

DISCOMYCETES OF MIDDLE ASIA

IV. NEW DATA ON ASCOBOLACEAE AND THELEBOLACEAE

This report is a continuation of the series of papers dealing with the Discomycetes of Middle Asia. 28 species of Ascobolaceae and Thelebolaceae are treated in the present study.

Only two species belonging to these families were reported from the Tien Shan Mountains in an earlier study (Dissing, Raitviir, 1973). Since that time the authors have collected a rich material of Ascobolaceae and Thelebolaceae from predominantly mountain areas of Middle Asia. Most of the samples were collected at the elevations between 1600 and 3300 m above sea level. The collected materials show that these families of Pezizales are well represented in subalpine and alpine habitats.

ASCOBOLACEAE Sacc.

Ascobolus aglaosporus Heimerl — the Uzbek SSR, the Turkestan Mountains, Zaamin reserve, on sheep dung, 2100 m, May 24, 1980, coll. K. Kalamees; the Tadzhik SSR, the Hissar Mountains, Anzob pass, on sheep dung, 3100 m, June 17, 1982, coll. B. Kullman.

Apothecia sessile, pulvinate, 0.5–0.6 mm in diameter, whitish with pale lilac hymenium. Spores ellipsoid, pale violaceous to pale brown, ornamented with small isolated warts or spines, 15–16.5×8–9.5 μm.

Ascobolus albidus Crouan — the Uzbek SSR, the Great Chimgan Mountains, on horse dung, 2300 m, April 24, 1985, coll. V. Prokhorov.

Apothecia subsessile, subcylindrical or barrel-shaped, 0.2–0.4 mm in diameter, 0.4–0.5 mm high, yellowish. Spores ellipsoid, violaceous to violaceous-brown with long anastomosing striae or with short curved striae, 19.6–25.0×11.8–12.5 μm. (Fig. 1, a).

Ascobolus carbonarius P. Karst — the Turkmenian SSR, the Kopet-Dag Mountains, Chuli near Ashabad, on burnt ground, May 13, 1968, coll. A. Raitviir.

Apothecia gregarious, sessile, saucer-shaped, 2.5–8 mm in diameter, brown to dark brown with reddish tint. Spores ellipsoid, violaceous to purplish-brown, ornamented with dense conspicuous isolated warts, which are larger and more elongated at the ends of spores, 20.5–22.5×12.5–16.9 μm (Fig. 1, b).

Ascobolus foliicola Berk. et Br. — the Tadzhik SSR, the Hissar Mountains, valley of the Varzob river, Kondara, Kvak, on fallen decaying leaves, 1800 m, May 27, 1978, coll. A. Raitviir.

Apothecia shortly stalked, cup-shaped, to saucer-shaped, 1–4 mm in diameter, greenish-yellow. Spores ellipsoid, violaceous to purplish-brown, ornamented with longitudinal anastomosing striae or reticulating striae, 16.0–21.0×8.5–11.0 μm.

Ascobolus furfuraceus Pers.: Fr. — the Tadzhik SSR, the Hissar Mountains, Ramit reservate, on horse dung, 1600 m, April 12, 1977, coll. A. Raitviir.

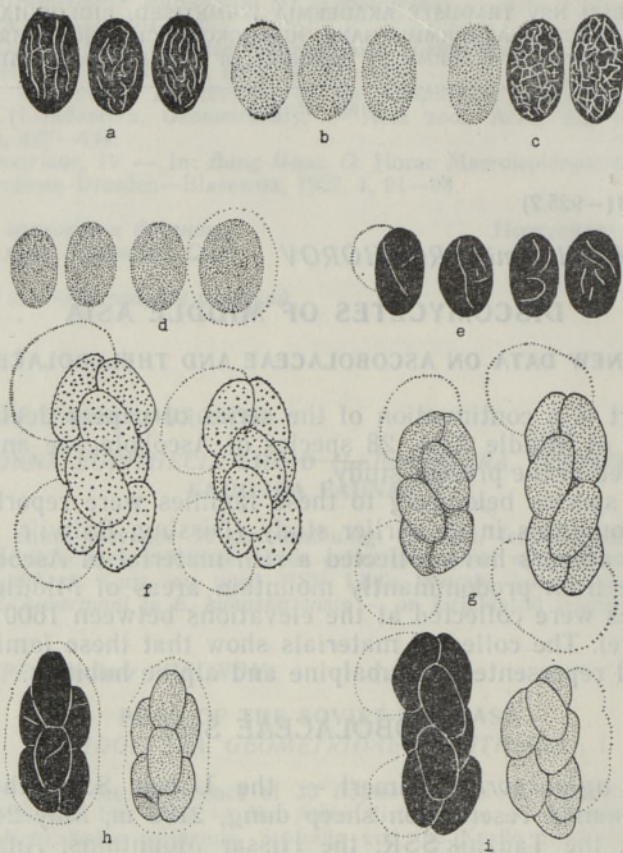


Fig. 1. Ascospores of different species of *Ascobolus* and *Saccobolus*. a — *A. albidus*; b — *A. carbonarius*; c — *A. geophilus*; d — *A. hawaiiensis*; e — *A. michaudii*; f — *S. caesariatus*; g — *S. obscurus*; h — *S. truncatus*; i — *S. versicolor*. 600 X.

Apothecia sessile, cup-shaped to saucer-shaped, 0.5–2 mm in diameter, yellowish-green. Spores ellipsoid, violaceous to purplish-brown, with longitudinal, sometimes anastomosing striae, $20.0\text{--}25.0 \times 10.0\text{--}14.0 \mu\text{m}$.

This widely distributed species, which is very common in temperate zone lowlands, occurs surprisingly rarely in Middle Asia.

Ascobolus geophilus Seaver — the Tadzhik SSR, the Western Pamir, valley of the Vanch river, Gudzhevast, on the ground in alluvial forest, 2000 m, June 8, 1978, coll. A. Raitviir.

Apothecia sessile on a rather narrow base, cup-shaped to saucer-shaped, 1–3 mm in diameter, yellowish-green to olivaceous. Spores ellipsoid, violaceous to purplish-brown, warted or reticulate, $19.6\text{--}20.7 \times 9.9\text{--}10.8 \mu\text{m}$. (Fig. 1, c).

Ascobolus hawaiiensis Brumm. — the Uzbek SSR, the Great Chimgan Mountains, on sheep and cow dung, 2300 m, April 24, 1985, coll. V. Prokhorov; the Kirghiz SSR, the Great Kirghiz Mountains, Chon-Kurchak, 2000 m, July 25, 1980, coll. S. Mosolova.

Apothecia sessile, barrel-shaped, subcylindrical or obconical, 0.15–0.6 mm in diameter, 0.3–0.36 mm high, whitish with violaceous tint or pale violaceous. Disk concolorous with the receptacle, dotted with numerous protruding tips of ripe asci. Ectal excipulum of multiangular cells, towards the margin composed of elongated, irregularly oriented cells of intervoven hyphae. Asci 8-spored, but sometimes with 2–4 aborted spores, cylindric-clavate or clavate with rounded apex, diffusely blued in

iodine, 156—181×22.3—30.6 μm. Spores 2-seriate, ellipsoid, hyaline at first, then bright violaceous, ornamented with small warts, surrounded by gelatinous envelope, 19.4—20.8×10.0—11.1 μm. Paraphyses straight, branched, hyaline, 2.5—3.0 μm in diameter, apically swollen up to 4.0—5.0 μm. (Fig. 1, d).

This rare species has been found from Hawaii, Japan, Denmark and Spain.

Ascobolus immersus Pers.: Pers. — very common in Middle Asia. It occurs almost everywhere from lowland deserts up to 3000 m a.s.l. in the high mountains.

Apothecia pyriform or barrel-shaped, 0.4—1 mm in diameter, whitish or pale brownish. Spores ellipsoid or broadly ellipsoid, violaceous to violaceous-brown with a few anastomosing striae, 45—65×26—34 μm.

Ascobolus michaudii Boud. — the Kirghiz SSR, the Kurpai Alatau Mountains, on ondatra dung, July 20, 1981, coll. S. Mosolova.

Apothecia solitary or in small groups, obconical or barrel-shaped, 0.8—2.1 mm in diameter, yellowish-green. Spores ellipsoid, bright violaceous, with 1, rarely up to 5 or 6 longitudinal oblique, curved, not anastomosing striae, 18.9—19.7×11.1—11.7 μm (Fig. 1, e).

Ascobolus scatigenus (Berk.) Brumm. — the Tadzhik SSR, the Hissar Mountains, on dead stems of *Ligularia thomsonii*, 2750 m, October 4, 1980, coll. S. Faizova.

Apothecia sessile, saucer-shaped, 0.5—1 cm in diameter, reddish-brown. Spores ellipsoid, purplish-brown at maturity, with a single longitudinal or oblique fissure, sometimes with 2 fissures or finely reticulate, 22.0—2.0×11.6—13.3 μm.

It is the first record of this species on dead herbaceous stems and the most northern locality of this pantropic species.

Iodophanus carneus (Pers.: Pers.) Korf — widely distributed in Middle Asia on sheep, cow, horse and donkey dung, occasionally also on rotting wood. In high mountains it grows up to 2600 m above sea level.

Apothecia sessile, saucer-shaped, 0.3—1 mm in diameter, rose-coloured. Spores ellipsoid, hyaline, 18—25×10—15 μm.

Saccobolus caesariatus Renny in Phill. — the Uzbek SSR, the Great Chimgan Mountains, on horse dung, 2300 m, April 26, 1985, coll. V. Prokhorov; the Kirghiz SSR, the Great Kirghiz Mountains, Chon-Kurchak, June 30, 1980, coll. S. Mosolova.

Apothecia solitary, sessile, 0.17—0.25 mm in diameter, white with violaceous tint, externally covered with tufts of agglutinated hyphae. Spores arranged into clusters according to pattern III,* 43.9—50.0×16.7—21.7 μm, individual spores elongated ellipsoid, pale violaceous to dark violaceous, finely warted, 19.4—22.2×8.3—9.4 μm. (Fig. 1, f).

Saccobolus depauperatus (Berk. et Br.) C. E. Hansen — the Uzbek SSR, the Great Chimgan Mountains, on cow and sheep dung, 2200 m, April 25, 1982, coll. K. Kalamees; the Aktau Mountains, Langar, on sheep dung, May 14—18, 1982, coll. K. Kalamees; the Kirghiz SSR, the Terskei Alatau Mountains, on horse, sheep and ondatra dung, 3300 m, July 27, 1981, coll. S. Mosolova.

Apothecia sessile, barrel-shaped to pulvinate, 0.1—0.25 mm in diameter, whitish to pale violaceous. Spores arranged into clusters according to patterns II or III, 28—38×10—13 μm. Individual spores ellipsoid to fusoid-ellipsoid, violaceous to dark brown, smooth, 10.0—13.0×5.0—6.5 μm.

Saccobolus obscurus (Cooke) Phill — the Kirghiz SSR, the Great Kirghiz Mountains, Chon-Kurchak, on cow dung, 2000 m, June 30, 1980,

* The spore cluster pattern types are indicated following the classification of J. van Brummelen (1967).

coll. S. Mosolova; the Terskei Alatau Mountains, on cow dung, 3300 m, July 27, 1981, coll. S. Mosolova.

Apothecia solitary or more often gregarious, 0.15–0.17 mm in diameter, 0.16–0.18 mm high, whitish to rose-coloured. Spores arranged into clusters according to pattern III, but sometimes also according to pattern I, $44.5\text{--}50.0 \times 16.7\text{--}18.3 \mu\text{m}$. Individual spores ellipsoid-rhomboid, medially swollen and with rounded ends, sometimes inequilateral, violaceous to dark gray with violaceous tint, ornamented with rounded warts $0.3\text{--}0.5 \mu\text{m}$ in diameter, $19.4\text{--}19.7 \times 8.3\text{--}8.9 \mu\text{m}$ (Fig. 1, g).

Saccobolus saccoboloides (Seaver in Dodge and Seaver) Brumm. — the Uzbek SSR, the Great Chimgan Mountains, on cow dung, 2200 m, April 25, 1982, coll. K. Kalamees.

Apothecia sessile, pulvinate, 0.5 mm in diameter, pale ochraceous. Spores not arranged into clusters or arranged into loose clusters according to pattern I. Individual spores fusoid-ellipsoid, purplish to dark brown, smooth to finely warted. $17.0\text{--}18.0 \times 8.0\text{--}8.5 \mu\text{m}$.

Saccobolus truncatus Vel. — the Tadzhik SSR, the Western Pamir, valley of the Shakh-dara river near Horog, on donkey dung, 2200 m, June 2, 1978, coll. A. Raitviir.

Spore clusters of this species were found in the collection TAA-64669 intermixed with the apothecia of *Iodophanus carneus* and *Thecotheus cinereus*. Spores arranged into compact clusters according to pattern I, $34.2\text{--}42.5 \times 13.9\text{--}16.9 \mu\text{m}$. Individual spores ellipsoid with truncate ends, brownish violaceous, finely punctate, $13.9\text{--}14.7 \times 7.8\text{--}8.3 \mu\text{m}$. (Fig. 1, h).

Saccobolus versicolor (P. Karst.) P. Karst. — the Uzbek SSR, the Great Chimgan Mountains, on sheep dung, 2300 m, April 25, 1985, coll. V. Prokhorov; the Turkmenian SSR, Ashabad region, Kaahkin district, Karahan, on sheep dung, May 1, 1985, coll. H. Orazov.

Apothecia discoid to pulvinate, solitary, sessile, 0.3–0.4 mm in diameter, whitish with violaceous tint, becoming yellowish. Spores arranged into compact clusters according to pattern III, $36.1\text{--}41.2 \times 12.8\text{--}15.0 \mu\text{m}$. Individual spores ellipsoid with rounded ends, violaceous to greyish-brown, verrucose with unnumerous striae, $13.1\text{--}19.4(20.3) \times 7.6\text{--}8.3(8.9) \mu\text{m}$. (Fig. 1, i).

Thecotheus cinereus (Crouan et Crouan) Chenantais — the Tadzhik SSR, the Western Pamir, valley of the Shakh-dara river, on donkey dung, 2200 m, June 1, 1978.

Apothecia sessile, cup-shaped, 0.5 mm in diameter, white. Asci $230 \times 15\text{--}30 \mu\text{m}$, totally blue in iodine. Spores fusoid, apiculate, surrounded by mucilaginous coating, finely punctate, thick-walled, hyaline, $28\text{--}30 \times 15\text{--}16 \mu\text{m}$, apiculi $3.5 \mu\text{m}$ long.

This collection occupies a somewhat intermediate position between *T. cinereus* and *T. apiculatus* Kimbrough. It has narrow asci as the latter species but its spores fit better *T. cinereus*.

THELEBOLACEAE (Brumm.) Eckbl.

Coprotus dextrinoideus Kimbr., Luck-Allen et Cain — the Kirghiz SSR, the Great Kirghiz Mountains, Chon-Kurchak, on cow and horse dung, June 26, 1981, coll. S. Mosolova.

Apothecia subcylindrical or pulvinate, sessile, solitary, 0.2–0.35 mm in diameter, whitish or pale yellowish. Spores ellipsoid, hyaline, containing a large de Bary bubble, $11.1\text{--}11.7 \times 7.2\text{--}7.8 \mu\text{m}$. Some asci contain small yellowish aborted spores (Fig. 2).

Coprotus ochraceous (Crouan et Crouan) Larsen — the Tadzhik SSR, the Western Pamir, valley of the Gunt river, on horse dung, 2600 m, June 2, 1978, coll. A. Raitviir.

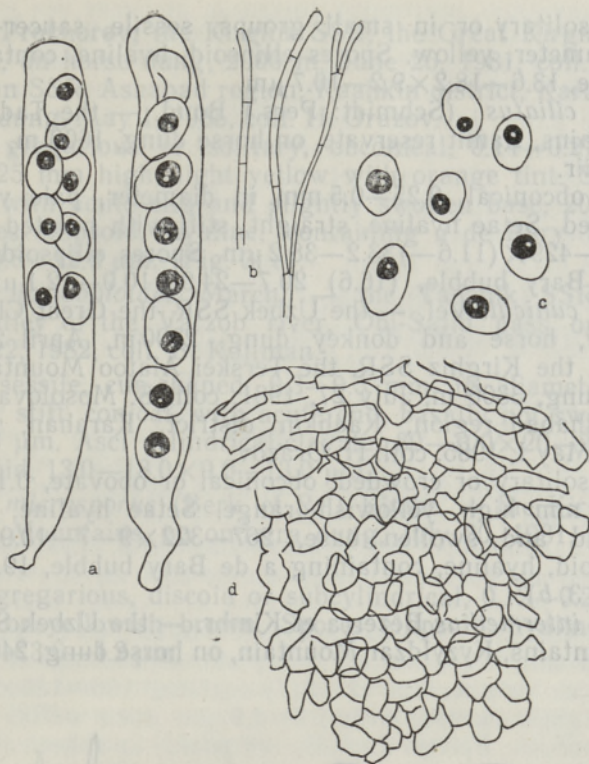


Fig. 2. *Coprotus dextrinoideus*: a — asci with 8 spores; b — paraphyses; c — spores; d — ectal excipulum. 600 X.

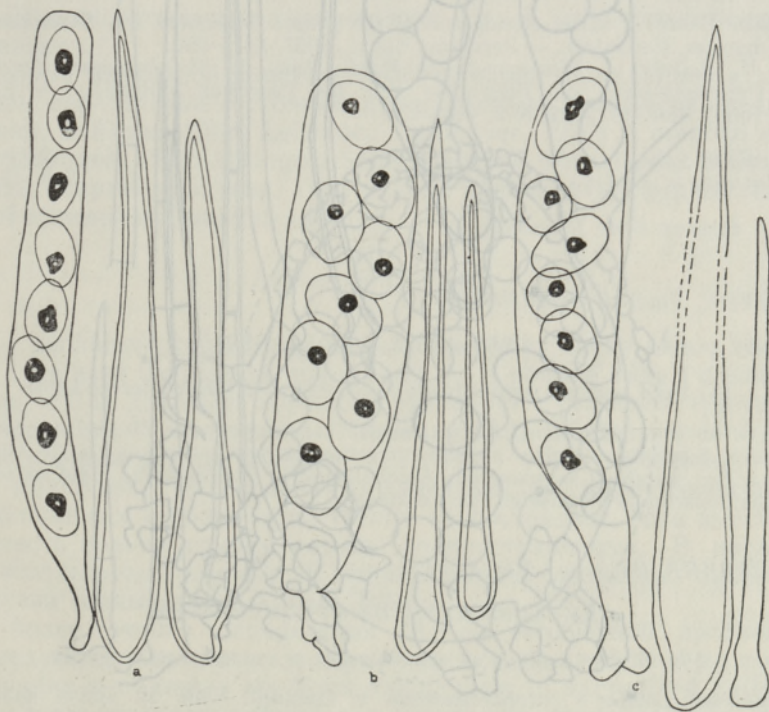


Fig. 3. Asci with spores and setae of species of the genus *Lasiobolus*: a — *L. ciliatus*; b — *L. cuniculi*; c — *L. intermedius*. 600 X.

Apothecia solitary or in small groups, sessile, saucer-shaped, 0.3—0.8 mm in diameter, yellow. Spores ellipsoid, hyaline, containing a large de Bary bubble, $13.6\text{--}18.2 \times 9.2\text{--}10.7 \mu\text{m}$.

Lasiobolus ciliatus (Schmidt: Pers.) Boud. — the Tadzhik SSR, the Hissar Mountains, Ramit reserve, on horse dung, 1600 m, April 12, 1977, coll. A. Raitviir.

Apothecia obconical, 0.25—0.5 mm in diameter, pale yellow to pale orange coloured. Setae hyaline, straight, stiff with pointed tip and swollen base, $363\text{--}429 \times (11.6\text{--})33.2\text{--}38.2 \mu\text{m}$. Spores ellipsoid, hyaline, containing a de Bary bubble, $(16.6) 20.7\text{--}24.9 \times 10.0\text{--}12.1 \mu\text{m}$. (Fig. 3, a).

Lasiobolus cuniculi Vel. — the Uzbek SSR, the Great Chimgan Mountains, on cow, horse and donkey dung, 2300 m, April 26, 1985, coll. V. Prokhorov; the Kirghiz SSR, the Terskei Alatau Mountains, on horse and donkey dung, 3300 m, July 27, 1981, coll. S. Mosolova; the Turkmenian SSR, Ashabad region, Kaahkin district, Karahan, on sheep and donkey dung, May I, 1985, coll. H. Orazov.

Apothecia solitary or crowded, obconical or obovate, 0.1—0.25 mm in diameter. 0.2 mm high, yellowish-orange. Setae hyaline, straight, stiff with acute end and swollen base, $267\text{--}322 \times 9\text{--}7\text{--}13.9 \mu\text{m}$. Spores broadly ellipsoid, hyaline, containing a de Bary bubble, $19.4\text{--}23 \times 13.1\text{--}14.8 \mu\text{m}$. (Fig. 3, b).

Lasiobolus intermedius Bezerra et Kimbr. — the Uzbek SSR, the Great Chimgan Mountains, Kyzylzar Mountain, on horse dung, 2400 m, April 26,

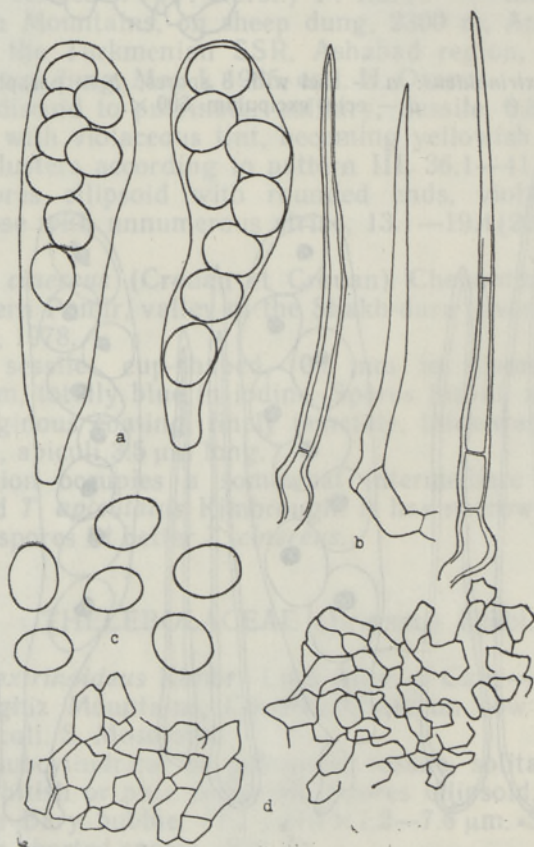


Fig. 4. *Trichobolus octosporus*: a — asci with 8 spores; b — setae; c — spores; d — part of excipulum. 600 X.

1985, coll. V. Prokhorov; the Kirghiz SSR, the Great Kirghiz Mountains, Chon-Kurchak, on horse dung, 2000 m, June 26, 1981, coll. S. Mosolova; the Turkmenian SSR, Ashabad region, Kaahkin district, Karahan, on horse and on camel dung, May 1, 1985, coll. H. Orazov.

Apothecia gregarious or solitary, obconical, 0.14—0.27 mm in diameter, 0.2—0.25 mm high, light yellow with orange tint. Setae straight, stiff, hyaline, with acute end and slightly swollen base, $202\text{--}336 \times 6.9\text{--}14.9 \mu\text{m}$. Spores ellipsoid, hyaline, containing a de Bary bubble, $15.3\text{--}18.8(20.0) \times 10.8\text{--}12.8 \mu\text{m}$. (Fig. 3, c).

Lasiobolus lasioboloides March. — the Tadzhik SSR, the Hissar Mountains, valley of the Varzob river, Obi-Safid pass, on horse dung, 2800 m, June 22, 1982, coll. B. Kullman.

Apothecia sessile, cup-shaped, 0.3—0.5 mm in diameter, yellowish. Setae straight, stiff, conical, with acute end, basally not swollen, hyaline, $70\text{--}140 \times 5\text{--}8 \mu\text{m}$. Asci cylindrical-clavate, $80\text{--}100 \times 20\text{--}25 \mu\text{m}$. Spores broadly ellipsoid, $13.0\text{--}18.0 \times 9.0\text{--}13.0 \mu\text{m}$.

Thelebolus microsporus (Berk. et Br.) Kimbr. — the Kirghiz SSR, the Kurpai Alatau Mountains, on ondatra dung, July 20, 1981, coll. S. Mosolova.

Apothecia gregarious, discoid or subcylindrical, 0.12—0.27 mm in diameter, yellow or yellowish brown. Spores ellipsoid, hyaline, without oil drops, $7.8\text{--}8.3 \times 3.6\text{--}4.2 \mu\text{m}$.

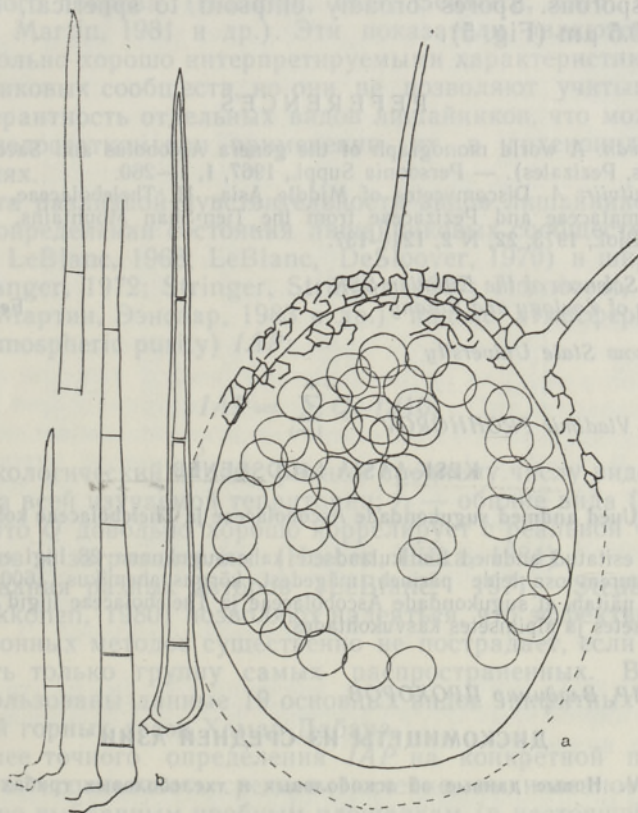


Fig. 5. *Trichobolus sphaerosporus*: a — a fruit body with ascus and part of excipulum, of setae (or hairs) and spores; b — setae. 600 \times .

Thelebolus stercoreus Tode: Fr. — the Uzbek SSR, the Great Chimgan Mountains, on cow and goat dung, 2300 m, April 26, 1985, coll. V. Prokhorov; the Kirghiz SSR, the Great Kirghiz Mountains, Chon-Kurchak, on cow and sheep dung, June 30, 1980, 2000 m, coll. S. Mosolova; the Turkmenian SSR, Ashabad region, Kaahkin district, Karahan, on camel and sheep dung, May 1, 1985, coll. H. Orazov.

— Apothecia gregarious, broadly ovate to subspherical, 0.23–0.3 mm in diameter, yellowish-brown. Spores ellipsoid, $6.7\text{--}6.9 \times 3.8\text{--}4.7 \mu\text{m}$.

Trichobolus octosporus Kimbr. — the Uzbek SSR, the Great Chimgan Mountains, on goat and cow dung, 2300 m, April 24, 1985, coll. V. Prokhorov.

Apothecia sessile, cylindrical, 0.15–0.2 mm in diameter, 0.2 mm high, orange-yellow, externally hairy. Ectal excipulum composed of *textura angularis*. Setae thin-walled, straight or slightly curved, with acute tip, usually 2-septate, $72\text{--}95 \times 4.7\text{--}8.3 \mu\text{m}$. Asci broadly clavate, 8-spored, J-, uniformly staining in congo red. Spores broadly ellipsoid, hyaline, smooth, $16.1 \times 11.1 \mu\text{m}$. Paraphyses filiform, septate, hyaline, $2.8 \mu\text{m}$ in diameter (Fig. 4).

Trichobolus sphaerosporus Kimbr. — the Uzbek SSR, the Great Chimgan Mountains, on goat and sheep dung, 2300 m, April 24, 1985, coll. V. Prokhorov.

Apothecia semiimmersed to superficial, ovate, 0.14–0.23 mm in diameter, 0.1–0.2 mm high, solitary, whitish, containing only one ascus. Setae 4–12 per apothecium, 2–3(7)-septate, $106\text{--}188 \times 6.5\text{--}11.1 \mu\text{m}$, straight or slightly curved, with $1.3\text{--}1.9 \mu\text{m}$ thick walls. Ascus broadly ovate, multisporeous. Spores broadly ellipsoid to spherical, $10.6\text{--}10.8\text{--}11.6 \times 8.4\text{--}10.5 \mu\text{m}$ (Fig. 5).

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KESK-AASIA LIUDSEENED

IV. Uued andmed sugukondade Ascobolaceae ja Thelebolaceae kohta

Artiklis on esitatud andmed liudkulaadsete kahe sugukonna 28 liigi esinemise kohta Kesk-Aasias. Suurem osa leide pärineb mägedest kõrgusvahemikus 1600–3300 m üle merepinna. See näitab, et sugukondade Ascobolaceae ja Thelebolaceae liigid on hästi esindatud subalpiinsetes ja alpiinsetes kasvukohtades.

Айн РАЙТВИИР, Владимир ПРОХОРОВ

ДИСКОМИЦЕТЫ ИЗ СРЕДНЕЙ АЗИИ

IV. Новые данные об аскоболовых и тхелеболовых грибах

Приведены данные о распространении в Средней Азии 28 видов, принадлежащих к двум семействам пезизовых грибов. Большинство местонахождений расположено в горах на высоте 1600–3300 м. Этот факт указывает на то, что аскоболовые и тхелеболовые грибы хорошо приспособлены к субальпийским и альпийским условиям местобитаний.