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## Agaricales of West Bengal VII : Some mushrooms of 24-Parganas District, West Bengal

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P. BASAK AND N. SAMAJPATI

Department of Botany, Calcutta University, Calcutta - 700 019

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In this paper five species of mushrooms were reported (namely *Agaricus squalidus* Masee, *Agrocybe broadwayii* (Murr.) Dennis, *Gymnopilus dilepis* (Berk. & Br.) *Lentinus squarrosulus* Mont. and *Marasmiellus inoderma* (Berk.) Singer, from 24-Parganas district, West Bengal. Of these *M. inoderma* is first reported from West Bengal. *L. squarrosulus* is an edible species.

**Key words :** Taxonomy, mushrooms, 24-Parganas district

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### INTRODUCTION

The contributions on agaric flora of India have been made by several scientists (Sathe and Rahalkar, 1979; Watling and Gregory, 1980; Horac, 1980; Leelavathy *et al.* 1987; Abraham *et al.* 1995, 1996)

The agaric flora of different districts of West Bengal have been reported from this laboratory (Ray and Samajpati, 1976; 1979; 1980 a,b; Roy and Samajpati, 1980; Manna and Samajpati, 1998). This is the seventh report in the series on agaric flora of West Bengal from this laboratory.

### MATERIALS AND METHODS

During the rainy season (June to September) the basidiocarp of agarics were collected from different regions of 24-Parganas district. At the time of collection, the habit, altitude, gross soil type, soil pH and other necessary field data of the individual specimen were noted. The collected specimens were brought to the laboratory as soon as possible for both macroscopic and microscopic observations following the methods of Singer (1975).

From the fresh pileus a spore-print was taken both in black and white paper. By using Melzer's reagent on the spores in mass, their amyloid or non-amyloid or pseudoamyloid nature was determined. Detail spore morphology (shape, size, any ornamentations present or not) was observed. By cutting thin hand sections anatomical peculiarities were noted.

Several chemical tests were also performed which are necessary criteria in the identification of fungi. The chemicals used were : 10% FeSO<sub>4</sub>, 30% Aq. NaOH, 20% Aq. KOH, 40% Aq. NH<sub>4</sub>OH, Conc. HNO<sub>3</sub>, Conc. HCl, Conc. H<sub>2</sub>SO<sub>4</sub>, 2% Aq. Phenol, 40% Formalin, Aniline water (1:1), Melzer's reagent. Aceto-carmin soln., lactophenol and cotton blue were also used for staining the sections (specimen) for microscopic observations.

All these species with proper ecological data, index number and their distribution as far as possible, are housed in the Herbarium of Mushroom Research Centre, Mycology laboratory, Botany Department, Calcutta University and duplicate collectin in the Kew Herbarium, Royal Botanic Garden, Kew, Surrey, England.

### ENUMERATION OF THE SPECIES

The enumeration of the species are arranged alphabetically in the following pages.

#### *Agaricus squalidus* Masee

*Pileus* : Convex, unbonate, 40-45 mm in diameter, young dry, fleshy, smoke grey to olivaceous grey, rest light buff colour; dry, fibrillose, not peels off easily, mat, filamentous, scaly (small), scales smoke grey to olivaceous grey, epicutis consisting of elongated hyphae. *Margin* : wavy, sulcate, fleshy, incurved at young, straight with age, not striate, not cortinoid, not scattered; *Lamellae* : free, crowded, distinctly formed, separable, 4-5 mm. broad, lamellules 3 different lengths, smooth, light buff colour; *Stipe* : centric, cylindrical, fleshy, leathery with maturity, 6-7 mm in diameter, glabrous, base bulbous, hollow, annulus thick, persistent, non-movable; *Context* : white to buff, inamyloid, colour changes to reddish when bruised, hyphae without clamp connection; *Spore print* : chocolate brown; *Basidiospores* : deep brown in H<sub>2</sub>O, symmetrical, subglobose, without ornamentation, brown under the microscope, smooth, inamyloid, small germ pore present, thick-walled, compound, 2.36  $\mu$  - 5.90  $\mu$  (3.83 $\mu$ ) x 2.36 $\mu$  - 3.54 $\mu$  (2.95 $\mu$ ), Q. value 1.3; *Basidia* : normal, 2-spored 13.00  $\mu$  - 18.32  $\mu$  (15.95 $\mu$ ) x 4.72  $\mu$  - 5.90  $\mu$  (5.1  $\mu$ ); *Cheilocystidia* : narrow, vesiculose, quite a few number present; *Hymenophoral trama* : regular at first, becoming irregular with age, consisting of elongated hyphae, 3.54 $\mu$  - 9.44 $\mu$  (7.08 $\mu$ ); *Pileal tissue* : made up of interwoven hyphae, elongated, 7.08 $\mu$  - 14.16 $\mu$  (9.9 $\mu$ ); *Habit and Habitat* : pulteoid, on humous soil among grasses, in groups of 2-5 individuals.

*Chemical characters* : aniline and nitric acid turning the colour of the context to deep reddish brown, no reaction with 2% phenol and 10% FeSO<sub>4</sub>, 40% Formalin, non-amyloid with Melzer's reagent. The tissue turns to buff colour with 20% KOH, 30% NaOH and 40% NH<sub>4</sub>OH.

*Geographical distribution and ecological data* : cosmopolitan in distribution, India - West Bengal; 24-Parganas (North) - Guma; Altitude - 19 ft. from sea level, soil pH 5.5, P. Basak, 13th June, 1980. M.H. No. 73.

*Agrocybe broadwayii* (Murr.) Dennis, *Bull. Soc. Mycol. Fr.*, **69** : 179 (1953)

*Hebeloma broadwayi* Murr. *Mycologia*, **4** : 82(1912).

*Pileus* : strictly convex, smooth, whitish to creamish, fleshy, dry, 12-30 mm in diameter, not peels off easily, thick; *Margin* : entire, round, very slightly undulated, thick, white to creamish coloured. *Lamellae* : adnexed, semi-crowded, clay buff, distinctly formed, brittle, not smooth, lamellules of three different lengths. *Stipe* : centric, cylindrical, concolorous with the pileus, glabrous, hollow, more frequently or not undulated, slightly

broad at the base, annulus and volva absent, firm, creamish, 25-50 mm in length, 2-5 mm in diameter; *Context* : fleshy, white, fibrous, consisting of interwoven hyphae, thin-walled, 3.54  $\mu$  - 4.92  $\mu$  in diameter; *Spore print* : rusty brown in mass; *Basidiospores* : elliptical, sometimes ovoid, thick-walled, smooth, with truncate germ pore, 7.32  $\mu$  - 10.92  $\mu$  x 5.75  $\mu$  - 7.08  $\mu$  Q. Value - 1.4; *Basidia* : normal, clavate, tetrasterigmatic, 20.92  $\mu$  - 27.88  $\mu$  x 5.75  $\mu$  - 7.08  $\mu$ ; *Pleurocystidia* : absent; *Cheilocystidia* : thin-walled, hyaline, with granular content, different sizes and the form; subglobose to pyriform, sometimes clavate. *Hymenophoral trama* : regular, homiomeric consisting of thin-walled, filamentous hyphal cells, cell diameter 3.32  $\mu$  - 6.08  $\mu$ ; *Habit and Habitat* : on loamy soil, single or rarely in group.

*Chemical characters* : gills, stipe and context turn into a darker shade in 10% FeSO<sub>4</sub>, no change in 30% aq. NaOH and 15% aq. KOH, in conc. HNO<sub>3</sub> the context turns pinkish.

*Geographical distribution and ecological data* : India - West Bengal - common in Midnapore, Hooghly, 24-Parganas, Bankura, soil pH 6.0. Altitude - 20 ft. from sea level; P. Basak, 3rd June, 1980; M.H. No. 61.

*Gymnopilus dilepis* (Berk. & Br.) Singer. *Syll. Fung.* **5** : 812(1887)

*Flammula dilepis* B. & Br., *Caryologia*, **15** : (2) 357-366.

*Pileus* : 23-55 mm in diameter; tough, fleshy, convex to plano-convex, with maturity becoming flattened, surface thoroughly covered by minute bluish-violet squammules; golden yellow coloured, soft but somewhat leathery texture; *Margin* : round, entire, thick, smooth, inrolled; *Lamellae* : adnate to adnexed, regular, 3-7 mm in thickness, edge smooth, crowded; *Context* : fleshy, cream to yellowish; *Stipe* : 22-53 mm, long, 6-7  $\mu$  in diameter, central, cylindrical, sometimes slightly wavy, surface differently coloured, hollow, surface covered by scales; annulus present, membranous *Basidia* : normal, cylindrical, tetrasterigmatic, 14.08  $\mu$  - 28.88  $\mu$  (21.54  $\mu$ ) x 4.72  $\mu$  - 7.90  $\mu$  (5.90  $\mu$ ) *Basidiospores*: ellipsoid, thick-walled, bright yellow, amyloid; 5.3  $\mu$  - 8.3  $\mu$  x 4.06  $\mu$  - 5.54  $\mu$  (6.90  $\mu$  - 4.54  $\mu$ ); Q. value - 1.4. *Spore print* : rusty tawny; *Hymenophoral trama*: well developed, regular, homiomeric, made up of thin-walled, hyaline cells, 5.90  $\mu$  - 10.08  $\mu$  in diameter; *Subhymenium* : cellular, well developed; *Cheilocystidia* : numerous, forming almost a continuous line; 28  $\mu$  - 42.04  $\mu$  x 5.54  $\mu$  - 9.08  $\mu$ ; different in shape and size; sometimes septed, thick-walled; *Pleurocystidia* : numerous, forming almost a continuous line along the lamellar surface, 18.37  $\mu$  - 28.88  $\mu$  x 8.72  $\mu$  - 9.90  $\mu$ ; different in shape and size, cylindrical to fusiform, cytoplasmic granulations present; *Pilear context* : comprises of round to oval cells, filamentous cells are also present; 11.54  $\mu$  - 13.08  $\mu$  in diameter; oleiferous hyphal diameter are 5.90  $\mu$  - 8.08  $\mu$ ; *Habit and Habitat* : in groups on trunks of palm trees, sometimes in meadow.

*Chemical characters* : The tissue turns negative with 2% phenol, 10% FeSO<sub>4</sub>, 20% KOH, 30% NaOH, 40% NH<sub>4</sub>OH. The tissue turns reddish brown with Melzer's reagent.

*Geographical distribution and ecological data* : Khulna (Bangla Desh) : Hooghly, Calcutta (West Bengal) : S. R. Bose (1920). Madhyamgram, new Barrackpore (24-Parganas - West Bengal), P. Basak, 30th June, 1980; M. H. No. 83/80.

*Lentinus squarrosulus* Mont. *Kew Bull.* (1969) **23** : (2) 219-248

- Pleurotus squarrosulus* (Mont.) Singer, *Sydowia*, **15** : 137 (1961).  
*Lentinus subnudus* Berk., *Hooker. Lond. Journ. Bot.*, **6** : 492 bis (1847)  
*L. inconspicuis* Berk., L. C. : 494 bis (1847)  
*L. multiformis* Berk. & Br. *Journ. Linn. Soc. Bot.*, **14** : 42 (1872)  
*L. cretaceous* Berk. & Br. l.c. (1873)  
*L. manipularis* Berk. & Br., l.c. : **43** (1873)  
*L. lobatus* Berk. & Br. l.c. : **44** (1873)  
*L. caespitosus* Surrey *Trans. Linn. Soc. Bot. Ser. 2, I* : 120, t. 19/4-5 (1875).  
*L. curreyanus* Sacc. & Cub., *Syll. Fung.*, **5** : 586 (1887)  
*Lentinus bayianus* Pat. *Journ. Bot.*, **6** : 15 (1890) taste Singer.  
*L. tigrinus* (L. ex Fr.) forma *squarrosulus* (Mont.) Pilat *Ann. Mucol. Berl.*, **34** : 130 (1936)

*Pileus* : 20-45 mm diameter, concavo-convex, centrally well depressed, umbilicate to infundibuliform, white, fleshy at young, on drying becomes hard and rigid, not peels off easily. 1 mm thickness, leathery, squamulose, concentrically arranged, glabrous, more or less concolorous. *Margin* : regular, sometimes wavy, inrolled, not striate, not sulcate, not cortinoid. *Lamellae* : decurrent, white to buff, crowded, distinctly formed, separable, interveined, pliable, 1-2 mm broad, smooth, wavy, *Stipe* : flattened, sometimes cylindrical, centric, sometimes eccentric, 3-5 mm in diameter, 20-35 mm long, solid, smooth, sometimes attenuated towards the base, annulus and volva absent. *Context* : fleshy, fibrous, leathery, white, 1-3 mm thick, generative hyphae thin-walled, binding hyphae thick-walled, diameter of the generative hyphae 1.72  $\mu$  - 3.08  $\mu$ , diameter of the binding hyphae 1.72  $\mu$  - 10.92  $\mu$ , clamp connection present; *Spore print* : cream to buff colour in mass; *Basidiospores* : cylindrical to ovoid, smooth, thin-walled, with granular content, inamyloid, 3.32  $\mu$  - 7.08  $\mu$  x 3.32  $\mu$  - 3.70  $\mu$ , Q value 1.6; *Basidia* : normal, clavate, tetrasterigmatic, 16.92  $\mu$  - 20.97  $\mu$  x 3.32  $\mu$  - 3.70  $\mu$ ; *Pleurocystidia* : clavate to cylindrical, 16.92  $\mu$  - 22.20  $\mu$  x 3.32  $\mu$  - 3.70  $\mu$  *Hymenophoral trama* : intermixed, hyaline, inamyloid, filamentous, comprising of elongated hyphal cells; *Habit and Habitat* : solitary, sometimes more than one sporophores coming out from the same base on wood.

*Chemical characters* : reactions negative with 10% FeSO<sub>4</sub>, 40% Formalin, 15% aq. KOH, 30% aq. NaOH on context and stipe. Conc. HCl turning the context tissue to reddish brown.

*Geographical distribution and ecological data* : distributed throughout Southern Asia, West Africa, Ceylon, Burma, Ghana, Nigeria (Pegler, 1969); India - Nilgiris (Butler and Bisby, 1931); West Bengal - Madhyamgram. Altitude - 20 ft. from sea level. P. Basak, 16th June, 1980 M.H. No. 78.

*Marasmiellus inoderma* (Berk.) Singer

*Pileus* : white, not fleshy, glabrous, subtomentose, not glutinous, irregularly shaped, upturned, 10-25 mm in diameter, dry, young, 0.5 mm thick, membranous, pigment absent; white, irregularly wavy, not fleshy, not peels off easily, centrally depressed due to upturned margin; *Margin* : irregular, striate, not sulcate, thin, not cortinoid, upturned;

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*Lamellae* : variously attached to the stipe, lamellae very few, hymenophore strongly reduced, adnexed, distinctly formed, 13-16 mm long, 2-2.5 mm broad, lamellules three different lengths; *Stipe* : eccentric, pubescent, 4-15 mm long, 1.5-3 mm in diameter, white, cylindrical, sometimes flattened, silky fibrils present at the base of the stipe, annulus absent, volva absent; *Context* : gelatinised, no characteristic odour, consisting of thin walled hyphae, in amyloid, clamp connection present; *Spore print* : pure white; *Basidiospores* : small, with thin inamyloid, homogenous wall, smooth, hyaline, light yellowish, mostly globose to fusiform;  $2.36 \mu - 4.72 \mu (3.54 \mu) \times 2.36 \mu - 4.72 \mu (3.30 \mu)$ ; Q. value - 1.07; *Basidium* : normal, subfusiform, tetrasterigmatic,  $28.20 \mu - 24.48 \mu (25.14 \mu) \times 7.08 \mu - 8.26 \mu (6.67 \mu)$ ; *Cheilocystidia* : numerous,  $42.5 \mu - 50.0 \mu (46.25 \mu) \times 6.25 \mu - 7.50 \mu (7.00 \mu)$ ; *Pileus tissue* : consisting of interwoven hyphae, inamyloid, clamp connection present, cell diameter -  $3.54 \mu - 8.26 \mu (6.13 \mu)$ ; *Hymenophoral trama* : regular to subregular, consisting of thin walled hyphae, cell diameter -  $4.72 \mu - 11.80 \mu (7.08 \mu)$ . *Habit and Habitat* : throughout the trunk of living dicotyledons; *Cocos nucifera*, single or in groups.

*Chemical characters* : no visible change of colour of context tissue with 2% phenol, 10% FeSO<sub>4</sub>, 20% KOH, 30% NaOH, 40% NH<sub>2</sub>OH, 40% Formalin, (1:1) aniline water, Melzer's reagent inamyloid.

*Geographical distribution and ecological data* : almost cosmopolitan, most species thermophilous, but many occur in the temperate zones of both hemispheres, Australia, Africa and Asia (Pegler). India - West Bengal; 24-parganas district (North, New Barrackpore, Altitude - 19 ft. from sea level, soil pH 5.5, P. Basak, 19th June, 1980 M.H. No. 82.

## DISCUSSION

The present observations on the study of Agaricales of 24-Parganas districts, West Bengal, have revealed some salient features which are discussed in a brief way.

The genus *Marasmiellus* under the tribe Collybieae, Family Tricholomataceae, is distributed throughout the world except Antarctica. From India only four species have been described so far. It is evident that *M. inoderma* (Berk) Singer is first time reported from West Bengal. In the southern part of the district where the soil is loamy and having comparatively low pH, individuals like *A. squalidus*, *A. broadwayii*, *M. inoderma*, *Gy. dilepis* are very common. On some dead wood *L. squarrosulus* is abundant and *M. inoderma* is somewhat cosmopolitan in the district occurring throughout the entire district.

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