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North Indian Agaricales—III

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Four species of *Lactarius*, namely, *L. fuliginosus*, *L. volemus*, *L. deliciosus* and *L. scrobiculatus* are illustrated and described.

Key Words: *Lactarius*, **Latex, Sphaerocyst, Fructification, Pileus**

Introduction

The first two contributions in the series (Saini & Atri 1982 a, b) give an account of six species of Agaricales. In this paper four species of *Lactarius* Dc. ex S. F. Gray are described for their morphological, anatomical and microchemical details. The specimens have been deposited in the Herbarium of the Botany Department, Punjabi University, Patiala (PUN). Colour terminology used is after Kornerup and Wanscher (1978). The type of spore ornamentation is given after Singer (1975).

Lactarius fuliginosus Fr., *Epicr. Syst. Myc.* p. 348, 1838 (figure 1 A–F)

Fructifications up to 6.7 cm high. Pileus up to 6.3 cm broad, first convex, then expanded, finally margin gets reflexed so as to create a depression in the centre, margin regular when young, slightly splitting at maturity, surface dry, dark

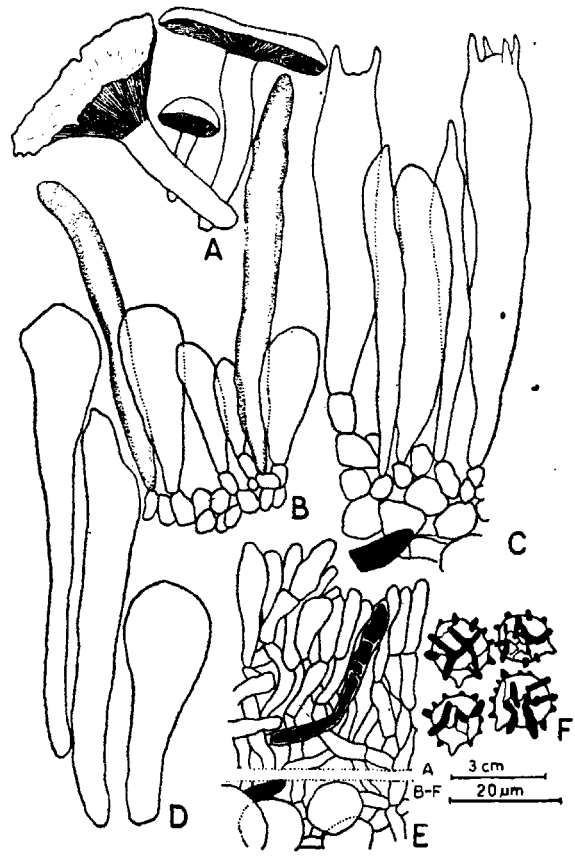

Figure 1 A–F *(Lactarius fuliginosus)*: *A*, Carpophores; *B*, Gill edge showing projecting lactifers and cheilocystidia; *C*, C.S. through gill showing basidia, pleurocystidia and a lactifer; *D*, Pleurocystidia; *E*, C.S. through pileus showing projecting lactifers in to the epicutis and heteromerous context; *F*, Basidiospores

brown (7F4) both when fresh and dry. Flesh white, turns pinkish on contact with air, tardily acrid. Latex milky, dries out on contact with air, unchanging, tardily acrid. Odour slightly aromatic.

Lamellae subdecurrent, close, few branched, lamellulae present, moderately broad, white when young, yellowish white (1A2) when mature, turns deep yellowish pink when bruised. Spore deposit yellowish white (1A2).

Stipe up to 5.7×1 cm, central, almost clavate, slightly tapering downwards, solid, dark brown (7F4), whitish at the base, surface pruinose, fleshy, flesh white, turns yellowish pink on exposure, latex milky, unchanging.

Spores7.6–12.5×9–12.3 μm, subglobose, warty, ornamentation type II, warts up to 2.3μm long, apiculate, strongly amyloid.

Basidia 42.5–74×9.9–13.7μm, 2 and 4 spored, clavate, sterigmata up to 5.3 μm long. Pleurocystidia 41–77.5×8–15 μm, ampullaceous to spathulate and also with narrower tip. Cheilocystidia 21.5–35×9–12 μm, ampullaceous. Lactifers abundant also project out from the margin as well as gill edges, staining dark blue in cotton blue mount.

Epicutis made up of turf like covering of pilocystidia and lactifers. Pileus trama of nests of sphaerocysts intermingled with interwoven septate hyphae, lactifers and connective hyphae. Stipe context and gill trama heteromerous.

Chemical colour reaction: pileus surface turns yellow in conc. HNO_3.

Specimens examined: Himachal Pradesh: Simla, Narkanda (2,700 m), on humicolous soil, in tufts of 2–3 in the gymnospermous forest dominated by *Abies pindrow*, N. S. Atri, PUN 280, August 10, 1979; Simla, Narkanda, on humicolous soil in the forest of *A. pindrow*, N. S. Atri, PUN 281, August 8, 1979.

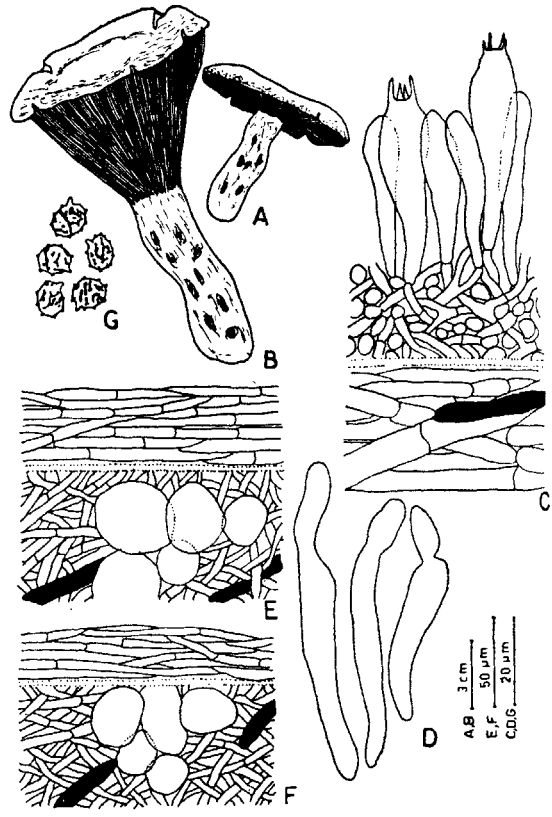

Figure 2 A–G *(Lactarius scrobiculatus)* : *A*, Partially mature carpophore; *B*, Mature carpophore; *C*, C.S. through gill showing basidia and a part of hymenophoral trama; *D*, Pleurocystidia; *E*, C.S. through pileus showing heteromerous context and scattered lactifers; *F*, C.S. through stipe showing heteromerous context and scattered lactifers; *G*-Basidiospores

The above characters of the present collections are in full agreement with those given by Smith (1949) and Pearson (1950). However, in the present collections the basidia are slightly larger and the cheilocystidia slightly broader. It constitutes a new record for India.

Lactarius scrobiculatus (Scop.) Fr., *Epic.* p.334, 1838; *Hym. Eur.*, p. 422, 1874; *Syll. Fung.*, **5**: 424,1887 (figure 2 A–G)

Fructifications up to 13.4 cm in height. Pileus up to 9.3 cm broad, first involute

with a depression in the centre, finally infundibuliform, margin incurved, shaggy with brownish hairs, irregular, splitting at maturity, brown yellow (5C7), no change when cut or bruised. Latex present, milky, turns yellowish on contact with air, slightly acrid. Flesh yellowish white, up to 7 mm thick, unchanging, bitter. Odour characteristic of its own.

Lamellae subdecurrent, distant, unequal, not in series, yellowish white (3A2), darker when mature, no change when cut or bruised, edge smooth. Spore print pale yellow (3A3).

Stipe up to 7.8×2.4 cm, stout, tough, slightly broad near the base, hollow, yellowish white (3A2), latex exudes out on cutting the stipe, latex colour becomes yellow when brought in contact with air, stipe surface pitted.

Spores up to 7.2–9.7×6–8 μm, subglobose, warty, warts connected with thick connections to form a mesh, ornamentation type IIIb and IV, apiculus up to 3 μm, nodulose type, strongly amyloid.

Basidia 37.5–48×7.5–12 μm, 4-spored, clavate, sterigmata up to 6 μm. Pleurocystidia up to 48.5–75×6–11 μm, deeply seated, macrocystidioid, cylindrical, appendiculate. Cheilocystidia absent.

Epicutis up to 33–48 μm thick, made up of thin narrow closely septate hyphae filled with yellowish content, context heteromerous, composed of sphaerocysts measuring up to 22–55×14–44.5 μm, intermixed with up to 7.4 μm broad septate hyphae. Hymenophoral trama solely of septate hyphae. Subhymenium 66–74 μm thick composed of sphaerocysts intermingled with septate hyphae. Stipe context heteromerous. Lactifers abundant in the stipe, pileus and gill context.

Chemical colour reactions: Pileus surface turns coffee brown in conc. H_2SO_4 while stipe surface turns dark brown.

Specimen examined: Uttar Pradesh: Jamnotri, Hanuman Chatti (3,184 m), scattered under *Abies pindrow*, N. S. Atri, PUN 326, September 2, 1980.

The above characters are in full agreement with those given by Pearson (1950). It has been recently listed by Watling and Gregory (1980) from Kashmir, here it is described in details from a different geographical region of North India.

Lactarius volemus Fr., *Epicr. Syst. Myc.* p.344, 1838 (figure 3A–F).

Fructifications up to 14.5 cm in height. Pileus up to 8.6 cm broad, first expanded,

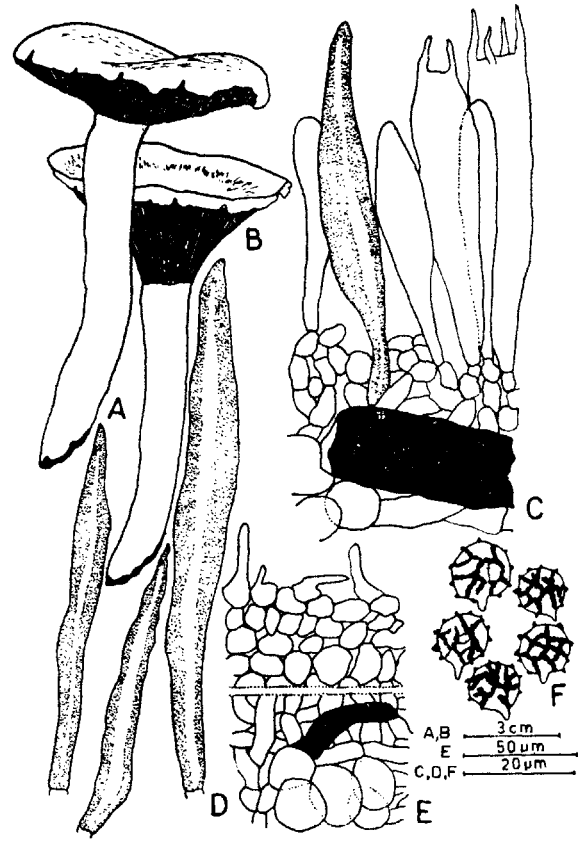

Figure 3 A–F (*Lactarius volemus*) : *A*, Partially mature carpophore; *B*, Fully mature carpophore; *C*, C.S. through gill showing basidia, pseudocystidia and a lactifer; *D*, Pseudocystidia (Pleuro-& Cheilo); *E*, C.S. through pileus showing pilocystidia, heteromerous context and a lactifer; *F* Basidiospores

finally infundibuliform, margin irregular, splitting at maturity, surface dry, brownish orange (5C4). Flesh white changes to orange yellow when kept in contact with air for more than one minute, mild. Latex milky, slightly acidic. Odourless

Lamellae subdecurrent, close, unequal, broad, yellowish white, (1A2) turns orange brown when bruised, edges wavy, sterile. Spore print white.

Stipe up to 13×1.7 cm, central to excentric, tough, stout, slightly tapering below, fleshy, solid, yellowish white (1A2), turns yellowish brown when bruised.

Spores 6.9–11.5 μm in diameter, globose, warty, warts small, up to 0.7 μm long, ornamentation type I, apiculus up to 3.04 μm long, strongly amyloid.

Basidia 33.4–56.2×6–10.6 μm, 2 and 4 spored, clavate, sterigmata up to 9.5 μm long. Pleuro and cheilocystidia macrocystidioid, 30.4–92.3×4.5–9.5 μm, both fusiform, deeply seated, abundant.

Cap, gill and stipe context heteromerous with scattered lactifers. Pilocystidia 19.6–38.9×5–13.5 μm, with inflated bases, abundant, beneath them is a pseudoparenchymatous layer.

Chemical colour reactions: Flesh turns dark brown in KOH, yellowish brown in NH_4OH, orange brown in conc. HNO_3 and deep brown in 10% phenol. Stipe surface turns deep brown in 10% phenol and its base deep orange and finally dark chocolate coloured in guaicol.

Specimen examined: Himachal Pradesh: Simla, way to Bhiont (1,970 m), on humicolous soil in the gymnospermous forest dominated by *Cedrus deodara* and *Pinus wallichiana*, N. S. Atri, PUN 283, August 17, 1979.

The above collection has been identified as *Lactarius volemus* Fr. and it agrees well with the details given for this species by Smith (1949) and Pearson (1950). Here it is recorded for the first time from India.

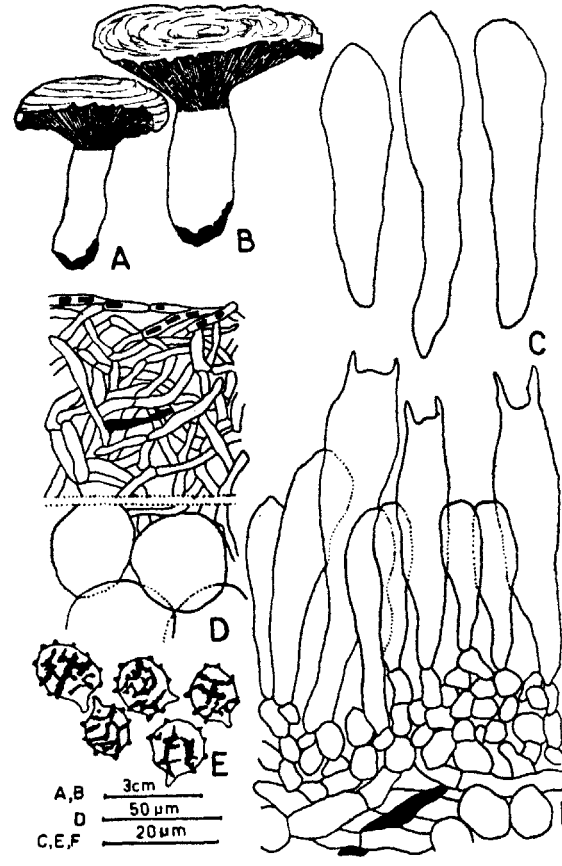

Figure 4 A–F (*Lactarius deliciosus*) *A*, Immature carpophore; *B*, Mature carpophore; *C*, Pleurocystidia; *D*, C.S. through pileus showing heteromerous context and lactifers; *E*, Basidiospores; *F*, C.S. through gill showing basidia and a lactifer.

Lactarius deliciosus (Fr.) S. F. Gray, *Nat. Arr. Britt. Plants.* 1:624, 1821. (figure 4A–F).

Fructifications up to 7 cm in height. Pileus up to 7.3 cm broad, first convex, finally expanded with a depression in the centre, zonate, pale orange (6A3). Latex deep orange, turns greenish on contact with air, first mild then acrid. Flesh acrid. Odour aromatic.

Lamellae decurrent, crowded, unequal, not arranged in series, branched, moderately broad, orange (6A6), turns greenish when bruised, edges smooth. Spore print yellowish white (4A2).

Stipe up to 4.7 × 2.2 cm stout, tough, slightly tapering above, solid, deep orange (6A8).

Spores 7.6–11.6×6–10.6 μm, subglobose, warty, warts small, ornamentation type I, apiculus up to 2.3 μm long, strongly amyloid.

Basidia 38–61×6.8–12.2 μm, 2 and 4 spored, clavate, sterigmata up to 6 μm long. Pleurocystidia 35–50 × 7.6–9 μm, clavate, abundant. Cheilocystidia none.

Cap, gill and stipe context heteromerous with scattered lactifers. Epicutis hyphal with scattered lactifers.

Chemical colour reactions: Flesh turns yellowish in NH_4OH. Stipe surface turns brown in 10% phenol.

Specimens examined: Himachal Pradesh: Simla, Narkanda (2,800 m), on humicolous soil in the gymnospermous forest dominated by *Abies pindrow*, N. S. Atri, PUN 282, August 16, 1979.

Uttar Pradesh: Jamnotri (3,800m), on humicolous soil in the forest of *Abies pindrow*, *Picea smithiana* and *Quercus semecarpifolia*, N. S. Atri, PUN 304, September 3, 1980: Chakrata, Deoban (2,700m), on humicolous soil in the forest of *Quercus semecarpifolia*, *Abies pindrow* and *Picea smithiana*, N. S. Atri, PUN 308, September 13, 1980.

The above characters of the present collections are in conformity with those given by Smith (1949) and Pearson (1950). It was reported by Berkeley (vide Bilgrami et al. 1979) from Eastern Himalayas. In the present paper its occurrence from the North Western Himalayas is reported.

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References

Bilgrami K S, Jamaluddin and Rizwi A M 1979 *Fungi of India*. Part I. (New Delhi: Today and Tomorrows Printers and Publishers) 467pp.

Kornerup A and Wanscher J H 1978 In *Methuen Handbook of Colour*. 3rd edn. (London: Eyre Methuen) 252 pp.

Pearson A A 1950 The genus *Lactarius*; *The Naturalist* 1–19 (London)

Saini S S and Atri N S 1982a North Indian Agaricales-II; *Sydowia-Annals Mycologici* 35 (In Press)

—— and —— 1982b North Indian Agaricales-I: *Indian Phytopath*. 35 265-272

Singer R 1975 In *The Agaricales in Modern Taxonomy* 3rd edn. (Vaduz: J. Cramer) 912 pp.

Smith A H 1949 In *Mushrooms in Their Natural Habitat* (New York: Hafner Press) 626 pp.

Watling R and Gregory M 1980 Larger fungi from Kashmir; *Nova Hedwigia* 32 (2+3): 493-564