SYSTEMATIC STUDIES ON RUSSULACEOUS FUNGI- THE GENUS LACTARIUS PERS.

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Lactanus subvemalis var. himalayensis var. nov., L. sanmiguelensis Hesler & Smith, L. subisabellinus var. subisabellinus Murrill and L. piperatus var. glaucescens (Crossl.) Hesler & Smith are illustrated and described. Out of these, the first taxon is new to science while the remaining three are new records for India.

Key Words: Lactanus, heteromorous, sphaerocysts, ornamentation.

The russulaceous fungi includes the agarics which are characterised by vividly coloured fleshy carpophores having lamellate hymenophore and heteromorous context. Russula Pers. and Lactarius Pers. are the two representative genera of these fungi. Russula species are brightly coloured while Lactarius species exude latex where cut or bruised. In this communication Lactarius subvemalis var. himalayensis var. nov., L. sanmiguelensis Hesler & Smith, L. subisabellinus var. subisabellinus Murrill and L. piperatus var. glaucescens (Crossl.) Hesler & Smith are included. Out of these, L. subvemalis var. himalayensis is new to science while the remaining three taxa are new fungus reports for India. For the study purpose, the collections were done from Shimla and Dalhousie hills of Himachal Pradesh. In the field the colour of the spore print and different parts of the carpophore was noted from Methuen Handbook of Colour (Komerup & Wanscher, 1978) and ISCC.NBS colour chart (Kelly, 1958). The examined collections were then deposited in the Herbarium of Botany Department, Punjabi University, Patiala (PUN). In the text the type of exosporial ornamentation is given after Singer (1986).

OBSERVATION


Pileus up to 3.2 cm in height. Pileus up to 3.2 cm broad, flattened depressed, margin regular; surface soil coloured with a typical orange yellow yellowish Brown (77. m.YBr) tone, dry, corrugated. Flesh up to 0.3 cm thick, white, staining carrot red with latex; taste tardily acrid; odour mild. Latex milky, copious, tardily acrid, changes to carrot red in less than one minute on exposure, lamellae adnate, unequal, crowded, narrow (up to 0.3 cm), not in series, some lamellae forking near the stipe, yellow olive Brown (89.pY), red on exposure, waxy, gill edges smooth. Stipe up to 4 cm long, 0.6 cm broad, cylindrical, central, concolorous with the pileus, exudes milky latex on cutting which changes to carrot red on exposure, smooth with slightly uneven surface, fleshy, hollow.

Spores 6.4-9.7 x 5.6-8.8 µm (excluding ornamentation) globose to subglobose, warty, ornamentation IIIb, VII, VIII, amyloid, apiculate. Basidia 40.3-68.4 x 9.7-16 µm, clavatis, 4 sporis, sterigmatibus usque 4.8-5.6 µm longis. Pleurocystidios 62-84.5 µm. Cheliocystidios 68.4-72.4 x 5.6-8 µm. Epicute pilei cellulari.

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of aseptate cystidoid projecting elements with encrusted tips which measure up to 2.5-4 \( \mu m \) in width.

**Collection Examined**: Himachal Pradesh: Nar-kanda on way to Hatu Peak (2,700m), growing solitary on humicolous soil under *Pinus wallichiana* Munruchi Kaur and S.S. Saini PUN 1802 September 6, 1991.

The macroscopic and microscopic features of the above examined collection are broadly in agreement with the details of *Lactarius subvernalis* var. albo-ochraceous (Hesler & Smith, 1979). However, in the present collection the latex after becoming carrot red does not fade to yellowish; spore size(6.4-9.7 x 5.6-8 \( \mu m \) instead of 6.9-7.7 x 5.4-7.2 \( \mu m \)) and basidial size (40.3-68. 4 x 0.7-16 \( \mu m \) instead of 37-48 x 8-11 \( \mu m \)) are on the larger side and also the basidial size (40.3-68. 4 x 0.7-16 \( \mu m \) instead of 37-48 x 8-11 \( \mu m \)) are on the larger side and also the pleurocystidia are aggregated only towards the gill edges and are lacking beyond. Based upon the above mentioned differences a new variety *L. subvernalis* var. himalayensis var. nov. which seems to be a close relative of var. albo-ochraceous has been erected.


**Fig. 2 (A-G)**

Fructification up to 10.4 cm in height. Pileus up to 8 cm broad, convex depressed when young, zonate with dark and light tone of orange colour, more tan in the center, finally infundibuliform, zonations obscure in the mature carphophore; margin bearded when young, splitting and cuticle developing cracks at maturity. Flesh up to 0.5 cm thick, yellowish, unchanging, taste tardily acrid; odour nil. Latex white, tardily acrid, unchanging. Lamellae decurrent, narrow, wavy to even serrate. Spore deposit yellowish white (more towards pale side). Stipe 6-8.5 cm long, 0.5 cm broad at the base, 0.7 cm broad near the pileus, concolorous with the pileus, central, smooth, hollow.

Spores 7.2-8 x 6.4-7.2 \( \mu m \) (excluding ornamentation) subglobose, warty, warts blunt, ornamentation type II, IIIb, VII and VIII, amyloid, apiculate, apiculus 0.8-1.6 \( \mu m \) long. Basidia 51-64.3 x 7.3-9 \( \mu m \) 4-spored, clavate; pleurocystidia: macrocystidia 47-63 x 9.6-11.3 \( \mu m \), fusiform to ventricose with beak shaped tips; cheilocystidia 45-58 x 8-10.5 \( \mu m \) fusiform with blunt tips and granular inclusions. Carpophore context heteromorous. Pileus cuticle an ixocutis, stipe cuticle made up of longitudinally intertwined septate 1.6-2.8 \( \mu m \) broad hyphae, at scrobiculations stipe cuticle subgelatinized.

**Collection Examined**: Himachal Pradesh: on way to Bariuri, Kotla Brog (1300m) scattered on calcareous soil along foot path under *Pyrus pashia*, N.S. Atri, PUN 1798, July 20, 1990.

The diagnostic features of this collection are in complete affinity with those given by Hesler & Smith (1979) for *L. sanmiguselensis*.

*Lactarius subisabellinus* Var. *subisabellinus* Murrill. Lloydia 11: 93, 1948. **Fig. 3 (A-H)**

Fructification 7-9.5 cm in height. Pileus up to 3.5 cm broad, young carphophores convex with acute umbo, flattened depressed at maturity with umbo in the depression; margin regular, incurved; surface orange Brown (59 d.Br) when young, with a lighter tone when partially mature but darker with Reddish Orange Reddish Brown (39 gyr.) tone at maturity, moist. Taste and odour mild. Latex dilute white with very thin consistency, unchanging, copious, mild. Lamellae decurrent, close, narrow, wavy to even serrate. Spore deposit yellowish white (more towards pale side). Stipe 6-8.5 cm long, 0.5 cm broad at the base, 0.7 cm broad near the pileus, concolorous with the pileus, central, smooth, hollow.

Spores 6.5-7.5 x 5.6-6.8 \( \mu m \) (excluding ornamentation) globose to subglobose, warty, warts blunt, ornamentation type II, IIIb, VII and VIII, amyloid, apiculate, apiculus. Basidia 46.7-53.5 x 11-14.5 \( \mu m \), 4-spored; pleurocystidia: macrocystidia 50.7-66.5 x 6.4-9.6 \( \mu m \), clavate, fusiform to ventricose with hyaline, tubular tips, sparsely placed; cheilocystidia 37.7-40 x 5.6-7.3 \( \mu m \), fusoid, Carpophore context heteromorous. Pileus cuticle differentiated into epicutis and subcutis; epicutis cellular with short celled hyphae giving rise to versiform stubby pileocystidia, cells arranged in a fusorous manner; subcutis made up to subhorizontally intertwined, septate 1.6-3.2 \( \mu m \) broad hyphae, Stipe cuticle made up of septate up to 1.6 \( \mu m \) broad hyphae, from these arise few septate to aseptate projecting hyphae measuring from 1.6-2.4 \( \mu m \) in width.

**Collection Examined**: Himachal Pradesh: Sir-mour, Pachhad, on way to Kotla Brog, Barakhet
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Figure 1 (A-G): *Lactarius subvernalis* var. *himalayensis* var. nov. A- Carpophore; B- Basidiospores; C- Pleurocystidia; D- Cross section through gill; E- Cross section through pileus showing cellular cuticle and context; F- Cheilocystidia; G- Cross section through stipe

Figure 2 (A-G): *Lactarius sanmiguelensis* Hesler & Smith. A- Carpophore' B- Cheilocystidia; C- Cross section through gill; D- Basidiospores; E- Cross section through pileus showing subgelatinized cuticle and context with lactifers; F- Pleurocystidia; G- Cross section through stipe

Figure 3 (A-H): *Lactarius subisabellinus* var. *subisabellinus* Murrill. A-B- Carpophores; C- Basidiospores; D- Cross section through gill; E- Cross section through pileus showing cellular epicutis, hyphal subcutis and context; F- Pleurocystidia, G- Cheilocystidia; H- Cross section through stipe

Figure 4 (A-G): *Lactarius piperatus* var. *glaucescens* (crossl.) Hesler & Smith. A- Carpophore; B- Basidiospores; C- Cheilocystidia; D- Cross section through gill; E- Cross section of pileus showing cellular cuticle and context with lactifer; F- Pleurocystidia; G- Cross section of stipe.
This collection is typical of *L. subisabellinus* var. *subisabellinus* Murrill. The diagnostic features of this collection are in conformity with the details given by Hesler & Smith (1979) for this variety.

*Lactarius piperatus* var. *glaucescens* (crossl.) Hesler & Smith. North American Species of *Lactarius* 186-187, 1979. Fig. 4 (A-G)

Fructification up to 11 cm in height. Pileus 7.5-11 cm broad, convex when young, infundibuliform at maturity; margin irregular, incurved, sulcate; surface yellow olive Brown (89.p.Y) when young, (86. I) at maturity, with whitish margin having yellowish patches on the surface and greyish to brownish patches over the rest of the pileus, rough, leathery with crackings in the older specimens. Flesh up to 0.6 cm thick, white, unchanging, tardily acrid, mild. Latex milky, with time the latex drop tends to tinge light greenish, tardily acrid. Lamellae adnate, unequal, forked repeatedly, crowded, narrow (up to 0.2 cm), yellow olive Brown (89.p.y), spotted brown on bruising, gill edges smooth, fragile. Spore deposit white. Stipe up to 7.4 cm long, 1.2 cm broad at the base, 1.8 cm broad in the center and 2.2 cm broad near the pileus, clavate, concolorous with the pileus, develop brownish patches where bruised, central to even excentric, smooth, tough, solid, fleshy.

Spores 6.4-9.6 x 5.6-6.8 μm (excluding ornamentation), globose to subglobose, warty. Ornamentation type IIb, VII, amyloid, apiculate. Basidia 41.9-50 x 8-9.7 μm (2-) 4- spored, clavate; pleurocystidia; macrocystidia 62.8-87 x 8-9.7 μm; cheilocystidia 51.5-78 x 7.2-8.8 μm, similar to pleurocystidia. Carophore contex heteromerous. Pileus cuticle cellular, from the surface arise septate to aseptate projecting 2.4-4 μm broad hyphae forming a thin sparsely populated turf over the pileus surface. Stipe cuticle cellular, on the surface are present septate to aseptate projecting encrusted hyphae measuring from 2.4-4 μm in width which form a regular turf.

Collections Examined: Himachal Pradesh: Narkanda, on way to Hatu Peak (2800m), in groups on humicdous soil under *Quercus dilatata*, Munruchi Kaur and N.S. Atri PUN 1806, September 9, 1991. Shimla on way to Tara Devi (2,000m), scattered on humicolous soil in *Quercus dilatata* forest, Munruchi Kaur and S.S. Saini, PUN 1807, September 10, 1991.

*Lectarius piperatus* var. *glaucescens* Hesler & Smith is different from variety *piperatus* in its white latex drop on the lamellae changing to greenish instead of yellowish. Its macroscopic as well as microscopic features are in full agreement with the details given by Hesler & Smith (1979) for this variety.

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REFERENCES


