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Protostropharia semiglobata var. *punjabensis*: A new coprophilous agaric from India

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ABSTRACT

Protostropharia semiglobata var. *punjabensis,* a new mushroom variety–growing on cow dung in Pathankot district of Punjab is described and illustrated.

Key Words: Agaricomycetes, Basidiomycota, mushroom, Strophariaceae, taxonomy

INTRODUCTION

The genus *Protostropharia* Redhead, Moncalvo & Vilgalys is a dark spored member of family Strophariaceae Singer & Smith of the order Agaricales Underw. It is characterized by a small to medium sized basidiome with viscid pileus, adnexed to adnate broad lamellae, annulate to sometimes glutinous stipe with gelatinous velar elements, ovoid to ellipsoidal basidiospores with truncate germ pore, presence of chrysocystidia and clamp connections. It is reported to grow on dung, or dung-enriched soil. The genus is distinguished from *Stropharia* (Fr.) Quél. by the production of astrocystidia rather than acanthocytes on its mycelium (Redhead, 2013).

MycoBank (www.mycobank.org) documents only two species, namely *P. alcis* (Kytöv.) Redhead, Thorn & Malloch and *P. semiglobata* (Batsch: Fr.) Redhead, Moncalvo & Vilgalys, which have been validly published under *Protostropharia.* From India, *Protostropharia semiglobata* is reported to occur as *Stropharia semiglobata* (Batsch: Fr.) Quél. in Punjab (Rea, 1922; Ginai, 1936; Saini and Atri, 1995), Jammu and Kashmir (Watling and Gregory, 1980), Tamil Nadu (Natarajan and Raman, 1983) and Kerala (Bhavani Devi, 1995). In this paper, we describe a new small spored variety of *P. semiglobata* that was found growing on cow dung in Pathankot area of Punjab, India.

MATERIAL AND METHODS

Microscopic characters were observed by cutting free hand sections after reviving a part of the dried specimen in 10% KOH and, –staining with 0.16% cotton blue (Atri and Saini, 2000). Basidium length excludes the length of sterigmata. The spore quotient (Q = L/W) was calculated considering the mean value of length divided by the width of 25 basidiospores. The color terminology used for morphological description is that of Kornerup and Wanscher (1978). The specimen has been deposited in the Herbarium of Punjabi University (PUN), Patiala, India. Herbarium acronym follows Holmgren & Keuken (1974).

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TAXONOMIC DESCRIPTION

Protostropharia semiglobata (Batsch: Fr.) Redhead, Moncalvo & Vilgalys var. punjabensis Amandeep Kaur, NS Atri & Munruchi Kaur var. nov. Figs. 1&2 MycoBank No.- MB 805354

Diagnosis: Differing from *P. semiglobata* in having much smaller basidiospores and cheilocystidia.

Holotype: India, Punjab, Pathankot: Berkula (309 m), growing solitary on cow dung in an open pasture, September 02, 2011, Munruchi Kaur and Amandeep Kaur, PUN 4840.

Basidiome 85 mm height. Pileus 17 mm diam., semiglobate; surface brownish orange ($6C_8$), viscid, shiny, glabrous, smooth; margin regular, not splitting, non-striate; cuticle separable; context thin, pale, unchanging; taste and odor not distinctive. Lamellae adnato-decurrent, forking near the margin, ventricose, subdistant, with lamellulae of 3 different lengths, up to 4 mm broad, dark brown ($6F_4$); edges white to light brown. Stipe 82 × 4 mm, cylindrical, slightly bulbous at the base, hollow, surface brownish yellow ($5C_8$), not bluing, pruinose, shredding at maturity; annulus not observed, a narrow dark zone near the stipe apex representing the evanescent veil present.

Basidiospores 10–14.5 × (6.5)7–9 mm (Q = 1.53), ellipsoid, with a truncate germ pore, thick-walled, smooth, golden yellow in water, brownish yellow in KOH. Basidia 17–22 × 7–9.5 mm, cylindric to clavate, 2-, 4- spored; sterigmata 2.5–3.5 mm long. Gill edges sterile. Cheilocystidia 17.5–34 × 6–10 mm, polymorphic, cylindrical, clavate, fusoid to fusoid-ventricose, thin-walled. Pleurocystidia chrysocystidioid, 22–44 × 6.5–13.5 mm, polymorphic, obclavate, lageniform to fusoid-ventricose, sometimes with mucronate apices, thick-walled. Pileus cuticle an

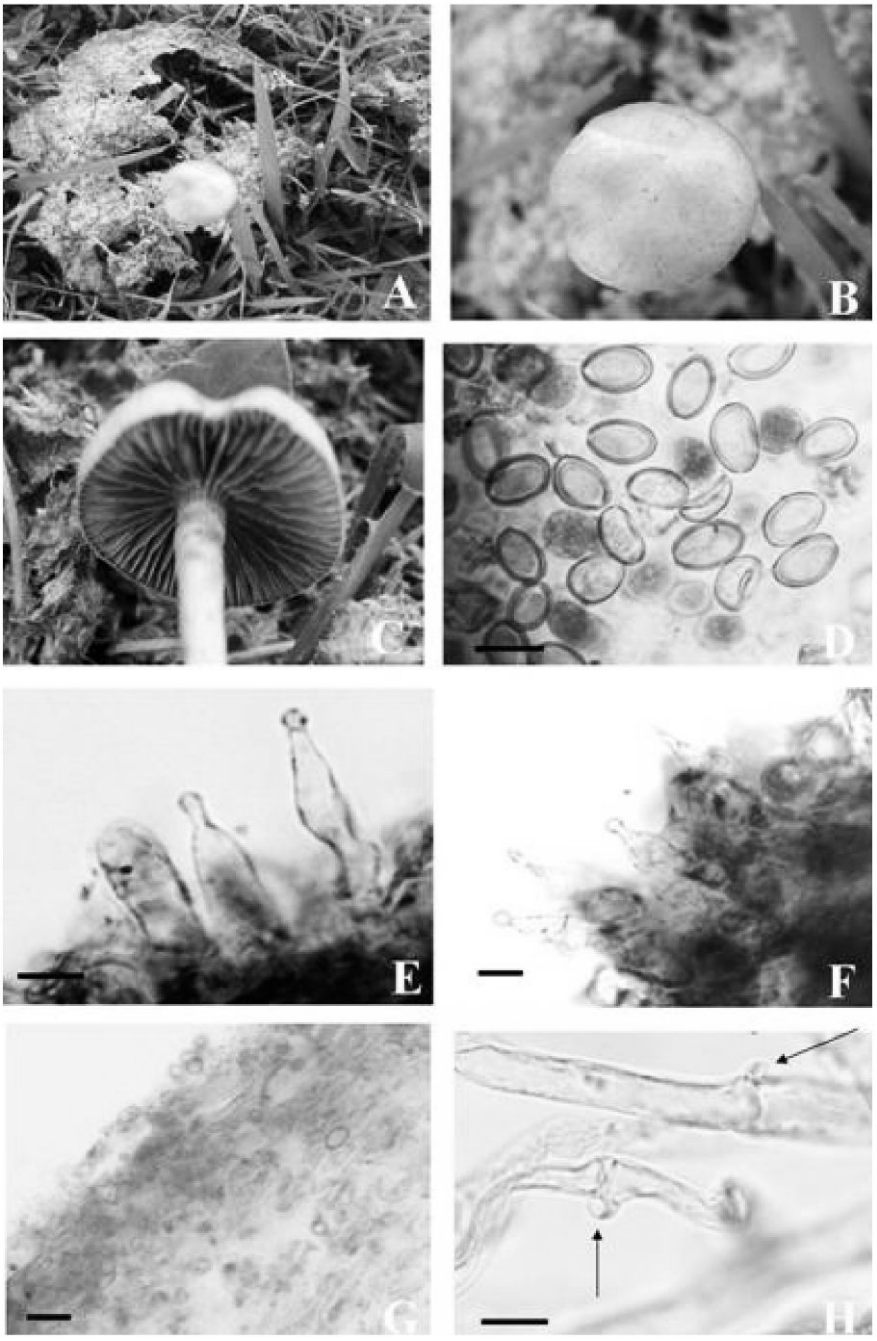

Fig. 1 *Stropharia semiglobata* var. *punjabensis*: A. Carpophore growing on cow dung; B. Pileus surface C. Gill attachment to the stipe; D. Basidiospores; E. Cheilocystidia; F. Chrysocystidia; G. Pileus cuticle and context; H. Clamp connections in pileus trama. Bars D-H 10 mm.

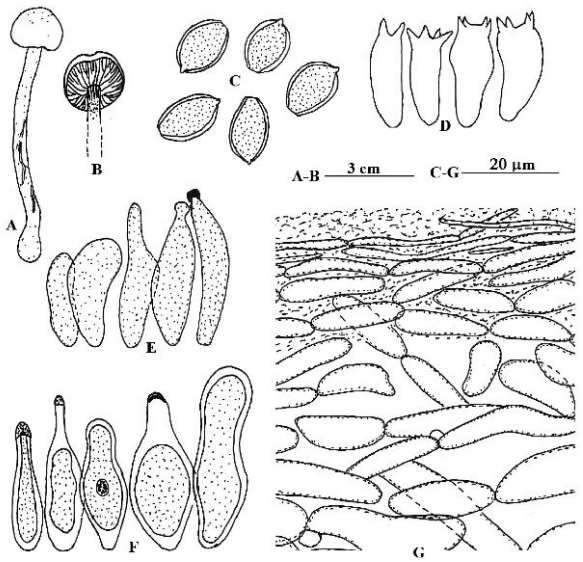

Fig. 2 *Stropharia semiglobata* var. *punjabensis*: A. Basidiome; B. Gill attachment to the stipe; C. Basidiospores; D. Basidia; E. Cheilocystidia; F. Chrysocystidia; G. Pileus cuticle and trama.

ixocutis, made up of filamentous, gelatinized, interwoven, thin-walled hyphae, 1.5–3.5 mm diam.; pileus trama made up of loosely arranged, inflated, interwoven, encrusted hyphae, 5–13.5 mm diam. Hymenophoral trama regular, composed of thin-walled, hyaline hyphae, 5–12 mm diam. Subhymenium pseudoparenchymatous. Stipe tramal hyphae parallel, thin-walled, hyaline, 3.5–15.5 mm broad. Astrocystidia not observed. Clamp connections present on hyphae of both pileus and stipe context.

DISCUSSION

The present collection resembles *S. semiglobata* (Kauffman, 1918; Natarajan and Raman, 1983; Arora, 1986; Watling and Gregory, 1987) morphologically in size, shape and colour of the basidiome and microscopically in similar sized chrysocystidia and other hyphal structures. However, *P. semiglobata* var. *punjabensis* differs from the type species in having smaller basidiospores (10–14.5 × 6.5–9 mm vs. 15–18 × 9–10 mm, Kauffman, 1918; 15–19 × 7.5–10 mm, Arora, 1986; 15–20 × 8–10 µm, Watling and Gregory, 1987) and cheilocystidia (17.5–34 × 6–10 mm vs. 30–45 × 3–4 mm, Kauffman, 1918; 50–70 × 12.5–17.5 mm, Watling and Gregory, 1987). Thus a new variety *P. semiglobata* var. *punjabensis* var. nov. is being proposed to describe the material from Punjab.

P. semiglobata is commonly known as 'dung roundhead'. Kauffman (1918) reported this species growing on dung hills and grassy places throughout Michigan State in the United States. It is an edible species that grows solitarily or in small groups on dung, manure rich soil, straw and grazed or fertilized grass (Arora, 1986). Watling and Gregory (1987) reported this species as extremely common, growing on all kinds of dung, especially those of horse, cattle, sheep and rabbit and in manured fields throughout the British Isles. Cortez and Coelho (2004) reported it growing solitarily on horse dung from Brazil. Natarajan and Raman (1983) and Bhavani Devi (1995) recorded this species growing solitarily or in groups on dung or manured soil from South India. The species has already been recorded as growing on camel dung from Punjab (Rea, 1922; Ginai, 1936; Saini and Atri, 1995). *Protostropharia semiglobata* var. *punjabensis* has been recorded growing on cow dung.

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