

HENRY DISSING, AIN RAITVIIR

**DISCOMYCETES OF MIDDLE ASIA. II. THELEBOLACEAE,
ASCOBOLACEAE, PYRONEMATACEAE AND PEZIZACEAE FROM
THE TIEN-SHAN MOUNTAINS**

This report is a continuation of the series (*vide* Raitviir, 1969) dealing with the Discomycetes of Middle Asia. 15 species belonging to 4 families of Pezizales are listed from the Tien-Shan Mountains. *Otideaceae*, *Helvellaceae*, *Morchellaceae* and *Sarcoscyphaceae* will be treated in the next paper of the series.

This study is based on the materials collected by A. Raitviir from the North-, Central- and West-Tien-Shan during the expeditions in 1963, 1965, 1967 and 1968. The collections were preliminarily inspected by A. Raitviir and then studied in detail by H. Dissing, who has also prepared the illustrations.

The flora of Pezizales of the Tien-Shan Mountains is not particularly rich due to the relatively unfavourable ecological conditions. The humidity of soil is generally low and there are practically no plane shadowy localities as terrestrial Discomycetes prefer to grow on. Nevertheless, several interesting species, among them two new ones have been found in the investigated area.

THELEBOLACEAE (Brumm.) Eckbl.

Lasiobolus pilosus (Fr.) Sacc. — The Tschatkal Mountains, Sary-Tschelek reserve, on horse dung, 1200 m, May 29, 1968; The Ferghana Mountains, Arslan-Bob, on horse dung, 1300 m, May 29, 1968.

Hairs pointed, without septa, up to 300 μ long. Spores smooth, without guttules, elliptic, 18.8—21.2—23.1/9.9—11.7—13.2 μ .¹

ASCOBOLACEAE Sacc.

Ascobolus immersus Pers. ex Fr. — The Ferghana Mountains, Arslan Bob, on horse dung, 1300 m, May 29, 1968. On the same dung sample *Lasiobolus pilosus* and *Sordaria humana* were seen.

Spores slightly smaller than normally reported for the species: 52.8—59.4/29.7—34.7 μ (only ten spores measured).

¹ Individual mean values calculated from measurements of 20 spores are indicated in bold face type.

PYRONEMATACEAE Corda emend. Eckbl.

Pyronema omphalodes (Bull. ex Fr.) Fuckel — the Ferghana Mountains, Arslan Bob, on burnt spot, 1300 m, May 29, 1968.

Spores 12.5—13.4—14.9/6.6—7.2—8.3 μ , smooth, hyaline, without oil guttules.

Coprobia sp. — the Ferghana Mountains, Arslan Bob, on cow dung, 1300 m, May 30, 1968.

Material very scanty, only fragments of two fruitbodies remained. Spores 13.2—13.7—14.8/6.6—6.7—7.3 μ , hyaline, without oil guttules, under oil immersion a very delicate striation could be seen. The size of the spores indicates that the material might represent an undescribed species.

Cheilymenia albescens Dissing et Raitv. species nova — Apothecia solitaria vel gregaria, sessilia, cupulata, dein appanata, 1—3 mm in diam., albido, extus densiter longe pilosa, ad marginem laeves, sicca pallide flavido-grisea. Exoexcipulum ex cellulis globosis vel angularis 10—33 μ in diam. Cellulae marginales clavatae, 33—40/6—10 μ vel 50—90/23—33 μ . Excipulum medullosum ex textura intricata. Pili cylindraceo-conici, brunnei, crassiparietales, radicanes, 10—16-septata, 600—1020/20—33 μ , vel 2—5-septate, 120—200 μ longi, nunquam radicanes. Hymenium 200—230 μ in sectio, asci cylindracei, 13—16.5 μ in diam. Sporae uniseriatae, ellipsoideae, hyalinae, laeves, aguttulatae, 19.8—20.6—22.4/9.9—11.4—12.5 μ . Ad lignum putridum crescit. (Fig. 1.)

Holotypus. Tian-Shan interior, Montes Moldotau apud vallim fluvii Karatal, 2800 m, ad lignum putridum, 29. VII 1967, A. Raitviir legit, in herbario TAA conservatur.

Species aliis generis pilis brunneis differt.

Apothecia solitary or gregarious, first cup-shaped, then expanded and flattened, 1—3 mm broad; disc whitish, outside concolorous, set with numerous stiff, brown hairs. On drying, the fruit-body becomes pale yellowish-gray. Outer excipulum, below the margin, of textura globosa to textura angulata, 40—100 μ thick, most cells 10—33 μ broad, rather thin-walled. Marginal cells club-shaped, mostly 33—40/6—10 μ , intermixed with cells measuring 50—90/23—33 μ , apparently without intermediate sizes. Medullary excipulum of textura intricata, hyphae densely interwoven, septate, branching, 2—3 μ thick. There are two types of hairs: 1) on the upper part of the outside, subparallel with surface, 600—1020 μ long, 20—33 μ broad at the base, 10—16-septate, originating from cells in the outermost excipulum or from medullary excipulum, sometimes forked at the base; 2) on the lower part of the outside, directed in wide angles to the surface, 120—200 μ long, 2—5-septate, originating from a bulbose, 30—40 μ broad, thick-walled basal cells in the outer excipulum, never rooting. Margin proper without hairs. Hymenium 200—230 μ high, asci operculate, cylindrical, 13—16.5 μ broad. Subhymenium with numerous ascogenous hyphae, deeply staining in cotton blue. Paraphyses 2—3 μ broad, septate, branching, colourless, not enlarged above. Spores uniseriate, hyaline, elliptic, smooth, but with a loosening perisporeal sheath, without oil guttules, 19.8—20.6—22.4/9.9—11.4—12.5 μ . No de Bary bubbles seen in KOH or cotton blue. (Fig. 1.)

Growing on strongly decayed wood.

The Moldotau Mountains, valley of the river Karatal, 2800 m, on strongly decayed wood, July 29, 1967.

Except for the lack of carotinoid pigments, the habitus of our fungus immediately recalls the members of the genus *Scutellinia*. A closer examination shows, however, that

it has characters in common with (at least) all the following genera: *Cheilymenia* (spores without guttules, with perisporeal sheath), *Scutellinia* (brown, thick-walled, more or less rooting hairs), *Tricharina* and *Trichophaea* (colourless, straight paraphyses). None of the recent descriptions (Eckblad, 1968; Rifai, 1968) defining these genera fully covers our fungus. Therefore, without a subjective evaluation of one of the mentioned characters, it cannot readily be placed in any of these genera. Since the characters of the spores are unique for the members of the genus *Cheilymenia*, we tentatively propose to treat our species as a member of this genus, even if the straight colourless paraphyses and the thick-walled brown hairs might point to relationships elsewhere. Creation of a new genus has been considered, but with our present incomplete knowledge about Humariaceae genera, an intermediate genus seems unwanted. The two types of brown, thick-walled hairs separate our species well from the known species of the genus *Cheilymenia*. Lack of carotenoid pigments might also be of diagnostic value, but as long as only one collection has been studied, we hesitate to emphasize this character.

Scutellinia scutellata (L. ex Fr.) Lamb. — The Zailiiski Alatau Mountains, valley of the river Malaya Almaatinka, 2000 m, on dead wood of *Picea schrenkiana*, August 20, 1963; the Terskei Alatau Mountains, Teploklyutchenka, 1800 m, on the ground, August 22, 1965.

Spores 19.8—21.4—23.1/12.5—13.3—14.9 μ , delicately warty. In both studied collections the hairs measured up to 1400 μ .

Scutellinia trechispora (Berk. et Br.) Lamb. — the Moldotau Mountains, valley of the Karatal river, 3200 m, on the ground, July 30, 1967.

Spores globose, 18.8—22.0—23.1 μ , with low rounded warts. Hairs short, up to 300 μ long.

Humaria hemisphaerica (Wigg. ex Fr.) Fuckel — the Terskei Alatau Mountains, Teploklyutchenka, Aksu, 1800 m, on the ground, August 26, 1965.

Spores 21.5—22.9—23.8/11.6—12.7—13.2 μ , ellipsoid, with low rounded warts, normally with two large oil guttules, without de Bary bubbles.

Trichophaea bicuspis (Boud.) Boud. — the Zailiiski Alatau Mountains, valley of the river Malaya Almaatinka, Gorelnik, 2000 m, on fallen twigs of *Picea schrenkiana*, August 19, 1963.

Apothecia 1—3 mm broad, obconical, solitary or gregarious. Hymenium whitish, flat, margin even, raised; outside brownish, upper part with scattered, stiff brown hairs, some of which are forked, with the lower part pointing downwards. Outer excipulum 75—82 μ thick in lower part, of textura globosa, individual cells 13—40 μ broad; 26—40 μ thick in upper part, of textura angulata, with single cells 6—20 μ broad and 6—14 μ high, and arranged in attenuated rows, with 6—12 cells in each row. The rows are arranged in a characteristic imbricate way with the free cells upwards. In the proper margin the cells are very small, regular, 6—7 μ broad and 9—10 μ high. When seen in section, the innermost cells in the outer excipulum are hyaline, thin-walled, while the surface cells are thick-walled, brownish. Medullary excipulum is a mixture of thin-walled cells; some of them are like hyphae, septate, branching, 2—5 μ broad, some are angular, 2—8 μ broad. Hairs originate from the outermost cells in outer excipulum. In upper part of apothecium they are thick-walled, brown, multiseptate, pointed, 700—960 μ long, at the base 16—23 μ broad, with the walls 3—5 μ thick. Some hairs are forked from the base, forming downward pointed appendage, 195—380 μ long. Anchoring hyphae-like hairs from the lower part of the apothecium are thin-walled, septate, colourless, 200—600 μ long,

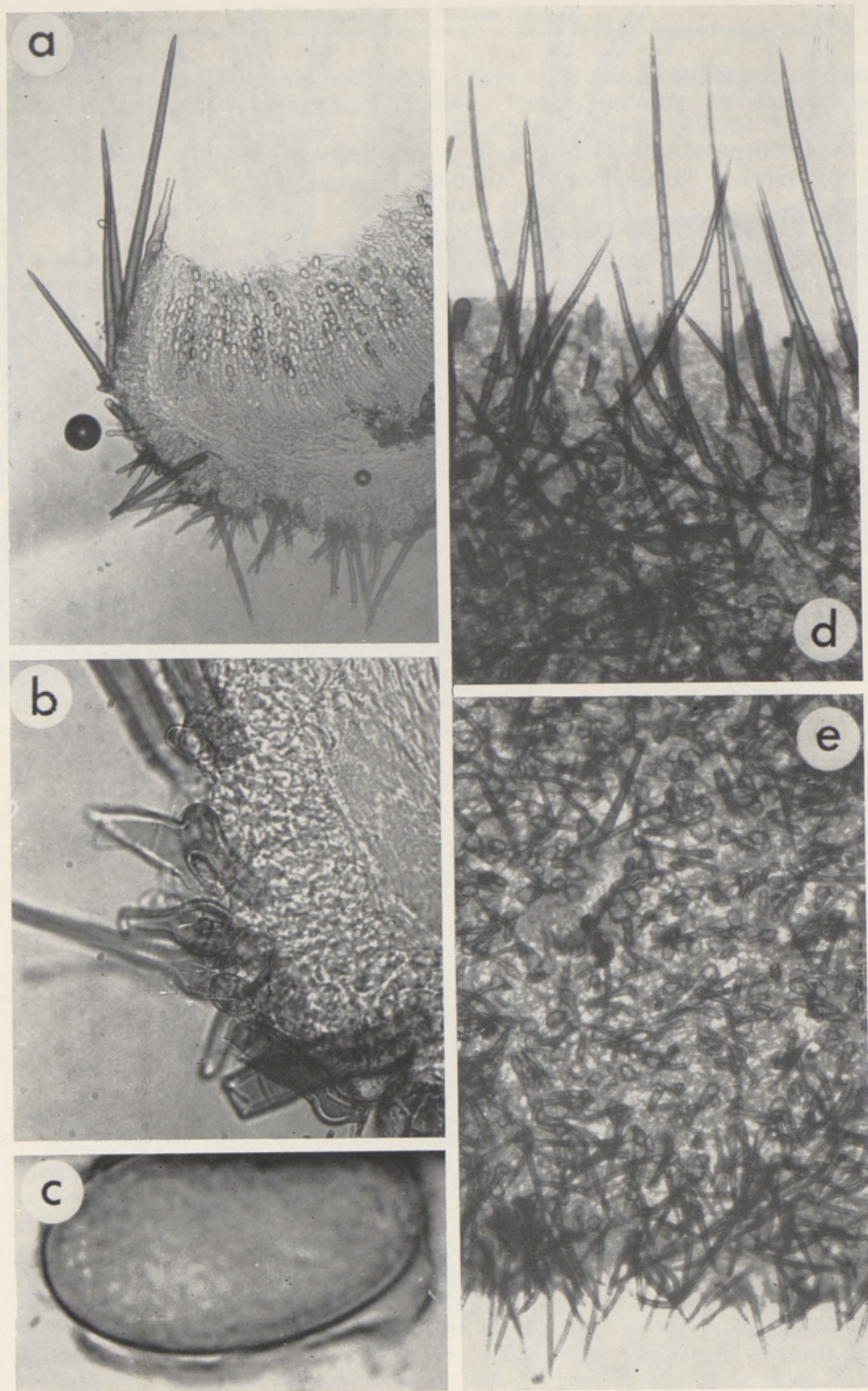


Fig. 1. *Cheilymenis albescens*: a — marginal section; b — outer excipulum with forked hairs; c — spore, note the loosening perispore sheath; d — hairs of type 1; e — hairs of type 2. a, d, e 100 \times ; b 390 \times ; c 2000 \times .

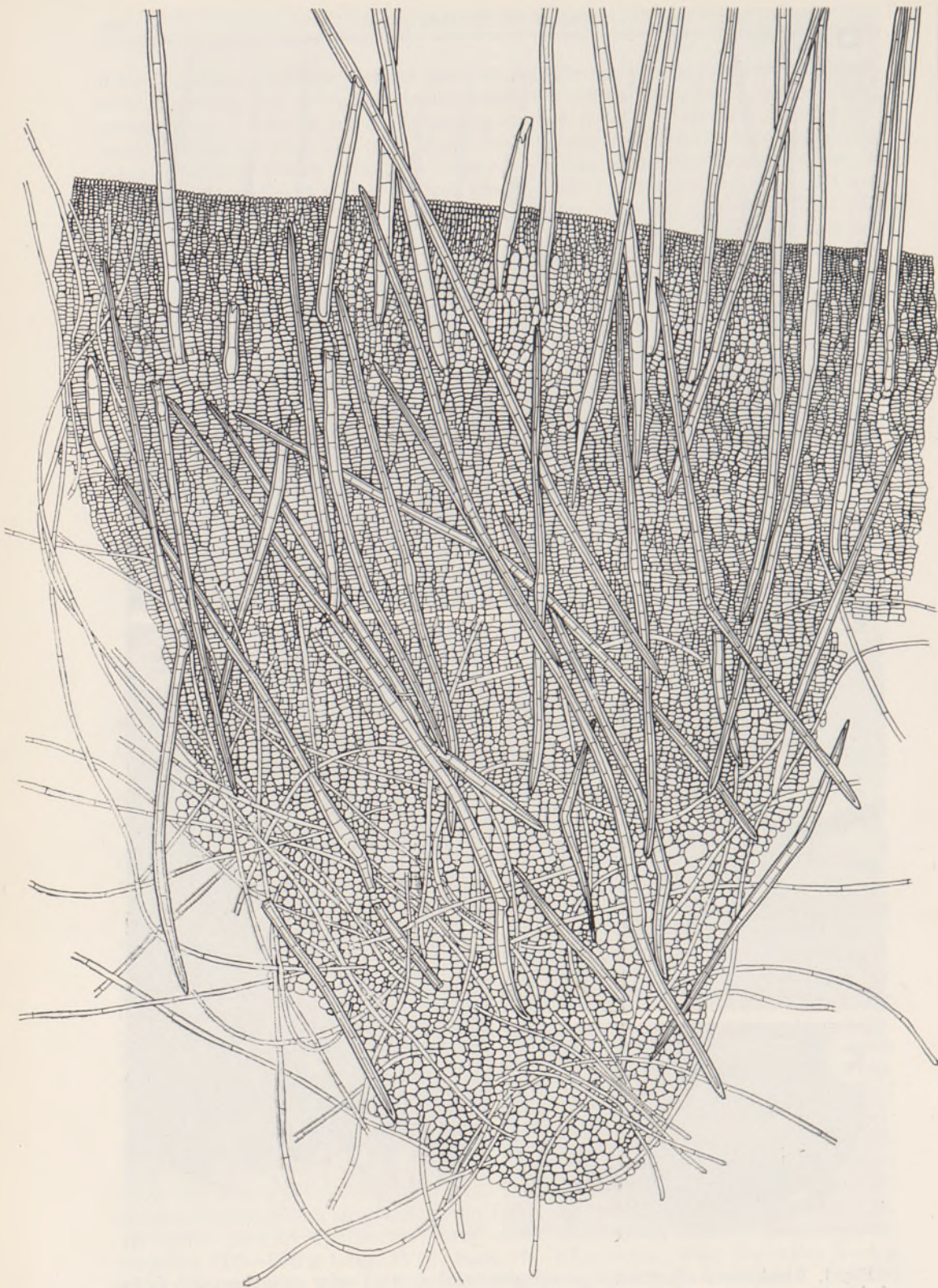


Fig. 2. *Trichophaea bicuspis*, surface of fruit-body, showing excipular hairs and cells. 110X.

5—7 μ broad. Subhymenium 60—100 μ thick, like the medullary excipulum, but with numerous ascogenous hyphae, deeply staining in cotton-blue. Hymenium 215—255 μ high, asci 10—13 μ broad. Paraphyses 2—3 μ broad, septate, only slightly enlarged above. Spores 15.8—16.5—18.2/9.2—10.1—11.6 μ , uniseriate, hyaline, smooth, thin-walled, without oil guttules. No de Bary bubbles seen in KOH or cotton-blue. (Fig. 2, 3, *i*.)

No oil guttules were seen in the spores. This is in discordance with observations mentioned by Dennis (1968) and Maas Geesteranus (1969). Both authors mention spores with two large oil guttules. In the excellent illustration by Boudier (1905—10, Plate 366) the spores are shown with two guttules as well as with polarly arranged granules. According to Boudier (*l. c.*, p. 206), only fully mature spores have two well differentiated guttules. Kanouse (1958) described the spores in North American material as "non-guttulate". In fresh material from Denmark (considered to be fully mature) only spores with polarly arranged granules were seen. The spores were mounted in water. Otherwise our material is in accordance with the above description.

Eckblad (1968) included species of *Trichophaea* in *Humaria*. We feel rather reluctant about this step since it seems that hereby the only contribution is that *Humaria* becomes as heterogenous as *Trichophaea* in the traditional sense. *T. gregaria*, *T. hemisphaerioides* and *T. paludosa* might well be considered to be closely related to *Humaria hemisphaerica*. But if *T. woolhopeia* is also transferred, the picture of *Humaria* is already broadened because of the occurrence of de Bary bubbles in the spores of *T. woolhopeia*. *T. abundans*, also with de Bary bubbles, has a *Botrytis* imperfect state and the bulbous excipular hairs are different from those found in the above-mentioned species. *T. bicuspis* as found in the present material has spores without oil guttules and without de Bary bubbles. It has also a very different outer excipulum with very peculiar hairs and excipular cells. (Fig. 2.)

Trichophaea gregaria (Rehm) Boud. — the Zailiiski Alatau Mountains, valley of the river Malaya Almaatinka, Gorelnik-Tchimbulak-Edelweiss, on decaying wood of *Picea schrenkiana* and on the ground, 2000—2400 m, August 19—24, 1963 (6 collections); the Terskei Alatau Mountains, Teplok-lyutchenka, Aksu, 2000 m, on decaying wood of *Picea schrenkiana*, August 26, 1965.

This species is treated in a very broad sense here. The material can be divided in three groups which probably constitute entities on species level, if the characters of spores (size, form and ornamentation) length of asci and length of hairs are considered. (Table, Fig. 3, *a—g*, 4.) It seems, however, impossible to give any names to our "species" before a detailed study of taxa on species and subspecies level. LeGal (1937) recognized *T. gregaria* as a species with completely smooth spores with numerous oil drops. *T. gregaria* var. *intermedia* LeGal was distinguished on its delicately warty spores with few oil drops. *T. pseudogregaria* (Rick.) Boud. was considered to be a closely related species (if not a variety only) with larger, rounded warts on the spores. Svrček (1948) doubted in the value of spore ornamentation as a diagnostic character, because he considered the question of ornamentation on the spores as a matter of ripening. He regarded *T. pseudogregaria* as a form of *T. gregaria*. Further he placed *T. gregaria* var. *intermedia* in synonymy with *T. pseudogregaria*. Expressing his opinion on the large variation of *T. gregaria*, Svrček (1948) recognized not less than five forms of the species. A number of species described by Velenovsky (1934, 1947) were studied by Svrček. They were all considered to be conspecific with *T. gregaria*. Kanouse (1958) described the spores of *T. gregaria* with one large central guttule, often with smaller ones... "smooth at first, becoming finally roughened". Due to the characteristic reaction in KOH she recognized *T. pseudogregaria* as a well defined species related to *T. paludosa* Boud. and *T. tuberculata* (Seaver) Kanouse. She intimated that *T. gregaria* var. *intermedia* only presented a fully mature state with roughened spores of *T. gregaria*.

The measurements of spores, asci and hairs from 7 studied collections of *Trichophaea gregaria*. Note that the size of spores combined with length of asci and hairs separates the collections in three, apparently well distinguished, groups

Coll. number	Spores (Indiv. mean values)	Ascus length	Marginal hair length
44097	22.9/9.5 μ	236—256 μ	320—384 μ
43397	23.2/9.6 μ	230—240 μ	320—384 μ
43370	23.6/9.5 μ	240—256 μ	330—386 μ
43457	23.8/9.0 μ	232—256 μ	356—384 μ
43417	23.3/11.5 μ	312—330 μ	240—256 μ
43352	26.0/9.8 μ	236—256 μ	680—710 μ
43456	26.2/9.9 μ	230—256 μ	640—670 μ

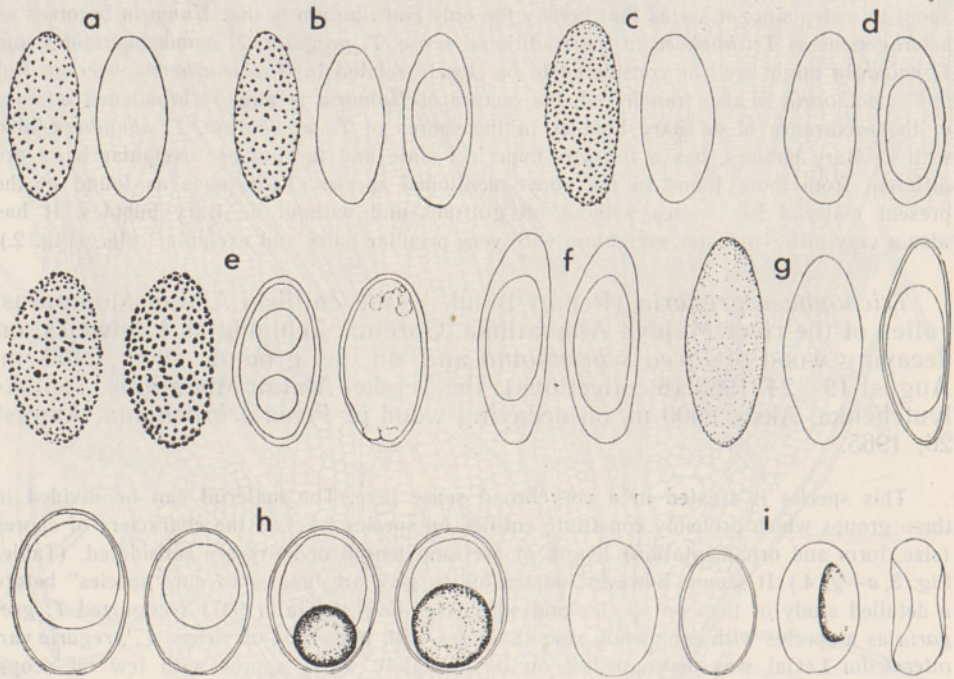


Fig. 3. Spores of *Trichophaea*. a — *T. gregaria*, TAA-44097, b — *T. gregaria*, TAA-43397; c — *T. gregaria*, TAA-43370; d — *T. gregaria*, TAA-43457; e — *T. gregaria*, TAA-43417; f — *T. gregaria*, TAA-43352; g — *T. gregaria*, TAA-43456; h — *T. woolhopeia*; i — *T. bicuspis*. All 1000 \times .

Trichophaea hemisphaerioides (Mouton) Graddon — the Zailiiski Alatau Mountains, valley of the river Malaya Almaatinka, Gorelnik, 2000 m, on the ground, August 19, 1963.

Spores 12.5—13.6—14.9/6.6—7.2—8.3 μ , smooth, elliptic, with two oil guttules. No de Bary bubbles seen. This species is normally found on burnt places, but has very rarely been recorded from other substrata, too (see Petersen, 1970, p. 70).

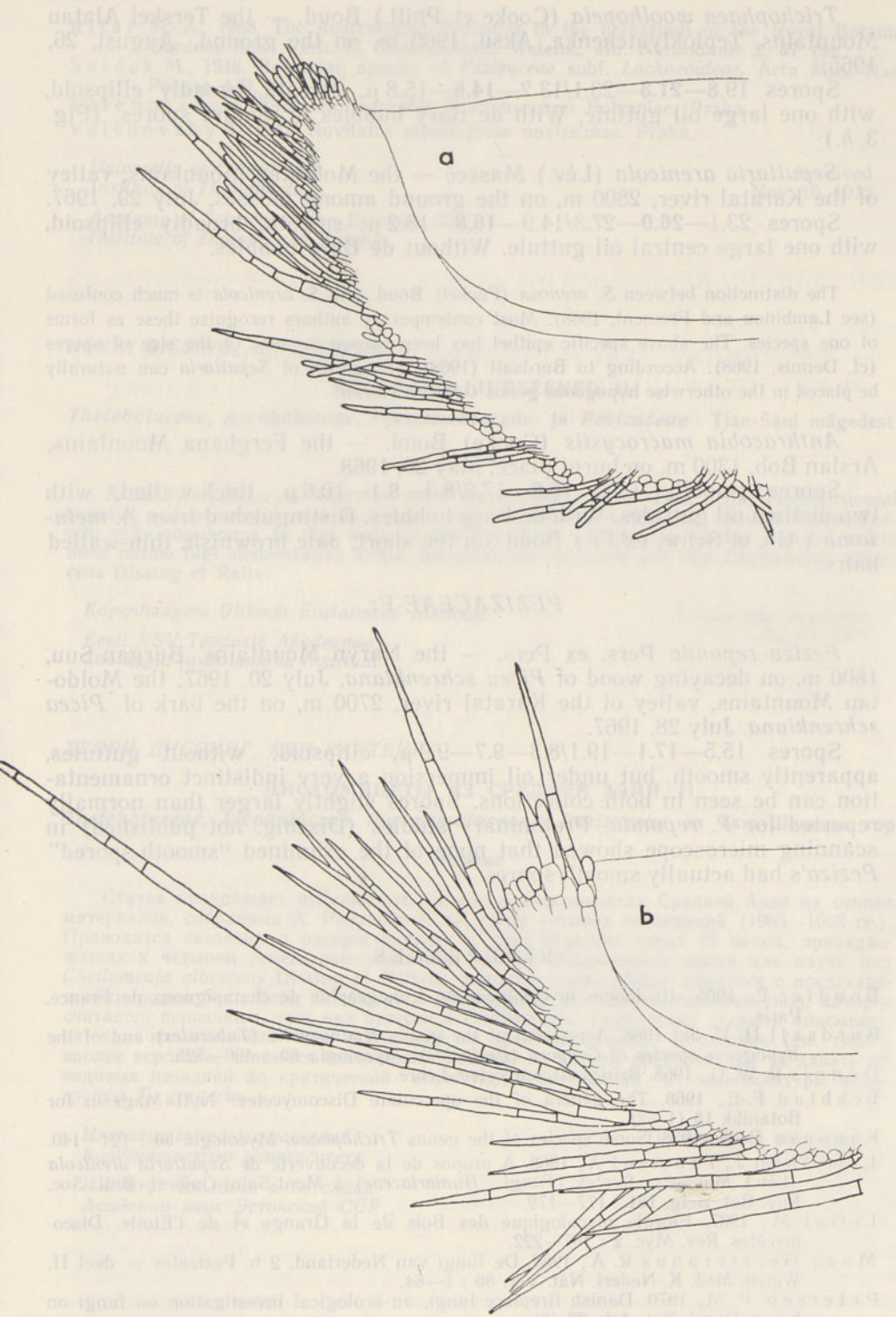


Fig. 4. Excipular hairs of *T. gregaria*: a — TAA-43417; b — TAA-43456. 110X.

Trichophaea woolhopeia (Cooke et Phill.) Boud. — the Terskei Alatau Mountains, Teploklyutchenska, Aksu, 1900 m, on the ground. August, 26, 1965.

Spores 19.8—21.3—23.1/13.2—14.6—15.8 μ , smooth, broadly ellipsoid, with one large oil guttule. With de Bary bubbles in mature spores. (Fig. 3, h.)

Sepultaria arenicola (Lév.) Masseé — the Moldotau Mountains, valley of the Karatal river, 2800 m, on the ground among mosses, July 29, 1967.

Spores 23.1—26.0—27.3/14.9—16.8—18.2 μ , smooth, broadly ellipsoid, with one large central oil guttule. Without de Bary bubbles.

The distinction between *S. arenosa* (Fuckel) Boud. and *S. arenicola* is much confused (see Lambinon and Froment, 1968). Most contemporary authors recognize these as forms of one species. The above specific epithet has been chosen because of the size of spores (cf. Dennis, 1968). According to Burdsall (1968), all species of *Sepultaria* can naturally be placed in the otherwise hypogeous genus *Geopora* Harkn.

Anthracobia macrocystis (Cooke) Boud. — the Ferghana Mountains, Arslan Bob, 1300 m, on burnt place, May 29, 1968.

Spores smooth, 13.8—15.8—17.2/8.3—9.1—10.6 μ , thick-walled, with two distinct oil guttules. With de Bary bubbles. Distinguished from *A. melaioma* (Alb. et Schw. ex Fr.) Boud. on the short, pale brownish, thin-walled hairs.

PEZIZACEAE Fr.

Peziza repanda Pers. ex Pers. — the Naryn Mountains, Burgan-Suu, 1800 m, on decaying wood of *Picea schrenkiana*, July 20, 1967; the Moldotau Mountains, valley of the Karatal river, 2700 m, on the bark of *Picea schrenkiana*, July 28, 1967.

Spores 15.5—17.1—19.1/8.3—9.7—9.9 μ , ellipsoid, without guttules, apparently smooth, but under oil immersion a very indistinct ornamentation can be seen in both collections. Spores slightly larger than normally reported for *P. repanda*. Preliminary studies (Dissing, not published) in scanning microscope showed that none of the examined "smooth-spored" *Peziza*'s had actually smooth spores.

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Received
 Nov. 10, 1972

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KESK-AASIA LIUDSEENED. II

Thelebolaceae, Ascobolaceae, Pyronemataceae ja *Pezizaceae* Tjan-Šani mägedest

Resümee

Artiklis jätkatakse A. Raitviiri poolt ajavahemikus 1963—1968 neljal ekspeditsioonil kogutud andmete avaldamist Kesk-Aasia liudseente kohta. Esitatakse andmed liudikulaadsete nelja sugukonna 15 liigi leviku kohta Tjan-Sani mägedes ja tehakse kriitilisi märkmeid mitme liigi süstemaatika kohta. Kirjeldatakse teadusele uut liiki *Cheilymenia albescens* Dissing et Raitv.

Kopenhaageni Ulikooli Eostaimede Instituut

Toimetusse saabunud

Eesti NSV Teaduste Akadeemia
 Zooloogia ja Botaanika Instituut

10. XI 1972

ХЕНРИ ДИССИНГ, АИН РАЙТВИИР

ДИСКОМИЦЕТЫ ИЗ СРЕДНЕЙ АЗИИ. II

Thelebolaceae, Ascobolaceae, Pyronemataceae и *Pezizaceae* из Тянь-Шанских гор

Резюме

Статья продолжает публиковать данные о дискомицетах Средней Азии на основе материалов, собранных А. Райтвииром во время четырех экспедиций (1963—1968 гг.). Приводятся сведения о распространении в Тянь-Шанских горах 15 видов, принадлежащих к четырем семействам пеизовых грибов. Описывается новый для науки вид *Cheilymenia albescens* Dissing et Raitviir, который имеет общие признаки с представителями родов *Scutellinia*, *Tricharina* и *Trichophaea*. На основе строения спор, которое считается первичным, этот вид отнесен к *Cheilymenia*. *Trichophaea gregaria* описывается как коллективный вид, состоящий из трех подъединиц. Последние (см. табл.), вполне вероятно, являются настоящими видами, но авторы предпочитают не давать им видовых названий до критической обработки систематики и номенклатуры видов группы *T. gregaria*.

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Поступила в редакцию
 10/XI 1972

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