2001.

Russula cicatricata Romagnesi 1967 ex Bon 1987

This species prefers siliceous areas, and mainly grows under oak and birch trees (ROMAGNESI 1967, MARCHAND 1977). EINHELLINGER (1985) reported it from peaty, acidic soil, under birch and poplar trees from the surroundings of Munich. KRIEGLSTEINER (2001) found it in sunny, light, mixed deciduous forest on

somewhat acidic soil. According to his observations its mycorrhiza-partners are birch, oak, beech and aspen.

This species being very rare in Hungary is also regarded as critically endangered species in the proposed Red List (RIMÓCZI et al. 1999). In Hungary its first specimen was found in the surroundings of Gyula (Mályvádi-erdő) in 1998 (VASAS and LOCSMÁNDI 1999). Two further localities were discovered in the following years in the Mátra Mts and in the Őrség, where it was found on acidic soil in mixed wood (*Quercus* and *Pinus*) under oak trees.

Taxonomically it belongs to Section Xerampelinae according to MOSER (1983). The colour of the cap is very similar to that of *R. mustelina*, but the flesh of the latter does not turn brown and not smell like fish (herrings).

Cap: 5–8 cm in diam. At first spherical, convex, later expanded and finally depressed at the centre. Its margin entire, but later might be sulcate. Cap-skin can be easily peeled off up to the centre. The surface is glistening when damp, and after drying faint concentric wrinkles might be visible at the marginal zone. Its colour is coffee brown, brownish olive, yellowish green, with brown or brownish red centre, which is often more strongly greenish or ochre.

Gills: brittle, crumbled, crowded, and forked at the stem. Its colour is dirty white at first, then pale cream, and finally pale ochre.

Stem: 4–6.5 cm high, 1–2 cm wide, cylindrical, often curved. Its surface often wrinkled. Usually whitish, flecked with ochre brown with age or when touched. The specimens found in the Őrség had rose-coloured shade towards the base.

Flesh: solid, firm, turning soft and crumbling when it is old. Its colour turns brown with age or if it is cut. It smells like herrings, its taste is mild.

Spores: 7.2–10.2 × 6.2–8.4 µm. Their surface is usually distinctly granulated, and only very short connections can be observed among the relatively high (0.8–1.2 µm) granules. Its spore powder is pale ochre.

Herbarium specimens (BP): Gyula, Mályvádi-erdő, in Querceto. Leg., det.: Cs. Locsmándi and G. Vasas, 09.09.1998. – Farkasfa: in silva mixta. Leg., det.: G. Vasas, 05.10.2001.

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