



Light Spored Agarics- New To India (Family Agaricaceae)

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ABSTRACT

Two species of genus *Lepiota* viz. *Lepiota brunneoincarnata* Chodat & C. Martin and *Lepiota humei* Murril var. *microspora* var. nov. and one species of genus *Chlorophyllum* viz. *Chlorophyllum sphaerosporum* Z.W. Ge & Zhu L. Yang, are taxonomically described and reported for the first time from India.

Key Words: Agaricaceae, lamellae, cheilocystidia, new records, India.

INTRODUCTION

Agarics are the most common group of mushrooms which can broadly be categorized on the basis of the spore print colour into Dark spored and Light spored agarics. Under the light spored agarics the spore print may vary from white, pale yellow to pale pink. The present paper deals with the light spored mushroom genera *Lepiota* and *Chlorophyllum*. The collections of these light spored agarics were done during the monsoon season from various localities of District Punjab. Of these *Lepiota brunneoincarnata* Chodat & C. Martin, *Lepiota humei* Murril var. *microspora* var. nov. and *Chlorophyllum sphaerosporum* Z.W. Ge & Zhu L. Yang are not earlier known from India. In the present paper the taxonomic description and these three light spored agarics are given supported by field photographs and line drawings.

MATERIALS AND METHODS

For the material and methods for noting down the extralimital details of the carpophores the standard format described by Atri et al. (2005) has been followed. The color terminology of Kornerup and Wanscher (1978) has been followed. The identified specimens have been deposited in the Herbarium, Department of Botany, Punjabi University, Patiala (Punjab) India, under the Accession No. PUN.

TAXONOMIC OBSERVATIONS

Lepiota humei Murril, *Lloydia* 6: 220 (1943) var. *microspora* M. Kaur and N. Kaur **var. nov.**

Fig. 1 (A-F), 4 & 5

Mycobank no.: MB 808340

Fructification 2-9 cm in height. Pileus 2.4-8.0 cm broad, flattened; broadly umbonate, nipped; surface off white with grayish orange 5B₄ to 5E₄ umbo; scaly, scales appressed to recurved fibrillose brownish orange (5C₃), cover the entire pileus surface; more concentrated in the centre; surface moist; margin irregular, splitting at maturity, striate; margin appendiculate; cuticle fully peeling; flesh upto 0.1-0.5 cm thick, white changing to reddish brown (6E₈) on cutting; taste and odour mild. Lamellae free, unequal, subdistant to crowded, offwhite, unchanging, moderately broad upto 0.8 cm broad; lamellulae present; gill edges smooth, normal. Stipe central 2.6-8.7 cm long, 0.3-0.7 cm broad, white changing to brownish red (9C₇) on bruising and cutting, equal in diameter throughout with a slightly bulbous base, hollow; scaly, scales fibrillose; annulate, annulus double, superior, ring like, movable. Spore print white.

Basidiospores (5.6) 6.26-8.95 (9.6) × 4.47-6.4 μm (excluding apiculus), (Q=1.41), ellipsoid, double walled, smooth, dextrinoid; apical pore absent; apiculate, apiculus 1.8 μm long. Basidia 16-27 (32) × 7.16-9 (11) μm, clavate, granular throughout,

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bisterigmate, tristerigmate to tetrasterigmate; sterigmata 1.6-3.58 μm long with blunt to pointed tips. Pleurocystidia absent. Cheilocystidia (16) 21-30 (37) \times 4.5-12.8 μm , claviform to utriform, thickly granulated at the apex with encrusted apices, abundant. Gill edges sterile.

Carpophore context homoiomerous. Pileus cuticle hyphal, gelatinized, made up of loosely arranged 2-4 μm broad septate hyphae giving rise to a regular turf of projecting, septate hyphae upto 9.0 μm broad hyphae; pileus context hyphae upto 13 μm broad. Hymenophoral trama irregular. Stipe cuticle hyphal, made up of upto 8.0 μm broad closely septate longitudinally tangled hyphae. Clamp connections present in stipe.

Collection examined- Punjab: Sangrur, Nadampur Village (231 m), growing scattered on dung, Jagdeep Kaur, PUN 4087, August 22, 2009. Hoshiarpur, Chabbewal (295 m), growing scattered in groups on grassy, humicolous soil. Narinderjit Kaur, PUN 4687, August 16, 2011.

Remarks- In its gross morphology, the presently worked out collections match with *Lepiota humei* Murill as described by Akers & Sundberg (1997). Microscopically, it differs from the descriptions given for *Lepiota humei* Murill in the literature by possessing 6.26-8.95 \times 4.47-6.26 μm spores instead of 8.0-13.5 \times 6-8.5 μm as given by Akers & Sundberg (1997). Further, it is mentioned in the literature that in *L. Humei* the minimum spore length is 7.5 μm and minimum spore breadth is 5.3 μm , but in PUN 4087 and PUN 4687 the minimum spore length and breadth is 6.26 \times 4.47 μm , also in these collections the basidia are bisterigmate, tristerigmate to tetrasterigmate. Vellinga (2007) has stressed upon the presence of only bisporic basidia in *L. Humei*. This small spored variant was collected in 2009 from District Sangrur of Punjab later in 2011 this variant was collected from Hoshiarpur thus, based upon these two different collections of this small spored variant a new variety i.e. *Lepiota humei* var. *microspora* var. nov. is proposed.

Lepiota brunneoincarnata Chodat & C. Martin *Bulletin de la Société botanique de Genève* 5: 222, 1889.

Fig. 2 (A-G), 6 & 7

Fructification 2.1-4.0 cm in height. Pileus 0.6-1.9 cm broad, conical to convex; broadly umbonate; surface moist; brownish orange (6C₃-6C₄); margin regular; scaly, scales appressed squamulose, concentrically

arranged; cuticle fully peeling; flesh upto 0.1 cm thick, white, unchanging; appendiculate pileal veil forming a white frill on the margin; taste mild, odour spicy. Lamellae free, unequal, distant, offwhite, unchanging, narrow, upto 0.3 cm broad; gill edges smooth, normal. Stipe central, 2.0-3.9 cm long, 0.1-0.3 cm broad, white above, concolorous with the pileus below, equal in diameter throughout, solid, scaly, scales similar to those present on the pileus, arranged spirally around the stipe; annulate, annulus single, superior, powdery, evanescent. Spore print white.

Basidiospores 7.16-8.9 \times 4.47-5.37 μm (excluding apiculus), (Q=1.63), elongate, double walled, hyaline; apiculate, apiculus upto 0.9 μm long; Basidia 22-32 (35) \times 7.16-11 μm , clavate, granular, bisterigmate to tetrasterigmate; sterigmata 1.8 - 2.68 μm long. Pleurocystidia absent. Cheilocystidia (14) 21-27 \times (5.0) 9.0-11 μm , clavate, hyaline with some granulated at the apex. Gill edges sterile.

Carpophore context homoiomerous. Pileus cuticle hyphal, gelatinized, made up of 4.49 – 13.47 μm broad, septate hyphae bearing an epithelial layer of numerous, claviform, sometimes once encrusted, 27-54 \times 9.0-14 μm pileocystidia; context made up of upto 13 μm broad septate hyphae. Hymenophoral trama regular. Stipe cuticle hyphal, made up of longitudinally tangled upto 7.0 μm broad septate hyphae; context hyphae upto 18 μm broad. Clamp connections present throughout.

Collection examined: Punjab: Patiala (251 m), Punjabi University Campus, growing scattered as fairy ring formation on grassy, humicolous soil. Narinderjit Kaur, PUN 4686, July 29, 2011.

Remarks: The above examined collection matches in macroscopic and microscopic details to *Lepiota brunneoincarnata* Chodat & C. Martin as described by Jordan (1995). This species is characterized in possessing a broadly umbonate brownish orange cap covered with scales, stipe scaly with powdery evanescent annulus and white spore print. It is a new fungus record from India.

Chlorophyllum sphaerosporum Z.W.Ge & Zhu L. Yang, *Mycotaxon* 96: 2006.

Fig. 3 (A-G), 8 & 9

Fructification 7.5-10.2 cm in height. Pileus 5.0-7.5 cm broad, infundibuliform, yellowish white (4A₂) when young, orange gray (5B₂) at maturity; broadly umbonate; margin regular, splitting at maturity; striate, striations along margins; surface dry, shining;

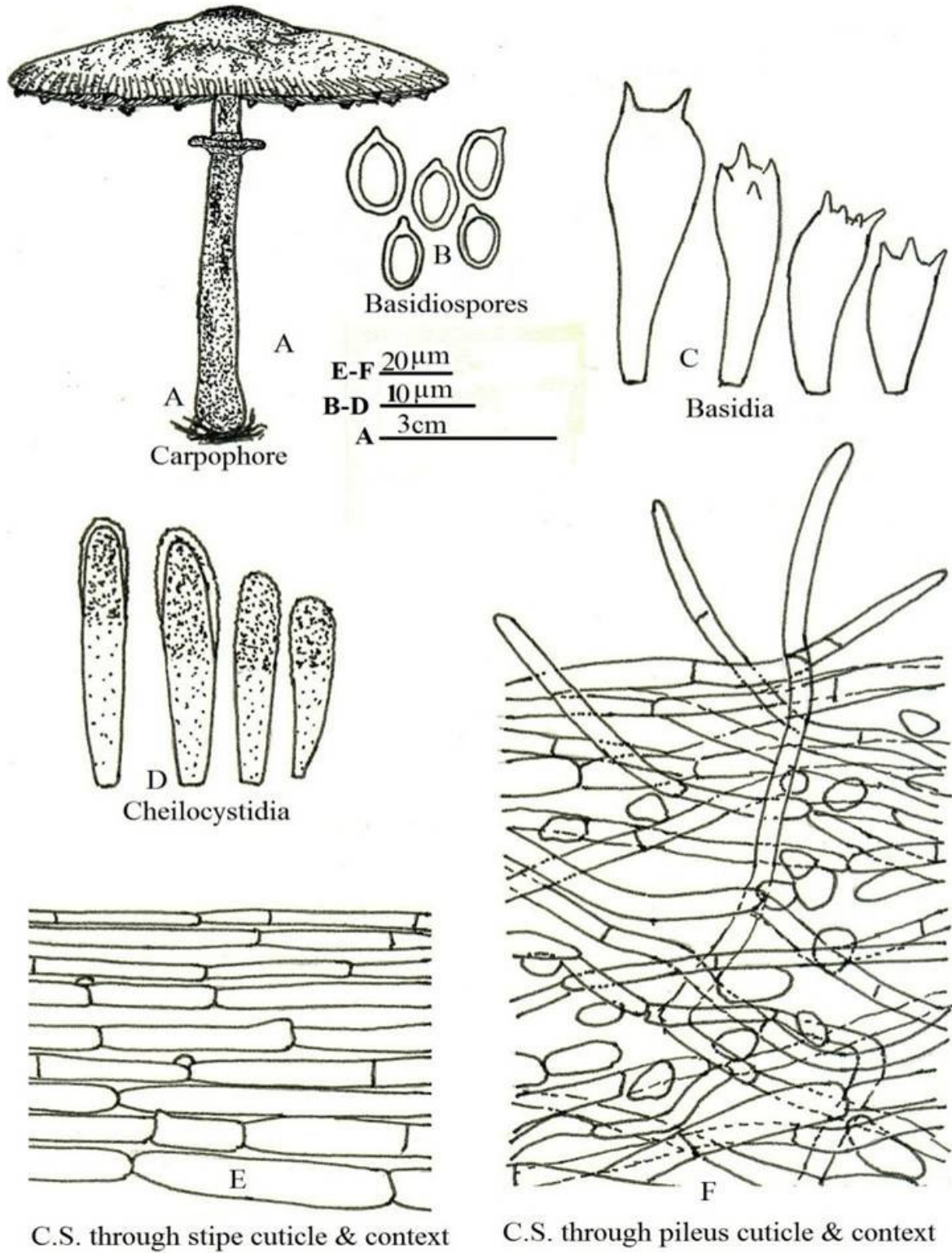


Fig. 1-A-F *Lepiota humei* Murill Var. *microspora* Var. nov. A Carpophore. B Basidiospores. C Basidia. D Cheilocystidia. E C.S. through stipe cuticle & context. F C.S. through pileus cuticle & context.

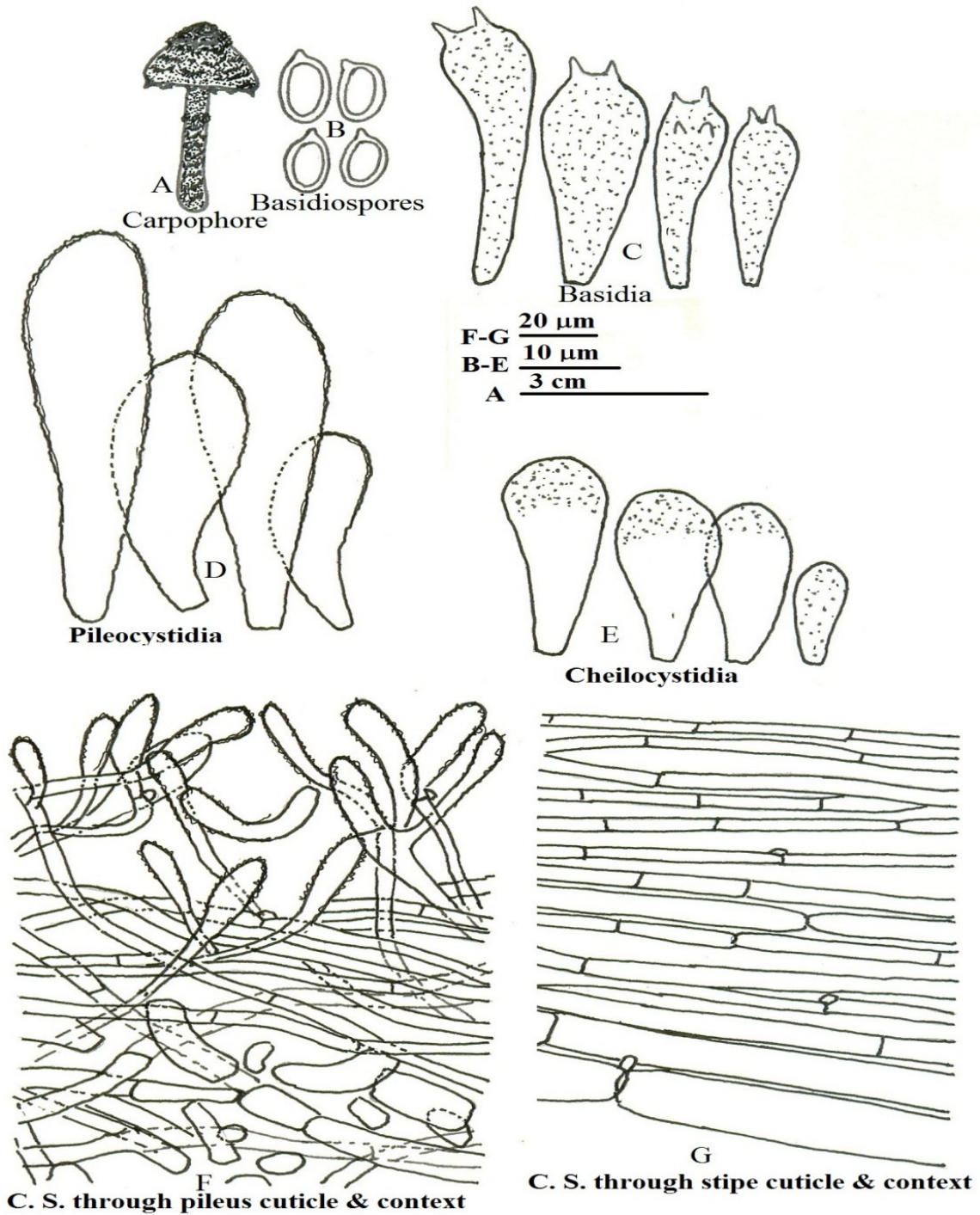


Fig. 2.A-G. *Lepiota brunneoincarnata* Chodat & C. Martin. A Carpophore. B Basidiospores. C Basidia. D Pileocystidia. E Cheilocystidia. F C.S. through pileus cuticle & context. G C.S. through stipe cuticle & context.

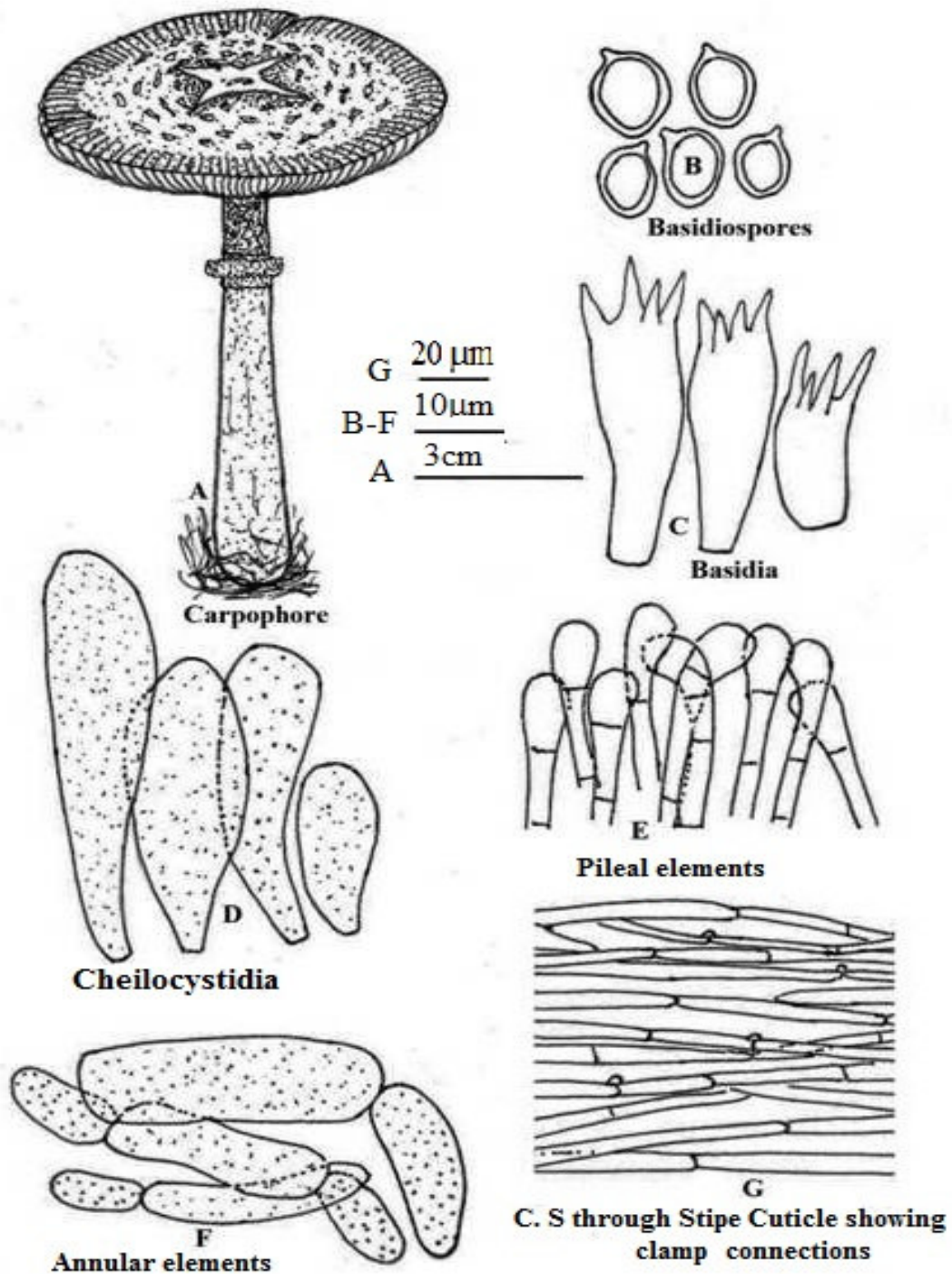


Fig. 3. A-G. *Chlorophyllum sphaerosporum* Z.W.Ge & Zhu L. Yang. A Carpophore. B Basidiospores. C Basidia. D Cheilocystidia. E Pileal elements. F Annular elements. G C.S. through Stipe cuticle showing clamp connections.



Fig. 4. *Lepiota humei* Murill var. *microspora* var. nov.

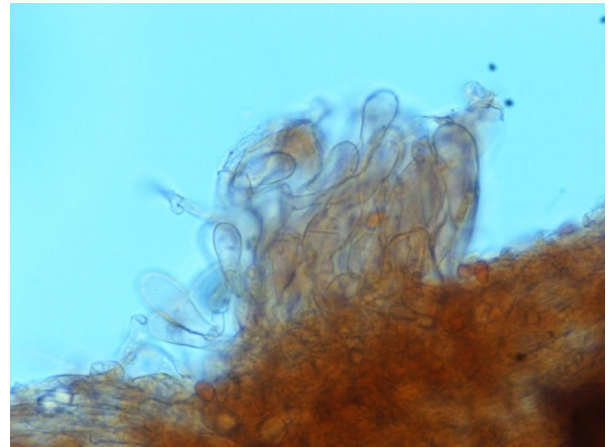


Fig. 7. *Lepiota brunneoincarnata* Chodat & C. Martin

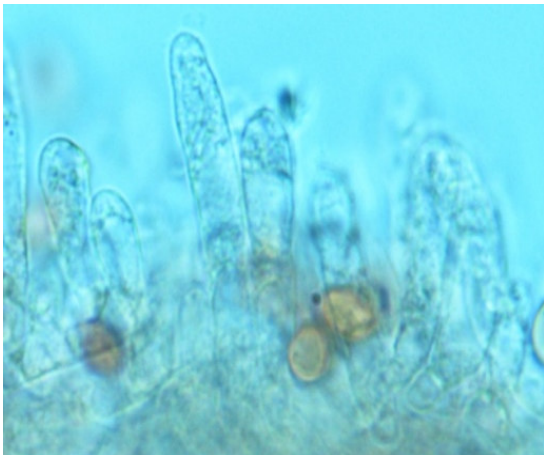


Fig. 5. *Lepiota humei* Murill var. *microspora* var. nov.



Fig. 8. *Chlorophyllum sphaerosporum* Z.W.Ge & Zhu L. Yang. Carpophores growing in fairy ring.



Fig. 6 *Lepiota brunneoincarnata* Chodat & C. Martin.

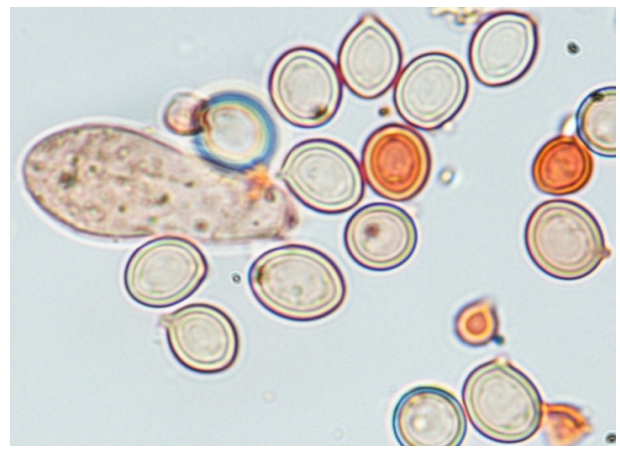


Fig. 9. *Chlorophyllum sphaerosporum* Z.W.Ge & Zhu L. Yang Basidiospores.

scaly, scales appressed fibrillose, more concentrated in concentric rings in the centre, scales lacking along the margin; cuticle fully peeling; flesh upto 1.2 cm thick, white, unchanging; pileal veil absent; taste and odour mild. Lamellae free, unequal, subdistant, orange white (5A₂), unchanging, upto 1.3 cm broad; gill edges smooth, normal. Stipe central, 6.4 - 9.0 cm long, 0.8 cm broad above and 1.0 cm broad below, offwhite, unchanging, obclavate, solid, scaly above annulus, smooth below; annulate, annulus double, funnel shaped with involute margin, movable, detached later on.

Basidiospores 8.0-9.84 (10.74) × 6.26-8.95 μm (excluding apiculus), (Q=1.23), broadly ellipsoid, double walled, dextrinoid, hyaline, germ pore absent; apiculate, apiculus upto 1.8 μm long. Basidia 17-32 × 8.45-10 μm, clavate, hyaline, tetrasporic; sterigmata 5.07-8.45 μm long. Pleurocystidia absent. Cheilocystidia 21-52 × 9-14 μm, clavate, hyaline to granular, abundant. Gill edges sterile.

Carpophore context homoiomerous. Pileus elements somewhat clavate forming a hymeniform layer of septate elements with inflated 3.58-5.37 μm broad tips. Hymenophoral trama irregular. Stipe cuticle hyphal, made of longitudinally tangled, septate hyphae upto 2.53 μm broad. Annular elements upto 10 μm broad. Clamp connections present in stipe.

Collection examined: Punjab: Patiala, Punjabi University Campus (251 m), growing scattered in clusters on humicolous soil. Harwinder Kaur, PUN 4683, August 12, 2008.

Remarks: The above examined collection belongs to genus *Chlorophyllum* Massee and its microscopic details especially the pileus cuticle elements and the shape and size of cheilocystidia and besides spores confirm it to be *C. sphaerosporum* as described by

Ge & Yang (2006). It is a new fungus record for India.

CONCLUSION

As these three species of family *Agaricaceae*, Viz, *Lepiota brunneoincarnata* Chodat & C. Martin, *Lepiota humei* Murill var. *microspora* var. nov. and *Chlorophyllum sphaerosporum* Z.W.Ge & Zh L. Yang are not earlier known from India. Hence, these are the first time reports from India.

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