

LACTARIUS FENNOSCANDICUS (RUSSULACEAE) A NEW RECORD FOR INDIA

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Members of *Lactarius* sect. *Deliciosi* (Fr.) Redeuilh, Verbeken & Walleyne are quite popular in European countries as they are taken with delicacy but, in India, especially in Sikkim they are not so appreciated by the local people. During the Macrofungi explorations undertaken in 2011 and 2012 to the different parts (Shingba Rhododendron Sanctuary, Dombang valley, Lachung, Lachen, Zema, Kalep) of North district of Sikkim the author came across few members of *Lactarius* sect. *Deliciosi*. They were mainly collected from the coniferous to mixed forests dominated by the trees like *Picea*, *Abies*, *Larix*, *Tsuga*, *Rhododendron*, *Acer* and *Betula*. Out of these collections one appears to be an interesting taxon namely, *Lactarius fennoscandicus* Verbeken & Vesterh. and is reported herein for the first time from this subcontinent with its detailed description coupled with the relation with its allied taxa. Supporting macro- and micromorphological illustrations are also given in this communication.

Macromorphological characterization was made in the field or base camp from the fresh basidiomata. Field photographs of the fresh basidiomata were taken with the aid of Nikon D300s. Colour codes and terms follow Henderson & al. (1969) which is indicated in the description as “a” and Kerner & Wancher (1981), indicated in the descriptions as “b”. For recording the colour of the spore print Kränzlin (2005) was used and is referred to in the description as “c”. Samples were allowed to dry with a field drier. In the laboratory, micromorphological characters were recorded from the dry samples mounted in a mixture of 5% KOH, 1% Phloxin, Congo red, a, d 30% Glycerol and Melzer's reagent. Macromorphological drawings were made from the fresh basidiomata. Drawings of basidiospores were made at 8000 × magnification and of other micromorphological structures at 1000 × magnification. Basidium length excludes the length of sterigmata. Measurements of spores are recorded based on the observation of twenty basidiospores. Spores are measured in side view and measurements are given as $KDa-KDc-KDb \times K Dx-KDz-KDy$ in which KDa = minimum value for the length of measured collections, KDb = maximum value for the length of measured collections, KDc = mean value for the length of measured collections and KDx = minimum value for the width of measured collections, KDy = maximum value for the width of measured collections, KDz = mean value for the width of the measured collections. Quotient of spore indicates length-width ratio ($Q = L/W$) and is presented here as $Qa-Qc-Qb$ where Qa = minimum quotient value amongst measured collections, Qb = maximum quotient value amongst measured collections, Qc = mean quotient value amongst measured collections. Herbarium name is after Holmgren & al. (1990). Scanning Electron Microscope (SEM) photographs of basidiospores were obtained from dry spores in the spore print. Spores were directly mounted on a double-sided adhesive tape pasted on a metallic specimen-stub and then scanned with gold coating at different magnifications in high vacuum mode to observe patterns of spore-ornamentation. SEM study was carried out with a FEI's Quanta 200 model installed at the S.N. Bose National Centre for Basic Sciences, Kolkata (India).

***Lactarius fennoscandicus* Verbeken & Vesterh., Cryptog. Mycol. 19 (1-2): 87. 1998. (Fig.1 & Pl. 1)**

Pileus 30 - 105mm diam., at first convex to planoconvex with incurved to decurved margin and slightly depressed centre, becoming more depressed in the centre with maturity; surface sticky to slightly viscid, strongly zonate with frequent comparatively narrow zones towards the margin, coral (a: 44) to brownish orange (b: 7C8) with dark brick to rust (a:13) zonations, rarely paler up to dull salmon, often locally with greenish areas, sometimes leaf green entirely; margin non-striate, incurved. Lamellae subdecurrent to decurrent, crowded

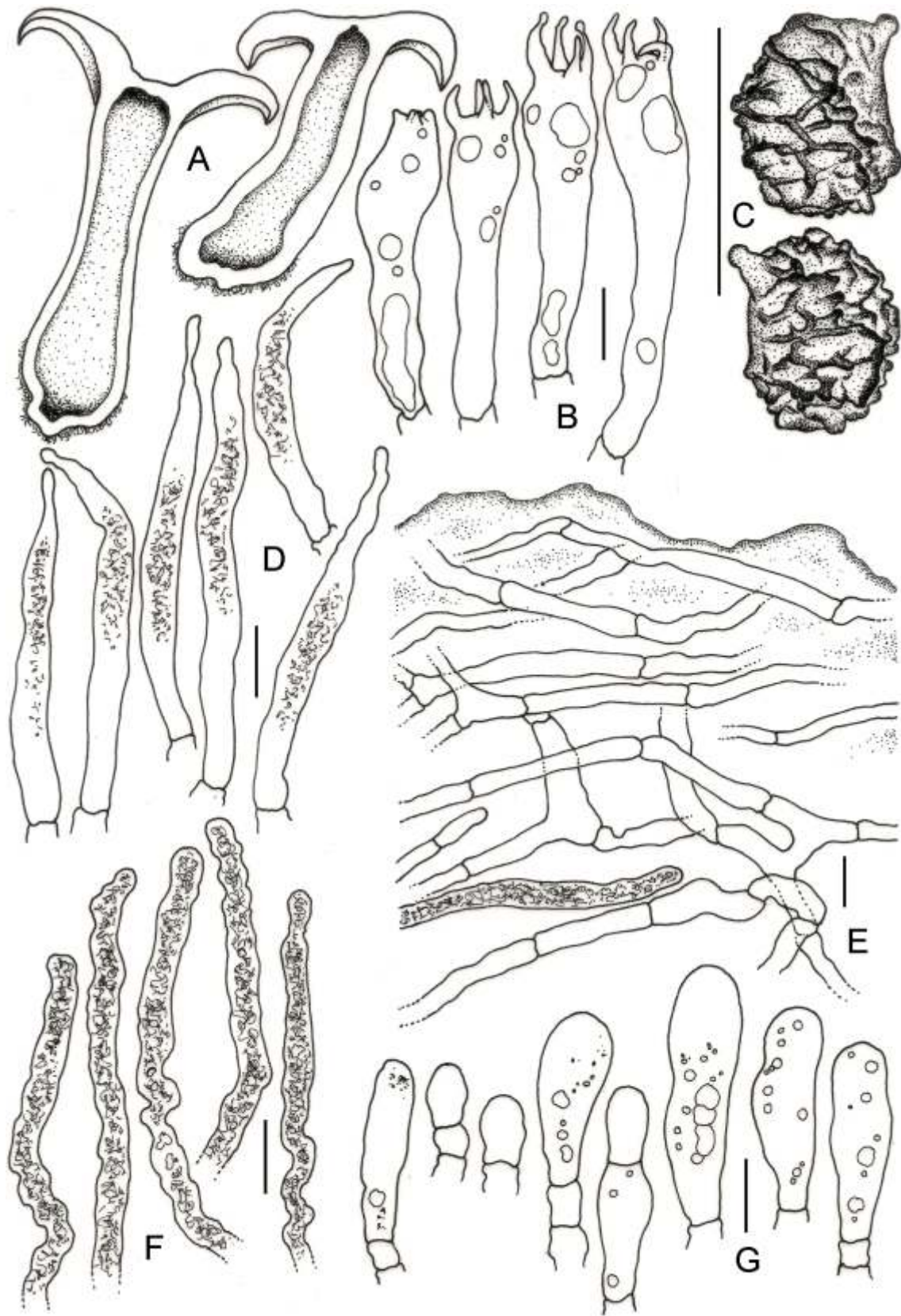


Fig. 1 : *Lactarius fennoscandicus* Verbeken & Vesterh.: (KD-11-058, drawn by K. Das): **A.** Fresh Basidiomata showing the lamellae and lamellulae; **B.** Basidia; **C.** Basidiospores; **D.** Pleuromacrocytidia; **E.** Cross-section through pileipellis; **F.** Pleuropseudocystidia; **G.** Marginal cells. Bars = 10µm.

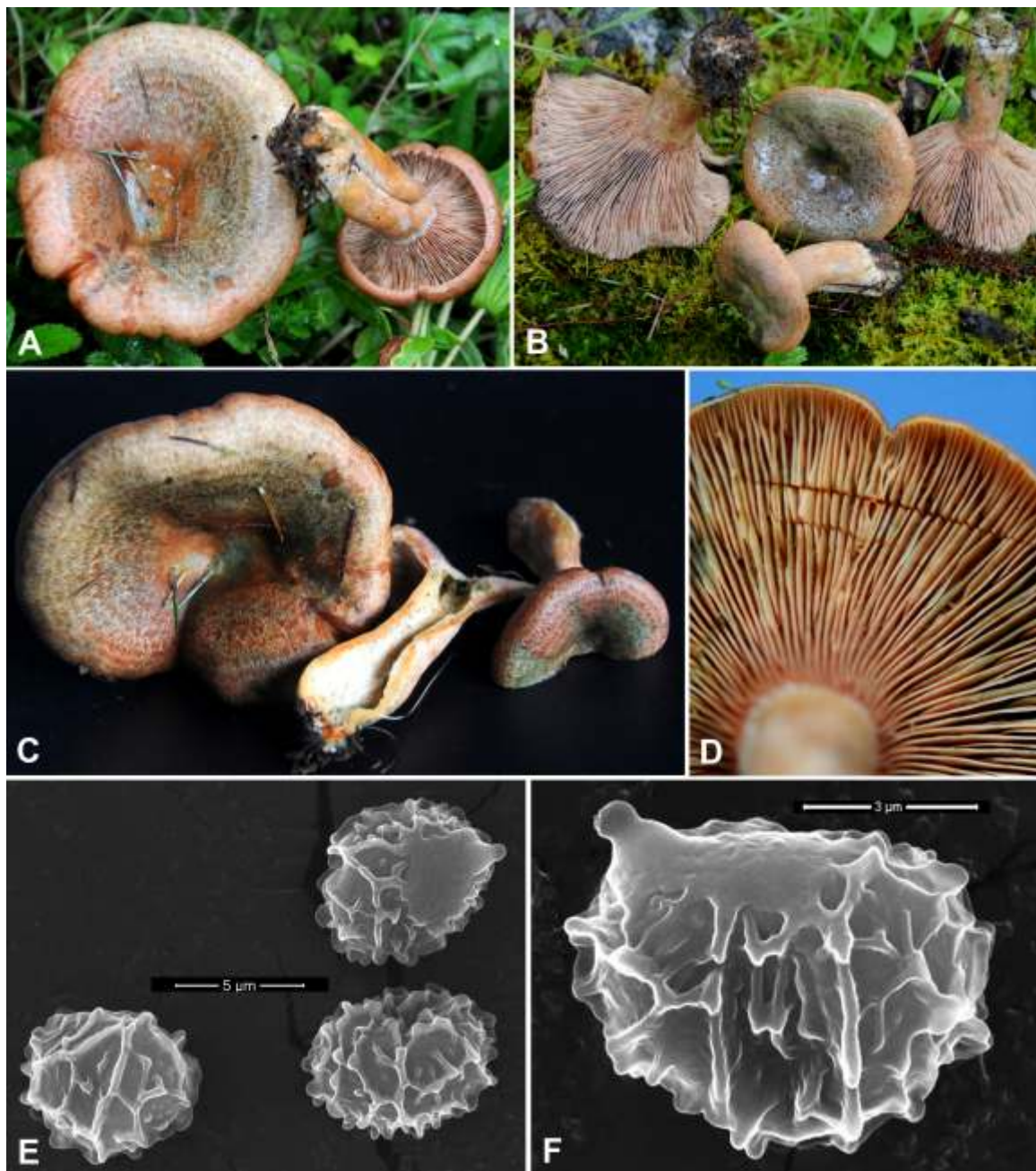


Plate -1 : *Lactarius fennoscandicus* Verbeken & Vesterh.: **A, B & C.** Dorsal and ventral view of fresh basidiomata; **D.** Latex oozing out from the cut lamellae; **E & F.** Scanning Electron Micrograph of basidiospores. Bars: E = 5µm, F = 3µm.

(18/cm at pileus margin), never forked, fragile, saffron to orange or brownish orange (b: 7C8) to coral (a: 44), turning greenish when bruised, with lamellulae in 6 - 7 series; edges entire, yellowish white. Stipe 33 - 85 × 13 - 23mm, cylindrical or slightly wider near the base, without any scrobicules, strigose at the base, never sticky, brownish orange (b: 7C8) to coral (a: 44), with a narrow zone at the apex and the base. Context hollow in stipe, yellowish white, changing slowly to saffron (a: 49), then becoming leaf green (a: 59), unchanging with KOH and FeSO₄, changing to leaf green (a: 59) with guaiac. Latex orange (a: 48), becoming apricot (a: 47) to rust (a: 13) and finally greenish grey (a: 65) on context and citrine (a: 64) on white paper. Spore print pale yellow-orange (c: 30Y, 5M).

Basidiospores 6.9-8.3-9.3 × 5.7-6.4-7.0µm, (n=20, Q = 1.21-1.27-1.38), broadly ellipsoid to ellipsoid; ornamentation amyloid, up to 0.5µm high, composed of narrow ridges and rounded warts which are aligned or

connected and forming an incomplete reticulum; plage inamyloid. Basidia $44 - 57 \times 10 - 12\mu\text{m}$, 4-spored, subclavate; sterigmata $5 - 6 \times 2.0 - 2.5\mu\text{m}$. Pleuromacrocystidia $44 - 58 \times 5 - 6\mu\text{m}$, emergent up to $20\mu\text{m}$, subfusiform, with slightly moniliform apex and niddle-like context. Pleuropseudocystidia abundant, $4 - 5\mu\text{m}$ broad, cylindrical with rounded apex, tortuous near the subhymenium, thin-walled, dense. Lamellar edge sterile. Cheilomacrocystidia absent. Marginal cells $9 - 38 \times 5 - 10\mu\text{m}$, cylindrical to clavate, sometimes multiseptate, thin-walled. Subhymenium cellular. Hymenophoral trama with abundant lactifers. Pileipellis an ixocutis, up to $300\mu\text{m}$ thick with gelatinised upper layer; hyphae up to $5\mu\text{m}$ broad, branched, septate. Clamp connections absent.

Habitat : Gregariously scattered in subalpine coniferous *Picea* forests.

Distribution : Sweden, Finland, India.

Specimens ex-mined : India: Sikkim: Dombang valley, 2920m, N $27^{\circ}43'35.2''$ E $88^{\circ}45'15.2''$, 22.08.2011, K. Das, KD 11-058 (BSHC); Zema I, 2785m, N $27^{\circ}45'11.6''$ E $88^{\circ}32'27.9''$, 30.08.2012, K. Das, KD 12-211 (BSHC).

Notes : *Lactarius fennoscandicus* is rather common in the localities of North Sikkim mentioned above and is characterized by its coral to brownish orange, distinctly zoned pileus, saffron to brownish orange lamellae that turn greenish where bruised, orange to rust coloured latex that turns apricot to rust and finally greenish grey on context (Heilmann-Clausen & al., 1998, Nuytinck & Verbeken, 2005) and citrine on white paper, stipe without any scrobicules, and the context remain unchanged with KOH and FeSO_4 (Nuytinck & Verbeken 2005). Moreover, association with *Picea* is quite distinct for this species. Microscopically, this species can be characterized by the absence of cheilomacrocystidia (Verbeken & Vesterholt, 1998) and presence of spores with incomplete reticulum.

Lactarius deterrimus Gröger (also reported from India by Watling & Gregory, 1980), a close relative of *L. fennoscandicus* can be separated by zonations in the pileus that are mainly located towards the margin (Basso, 1999), the latex which never becomes greenish grey on the context, larger spores ($7.6 - 8.5 - 9.4 - 10.4 \times 5.9 - 6.6 - 7.1 - 8.0\mu\text{m}$) as documented by Nuytinck & Verbeken (2005), rather abundant cheilomacrocystidia (Heilmann-Clausen & al., 1998, Nuytinck & Verbeken, 2005). Few other taxa of *Lactarius* sect. *Deliciosi* which are reported from India like, *L. deliciosus* (L.: Fr.) Gray (Atri & al., 1991) and *L. sanguifluus* (Paulet) Fr. (Lakhanpal & al., 1987) also somewhat resembles the present species. But in *L. deliciosus*, stipe is always scrobiculate whereas, in *L. sanguifluus* pileus is azonate to faintly zonate (Nuytinck & Verbeken, 2005). Moreover, both the species have cheilomacrocystidia (Nuytinck & Verbeken, 2005).

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