



## A new species of *Psathyrella* (Psathyrellaceae, Agaricales) collected on dung from Punjab, India

Amandeep Kaur<sup>1\*</sup>, NS Atri<sup>2</sup> and Munruchi Kaur<sup>2</sup>

<sup>1</sup> *Desh Bhagat College of Education, Bardwal–Dhuri–148024, Punjab, India.*

<sup>2</sup> *Department of Botany, Punjabi University, Patiala–147002, Punjab, India.*

(Received on: 25 November, 2013; accepted on: 31 December, 2013)

### ABSTRACT

A new species, *Psathyrella fimicola*, belonging to the family *Psathyrellaceae* Vilgalys, Moncalvo & Redhead, is described. It is found growing on horse dung from Patiala district of Punjab state. The new species is characterized by its medium sized carpophores having brownish yellow pileus with prominent floccose powdery veil, appendiculate pileus margin and white stipe which changes to brown where bruised.

**Key Words:** Agaricomycetes, Basidiospore, New species, *Psathyrella*, Taxonomy.

### INTRODUCTION

The genus *Psathyrella* (Fr.) Quél. is represented by 400 species of mushrooms the world over (Kirk *et al.* 2008). The genus is characterized by conical, campanulate to convex or applanate, often hygrophanous pileus; adnexed to adnate, wedge-shaped, dark brown to black non-deliquescent lamellae; fragile, white or pallid stipe; cellular pileus cuticle; ovoid to ellipsoidal, smooth spores which bleach and become slate colored in concentrated sulphuric acid.

As many as 40 species of this genus are reported from India (Natarajan *et al.* 2005; Kaur *et al.* 2011; Mohanan 2011). From Punjab state, 7 species namely *P. candolleana* (Fr.) Maire, *P. empyreumatica* (Berk. & Broome) Sacc., *P. floccosa* (Earle) A. H. Sm., *P. incerta* (Peck) A. H. Sm., *P. moshiana* Pegler, *P. singeri* A. H. Sm., and *P. spintrigera* (Fr.) Konrad & Maubl. are known so far (Sarwal & Rawla 1983; Saini & Atri 1993; Kaur *et al.* 2011). Based on the survey conducted to various dung localities of Punjab, *P. fimicola* is collected, worked out and described as a new coprophilous species because of its unique distinguishing features.

### MATERIAL AND METHODS

The material was collected from a dung locality in Punjab. The macroscopic characters pertaining to gross morphology, shape, color and size of pileus, stipe, etc. were noted down from the fresh material on the field key especially designed for the purpose (Atri *et al.* 2005). The color terminology used is that of Kornerup & Wanscher (1978). The specimens were hot air dried and packed in cellophane paper bags containing 1-4 dichlorobenzene. The microscopic structures were observed by cutting free hand sections after reviving a part of the dried specimens in 10% KOH solution and staining the sections in 1% Cotton blue. Line drawings of microscopic details were drawn with the aid of Camera lucida under oil lens. The type collection has been deposited under PUN in the Herbarium of Botany Department, Punjabi University, Patiala (Punjab), India.

**Corresponding author:**

amandeepbotany75@gmail.com

## TAXONOMIC DESCRIPTION

*Psathyrella fimicola* NS Atri, Munruchi Kaur and Amandeep Kaur **sp. nov.** Figs. 1- 2

Mycobank No.: MB 805218

Diagnosis: The medium sized mushroom possesses convex to semiglobate brownish yellow hygrophanous pileus covered with floccose white powdery veil, adnate close to crowded white gills becoming light brown at maturity, grayish yellow spore deposit, annulate stipe which becomes brown on bruising, ellipsoidal to oblong basidiospores measuring  $5.7 - 8 \times 3.4 - 5 \mu\text{m}$ , absence of pleurocystidia, sterile gill edge with polymorphic cheilocystidia, cellular pileus cuticle and presence of clamp connections.

Holotype: India, Punjab, Patiala: Harigarh, 251 m a.s.l., growing in a group on horse dung, Amandeep Kaur, June 18, 2011, PUN 4317.

Etymology: The species name has been derived from its coprophilous habitat.

Carpophores 5.5 - 6.7 cm in height. Pileus 2.5 - 2.8 cm broad, 1.4 - 1.8 cm high, broadly convex to semiglobate; surface brownish yellow (5C<sub>7</sub>) with light brown (6D<sub>6</sub>) apex, hygrophanous, yellowish brown with tan apex when dried; pileal veil floccose-powdery, whitish to whitish brown; margin regular to irregular with occasional appendiculate velar remnants, splitting, non-striate; cuticle not peeling; flesh thin, up to 0.1 cm broad, white, unchanging; taste and odor not distinctive. Lamellae adnate, unequal, close to crowded, narrow, white when young, light brown at maturity; edges smooth. Spore print grayish yellow (2B<sub>5</sub>). Stipe central, 5.3 - 6.4 cm long, 0.3 - 0.45 cm broad, cylindrical, equal to slightly tapering upwards, solid, surface pruinose-fibrillose above the annulus, floccose below the annulus in the beginning but in due course glabrescent, white, bruising brown; annulate, annulus superior, peronate, attached, white.

Basidiospores  $5.7 - 8 \times 3.4 - 5 \mu\text{m}$  (Q = 1.63), ellipsoidal to oblong, central germ pore present, thick walled, smooth, light brown, fades in concentrated H<sub>2</sub>SO<sub>4</sub>, light grayish brown to grayish hyaline in KOH. Basidia  $10 - 17 \times 6.8 - 9.3 \mu\text{m}$ , clavate, 4 - spored, thin-walled, hyaline; sterigmata 2.5 - 4.3  $\mu\text{m}$  long. Brachycystidia present between

the basidia. Gill edges sterile. Cheilocystidia  $22 - 37.4 \times 10 - 14.4 \mu\text{m}$ , abundant, polymorphic, lageniform, clavate to inflated clavate, thin-walled, granular, densely encrusted at the tips. Pleurocystidia absent. Pileus cuticle 2 - to 3 - layered deep cellular epithelium,  $49 - 63 \mu\text{m}$  thick; cuticular elements  $20.4 - 37.4 \times 17 - 25.5 \mu\text{m}$ , subglobose to pedicellate, clavate, thin-walled, hyaline to granular at tips; pileus context homoiomerous, made up of thin-walled  $3.4 - 13.6 \mu\text{m}$  broad hyphae. Hymenophoral trama regular, composed of thin-walled hyaline  $3.4 - 10 \mu\text{m}$  broad hyphae. Subhymenium pseudoparenchymatous. Stipe cuticle with a turf of scattered caulocystidia; context hyphae intermingled, thin-walled, hyaline  $3.4 - 15.4 \mu\text{m}$  broad; caulocystidia  $23.8 - 54.4 \times 8.5 - 18.7 \mu\text{m}$ , abundant, polymorphic, lageniform, cylindrical or clavate, some with prominent clamp connection at the base, thin walled, irregularly granular. Clamp connections present throughout. A comparison of *Psathyrella fimicola* characteristics with related species is gives in table 1.

## DISCUSSION

The presently examined collection represents diagnostic features typical of subgenus and section *Candolleana* A.H. Sm. because of the spore size range ( $5.7 - 8 \times 3.4 - 5 \mu\text{m}$ ), absence of pleurocystidia and presence of occasional appendiculate pileal veil (Smith 1972). The species is characterized by medium-sized carpophores, brownish yellow pileus surface, prominent floccose-powdery veil remnants, non-striate appendiculate pileal margin and white stipe which turn brown on bruising. It has small sized spores which turn into light grayish brown to grayish hyaline in KOH and the hyphae of subcuticular region of the pileus also look grayish hyaline in KOH under the microscope. *Psathyrella luteopallida* A.H. Sm. of section *Candolleana* and *P. subhyalinispora* A.H. Sm. of section *Subatratae* (Romagnesi) Singer are the two species which are quite close to this species. *Psathyrella luteopallida* differs from it in having smaller carpophores (up to 2.5 cm long), pale yellow to mouse gray pileus surface, larger spores ( $9 - 12 \times 5 - 6 \mu\text{m}$ ) which lack germ pore and in the absence of

**Table1.** Comparable characteristics of *Psathyrella fimicola* with related species

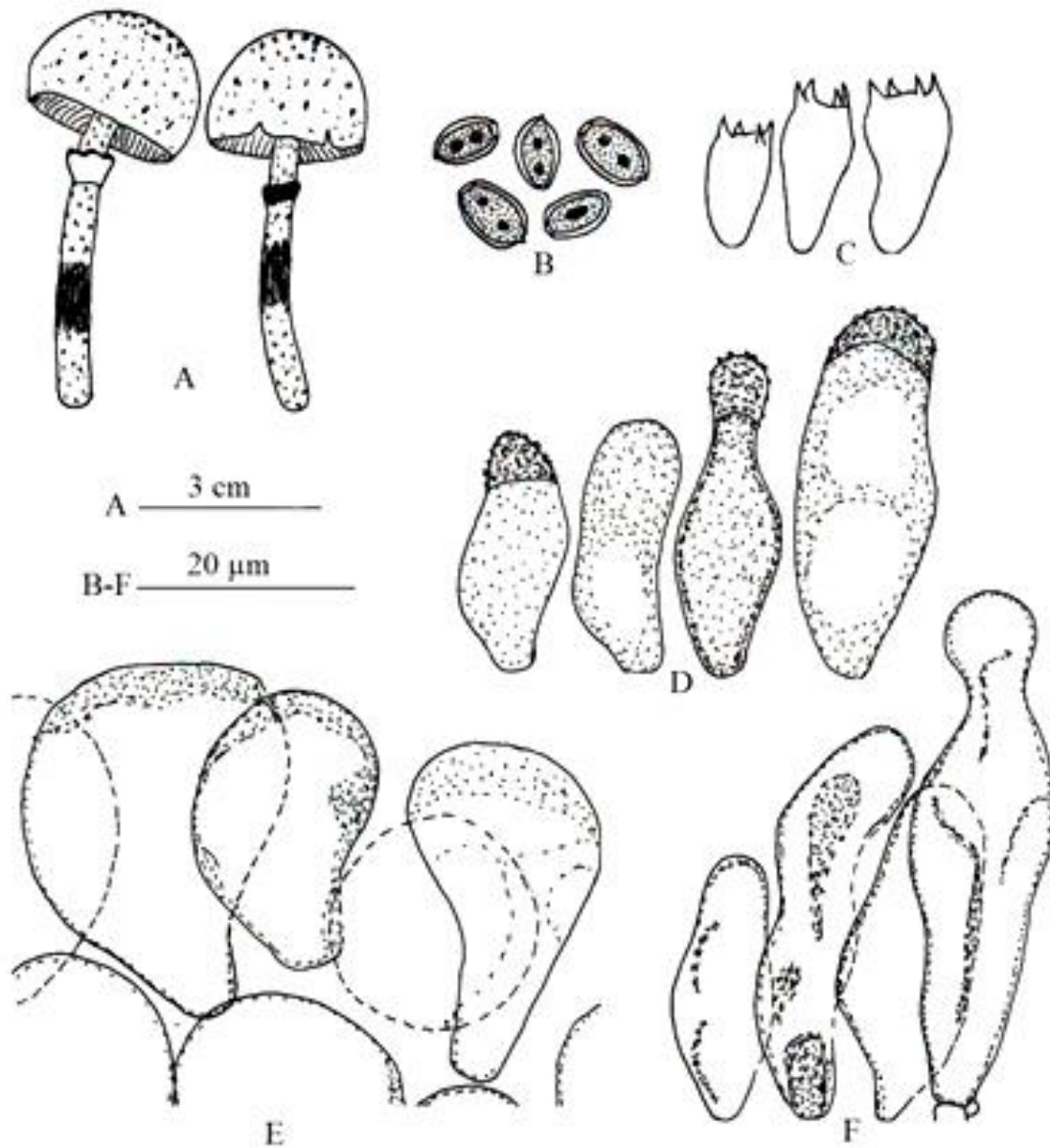
Characteristic	<i>Psathyrella fimicola</i> sp. nov.	<i>Psathyrella luteopallida</i> (Smith 1972)	<i>Psathyrella subhyalinispora</i> (Smith 1972)
Carpophore size	Medium-sized (5.5 – 6.7 cm long)	Smaller carpophores (up to 2.5 cm long)	Medium-sized (up to 5 cm long)
Pileus surface	Brownish yellow	Pale yellow to mouse gray	Dingy yellow–brown
Pileal veil remnants	Prominent, floccose–powdery	Fibrillose	Glabrous pileus
Pileal margin	Non-striate, appendiculate in some carpophores	Non-striate, appendiculate when young	Striate to disc when moist, atomate when faded, not appendiculate
Stipe surface	White which turn brown on bruising	White over all	White over all
Annulus	Present	Present	Exannulate stipe
Spores	Small sized spores (5.7 – 8 × 3.4 – 5 μm), light brown, which turn into light grayish brown to grayish hyaline in KOH	Larger spores (9 – 12 × 5 – 6 μm), color in KOH grayish hyaline, not darkening appreciably	Larger spores (7 – 9 × 4.5 – 6 μm), color in KOH subhyaline
Germ pore	Present	Absent	Not distinct
Hyphae of pileus subcuticular region	Grayish–hyaline in KOH	Hyaline in KOH	Yellowish-hyaline in KOH
Caulocystidia	Present	Absent	Absent

caulocystidia. *Psathyrella subhyalinispora* is different from the presently examined species in having larger spores (7 - 9 × 4.5 - 6 μm), dingy yellow-brown glabrous pileus, exannulate stipe and

absence of caulocystidia (Smith 1972). Based upon its diagnostic features which are typical of subgenus *Candolleana*, a new species *Psathyrella fimicola* sp. nov. has been proposed to accommodate this coprophilous collection.



**Fig. 1.** *Psathyrella fimicola*. **A**– Carpophore growing in natural habitat; **B**– Carpophore showing floccose-powdery veil and peronate annulus; **C**– Basidiospores; **D**– Caulocystidium with clamp connection at the base. Bars **C-D** 10  $\mu\text{m}$ .



**Fig. 2.** *Psathyrella fimicola*. A– Carpophores, B– Basidiospores, C– Basidia, D– Cheilocystidia, E– Pileal cuticle elements, F– Caulocystidia.

## ACKNOWLEDGEMENTS

Authors wish to thank Punjabi University, Patiala, Punjab for providing laboratory facilities and University Grants Commission for financial assistance under ASIST programme and SAP-III programme of D.R.S. in which Mycology and Plant Pathology is one of the thrust areas.

## REFERENCES

- Atri NS, Kaur A, Kour H. 2005. Wild mushrooms-collection and identification. In: Rai RD, Upadhyay RC, Sharma SR (eds) *Frontiers in Mushroom Biotechnology*, NRCM, Chambaghat, Solan, Himachal Pradesh, India, pp 9-26.
- Holmgren PK and Keuken W. (eds) 1974. *Index Herbariorum*. Part I. The Herbaria of the World. *Regnum Vegetabile* 92: 1-397.
- Kaur M, Kaur B, Kaur H, Atri NS. 2011. The Genus *Psathyrella* (Fr.) Quél from India. *Journal of Mycology and Plant Pathology* 41: 584-588.
- Kirk PF, Cannon PF, Minter DW, Stalpers JA. 2008. *Ainsworth and Bisby's Dictionary of Fungi*, 10<sup>th</sup> ed. CABI Bioscience, CAB International, UK.
- Kornerup A and Wanscher JH. 1978. *Methuen Handbook of Colour*, 3<sup>rd</sup> ed. Eyre Methuen, London.
- Mohanan C. 2011. *Macrofungi of Kerala*. KFRI Handbook No. 27, Kerala Forest Research Institute, Peechi, Kerala, India.
- Natarajan K, Kumaresan V, Narayanan K. 2005. A checklist of Indian Agarics and Boletes (1984-2002). *Kavaka* 33: 61-128.
- Saini SS and Atri NS. 1993. North Indian *Agaricales*-IV. *Indian Journal of Mycology and Plant Pathology* 23: 250-254.
- Sarwal BM and Rawla GS. 1983. Taxonomic studies on Indian Agarics - III. *Bibliotheca Mycologica* 91: 541-548.
- Smith AH. 1972. The North American Species of *Psathyrella*. *Memoris N Y Bot Gard* 24, New York, pp 633.