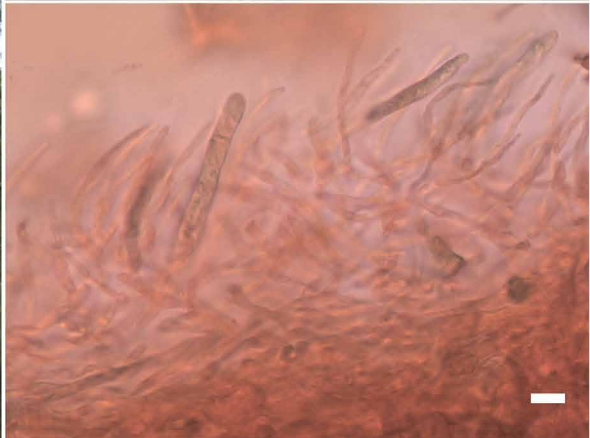
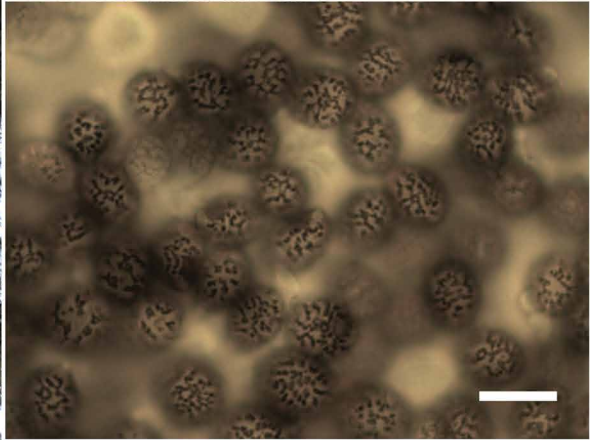


*Russula mansehraensis*





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***Russula mansehraensis* Saba, Caboň & Adamčík, sp. nov.**

*Etymology.* The name refers to Mansehra, the province where the species was collected for the first time.

*Classification* — *Russulaceae*, *Russulales*, *Agaricomycetes*.

*Basidiomata* small to medium sized, 40–45 mm tall. *Pileus* 27–34 mm diam, convex, centrally slightly depressed, surface dry, smooth, matt, vivid red or strong red with centre reddish orange (10R6/12 colour chart of Munsell 1975) and rusty spotted with spots sometimes concentrically arranged; margin even, or slightly involute, without striations. *Lamellae* regular, adnate, crowded, light yellow, pale yellow or light orange yellow, brittle, edge entire, concolorous. *Stipe* 35–40 × 8–10 mm, central, cylindrical to subcylindrical, stuffed, slightly longitudinally wrinkled, white, towards base with light yellow-brownish or moderate yellow-brownish spots, without pinkish shades. *Context* compact, not firm, odour indistinct and taste strongly acrid. *Spores* (7.5–)8–8.5(–9.5) × (5.5–)6.5–7(–7.5) µm, av. 8.3 × 6.7 µm, Q = (1.13–)1.17–1.29(–1.4), av. 1.23, ornamentation consisting of (4–)5–8(–10) moderately large and distant amyloid warts in the circle 3 µm diam on spore surface, warts 0.5–1 µm high, connected with occasional to frequent short or longer fine line connections ((0–)1–3(–5) line connections in the circle), occasionally fused in short or longer chains ((0–)2–5(–7) fusions in the circle), chains and crests often branched, but rarely forming a reticulate structure, isolated warts rare. Suprahilar plage amyloid, large. *Basidia* (29–)31.5–38.8(–47) × (10–)11.5–13.5(–15) µm, av. 35.1 × 12.5 µm, 4-spored, clavate, sometimes pedicellate. *Hymenial cystidia* on lamellar sides widely dispersed to dispersed, 300–400 per mm<sup>2</sup>, fusiform or rarely clavate, pedicellate, thin-walled, measuring (49–)54–74(–84) × (10–)11.5–16(–20) µm, av. 64 × 13.7 µm, apically acute to acute-pointed and with 2–7(–9) µm long appendage, contents heteromorphous, granular-banded, yellowish, turning brownish red to almost black in sulfovanillin. Lamellar edges covered with abundant marginal cells, occasional cheilocystidia and dispersed basidia; *marginal cells* not well differentiated, similar to the basidiola on lamellar sides, but smaller, measuring (9–)12–17.5(–19) × (4–)4.5–7(–7.5) µm, av. 15 × 5.8 µm; *cheilocystidia* narrower than pleurocystidia, clavate or fusiform, pedicellate, thin-walled, measuring (42–)50.5–66(–73) × (8–)9.5–14(–16) µm, av. 58.3 × 11.9 µm, apically with mainly acute tips and usually with 1–6 µm long appendages, contents similar as in pleurocystidia. *Pileipellis* orthochromatic in Cresyl blue, 115–135 µm deep, sharply delimited from the underlying spherocytes of the context; distinctly divided in a 60–75 µm deep, strongly gelatinised suprapellis of loose, erect or ascending hyphal terminations and, near surface, with some repent, longer pileocystidia; and a 55–65 µm deep subpellis of less gelatinised, dense, irregularly, but near the trama horizontally oriented, intricate, branched, 2–5 µm wide hyphae. Acidoresistant incrustations absent. Hyphal terminations in pileipellis near the pileus margin slender and branched, thin-walled, with terminal cells measuring (11–)18–33(–48) ×

2.5–3.5(–4) µm, av. 25.6 × 3.1 µm, mainly narrowly subulate or fusiform, partly subcylindrical, usually apically attenuated or constricted, often moniliform; near the pileus centre with mainly cylindrical, often flexuous terminal cells, measuring (12–)16–26(–32) × (2–)2.5–3.5(–4.5) µm, av. 21.1 × 3 µm, apically obtuse; subterminal cells mainly branched or not, often with lateral branches or nodules, equally wide as terminal cells. Pileocystidia near the pileus margin numerous, narrowly clavate or fusiform, mainly 2- or more-celled (1–4(–6)-celled), thin-walled, with terminal cells measuring (18–)32.5–85.5(–150) × (3–)4.5–7(–8) µm, av. 59 × 5.8 µm, apically obtuse, subterminal cells equally wide or narrower, often shorter, contents in Congo red heteromorphous, granulose or crystalline, turning dark reddish brown to black in sulfovanillin; near the pileus centre smaller and narrower, with terminal cells measuring (25–)31.5–89.5(–160) × (3.5–)4.5–6.5(–8.5) µm, av. 60.5 × 5.6 µm more frequently 1-celled, with more granular and yellow-coloured contents. Cystidioid hyphae in subpellis and pileus trama dispersed, with heteromorphous-granulose, yellowish, often oleiferous contents.

*Typus.* PAKISTAN, four collections from Khyber Pakhtunkhwa, Shangla district, Puran, on soil under *Pinus roxburghii* (*Pinaceae*), alt. 1500 m, 5 Sept. 2013, S. Ullah (holotype HUP-SUR180, ITS, LSU, mtSSU and *rpb2* sequences GenBank MG948636, MG944280, MG944266 and MG944255, MycoBank MB816290).

For additional material examined, see MycoBank.

*Notes* — The type specimen of *R. mansehraensis* was morphologically described as '*Russula* sp.' and its phylogenetic position as member of *R. maculata* lineage was resolved in our previous study (Adamčík et al. 2016). In this study we supported both morphology and phylogeny by more collections from Pakistan, more observations and more sequences including additional loci (for phylogenetic tree, see MycoBank). We confirmed the placement of *R. mansehraensis* in *Russula* subsect. *Maculatinae*, where it clustered in the strongly supported clade together with European species *R. maculata* and *R. nympharum*. Our phylogeny showed strong support for recognising of *R. mansehraensis* as a new species. The other ITS sequences retrieved from GenBank (<https://www.ncbi.nlm.nih.gov/genbank>) and UNITE (<http://unite.ut.ee>) databases originate from Papua New Guinea and Southern and Northern China and apparently represent different species associated probably with other host trees (e.g., *Castanopsis* and *Keteleeria*).

The *R. maculata* lineage is morphologically defined by a red pileus cuticle discolouring to yellow or white, yellow spore print, acrid taste of the flesh and yellow brownish spots on surface of the pileus and the stipe. Our field observations on *R. mansehraensis* agree well with this morphological delimitation of the group. Contrary to above-mentioned European species, the Pakistani species does not show any distinct pink shades on the stipe surface and basidiomata are distinctly smaller and thin-fleshed. All studied collections of *R. mansehraensis* were collected in mono-dominant *Pinus roxburghii* forests, contrary to both European species known only as associates of deciduous trees. Our study confirms that relatively small spores (up to 8.5 × 7 µm) and mainly 2- and more-celled pileocystidia are micromorphological characters that define *R. mansehraensis*.

*Colour illustrations.* *Russula mansehraensis* (HUP-SUR180) growing in mono-dominant forest of *Pinus roxburghii*; basidiomata; spores; pileipellis near the pileus margin; hymenial elements. Scale bars = 10 mm (basidiomes), 10 µm (microscopic structures).

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