

# The first contribution on mycophilous fungi from Belarus

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**SUMMARY:** Two species of zygomycetes, 9 ascomycetes and 11 anamorphic fungi with unknown theleomorph growing on decaying agarics, boletes, polypores, and *Stereum* were collected in five sites in central Belarus in September 2004. Among Ascomycota seven species belong to the genus *Hypomyces* and its anamorphs. The mycophilous fungi are described and illustrated; the descriptions are based on pure cultures and common herbarium samples.

**Key words:** anamorphic, Ascomycota, *Calcarisporium*, *Cladobotryum*, fungicolous Hypocreaceae, *Hypomyces*, *Mycogone*, *Sepedonium*, Zygomycota

## Introduction

Mycophilous fungi are an assemblage of species from the phyla Ascomycota, Basidiomycota, Zygomycota, and from anamorphic genera, united by their substratum ecology, i.e. they are the fungal organisms inhabiting in most cases fruitbodies of other fungi as the main nutritive source. They act both as true parasites and colonizers of dead fruitbodies. Traditionally these fungi were collected and described from macroscopic fungal fructifications, especially agaricoid and polyporoid ones, both living (almost undecayed), and differently decayed.

Most of species obligately growing on macroscopic fungi fruitbodies belong to the Hypocreaceae (the genera *Hypocrea*, *Hypomyces*, *Sporophagomyces*) and their anamorphs. The first record of mycophilic Hypocreaceae, possibly from Belarus area within its current borders, was *Hypomyces aurantius* reported by Błoński (1889: 93) on dead *Trametes versicolor* from Belovezhskaya Pushcha (Belovezh Primeval Forest), without exact locality data.

In September, 2004 the first, senior author undertook the collection trip to Belarus. The materials collected together with the junior author were deposited both in private herbarium of the senior author ("Herbarium mycologicum G R W Arnold. Fungi belorossici" – numbers with prefix "A") and in the section "Fungi" (MSK-F) of the Herbarium at the V.F. Kuprevich Institute of Experimental Botany. Most samples were isolated in pure culture by the senior author, grown on 3% malt extract agar (MEA) with 1.7% of agar at room temperature, and stored in private culture collection and as dried agar plates in common herbarium envelopes. Dried cultures are cited here with prefix "A", except of marked by asterisk \*, which are the common herbarium specimens. The materials on agaricolous, boleticolous, and polyporicolous, plus *Stereum*-inhabiting Ascomycetes, Zygomycetes, and anamorphic fungi, collected in 2004, are described in this paper.

The data on each collection in the list includes: host, collection site number, collector initials (GA – G. Arnold, EYu – E. Yurchenko), reference herbarium numbers in brackets. Unidentified ‘agaricoid fungi’ in the text imply basidiomycetes with lamellate hymenophore.

Collection sites were numbered:

1 – Minsk voblasts’ (oblast, region), Asipovichy district (rayon), near Lapichy village, 25 IX 2004;

2 – Minsk voblasts’, Asipovichy district, between villages Brytsalavichy and Ust-sizh, Svislach-Byarezina forest, 25 IX 2004;

3 – Minsk voblast’, Valozhyn district, near Pershamaiski settlement, Valozhynskaya Pushcha forest, 26 IX 2004;

4 – Minsk voblasts’ and district, near Khadakova village, Prylukski Forest Sanctuary, 27 IX 2004;

5 – Minsk City, Central Botanical Garden of the National Academy of Sciences of Belarus, 28 IX 2004.

## The list of species

### Zygomycota

1. **Spinellus fusiger (Link) Tiegh.** On agaricoid fungus, 4, GA, EYu (MSK 6802); on *Mycena* sp. basidiomata, 4, EYu, GA (MSK 6803).

The fungus occupies upper cap surface, lamellae, and partly stipe. Specimen MSK 6803 has spindle-shaped spores (25–)36–53 × (7.5–)9–12.5 μm, and fits to the description of *S. fusiger* sensu Naumov (1954). Most of spores in MSK 6802 are short spindle-shaped, 37–47 × 15.5–18 μm, fitting to the description of *S. macrocarpus* (Corda) P. Karst. f. *typica* Naumov (Naumov, 1954: 154); but within this specimen there are also narrow and slightly longer spindle-shaped spores like in MSK 6803. It confirms that *S. macrocarpus* is a synonym of *S. fusiger*.

2. **Syzygites megalocarpus Ehrenb.** On agaricoid fungus, 2, GA (A04/138; dup.: MSK 8498); on cap of decaying agaricoid fungus, 2, GA, EYu (MSK 6812). On *Mycena* sp., 3, GA (A04/151, numerous zygospores; dup.: MSK 8494); on decaying agaricoid fungus, 3, EYu, GA (MSK 6809). On agaricoid fungus, 5, EYu, GA (MSK 6806).

### Ascomycota and their anamorphs

3. **Hypocrea pulvinata Fuckel** [syn. *Hypocrea fungicola* (P. Karst.) Sacc.]. On hymenophoral side of old *Fomitopsis pinicola* (Sw.) P. Karst., 4, GA, EYu (MSK 6811).

4. **Hypomyces aurantius (Pers.) Fuckel**, anamorph **Cladobotryum varium Nees** (Fig. 1). On *Trametes versicolor* (L.) Lloyd, mostly on hymenophoral side, 2, GA, EYu (MSK 6808, both mature perithecia and anamorph); on *T. versicolor*, 2, GA (A04/126.teleo; dup.: MSK 8486); on *Stereum* sp., 2, GA (A04/152.teleo; dup.: MSK 8518); on *Stereum* sp., 2, GA (A04.152.2; dup.: MSK 8475).

*Cladobotryum varium* differs from other *Cladobotryum* species by (1)2-celled conidia of mostly obovoid shape, with big truncate basal hilum. Size of conidia in our specimens is  $(7.2\text{--})8\text{--}18 \times (4.5\text{--})5.5\text{--}7.5\text{--}(8.2) \mu\text{m}$ . Though, the size of conidia is variable in descriptions: Gams & Hoozemans (1970), Gray & Morgan-Jones (1980) reported smaller ones,  $10\text{--}16 \times (5\text{--})6\text{--}7 \mu\text{m}$ ; Rudakov (1981), Rogerson & Samuels (1993), Põldmaa et al. (n.d.) reported bigger ones,  $(8.5\text{--})10\text{--}16\text{--}(25) \times 5\text{--}9\text{--}(10) \mu\text{m}$ . In MSK 8518 conidia are commonly glued together and connected by anastomoses in groups. Conidiophore main axes in our specimens are  $4.5\text{--}5 \mu\text{m}$  wide below the first whorl of branches. The conidiogenous cells size is age-dependent due to retrogressive conidiogenesis; in our specimens phialides are short and stout,  $12\text{--}25 \times 3\text{--}4 \mu\text{m}$ ; in other descriptions they are slender,  $1.5\text{--}3 \mu\text{m}$  wide [Rogerson & Samuels (1993)] to short,  $3\text{--}4\text{--}(5) \mu\text{m}$  wide [Gams & Hoozemans (1970), Gray & Morgan-Jones (1980), Rudakov (1981), Põldmaa et al. (n.d.)].

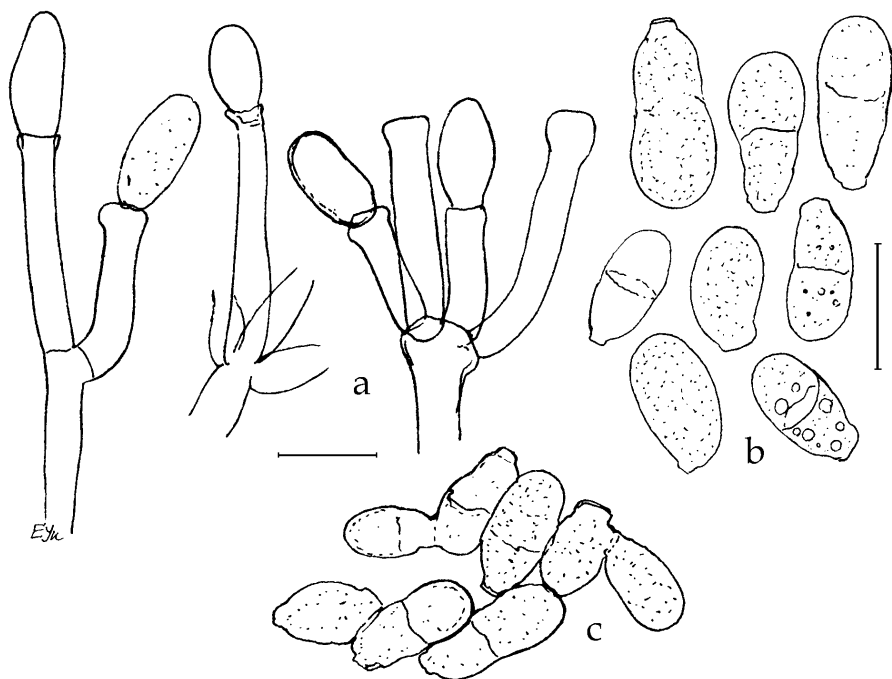


Fig. 1. The anamorph of *Hypomyces aurantius* (*Cladobotryum varium*) from culture: a – conidiophores with conidia (MSK 8486), b – conidia (MSK 8518), c – agglutinated and anastomosed conidia (MSK 8518). Scales =  $10 \mu\text{m}$ .

**5. *Hypomyces ochraceus* (Pers.) Tul. & C. Tul., anamorph *Cladobotryum verticillatum* (Link) S. Hughes** [syn. *C. agaricina* (Link) Nees] (Fig. 2). On *Russula* sp., 2, GA (A04/131; dup.: MSK 8492); on *Lactarius helvus* (Fr.) Fr., 2, GA (A04/158; dup.: MSK 8520); on *Lactarius* sp., 2, GA (A04/159; dup.: MSK 8505). On decaying tree trunk lying on ground, 2, GA (A04/153.Str(3); dup.: MSK 8519). On *Lactarius* sp., 3, GA (A04/154; dup.: MSK 8497).

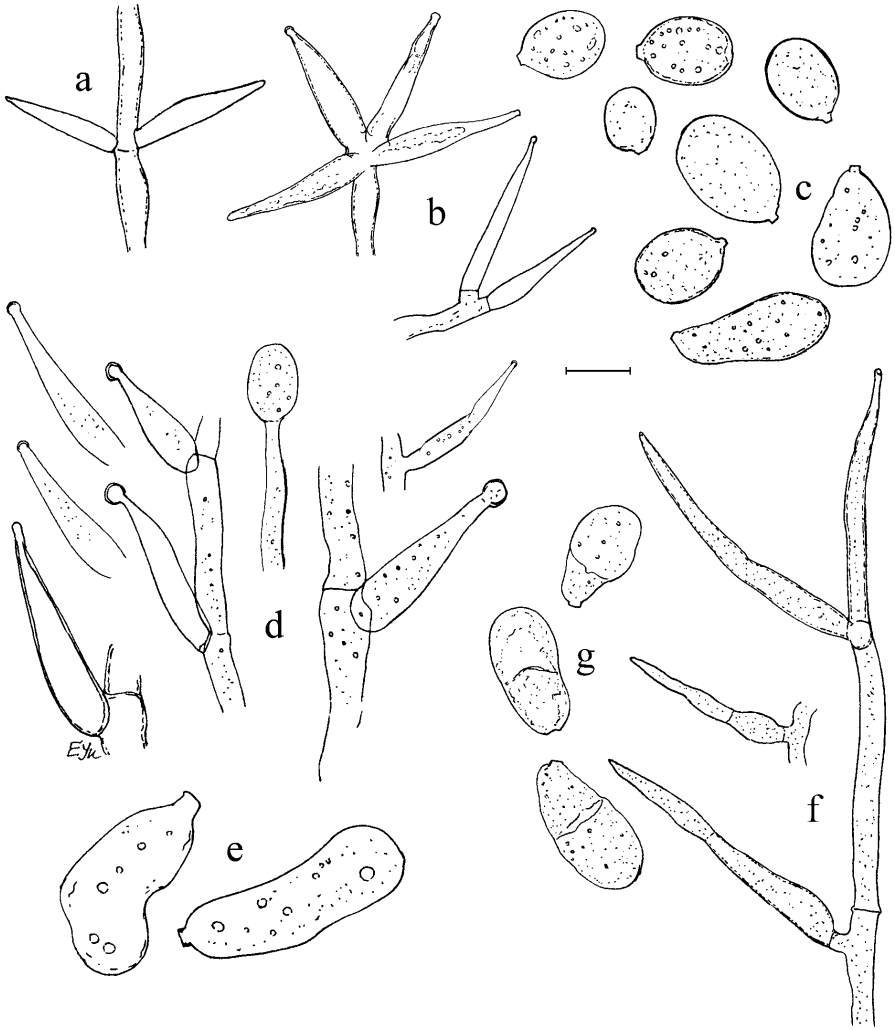


Fig. 2. The anamorph of *Hypomyces ochraceus* (*Cladobotryum verticillatum*) from culture. MSK 8492: a – conidiophore portion. MSK 8492: b – conidiophores, c – conidia. 6817: d – conidiophores, e – occasional large conidia. MSK 8520: f – conidiophores, g – rare 2-celled conidia. Scale = 10  $\mu$ m.

Phialides 22–70  $\mu\text{m}$  long, 2.7–6  $\mu\text{m}$  wide at base, mostly solitary. Conidia 1-celled, obovoid, ellipsoid, rarely globose, subglobose, pyriform, elongate pyriform, subhyaline (partly refractive due to oily contents), 10–19(–28.5)  $\times$  5.7–11.5(–15)  $\mu\text{m}$ , with prominent basal scar. In MSK 8505 conidia small, 10.5–15  $\times$  8.3–12  $\mu\text{m}$ . This anamorph differs from other *Cladobotryum* species by aseptate conidia with right outlines, except of MSK 8520, where conidia are 0(1)-septate and sometimes of irregular outline. According to Gams & Hoozemans (1970), Pöldmaa et al. (n.d.) conidia in this species can be rarely 2-celled. We belong *Cladobotryum verticillatum*-type of conidial sporulation to *Hypomyces ochraceus*. Rogerson & Samuels (1994) considered *C. verticillatum* as the proven anamorph of *Hypomyces armeniacus* Tul. & C. Tul.

**6. *Hypomyces odoratus* G.R.W. Arnold, anamorph *Cladobotryum mycophilum* (Oudem.) W. Gams & Hooz. (Fig. 3). On *Hebeloma* sp., 2, GA (A04/129; dup.: MSK 8509); on decayed agaricoid fungus, 2, GA (A04/160; dup.: MSK 8510).**

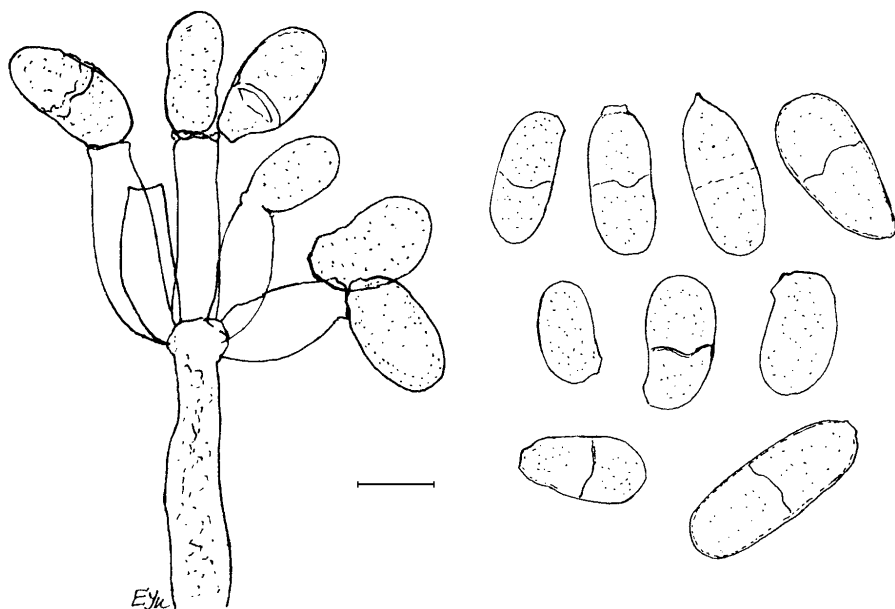


Fig. 3. The anamorph of *Hypomyces odoratus* (*Cladobotryum mycophilum*) from culture (MSK 8510): conidiophore upper part and conidia. Scale = 10  $\mu\text{m}$ .

Cultural mycelium pinkish yellow, staining agar in reddish tints. This *Cladobotryum* species differs from others by very short and thick phialides, 13.5–22.5  $\times$  5.2–8.2  $\mu\text{m}$ , with wide flattened tip. Conidiophore main axis 6.5–8  $\mu\text{m}$  wide in upper part. Conidia (1)2-celled, ellipsoid, obovoid, ovoid, sometimes slightly curved, hyaline, 11.5–24(–27)  $\times$  7–10  $\mu\text{m}$ . The size of conidia fits to the range in descriptions by Gams & Hoozemans (1970), Pöldmaa et al. (n.d.): 15–35  $\times$  7.5–12  $\mu\text{m}$ . Rogerson &

Samuels (1994) described small conidia in this species,  $14\text{--}22 \times 5\text{--}7 \mu\text{m}$ , more or less cylindrical to narrowly ellipsoidal, but on the picture (p. 858) short spindle-shaped conidia are shown.

**7. *Hypomyces rosellus* (Alb. & Schwein.) Tul. & C. Tul.,** anamorph ***Cladobotryum dendroides* (Bull.) W. Gams & Hooz.** (Fig. 4). On ground and on decayed agaricoid fungus, 2, GA (A04/112; dup.: MSK 8490); on *Mycena* sp., 2, GA (A04/125; dup.: MSK 8527); on immature *Xylaria* sp. stroma, 2, GA (A04/141, anamorph state; dup.: MSK 8523); on old agaricoid fungus, 2, GA (A04/155; dup.: MSK 8481); on old agaricoid fungus, 2, GA (A04/134; dup.: MSK 8488). On strongly decayed agaricoid fungus remains and on surrounding litter and fallen material (*Picea abies* (L.) Karst. bark and cone), 4, GA, EYu (MSK 6814).

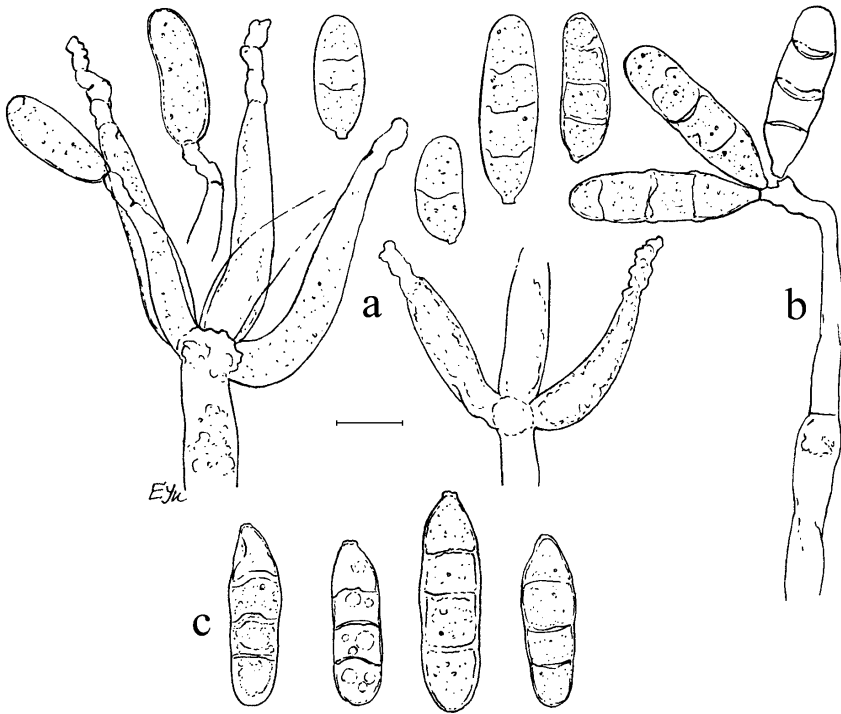
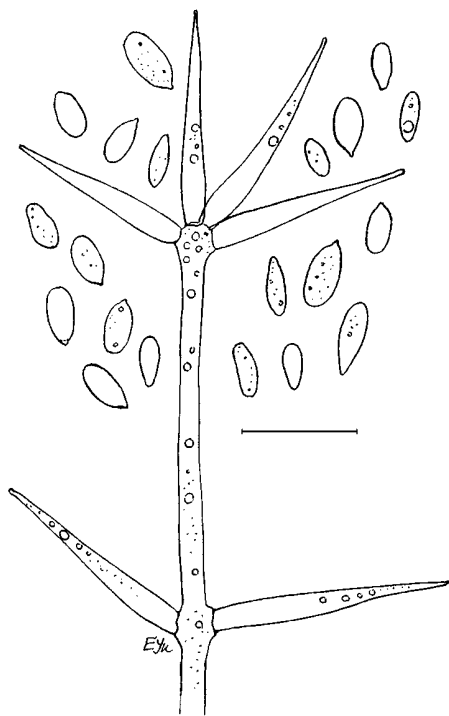


Fig. 4. The anamorph of *Hypomyces rosellus* (*Cladobotryum dendroides*): a – conidiophores and conidia (MSK 6814); b – conidiophore branch with three conidia (MSK 8523); c – conidia (MSK 8481). Scale =  $10 \mu\text{m}$ .

Conidia distinctly or indistinctly 1–3 septate, sometimes 1-celled, subcylindrical, ellipsoid, rarely elongate ovoid,  $15.5\text{--}34.5 \times 6.5\text{--}11 \mu\text{m}$ . The main diagnostic character of this species is mainly 4-celled conidia, developing in clusters on proliferating tips of conidiogoneous cells.

**8. *Hypomyces tremellicola* (Ellis & Everh.) Rogerson** [syn. *Nectriopsis tremellicola* (Ellis & Everh.) W. Gams], anamorph ***Verticillium* sp.** (Fig. 5). Isolated from *Crepidotus* sp. fructification, 4, GA (A04.121; dup.: MSK 8514).



The specimen matches well the description of the anamorph of *H. tremellicola* in conidiophores' morphology, but differs in conidial size:  $4\text{--}6 \times 1.5\text{--}2.8\text{--}(3.6) \mu\text{m}$  versus  $5\text{--}9 \times 3\text{--}5 \mu\text{m}$  in Rogerson & Samuels (1994),  $4\text{--}12 \times 2\text{--}5 \mu\text{m}$  in Pöldmaa et al. (n.d.). Conidia have clear basal hilum according to our data and Rogerson & Samuels (1994), but are hilum-less according to Pöldmaa et al. (n.d.).

Fig. 5. The anamorph of *Hypomyces tremellicola* (*Verticillium* sp.) from culture (MSK 8514): conidiophore and conidia. Scale =  $10 \mu\text{m}$ .

**9. *Hypomyces* sp.**, anamorph ***Sepedonium chrysospermum* (Bull.) Link s. l.** On *Xerocomus* sp., 2, GA (A04/133; dup.: MSK 8503); on decaying *Xerocomus* sp., 2, GA, EYu (MSK 6804). On strongly destroyed cf. *Xerocomus*, 4, EYu, GA (MSK 6805). On *Xerocomus* cf. *rubellus* (Krombh.) Quél., 5, GA, EYu (MSK 6434). On *Paxillus involutus* (Batsch) Fr., 2, GA (A04/132; dup.: MSK 8512). On *Paxillus involutus*, 3, GA (A04/150; dup.: MSK 8479).

This collective taxon includes *Hypomyces chrysospermus* Tul. & C. Tul. (anamorph *Sepedonium chrysospermum* (Bull.) Fr., inhabiting *Xerocomus*, *Paxillus*, and other Boletales) and *H. microspermus* Rogerson & Samuels (anamorph *S. microspermum* Besl, inhabiting the members of *Xerocomus chrysenteron*-group).

Aleuriospores subhyaline, pale yellow to citron yellow when immature, golden yellow when mature, globose or broadly ellipsoid, occasionally pyriform,  $8.2\text{--}16.8 \times 8.2\text{--}15 \mu\text{m}$ , with prominent warts – short-cylindrical at first, then semiglobose. In the specimen MSK 6804 kept in wet and cool chamber over 22 days aleuriospores are extremely abundant and pigmented brownish golden yellow. Conidia observed in culture (A04/132, A04/150) ovoid, elongate ellipsoid, subcylindrical, clavate, hya-

line,  $5.8\text{--}13(-16) \times 2.5\text{--}7 \mu\text{m}$ , with basal hilum, either base rounded or slightly truncate in clavate conidia. Conidia are hilum-less according to Rogerson & Samuels (1989: 427), Pöldmaa et al. (n.d.). Our collections have aleuriospore size in culture and on natural substrata, as well as conidia size in culture, fitting to the range of *S. microspermum* (aleuriospores  $12\text{--}15 \mu\text{m}$  diam sec. Rogerson & Samuels, 1989; aleuriospores  $(8.5\text{--})10\text{--}15 \mu\text{m}$  diam, conidia  $(5\text{--})9\text{--}14(-17) \times 3\text{--}5(-7) \mu\text{m}$  sec. Pöldmaa et al., n.d.), but the distinguishing of the two species based on anamorph characters alone needs further research.

#### 10. *Ophiostoma polyporicola* Constant. & Ryman

(Fig. 6). Isolated from collection material of *Hypocrea pulvinata* growing on *Fomitopsis pinicola*, 4, GA (A04/123.1; dup.: MSK 8477).

The fungus produced numerous perithecia in culture. This specimen fits the description of *O. polyporicola* (Constantinescu & Ryman, 1989) according to its typical host (*Fomitopsis pinicola*), basal diameter of perithecia, neck thickness, and ascospore shape, but differs by longer perithecia necks,  $1.7\text{--}3.8 \text{ mm}$ , and smaller ascospores,  $2.2 \times 1 \mu\text{m}$  (necks are  $0.75\text{--}2.25 \text{ mm}$  and ascospores  $3\text{--}3.5 \times 1\text{--}1.3 \mu\text{m}$  according to Constantinescu and Ryman).

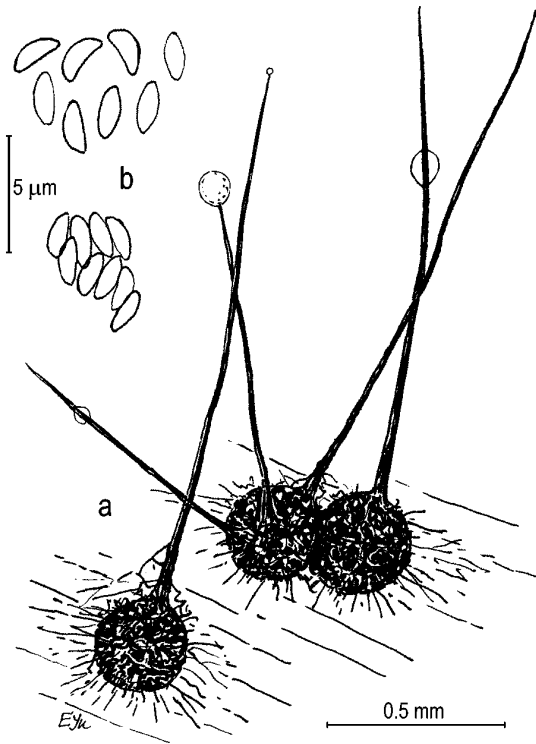


Fig. 6. *Ophiostoma polyporicola* from culture (MSK 8477): a – perithecia, two with single neck, one with three necks; necks with slimy drops containing ascospores; b – ascospores.

**11. *Sporophagomyces chrysostomus* (Berk. & Broome) K. Pöldmaa & Samuels** [syn. *Hypomyces chrysostomus* Berk. & Broome], anamorph ***Acremonium lindtneri* (Kirschst.) Samuels & Rogerson** [syn. *Moeszia lindtneri* (Kirschst.) G.R.W. Arnold]. The fungus was collected in all cases on spore mass on hymenophoral side of basidiomata of *Ganoderma applanatum*: 2, GA (A04/143; dup.: MSK 8487); 2, GA, EYu (MSK 6807); 5, GA, EYu (MSK 6813).



The culture A04/143 has small, mostly aseptate conidia  $10\text{--}12 \times 1.8\text{--}2.5 \mu\text{m}$  [versus  $9.5\text{--}27.5 \times 2\text{--}5 \mu\text{m}$ , (0)1(–3)-septate according to the description in Rogerson & Samuels (1993);  $10\text{--}19 \times 3 \mu\text{m}$ , 1–3-septate in Arnold (1971)]. In specimen MSK 6807 conidia are mostly 1-septate,  $7.2\text{--}14 \times 2.2\text{--}3.2 \mu\text{m}$ .

### Anamorphic fungi with unknown teleomorph

**12. *Acremonium bactrocephalum* W. Gams** (Fig. 7). Isolated from *Lactarius torminosus* (Schaeff.) Gray fruitbody, 2, GA (A04/140; dup.: MSK 8485).

Mat of 18-day culture *ca* 5 cm in diam, white with very weak pinkish ochraceous hue, tender, rather low, subfelty. Hyphae hyaline,  $0.8\text{--}2.1 \mu\text{m}$  wide. Phialides simple, occasionally branched, hyaline,  $23\text{--}25 \mu\text{m}$  long,  $1.5\text{--}1.7 \mu\text{m}$  wide at base. Conidia hyaline, mostly spindle-shaped,  $4.1\text{--}5.2 \times 0.6\text{--}1.6 \mu\text{m}$ ; occasional conidia ellipsoid or pyriform, from  $2.7 \mu\text{m}$  long and up to  $1.6 \mu\text{m}$  wide. The specimen matches well to the description of *A. bactrocephalum*, having white or pinkish mycelium, phialides  $20\text{--}45 \times 1.5\text{--}1.7 \mu\text{m}$ , rod-shaped or elongated spindle-shaped conidia  $2.5\text{--}6 \times 0.6\text{--}1.5 \mu\text{m}$  (Rudakov, 1981).

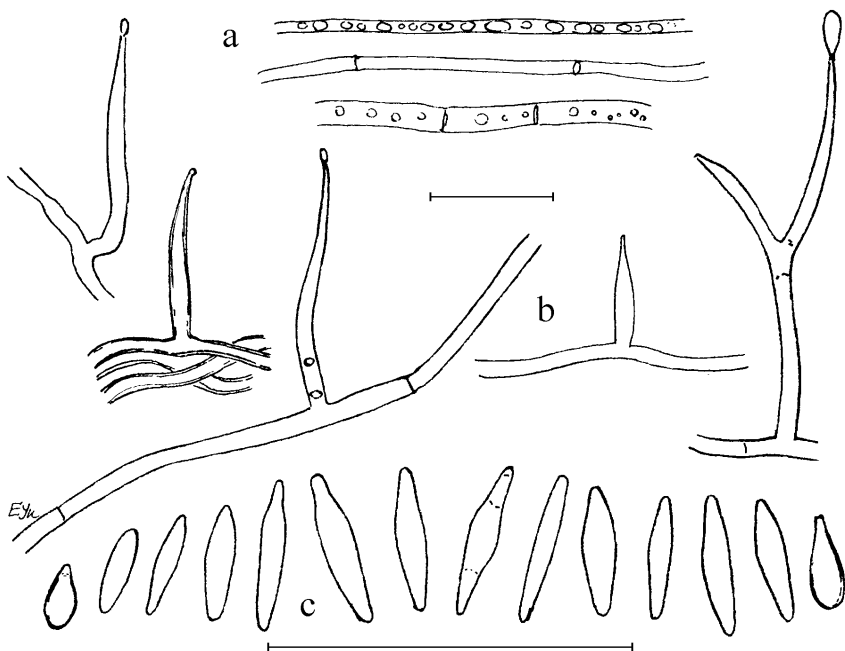


Fig. 7. *Acremonium bactrocephalum* from culture (MSK 8485): a – hyphae, b – conidiophores, c – conidia. Scale =  $10 \mu\text{m}$ .

**13. *Aphanocladium album* (Preuss) W. Gams** (Fig. 8). Isolated from *Ganoderma applanatum* (Pers.) Pat. fruitbody, 2, GA (A04/143.4; dup.: MSK 8483a, 8483b).

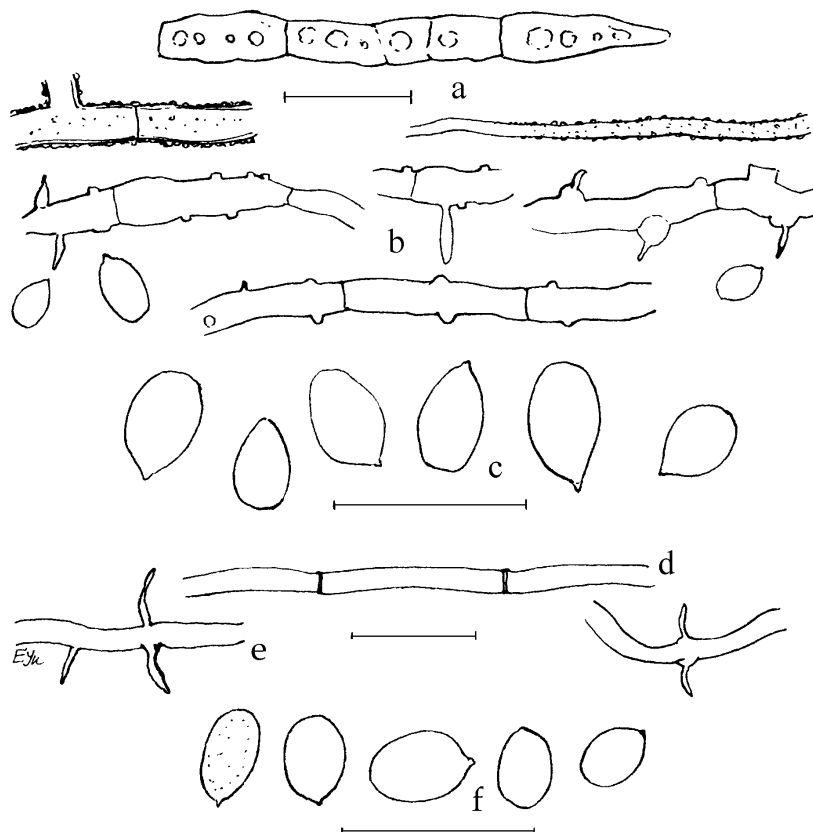


Fig. 8. *Aphanocladium album* from culture. MSK 8483b: a – smooth and encrusted hyphae, b – hyphae with conidiogenous cells, c – conidia. MSK 8483a: d – hypha, e – hyphae with conidiogenous cells, f – conidia. Scales = 10  $\mu$ m.

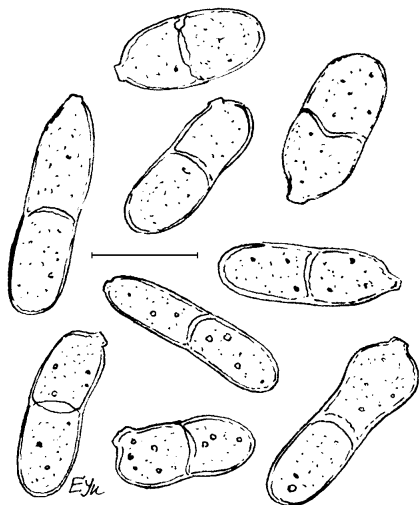
Mat white with weak cream hue, slender, subfelty. Hyphae 0.8–3(–4)  $\mu$ m wide, hyaline or pale colored, smooth or rough. Phialides single or verticillately arranged in pairs, ca 4.5  $\times$  1.8  $\mu$ m when not collapsed. Conidia ovoid, obovoid or ellipsoid, (3.2–)3.7–5(–6.7)  $\times$  2.7–3.8(–4.5)  $\mu$ m, hyaline or very pale colored, apical part of conidium rounded or slightly flattened. The specimen fits to the generic concept of *Aphanocladium* due to short, slender, reduced phialides arranged along hyphal walls, and collapsing later, except of swollen knob at base (Carmichael et al., 1980: 258; Sutton et al., 2001: 36). Numerous knobs give denticulate appearance to the hyphae. The morphological concept of *A. album* is not clear. Conidia are ovoid, 3–4  $\times$  2–3  $\mu$ m, phialides 4–12  $\times$  1.5–2  $\mu$ m fide Yegorova (1986). Fide Sutton et al. (2001) conidia are ovoid, 3–6  $\times$  2–2.5  $\mu$ m. Chen et al. (1999) described globose to ellipsoid conidia 2.8–5.5  $\times$  1.7–3.7  $\mu$ m. *Aphanocladium album* was reported parasiti-

tizing *Agaricus bisporus* (J.E. Lange) Pilát (Chen et al., 1999), *Plasmopara viticola* (Berk. & M.A. Curtis) Berl. & De Toni (Mitov & Ibrakhim, 1977 – see Rudakov, 1981), rust fungi (Biali et al., 1972 – see Rudakov, 1981). It also occurs in soils (Yegorova, 1986).

**14. *Botrytis cinerea* Pers.** Isolated from agaricoid fungus, 3, GA (A04/147; dup.: MSK 8491).

**15. *Calcarisporium arbuscula* Preuss;** on *Xerocomus* sp., 1, GA (A04/109.1; dup.: MSK 8524). On *Cortinarius* sp., 2, GA (A04/114; dup.: MSK 8508); on *Cortinarius* sp., 2, GA (A04/127; dup.: MSK 8511); on *Lactarius vellereus* (Fr.) Fr., 2, GA (A04/128; dup.: MSK 8526); on *Lactarius helvus*, 2, GA (A04/139; dup.: MSK 8495). On *Bankera fuligineoalba* (J.C. Schmidt) Coker & Beers, 3, GA (A04/115\* – dup.: MSK 8516; A04/115 – dup.: MSK 8476); on *Dermocybe* sp., 3, GA (A04/145; dup.: MSK 8484, 8501); on *Cortinarius* sp., 3, GA (A04/148; dup.: MSK 8500); on *Lactarius* sp., 3, GA (A01/149; dup.: MSK 8521); on old *Lactarius* or *Russula*, 3, GA (A04/154.1; dup.: MSK 8476), on decaying agaricoid fungus, 3, EYu, GA (MSK 6809), on decaying *Boletus edulis* Bull. upper cap surface, 3, EYu, GA (MSK 6555). On *Inocybe* sp., 4, GA (A04/120; dup.: MSK 8525).

Evidently it is a most common agaricolous and boleticulous hyphomycete, together with *Cladosporium macrocarpum*. Conidia in this species were described and illustrated as obovoid, drop-shaped, narrowly ellipsoid, ca 6–9 × 2–3.5 µm (de Hoog, 1974), 4–6 × 1.5–2 µm (Ellis & Ellis, 1985), 4.5 × 1.5 µm (Cooper, 2005), borne on denticles arranged in arm-like pattern at the tips of conidiophore branches. In our specimens conidia are from narrowly ellipsoid to clavate and slightly constricted, and bigger. In culture (MSK 8501, 8525) they measure (3.5–)4–12(–13.5) × 1.2–3(–5.7) µm. On natural substratum (MSK 6555) conidia are 5.5–13(–16) × (1.3–)1.7–3(–4.2) µm, and conidiophores frequently with poorly-denticulated tips, bearing 2–3 denticles.



**16. *Cladobotryum* sp. 1** (Fig. 9).

On *Russula* or *Lactarius*, 3, GA (A04/116(1), dup.: MSK 8517a; A04/116(2), dup.: MSK 8517b).

Cultural mycelium abundant, white, not staining agar in red. Conidia 2-celled (occasionally 3-celled), mostly elongate ellipsoid to cylindrical, but also ovoid, ellipsoid, elongate pyriform, many conidia slightly constricted at septa, (13–)18.5–19.5(–23) × 6.2–7.5 µm. This *Cladobotryum* species clearly differs from other cladobotryums described here by rather narrow conidia with the tendency to be cylindrical and slightly constricted.

Fig. 9. *Cladobotryum* sp. 1 from culture (MSK 8517b): conidia. Scale = 10 µm.

**17. *Cladobotryum* sp. 2** (Fig. 10). On decaying *Entoloma* sp. lamellae, 5, EYu, GA (MSK 6817).

Conidiophores 8.5–9.5  $\mu\text{m}$  wide. Young phialides stout, almost conical, 32–52  $\times$  (3.5–)6–8  $\mu\text{m}$ , arranged verticillately in 2–3 or solitary. Conidia 0–1-septate, ellipsoid to cylindrical, obovoid and pyriform, hyaline, large, 18–35(–38)  $\times$  9.5–16. The material resembles the anamorph of *Hypomyces odoratus*, but have quite larger conidia and of irregular shape.

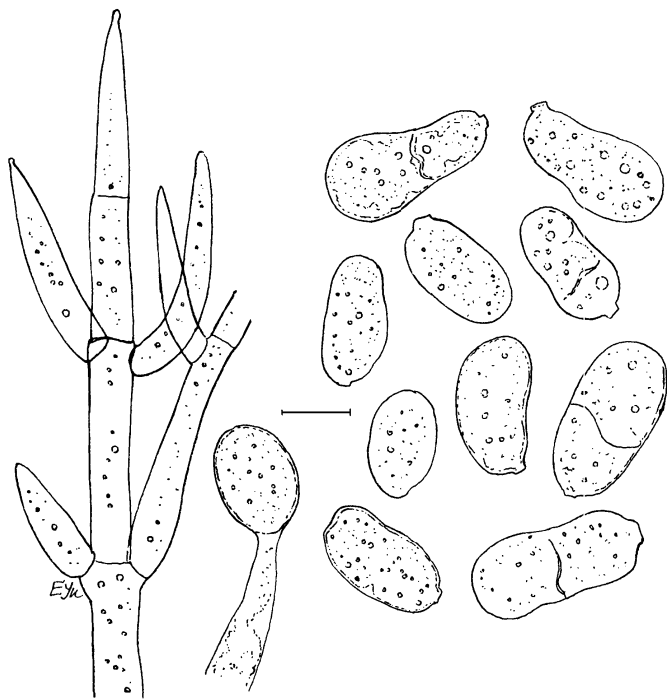


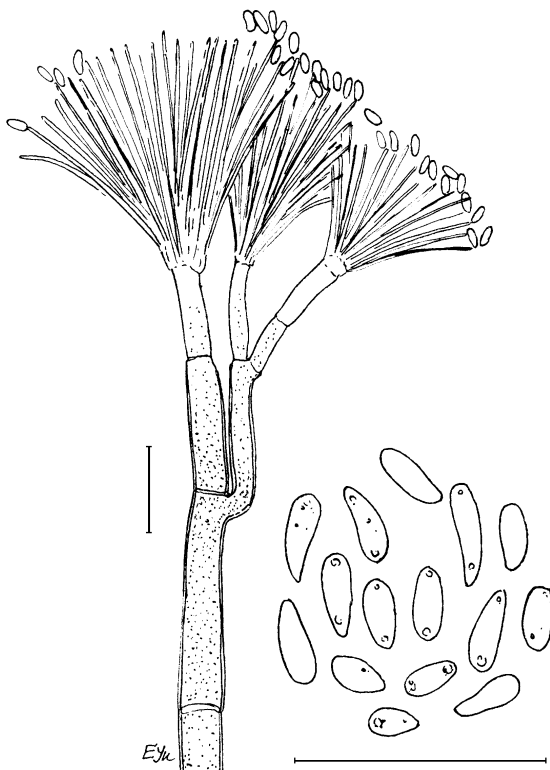
Fig. 10. *Cladobotryum* sp. 2 (MSK 6817): conidiophores and conidia. Scale = 10  $\mu\text{m}$ .

**18. *Cladosporium macrocarpum* Preuss.** [syn. *C. herbarum* (Pers.) Link var. *macrocarpum* (Preuss) M.H.-M. Ho & Dugan]. On the upper cap surface of decayed agaricoid fungus, 3, EYu, GA (MSK 6809, 6815). On cap of strongly decayed *Xerocomus* sp., 5, GA, EYu (MSK 6872).

The fungus occurs as numerous olivaceous pillows 0.5–1.5 mm in diam. MSK 6815 has short conidiophores (55–100  $\mu\text{m}$ ) without pronounced nodose swellings, typical to *C. herbarum* group.

**19. *Leptographium abietinum* (Peck) M.J. Wingf.** [syn. *Verticicladiella abietina* (Peck) S. Hughes] (Fig. 11). Isolated from *Fomitopsis pinicola* hymenophoral side and associated with *Hypocrea pulvinata*, 4, GA (A04/123.11; dup.: MSK 8473).

Conidia in our specimen are mostly subcylindrical or subclavate, straight, 1.6–



3.7(–5) × 0.8–1(–1.2) μm, some portion of conidia clavate, sometimes slightly curved, conidiogamous cells 16.5–19 × 0.8–1 μm. According to Ellis (1971: 367) conidia in *V. abietina* are mostly clavate and usually curved, 2.5–5 × 1–1.7 μm, conidiogamous cells 8–25 × 1–1.5 μm. By conidia shape the specimen is close to *Leptographium procerum* (W.B. Kendr.) M.J. Wingf. (*V. procera* W.B. Kendr.), having straight conidia ca 3.3–4 × 1.5–2 μm (Salonen & Ruokola, 1991). The species is known as *Picea* wood inhabitant (Ellis, 1971).

Fig. 11. *Leptographium abietinum* from culture (MSK 8473): conidiophore and conidia. Scales = 10 μm.

**20. *Mycogone rosea* Link** (Fig. 12, a–c). On *Amanita vaginata* (Bull.) Lam., 4, GA (A04/117; dup.: MSK 8522); on soil and litter, 4, GA, EYu (MSK 6810).

Cultural mat ochraceous. Hyphae 1.3–7 μm wide. Aleuriospores yellow with pinkish tint in MSK 6810, yellow with weak pinkish tint or pale yellow in culture (MSK 8522), pinkish ochraceous in mass, 23–34(–37) μm long, 24.5–37.5 μm wide, covered by warts 0.8–2.5 μm diam and 0.8–1.6 μm high; basal cell ellipsoid, 11–17 μm long, 16–25 μm wide.

Our specimens have bigger aleuriospores, than described for *M. rosea* by Gray & Morgan-Jones (1980; upper cell 20–28 μm wide), but fit to the description in Rudakov (1981: 115; upper cell 25–35 μm in size). The data on conidial morphology in this species are not completely clear. In MSK 6810 on natural substratum there are rare subcylindrical, 1–2-celled, hyaline conidia 20–23 × 4.5–5 μm. In culture (A04/117) conidia are scattered, 1-celled, obovoid, ovoid, spindle-shaped, navicular, ellipsoid, hyaline or subhyaline, 8.2–15.5 × 3.2–5.8 μm. According to Gray & Morgan-Jones (1980) conidia are oblong to cylindrical, 0(1–2)-septate, 10–15 × 3–4 μm. According to Rudakov (1981) conidia are elongated or almost pyriform, 7–30 × 3.5–7 μm.

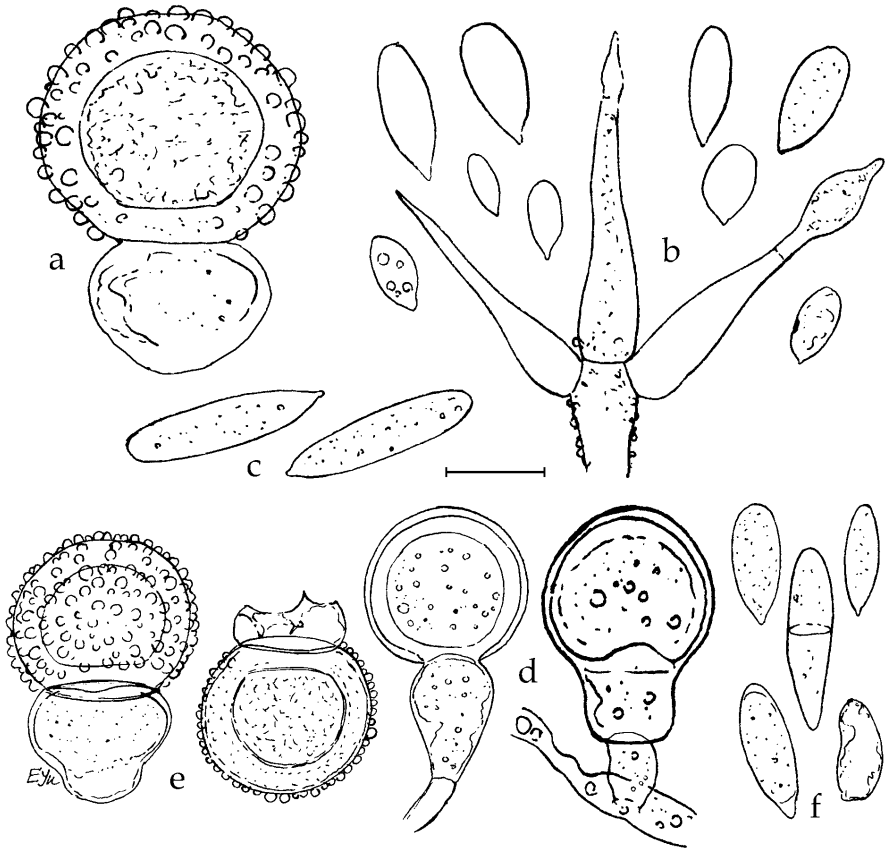


Fig. 12. *Mycogone rosea* and *Mycogone* sp. from culture. *Mycogone rosea*: a – aleuriospore (MSK 8522), b – conidiophore and conidia (MSK 8522), c – conidia (MSK 6810). *Mycogone* sp. (MSK 8489b): d – immature aleuriospores, e – mature aleuriospores, f – conidia. Scale = 10  $\mu$ m.

**21. *Mycogone* sp.** (Fig. 12, d–f). On *Macrolepiota procera* (Scop.) Singer, 5, GA (A04/108; dup.: MSK 8489a, 8489b).

Cultural mat pale ochraceous. Hyphae 2–7  $\mu$ m wide. Aleuriospores pale yellow to yellow with brownish hue, 12.5–21.5  $\mu$ m long, 15.5–26  $\mu$ m wide, covered by warts 0.5–1.7  $\mu$ m in diam and 0.8–1.5  $\mu$ m high; basal cell ellipsoid or pyriform, 9.5–14  $\mu$ m long, 16–18.5  $\mu$ m wide. Conidia spindle-shaped, 1- or 2-celled, slightly constricted at septa, subhyaline, 10–16.5  $\times$  4–5(–7)  $\mu$ m. The specimen differs from *Mycogone rosea* in smaller aleuriospores and also in shape of basal cell, which rather frequently has slightly pyriform outline. It is morphologically close to *M. perniciosus*, a parasite of *Agaricus* and *Pluteus*, having aleuriospores 20–23  $\mu$ m diam (Ellis & Ellis, 1998), but differs in pigmented aleuriospores and wider hyphae.

**22. *Thysanophora penicillioides* (Roum.) W.B. Kendr.** Isolated from old *Armillaria* sp. fructifications, 4, GA (A04/122.3; dup.: MSK 8480).

Phialides in the specimen 10–11.2 × 2.7–2.8 µm, collected in clusters in number 3–4; conidia lemon-shaped, clavate, lacrimoid or pyriform, pale brownish, slightly thick-walled, 2.8–5.7 × 2–3.5 µm. The fungus is known from soil (Ellis, 1971) and fallen conifer leaves (Elis & Ellis, 1985).

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