

## SOME COMMON SPECIES OF FLESHY MACROMYCETES (DISCOMYCETES, GASTEROMYCETES AND AGARICALES) FROM MARGALLA HILLS NATIONAL PARK AND ADJACENT AREAS

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### Abstract

In the present study seventeen species of Discomycetes, Gasteromycetes and Agaricales are reported from Margalla Hills National Park and adjacent areas. Out of these *Mycena myxocaulis* is new to Pakistan. Detailed descriptions and figures are provided. Association of these species with dominant tree species of the area viz., Oak (*Quercus leucotrichophora*), Chir Pine (*Pinus roxburghii*) and Paper Mulberry (*Broussonetia papyrifera*) is also discussed.

### Introduction

Flora of macrofungi from Pakistan is little known in spite of the fact that forests of Pakistan have a rich flora of higher fungi. Ahmad made pioneering studies on macrofungi of Pakistan (1952, 1956, 1969, 1972, 1978 and 1980). His work was listed by Mirza and Qureshi (1978) and again it was compiled after his death (Ahmad *et al.*, 1997). Shibata (1992), Murakami (1993), Nazir (1993), Khalid and Iqbal (1995), Khalid (1998) reported macrofungal flora from northern Pakistan and Gardezi (1998) from Azad Jammu and Kashmir.

The Margalla hills, which are the mountain range situated at the northeast to west and south west of Islamabad, start near Tret and end near Taxila and have remained unexplored from macrofungal standpoint. This range is actually an extension of Murree hills (Western Himalayas). It stands on the northeastern part of the Potohar plateau.

Instituted in 1980, the Margalla Hills National Park comprises of the Margalla Range (12605 ha), the Rawal Lake and Shakar Parian Sports and Cultural Complex. The hill range nestles between an elevation of 685 meters at the western end and 1,604 meters on its east. The vegetation of southern slopes is short stature, comprising deciduous and evergreen trees with diverse shrub growth, *Carissa opaca* and *Dodonea viscosa* being the dominant species. In the north, stand Pines (*Pinus roxburghii*) and groves of Oak (*Quercus leucotrichophora*) with undergrowth of *Myrsine africana*. These Oak groves support a multitude of macrofungi in the hill range. There are dense stands of Paper Mulberry (*Broussonetia papyrifera*) in different parts of Islamabad. Stands of this tree support a great diversity of macrofungal flora.

Margalla Hills National Park have remained unexplored from macrofungal standpoint, aim of this study therefore, has been, collection, description and identification of Jelly Fungi and Mushrooms of this region. An attempt has also been made to study the ecology of these fungi wherever possible.

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## Description of Species

### *Ascomycota*

#### *Incertae sedis*

(formerly 'Discomycetes')

#### *Pezizales*

#### *Helvellaceae*

#### *Helvella* L.

*Helvella crispa* (Scop.) Fr.

Fig 1A, B

Ascocarp saddle shaped, 3-4 cm broad, upper surface cream with a darker undersurface, stipe lacunose or deeply furrowed, white, 2.5-3.5 x 1-1.5 cm. Spores 13 x 10  $\mu$ m, ellipsoid, hyaline with a large central oil droplet.

**Habitat:** On the ground in Pine-Oak mixed forests, Pir Sohawa- Pharilla track, Margalla hills (13-09-99). Ahmad (1978) reported this species from Murree, Shogran, Sharhan, Patriata and Kalam.

### *Leotiales*

#### *Leotiaceae*

#### *Leotia* Pers.

*Leotia lubrica* (Scop.) Pers.

Fig 2A, B

Ascocarp pileate, stipitate, gelatinous. Pileus convex or irregular in shape, incurved, olivaceous brown or black, 1 cm diameter, undersurface yellow. Stipe yellow, compressed, longitudinal striate, 6 x 0.4 cm. Hymenium covers the upper surface of pileus. Asci clavate, upto 150  $\mu$ m in length and diameter approaches 10  $\mu$ m towards apex, paraphyses filiform, swollen to 4  $\mu$ m at tips. Spores hyaline, fusiform, with two large oil droplets, 17-20 x 5-7  $\mu$ m.

**Habitat:** On the ground, in a Pine forest, Pir Sohawa-Pharilla track (13-09-99). Ahmad (1978) reported this species from Murree.

### *Basidiomycota*

#### *Basidiomycetes*

#### 'Gasteromycetes'

#### *Sclerodermatales*

#### *Astraeaceae*

#### *Astraeus* Morgan

*Astraeus hygrometricus* (Pers.) Morgan

Fig 3A, B

Fruit-body solitary or more often gregarious, hypogeous, covered all over with numerous long, branched, brown rhizomorphs, 2-2.5 cm in diameter (when dry). Exoperidium splits stellately into 11-12 strongly hygroscopic rays which roll

inwards and cover endoperidium when dry, open when moistened, fleshy layer brown, breaking into irregular areas by deep grooves, falling away completely in some specimens; exterior perfectly smooth. Endoperidium sessile, globose or depressed globose, dirty white or grey, surface spongy; mouth naked; an irregular torn aperture. Gleba dark brown. Spores globose, 8-11  $\mu\text{m}$  in diameter, dark brown verrucose.

**Habitat:** On the ground in Pine forests, Shedandi, Margalla hills (14-09-99). Ahmad (1978) reported this species from Murree and Kaghan Valley. A very common species, easily identified by the strongly hygroscopic exoperidium, spongy surface of the sporocarp, naked mouth and large, globose, strongly warted spores.

### *Sclerodermataceae*

#### *Scloderma* Pers.

#### *Scloderma verrucosum* (Bull.) Pers.

Fig 4A, B

Fruit-body globose or subglobose, 2-2.5cm in diameter, with a very well developed mycelial base often produced into a long white pseudostem (2.5 x 0.5 cm). Peridium thin, tough, light buff, the cuticle breaking up into small darker coloured thin appressed squamules. Gleba at maturity becomes a dry pulverulent mass of spores not permeated by a capillitium. Dehiscence by irregular splits of thick peridium at apex, freely exposing the rather large spores, which are blown away by winds. Spores globose, light brown, verrucose, 7-10  $\mu\text{m}$  in diameter.

**Habitat:** On the ground in Oak grove near Gokina Chowki, Margalla hills (23-08-99). Ahmad (1978) reported this species from Murree, Changla Gali and Nathia Gali.

### 'Hymenomycetes'

#### *Agaricales*

#### *Agaricaceae*

#### *Lepiota* (Pers.) Gray

#### *Lepiota cristata* (Alb. & Schwein.) P. Kumm.

Fig 5A, B

Pileus campanulate, 2.5-3 cm, white with a brown apex, appressed squamulose, squamules brown coloured, arranged in a concentric manner on the pilear surface. Lamellae white, distant. Stipe 2.5 cm x 2mm, white, with a swollen base. Annulus fugacious, central. Spores, hyaline, spurred with truncate apex, 5-6 x 3  $\mu\text{m}$ .

**Habitat:** Occurs solitarily on ground in Oak grove near Gokina Chowki, Margalla hills (23-8-99). This species is easily identified by campanulate pileus with a brown apex, concentrically arranged brown squamules and apical fugacious annulus.

***Termitomyces* R. Heim*****Termitomyces clypeatus* R. Heim**

Fig. 6

Pileus convex, 1.5-2.5 cm diameter, pale brown, with a pointed grey perforatorium. Lamellae free, white. Stipe 1.5-4.5 x 0.3 cm, veil fugacious, no membranous annulus present. Pseudorrhiza white. Spores hyaline, ellipsoid, non-amyloid, thin-walled, 9.75 x 4.5  $\mu$ m.

**Habitat:** Grows from subterranean termite nests, Shakar Parian, Islamabad (Sep. 99). This species is characterized by the pale brown pileus, with a smooth dark coloured perforatorium and white coloured pseudorrhiza. Ahmad (1980) reported this species from Lahore.

***Termitomyces eurhizus* (Berk.) R. Heim**

Fig 7A, B

Pileus convex, 3.7-4.5 cm diameter, white glabrous viscid, universal veil adherent to pileal surface in the form of a circular patch with free margins. Lamellae free, white. Stipe 6-7 x 1.5 cm, with a persistent apical annulus and a long pseudorrhiza. Spores hyaline, ellipsoid, smooth, non-amyloid, thin-walled, 6-8 x 4-5  $\mu$ m.

**Habitat:** Grows from subterranean termite nests, Wah Cantt (6-8-99). Ahmad (1980) reported this species from Kharian, Daphar plantation and Islamabad.

***Coprinaceae******Coprinus* Pers.*****Coprinus comatus* Fr.**

Fig 8A, B

Pileus parabolic when young, then campanulate, whitish or tinged ochraceous, at first even, then broken up into scattered, more or less reflexed, large torn squamules, height upto 15 cm, undergoes deliquescence from bottom upwards. Lamellae free or very lightly adnexed, pink then blackish. Stipe upto 11cm long, stout, attenuated towards apex, volva usually evanescent, its free margin forming a ring which is carried up for some distance by the elongating stipe. Spores 13-17 x 8-10  $\mu$ m.

**Habitat:** On the ground, Wah Cantt (11-09-99). Gregarious on rich soil in gardens, pastures etc., easily identified by its shaggy appearance.

***Coprinus disseminatus* (Pers.) Gray**

Fig 9A, B

Pileus at first ovoid then campanulate, 0.5-1cm diameter, plicate-sulcate, white darkening to grey, membranous. Lamellae adnate, whitish soon greyish brown, narrow, distant to crowded, non-deliqescent. Stipe 2-3 cm x 1mm, equal.

cylindrical, hollow, white and translucent, glabrescent. Spores 6-9 x 4-5  $\mu\text{m}$ , ellipsoid, broadly ovate in face view, truncated by an apical germ pore, relatively pale brown.

**Habitat:** Gregarious to caespitose, on a fallen tree of *Broussonetia papyrifera*, Shakar Parian, Islamabad (09-08-99). This is very common cosmopolitan species that grows in enormous numbers. Non-deliquescent hymenophore and brown spores are characteristic features of this species. Ahmad (1980) reported this species from Lahore and Changa Manga.

***Coprinus lagopus* (Fr.) Fr.**

Fig 10A, B

Pileus very thin and membranous, at first ovoid to campanulate soon totally revolute; 3.5-4cm diameter, surface pale greyish, recurved squamulose, plicate-sulcate, pellucid striate. Lamellae free, linear, grey soon black, very thin. Stipe 9.5-10 x 0.4-0.5 cm, fragile, attenuated apically, terete, hollow, surface pure white, fibrillose. Spores ovoid-ellipsoid with a germ-pore which truncates the apex, black, opaque and smooth, 8-10 x 5-6 $\mu\text{m}$ .

**Habitat:** On the ground in dense stands of *Broussonetia papyrifera*, Shakar Parian, Islamabad (24-07-99). A cosmopolitan species, of common occurrence in Margalla Hills National Park, with quickly deliquescent fruit-bodies. Ahmad (1980) reported this species from Khipro and Lahore.

***Coprinus micaceus* (Bull.) Fr.**

Fig 11A, B

Pileus ovoid then campanulate, fleshy fragile, 3-6 cm diameter, surface ochraceous yellow, darker towards the apex, plicate-sulcate, covered by glistening mica like particles, margin becoming revolute and lacerate at maturity. Lamellae adnexed then seceding, pale, soon darkening as spores mature, fairly broad, deliquescent, crowded, with lamellulae of two lengths. Stipe equal or attenuated apically, cylindrical, white, smooth, 4-10 x 0.3-0.6 cm, hollow. Annulus absent. Spores 7-11 x 5-7  $\mu\text{m}$ , pentagonal, apically truncated by a broad germ-pore, dark reddish brown, smooth.

**Habitat:** Gregarious on living trees of *Broussonetia papyrifera*, Shakar Parian, Islamabad (24-07-99). This species typically grows in dense clusters from buried wood and is one of the more common species of *Coprinus*.

***Psathyrella* (Fr.) Quél.**

***Psathyrella candolleana* (Fr.) Maire.**

Fig 12A, B

Pileus convex campanulate, then applanate, 3-10 cm diameter, pinkish white, glabrous except for a few fugacious velar squamules in the early stages, margin appendiculate with small, white fragments of the veil, rimose, margin splits between

lamellae. Lamellae adnexed, pale brown, crowded with lamellulae of three different lengths. Stipe 5-8 x 0.5 cm, equal or slightly attenuated towards the apex, cylindrical, fragile, white. Spores 6-7 x 4  $\mu\text{m}$ , ovoid to ellipsoid, scarcely truncated by a small apical germ-pore, pale brown, with a slightly thickened wall.

**Habitat:** On the ground near *Broussonetia papyrifera*, Shakar Parian, Islamabad, (26-07-99). This is one of the most common and most variable of agarics, frequently occurring on lawns and under trees. Ahmad (1980) reported this species from Ladhar (Sheikhupura) and Lahore.

### *Cortinariaceae*

#### *Crepidotus* (Fr.) Staude

#### *Crepidotus mollis* (Schaeff.) Fr.

Fig 13A, B

Fruit-body pleurotoid, sessile or substipitate, pileus 3cm wide, 2.5 cm projecting, white. Lamellae white then brown. Spores ellipsoid, pale brown, 7-9 x 5-6  $\mu\text{m}$ .

**Habitat:** On fallen branches or humicolous among mosses or even found attached to stones, in Oak grove near Gokina Chowki, Margalla hills, Islamabad, (23-08-99). Work by Pegler and Young (1972) has revealed ultrastructural details of spore form of *Crepidotus mollis*. Ultrastructurally the wall surface is very finely rugulose, occasionally with more individualized minute verruculae. The rounded apex is sometimes slightly tapered, to give a subamygdaliform outline. Ahmad (1980) reported this species from Patriata and Murree.

### *Hericiales*

#### *Auriscalpiaceae*

#### *Lentinellus* P. Karst.

#### *Lentinellus omphalodes* (Fr.) P. Karst.

Fig 14A, B

Pileus applanate to infundibuliform, 1.5-3 cm diameter, dark brown. Stipe cylindrical, 3-5 x 0.5 cm, concolourous with pileus or paler concolourous. Lamellae sub-decurrent, thin. Spores 6-9  $\mu\text{m}$  diameter, verrucose.

**Habitat:** On the ground in Oak grove near Gokina Chowki, Margalla hills (23-08-99). Ahmad (1980) reported this species from Swat:Kalam, attached to buried wood, Murree Hills:Charehan and Lahore.

### *Pleurotaceae*

#### *Pleurotus* (Fr.) P. Kumm.

#### *Pleurotus fossulatus* Cooke

Fig. 15A, B

Pileus upto 12 cm diameter, applanate or slightly depressed at the apex, cream, appressed squamulose, margin acute and entire, with a slightly eccentric stipe. Lamellae white then cream, decurrent in a reticulate fashion. Stipe 3-5 x 1.5

cm, greyish white. Spores cylindric, 13-14 x 4-5  $\mu\text{m}$ , hyaline, thin-walled, non-amyloid.

**Habitat:** On *Broussonetia papyrifera* near Quaid-i-Azam University, Islamabad (21-09-99). This species is characterized by central to eccentric stipe and reticulate pattern of decurrent lamellae

***Pleurotus ostreatus* (Jacq.) Quéf.**

Fig 16A, B

Pileus upto 15 cm wide, 11cm projecting, white, surface smooth, glabrous, laterally stipitate. Lamellae decurrent, upto 2 cm wide. Lamellulae of different lengths alternate with lamellae. Spores cylindric, 12-14 x 3-5  $\mu\text{m}$ , hyaline, thin-walled, non-amyloid.

**Habitat:** On logs, Wah Cantt (20-07-99). Ahmad (1980) reported this species from Swat: Kalam on dead trunk of *Juglans regia* and from Kaghan Valley: Shogran.

***Tricholomataceae***

***Mycena* (Pers.) Roussel**

**\**Mycena myxocaulis* Pegler**

Fig. 17

Pileus 2.85-3.25 cm diameter, convex, slightly depressed at apex; creamish white, translucent striate. Lamellae adnate with lamellulae of atleast two different lengths, intervenose. Stipe 8 x 0.3 cm, compressed, equal or expanded below, hollow, surface brown. Spores 5 x 3.75  $\mu\text{m}$ , ovoid to ellipsoid, hyaline, thin-walled.

**Habitat:** Caespitose on *Broussonetia papyrifera*, Shakar Parian, Islamabad (12-08-99).

\* New to Pakistan.

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Figure 1A. *Helvella crispa* ascocarp.



Figure 2A. *Leotia lubrica* ascocarp.

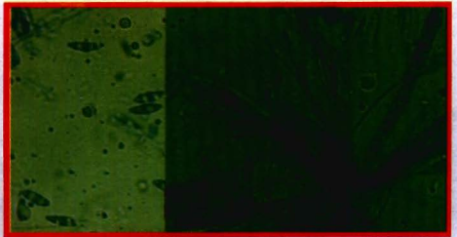


Figure 2B. *Leotia lubrica* asci (40x),  
paraphyses and ascospores.



Figure 1B. *Helvella crispa* ascus  
containing ascospores (40x).



Figure 3A. *Astraeus hygrometricus*  
basidiocarp.

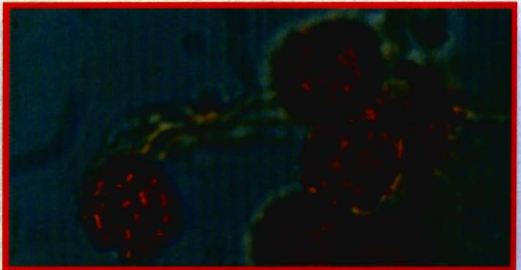


Figure 3B. *Astraeus hygrometricus* spores (100x).





Figure 4A. *Scleroderma verrucosum* basidiocarp.



Figure 4B. *Scleroderma verrucosum* spores (100x).



Figure 5A. *Lepiota cristata* basidiocarp.



Figure 5B. *Lepiota cristata* spores (100x).



Figure 6. *Termitomyces clypeatus* basidiocarp.



Figure 7A. *Termitomyces eurhizus* basidiocarp.

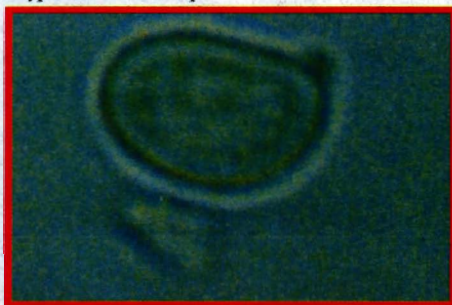


Figure 7B. *Termitomyces eurhizus* Spore (100x).

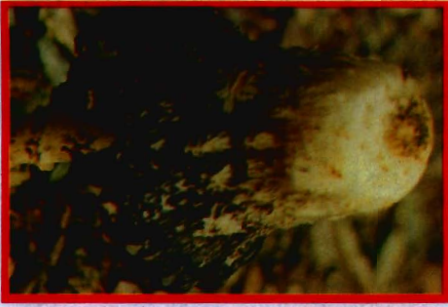


Figure 8A. *Coprinus comatus* basidiocarp and 8B spores (100x).

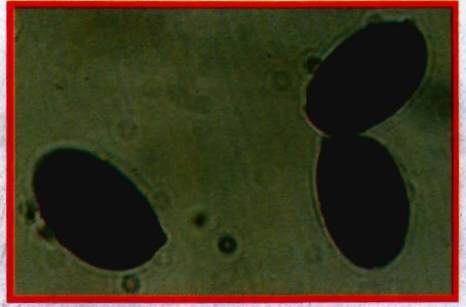


Figure 9A. *Coprinus disseminatus* basidiocarp. And 9B spores (100x).



Figure 10A. *Coprinus lagopus* basidiocarp, and 10B spores (100x).

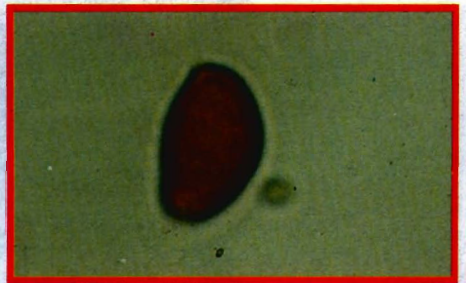


Figure 11A. *Coprinus micaceus* basidiocarp, and 11B spores (100x).

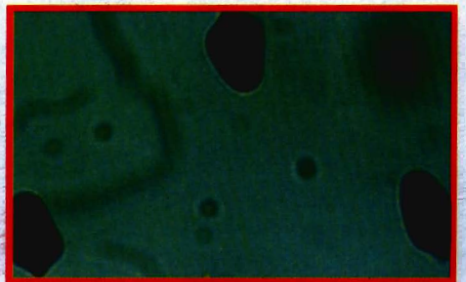




Figure 15A. *Pleurotus fossulatus* basidiocarp and 15B spores (100x).



Figure 16A. *Pleurotus ostreatus* basidiocarp and 16B spores (100x).



Figure 17. *Mycena myxocaulis* basidiocarp.



Figure 12A. *Psathyrella candolleana* basidiocarp.



Figure 12B. *Psathyrella candolleana* spores (100x).



Figure 13A. *Crepidotus mollis* basidiocarp, and 13B spores (100x).

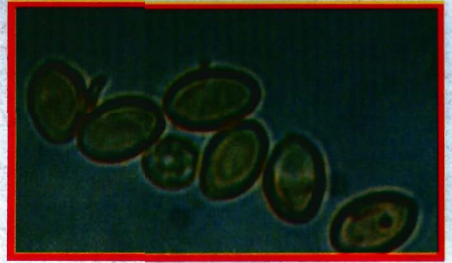


Figure 14A. *Lentinellus omphalodes*.

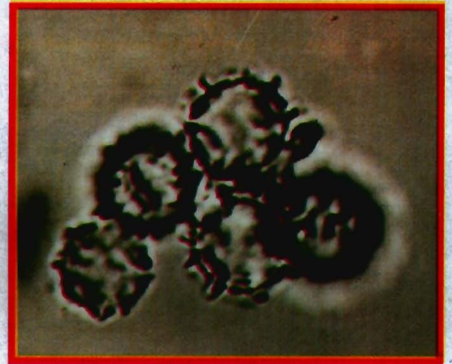


Figure 14B. *Lentinellus omphalodes* spores (100x).

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