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ADDITIONS TO THE DISCOMYCETES OF PAKISTAN

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Abstract

Ten species of Discomycetes viz., *Bulgaria inquinans* Fr., *Geopyxis alpina* Fr., *Helvella atra* Holmskj ex Fr., *H. cupuliformis* Dissing & Nanuf., *H. elastica* Bull. ex St. Amnas, *H. villosa* (Hedw. ex Kze.) Dissing & Nanuf., *Humaria hemisphaerica* (Wigg ex. Gray) Fckl., *Sarcoscypha occidenta* lis (Schw.) Sacc., *Scutellinia scutellata* (Fr.) Lambotte, *Trichophaea cupulata* Paut., are described and illustrated from Himalayan moist temperate forests of Pakistan. Of these, *B. inquinans, G. alpina, H. cuputaformis* and *Trichophaea cupulata* are new records from Pakistan.

Discomycetes, the cup fungi, are the most common type of fleshy ascomycetes. At least 175 species of Discomycetes are known from Pakistan (Ahmad, 1955, 1978; Ahmad *et al.*, 1997). During a survey of macromycetes of Himalayan moist temperate forests of Pakistan, 10 species of Discomycetes were collected and identified after reference to Dennis (1978) and Pegler & Spooner (1992). Of these, 4 species viz., *Bulgaria inquinans, Geopyxis alpina, Helvella capuliformis and Trichophara cupulata* appeared to be new records for Pakistan. All the voucher specimens have been deposited in SHI Mycological Herbarium, Punjab University, Lahore.

Description of Taxa

Bulgaria inquinans Fries
(Plate Ib; Fig. 1a).

Ascocarps disc to saucer-shaped or top-shaped, disc with margins weavy to entire, blackish brown to chocolate shining, upto 3 cm across, stalked; exterior rough, brown in groups; stalk thick, brown to blackish brown, upto 2x0.5 cm. Ascocarps transformed into ink like blackish mass with passage of time. Asci hyaline to light grey when immature. Mature asci clavate, grey with hyaline stalk, upto 102x11-12 μm containing 8 ascospores; ascus pore blue in iodine. Ascospores ellipsoid to allantoid and fusiform, reddish to dark grey, 10-17.8 x 6.5 8.5 μm, uniseriate, paraphyses hyaline, coiled at tips, 113.7 x 2.8 μm. This fungus is being reported for the first time from Pakistan.

Ecology: Gregarious, on a cut stump of *Aesculus indica*, # 13895
Locality: NWFP, Kuzagali; August 13, 1995.

Geopyxis alpina Fr.
(Plate Ig,h; Fig. 1b).

Apothecia cup-shaped, upto 2 cm across and 1 cm deep, peach or pinkish yellow coloured, sessile; flesh thin, brittle, appothecial cup margins even to slightly wavy. Asci cylindric, with tapering ends, 141-251 x 3-10 μm, 8 spored, uniseriate; Ascospores hyaline, ellipsoid to cylindric, sometimes boat shaped, 13.2-17.2 x 5.8-8.6 μm with oil droplets. Paraphyses cylindric, hyaline, slightly broader at tip and narrower at the base, septate, 240-250 x 7-3 μm.

Plate I: Apothecia of discomycetes. a: *Helvella atra*, b: *Bulgaria inquinans*, c: *H. elastica*, d: *Sarcoscypha occidentalis*, e,f: *H. villosa*, g,h: *Geopyxis alpina*, i: *H. cupuliformis*, j: *Scutelinia scutellata*, k: *Humaria hemisphaerica*, l: *Trichophaea cupulata*.

Scale bar = 1 cm.

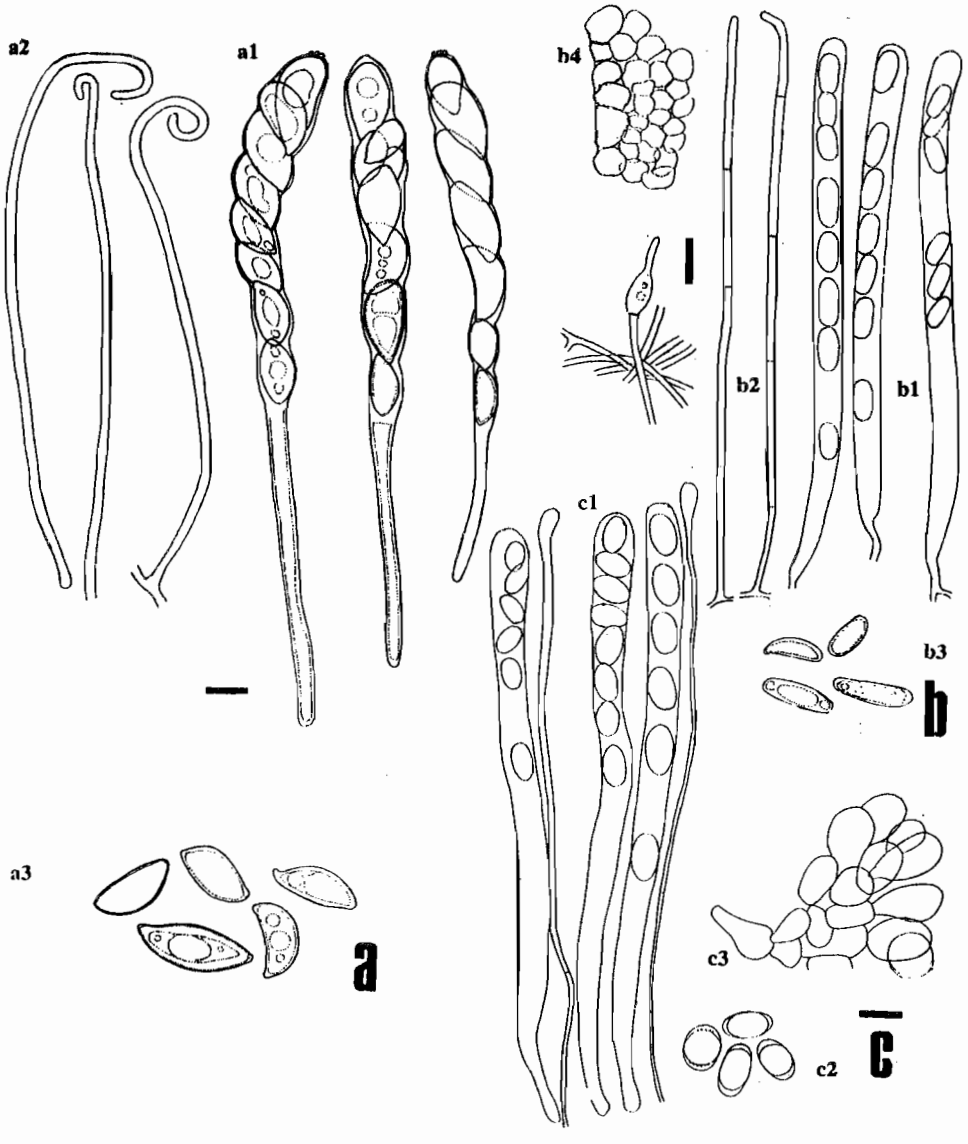

Fig. 1: a, *Bulgaria inquinans*, a1. Asci containing ascospore, a2. paraphyses, a3. ascospores, b. *Geophyxis alpina*, b1. asci, b2. paraphyses, b3. ascospores, b4. ectal excipulum. c. *Helvella atra*, c1. asci & paraphyses, c2. ascospores, c3. ectal excipulum.
Scale bar = a&b: 10 μm; c: 18 μm.

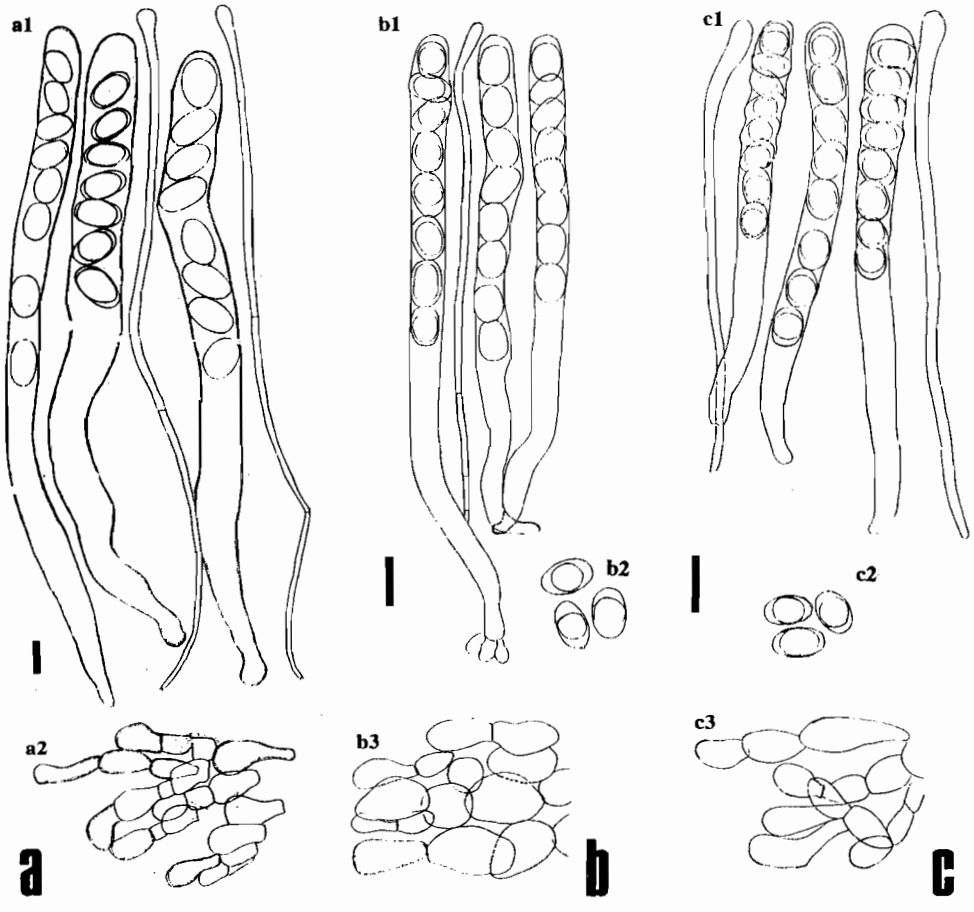

Fig. 2. a. *Helvella cupuliformis*, a1. asci & paraphyses, a2. part of the ectal excipulum. b. *H. elastica*, b1. asci & paraphyses, b2. ascospores, b3. ectal excipulum, c. *H. villosa*, c1. asci & paraphyses, c2. ascospores, c3. ectal excipulum.
Scale bar = 13.5 μm for a, 16 μm for b and 20 μm for c.

Ecology: On shale soil, penetrated by the roots of *Pinus wallichiana*, # N41.
Association: With *Vibernum nervosum, Pinus wallichiana* A.B. Jackson; July 23, 1995, August 10, 1995.
Locality: NWFP, Kaghan, Sharan; Khanspur Ayubia.
Helvella atra Holmskj. ex Fr., *Syst. Mycol.* 2: 19, 1822
(Plate Ia; Fig. 1C).

Apothecium convex to saddle shaped, indigo-blue to purplish blue in colour; cap margins undulating, cup almost 1.0 cm deep, stalked; stalk upto 3 cm long, indigo blue to purplish blue, cylindric, smooth. Asci elavate, 246-276 x 5-20 μm, 8 spored, uniseriate, Ascospores light yellow in KOH, with a single large oil droplet, ellipsoid to cylindric, 18-22 x 13-16 μm. Paraphyses cylindric, light yellow in KOH, septate, slightly swollen at the tip, upto 14 μm, 250-280 μm long.

Ecology: On ground, rare, single.
Association: With *Pinus wallichiana*; July 18, 1995 # K24.
Distribution: NWFP, Kaghan Valley, Sharan.

Helvella cupuliformis Dissing & Nannfeldt
(Plate Ii; Fig. 2a).

Apothecium cup shaped, almost circular, cup margins undulating, greyish inside and gray with dull green tinge outside, almost 5 mm deep; Apothecium stalked, stalk upto 1 cm long, clay coloured, upto 1.5 mm thick, depressed in the middle longitudinally. Asci clavate 264.8-288.0 μm long, 3.6-19.2 μm wide at the tip and 4.3-10.3 μm wide below, uniseriate. Ascospores light yellow in KOH and with droplets, ellipsoid, 13.6-20.5 x 10.0-13.2 μm. Paraphyses cylindric, light yellow in KOH, septate, slightly broader at the tip narrower at the base, 265-298 x 1.6-7 μm.

Ecology: Common, in groups, on fallen leaves on the ground.
Association: With *Prunus* sp.; July 23, 1995 # N43.
Distribution: NWFP, Kaghan Valley, Sharan.

Helvella elastica Bull. ex St. *Amnas Fl. Agen.* 537, 1821
(Plate Ic, Fig. 2b).

Ascocarp upto 4.5 cm high, cap saddle shaped, beautifully divided into 2 equal lobes, light brown to reddish brown, upto 15 cm across and 1 cm deep. Stipe smooth, offwhite to white, 2-4 x 0.3 cm across and slightly thickened at the base. Asci light yellow to hyaline in KOH, cylindrical to slightly buldged out in the middle due to spore pressure, tappering towards the base, having granular oil droplet in the lower part, upto 250-258 x 8.5-15.0 μm, containing 8 ascospores; ascospores yellow to hyaline, ellipsoid to subglobose, with a large central vacuole, looking apiculate, 18-20 x 10.5-14.0 μm. Paraphyses cylindrical, swollen at tips, slightly narrowing towards the base, having oil contents.

Ecology: On decaying organic matter under *Abies pindrow* Royle, # 9995.
Distribution: NWFP, Nathiagali; Sept. 9, 1995.

Helvella villosa (Hedw. ex Kze.) Dissing & Nanuf., *Sv. Bo. Tidskr.*, 60: 330, 1966
(Plate Ie,f; Fig. 2c).

Appothecia cup-shaped, cup upto 2 cm across, circular at maturity, deep, innerside smooth while outer side woolly. Cup margins slightly weavy. Stalk upto 2 cm long and 0.5 cm thick. Asci cylindrical and slightly narrowing at the base, light yellowish to hyaline in KOH, containing 8 ascospores, 262 x 26.5 x 14-16.5 μm. Ascospores elliptical with a large central oil droplet, 1.9-2.1 x 7.8-8.3 μm. Paraphyses cylindric, slightly swollen at the tip, upto 8 μm.

Ecology: On humus soil penetrated by the roots of *Abies pindrow* and *Juglans regia* L.
Distribution: NWFP, Kuzagali; Sept., 8, 1995, # 8995.

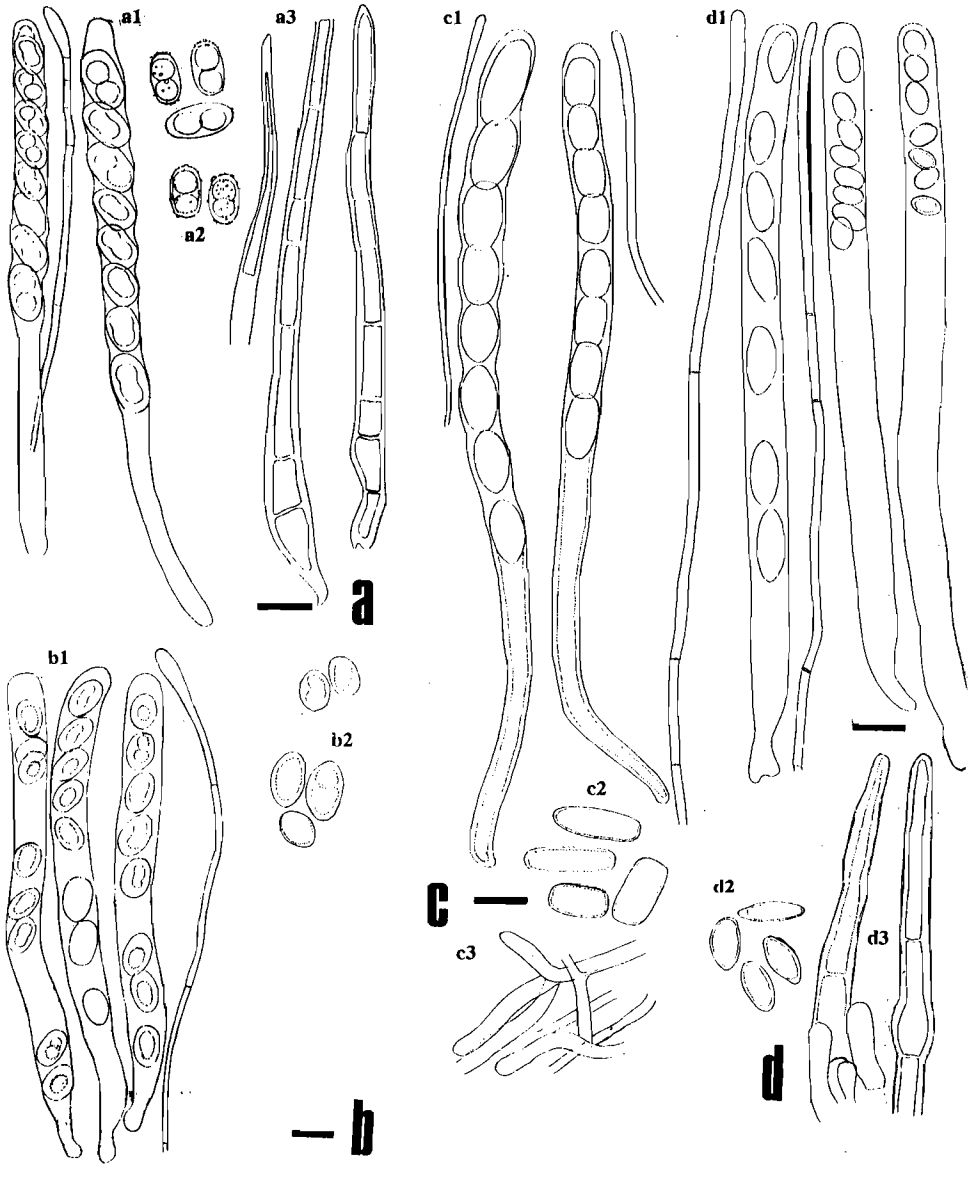

Fig. 3. a. *Humaria hemisphaerica*, a1. asci & paraphyses, a2. ascospores, a3. setae, b. *Scutellina scutellata*, b1. asci & paraphyses, b2. ascospores, c. *Sarcocypha occidentalis*, c1. asci & paraphyses, c2. ascospores, c3. excipulum, d. *Trichophaea cupularis*, d1. asci & paraphyses, d2. ascospores, d3, setae.
Scale bar = 10 for a, 12 for c and 15 μm for b and d.

Humaria hemisphaerica (Wigg. ex Gray) Fckl., *Symb. Mycol.* 320, 1870
(Plate Ik; Fig. 3a)

Ascocarp cup-shaped, inner surface of cup whitish and outer surface dark grey to blackish and hairy, sessile, upto 2.5 cm across and 1.5 cm deep. Asci slightly clavate to cylindric, hyaline, containing 8 ascospores, filling more than upper half of the asci, upto 235 x 12-18 μm. Ascospores guttulate, cylindric and rounded at the ends, containing 2 oil droplets, covered by warts, 22-26 x 14-15 μm, paraphyses septate, hyaline and swollen, upto 8 μm at the tip. Setae honey coloured to dark brown, upto 352 x 10-18 μm.

Ecology: On ground, under *Juglan regia* and *Abies pindrow* formation.
Distribution: NWFP, Kuzagali; Sept., 1995, # 6995.

Sarcoscypha occidentalis (Schw.) Sacc., *Syll. Fung.* 8: 154, 1889
(Plate Id; Fig. 3c).

Ascocarps cup-shaped, light red or scarlet coloured, cup upto 0.5 cm deep and 1.2 cm across, outer surface of the ascocarp whitish or slightly reddish, outer surface ridged, cup margins rolled inwards. Stipe upto 1 cm long in mature specimens and 0.2 cm thick, tapering towards the base. Asci upto 294.0 x 10-12.45 μm, hyaline to light yellow in KOH, containing 8 ascospores, uniseriate. Ascospores light yellowish in KOH, elliptic to cylindrical with rounded ends, 21.8-26.5 x 10.5-13.0 μm. Paraphyses filiform, slightly swollen, upto 3-4 μm at the tips, septate with reddish colouration at the tip.

Ecology: On a rotting log.
Distribution: NWFP, Kuzagali, Nathiagali; Sept., 10, 1995, # 10995.

Scutellinia scutellata (Fr.) Lambotte, *Mem. Soc. Roy. Sci. Liege*, 2, 14: 299, 1888
(Plate Ij; Fig. 3b).

Apothecia saucer-shaped, slightly concave, upto 1 cm in diam., bearing upto 1.8 cm long, stiff, dark brown, tapered, hairs or setae on the outer surface especially at the margins, fertile surface bright orange-red, smooth, outer surface pale brown, flesh thin. Asci clavate, 195.2-211.84 μm in length while at the tip broader 15.90-17.67 μm; at the base 6.2-6.81 μm, 8-spored, uniseriate. Ascospores ellipsoid, hyaline, 22.5-25.5 x 12-15 μm with fine warts, having oil droplets. Paraphyses cylindric, yellowish, slightly broader at the tip, narrower at the base, 215-218.4 x 3.29-7.05 μm long, at tip 9.7-9.93 μm wide at tip, 14.89-18.20 μm wide in the center.

Ecology: In groups, on damp soil, branches and decaying roots of conifers.
Distribution: NWFP, Kaghan Valley, Sharan; July 22, 1996 # N47.

Trichophaea cupulata Paut., *Norv. J. Bot.* 27: 31-32, 1980
(Plate Il; Fig. 3d).

Ascocarps deeply cup-shaped, sessile, outerside brown to blackish brown, hairy, innerside whitish, smooth, upto 0.5 cm across and 0.3 cm deep, setae present at the cup-margins; margins smooth. Asci hyaline, cylindric slightly tapering at the base, upto 270.25 x 12.45 μm, containing 8 ascospores in single row. Ascospores hyaline in KOH, cylindric to ellipsoid, rounded at ends, 15-18 x 7-8.5 μm. Paraphyses cylindric,

hyaline, septate, longer than the asci and upto 3 μm at tips. Setae honey dew coloured to brown, upto 148.0 x 6-13 μm.
Ecology: Growing on moist soil penetrated by roots of Gymnospermous trees.
Distribution: NWFP, Nathiagali to Dungagali; August 12, 1995, # 12895.

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References

Ahmad, S. 1955. Pezizales of West Pakistan. *Biologia*, 1: 1-24.

Ahmad, S. 1978. *Ascomycetes of Pakistan*. Biological Society of Pakistan, Monograph 7(1): pp. 141-165.

Ahmad, S., S.H. Iqbal and A.N. Khalid. 1997. *Fungi of Pakistan*. Sultan Ahmad Mycological Society of Pakistan, University of the Punjab, Lahore, pp. 46-56.

Dennis, R.W.G. 1978. *British Ascomycetes*. Verlag von J. Cramer, Germany.

Pegler, D. and B. Spooner. 1992. *The Mushroom Identifier*. New Burlington Books, London.

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