

Corticoid fungi on mosses in Belarus

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The close contact of alive and dead bryophytes with fungal fruitbodies and vegetative mycelium is widespread phenomenon in corticoid fungi

The bryophilous fungi in broad sense are all fungal organisms growing in tight contact with mosses and liverworts (Ainsworth and Bisby's dictionary ..., 1995, p. 66). Since many of corticoid fungi (*Corticaceae* s. l., *Basidiomycetes*) inhabit the same microtopes as epixyloous mosses and develop on decayed wood immersed in moss cover on ground they are expected to be commonly associated with *Bryophyta*. However, such associations are poorly documented. Among few known in literature bryophilous corticoid species are *Sistotrema octosporum* (J. Schröt. ex Höhn. et Litsch.) Hallenb. [= *S. commune* J. Erikss., *Corticium muscicola* Bres.], and *Ramaricium albochraceum* (Bres.) Jülich [= *R. occultum* J. Erikss.] (Eriksson, 1949, 1958; Parmasto, 1965). The first data about corticoid fungi on mosses in Belarus were published in our work (Yurchenko, 1998) where 3 fungal species on 3 species of mosses were reported.

The present work is based on study of corticoid fungi kept in Kuprevich Institute of Experimental Botany Herbarium, Minsk (MSK, Fungi or MSK—F), collected mostly in Byarezinski Biosphere Reserve. The group of fungi under consideration we accept in general as «non-poroid resupinate *Aphylophorales*» following Jülich and Stalpers (1980). The specimens from the reserve were collected near villages Domzharytsy, Kvetcha, Perakhodtsy, Rozhna, and Stvol'na,

all in Lepel' district. The most of fungi were collected in *Pinus sylvestris*-*Pleurozium schreberi* type of forest communities, commonly including also *Vaccinium myrtillus*, *V. vitis-idaea*, and young *Picea abies* (Pinetum pleuroziosum).

The bryophytes nomenclature is following Ignatov and Afonina (1991); authorship formulation is given where the first mention of species in the list. Many of fungi described below come on bryophyte organs from dead wood and bark, or forest litter as main nutritive substrata. In such cases after the moss name the lignous plant name or «litter» are added in brackets. Besides the host data, the geographical locality (district of Belarus, settlement), biocoenosis name, date of collection, and herbarium number of the specimen are given. The species are accompanied by descriptions of their morphological peculiarities. The new for Belarus territory species are marked by asterisk (*).

The list of corticioid fungi on mosses in Belarus

1. *Amphinema byssoides* (Pers.: Fr.) J. Erikss., Symb. Bot. Upsal. **16** (1): 113, 1958.

Basidioma cream to brownish yellow, porulose-reticulate; margin loose, whitish or cream, consisting of raised or appressed mycelium; hyphae hyaline to yellowish, sometimes with brownish tint, straight, sometimes more or less sinuous, with both simple and clamped septa, 1.7–4 (5.5) μm wide, smooth or encrusted by minute grains, especially in sterile strands; hyphal wall slightly thickened; cystidia 42–45 \times (2.5) 3.5–4 μm , subulate, cylindrical, subfusiform, smooth or rough, subhyaline to yellowish, with simple and clamped septa; basidia ca. 16 \times 5 μm ; spores 3–3.7 \times 2–2.5 μm , yellowish, with thin to slightly thickened wall, with an oil drop.

Specimens examined: Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on dead *Hylocomium splendens* (Hedw.) Schimp., 4 VI 1999 (MSK 4708). — Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on dead organs of *Pleurozium schreberi* (Brid.) Mitt. (*Pinus sylvestris* L.), 28 V 1997 (MSK 4208). — Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on dead organs of *P. schreberi* (*P. sylvestris*), 11 VII 1998 (MSK 4459). — Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on dead organs of *P. schreberi* (*P. sylvestris*), 3 VI 1999 (MSK 4752). — Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on dead and alive organs of *P. schreberi* (*P. sylvestris*), 3 VI 1999 (MSK 4926). — Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on dead and alive organs of *P. schreberi* and *Ptilium crista-castrensis* (Hedw.) De Not. (litter), 14 XI 1997 (MSK 4284).

Sterile mycelium of the fungus is common component of moss phylloplane, especially on lower parts of plants. Hymenium was found on dead organs of *Pleurozium* and *Ptilium*.

2. *Athelia arachnoidea* (Berk.) Jülich, Willdenowia, Beih. 7: 53, 1972. — Fig. 1, 2.

Sterile or basal hyphae 3.2–6 μm wide, straight, smooth or encrusted; occasional basidia (immature and mature) ca. 17–20 \times 5 μm , at the base with simple septum; sclerotia composed of short swollen yellowish cells 6–16 \times 5–8.5 μm .

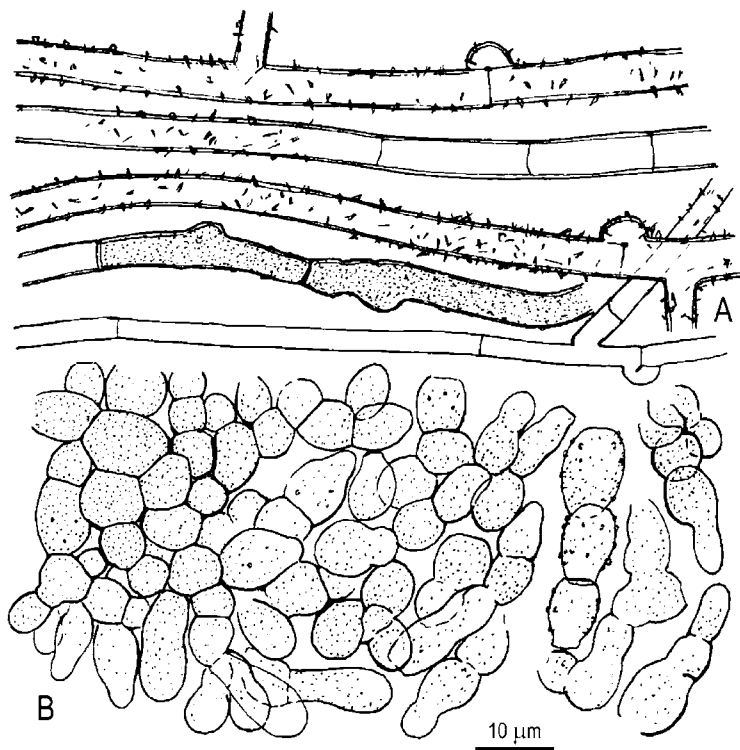


Fig. 1. *Athelia arachnoidea* (Berk.) Jülich (MSK 5382): A — sterile hyphae from *Pylaisiella polyantha*, B — cells of sclerotia from bark and lichen thalli.

Specimens examined: Minsk, on alive, rarely dead *Orthotrichum* sp. (over trunk of *Populus* \times *canadensis* Moench), 13 XII 2000 (MSK 5744). — Minsk, Drazdy, on alive *Orthotrichum* sp., alive and dying *Pylaisiella polyantha* (Hedw.) Grout (*P.* \times *canadensis*), 11 XII 2000 (MSK 5750). — Minsk district, Budzyonnaha, road plantation, on alive and dying *Orthotrichum speciosum* Nees, alive, dying, and dead *P. polyantha* (*P. x canadensis*), 18 III 2001 (MSK 5766). — Hrodna district, Yatvez', on alive and dying *P. polyantha* (*Malus domestica* Borkh.), 27 VIII 1995 (MSK 5382).

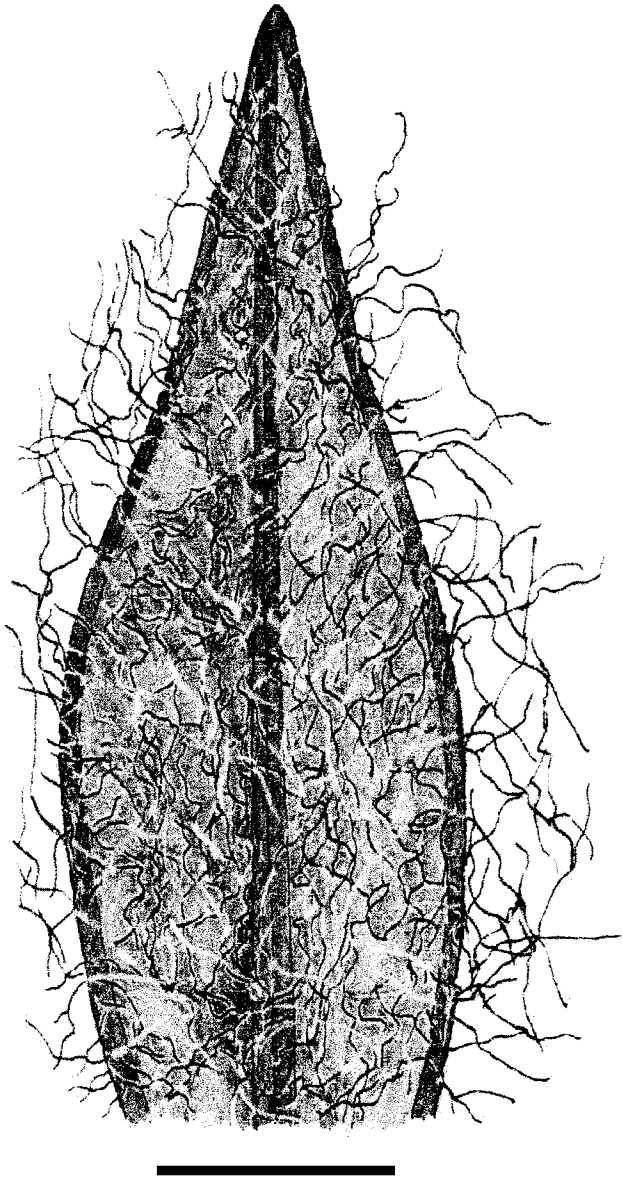


Fig. 2. *Athelia arachnoidea* (Berk.) Jülich (MSK 5744): hyphae on an alive leaf of *Orthotrichum* sp.; bar = 0.25 mm.

The fungus inhabits epiphytic mosses mostly on bark of old alive *Populus*, 0.1–2 m above the ground, and develops commonly in cold and moist period, in parks, gardens, road and street plantations. Commonly the fungus grows as necrotroph and forms lesions in moss cover on the bark. Sclerotia in moss phylloplane were not found, but were present on bark and lichen thalli (MSK 5382).

3. *A. epiphylla* Pers.: Fr., Elench.: 226, 1828; Pers., Mycol. Eur. 1: 84, 1822 s. ampl. — Fig. 3, 4.

Two specimens having basidia and basidiospores fit into the species concept of *A. epiphylla* s. str. (Jülich, 1984).

Basidioma pure white, in MSK 4713 loose, ca. 0.4–2 × 0.25–1.5 mm; basal hyphae 3–5 μm wide, branched commonly at right angle, with thin or thickened wall; subbasidial hyphae 2.7–3.5 μm wide; clamps scattered on basal hyphae; in MSK 4713 clamps rare and weakly pronounced (weakly bulged); basidia 13.5–22.5 × 3.5–6 μm, with 2–4 sterigmata; sterigmata 3.7–5 × 0.8–1 μm; spores (3.5) 4–5.5 (6.7) × (2.3) 2.5–3.3 (4.5) μm, hyaline or seemingly greenish.

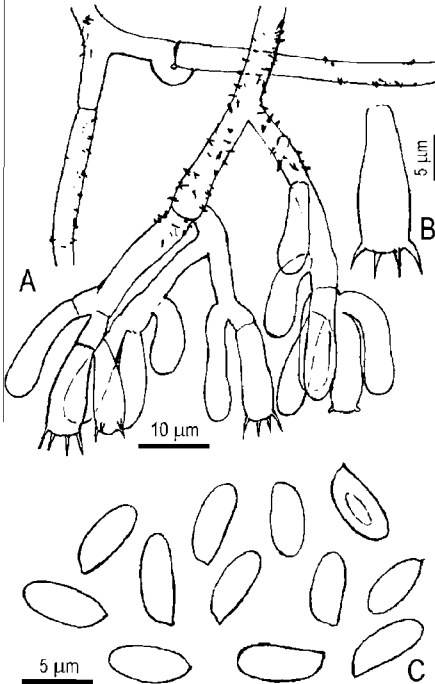


Fig. 3. *Athelia epiphylla* Pers.: Fr.

(MSK 5737): A — fragment of hymenium and subhymenium, B — basidium, C — spores.

Specimens examined: Minsk district, Kryzhouka, *Picea abies*—moss forest, on alive *Plagiomnium ellipticum* (Brid.) T. Kop. (*Quercus robur* L.), 29 X 2000 (MSK 5737). — Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on alive *Ptilium crista-castrensis*, 4 VI 1999 (MSK 4713).

In a number of specimens only sterile hyphae belonging to *A. epiphylla* complex were observed:

Hyphae with clamped and simple septa, smooth or with scattered incrustation, mainly straight, hyaline or subhyaline, 3–5 μm wide, walls ca. 0.7–1.2 μm thick, clamps of right rounded shape, seemingly with a small central hole.

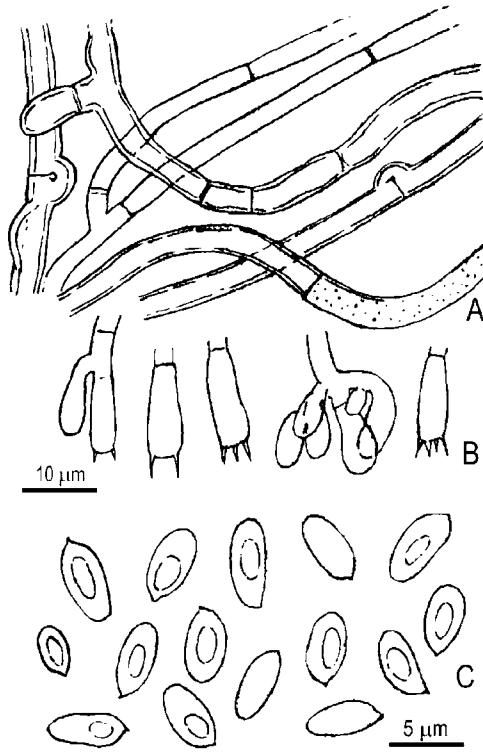


Fig. 4. *Athelia epiphylla* Pers.: Fr. from *Ptillum crista-castrensis* (MSK 4713): A — subcicular hyphae, B — basidia and basidioles, C — spores.

Specimens examined: Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on alive *Hylocomium splendens*, 4 VI 1999 (MSK 4708). — Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on alive *Pleurozium schreberi*, 28 V 1997 (MSK 4080). — Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on dead and alive organs of *P. schreberi*, 28 V 1997 (MSK 4208). — Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on dead and alive organs of *P. schreberi*, 11 VII 1998 (MSK 4488).

4. *A. aff. ovata* Jülich, Willdenowia Beih. 7: 106, 1972. — Fig. 5.

Fungus appears as loose, not continuous, pure white basidiomata ca. 0.2–1.5 × 0.1–0.8 mm on alive moss organs; basal hyphae 3.3–6 (6.5) μm wide, with scattered clamps, hyaline or yellowish, wall thin to thickened; subhymenial hyphae 2–3 μm wide, clampless; basidia 12.5–22 × (3.5) 4–5.5 (6) μm , with 2–4 sterigmata; spores 5–6 (6.7) × (2.3) 3–3.5 (3.7) μm , with pointed apiculus.

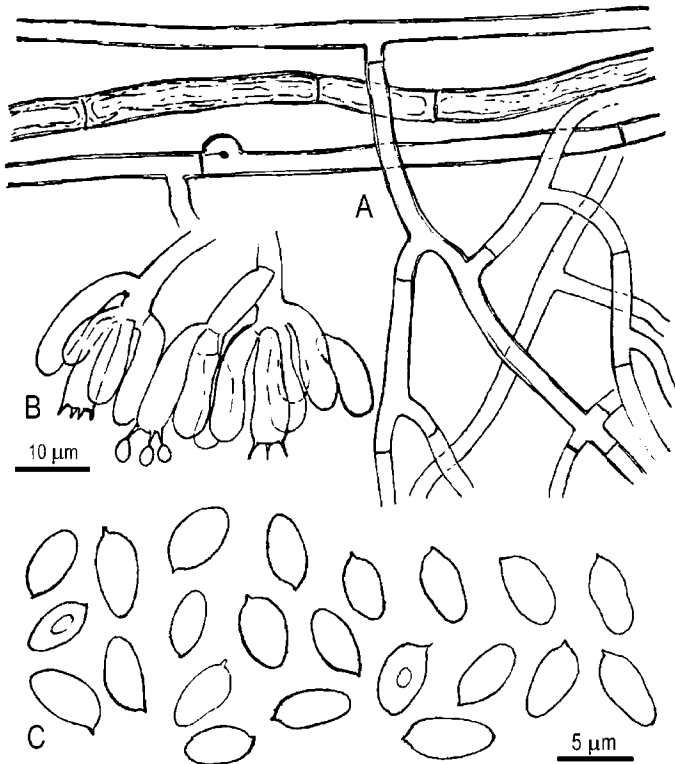


Fig. 5. *Athelia aff. ovata* Jülich from *Hylocomium splendens* and *Pleurozium schreberi* (MSK 4051): A — subicular and subhymenial hyphae, B — fragment of hymenium, C — spores.

Specimen examined: MSK 4051, on *Hylocomium splendens* and *Pleurozium schreberi*, (Yurchenko, 1998).

The specimen has smaller spores and narrower basidia than *A. ovata* in Jülich (1984).

5. Botryobasidium subcoronatum (Höhn. et Litsch.) Donk, Medd. Ned. Mycol. Ver. **18–20**: 117, 1931.

Basidioma hypochnoid or pellicular, white to cream; basal hyphae hyaline thin-walled to yellow and with wall up to 2.5 μm , clamped, branched mostly at right angle; subbasidial hyphae 5–6.3 μm wide; basidia suburniform, ca. 12–13 \times 6–6.7 μm ; spores navicular, 6 \times 2.5–3.3 μm .

Specimen examined: Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on dead *Pleurozium schreberi* (*Pinus sylvestris*), 10 VI 2000 (MSK 5106).

6. Botryohyphchnus isabellinus (Fr.: Fr.) J. Erikss., Svensk Bot. Tidskr. **52** (1): 2, 1958.

Basidioma isabelline or avellaneous, hypochnoid; margin distinct or indistinct; hyphae hyaline or subhyaline, 7–12.5 (14) μm wide; basidioles ca. 22 \times 11–13 μm , short-clavate; spores globose, subglobose, with prominent apiculus, subhyaline to yellowish-brownish, echinulate (echinuli 1.3–2.3 μm long), of variable size, 6–10.5 μm diam, sometimes with a drop.

Specimen examined: Byarezinski Biosphere Reserve, *Picea abies*–*Populus tremula*–*Vaccinium myrtillus* forest, on alive *Brachythecium* sp. (dead basidioma of *Phellinus robustus*), 10 VI 2000 (MSK 5661).

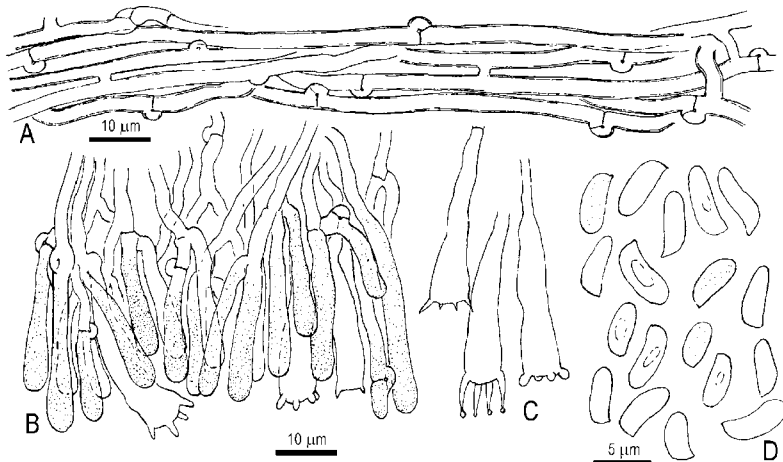


Fig. 6. *Ceraceomyces borealis* (Romell) J. Erikss. et Ryvarden (MSK 4756): A — subicular hyphae, B — fragment of the hymenium, C — basidia, D — spores.

7. *Ceraceomyces borealis* (Romell) J. Erikss. et Ryvardeen, Cort. N. Eur. 2: 205, 1973. — Fig. 6.

Basidioma pellicular, hymenial surface cream or brownish; margin white, mould-like; subicular hyphae 2.5–3 μm wide; basidia clavate, stalked, 28–32 \times 5.5–6.3 μm ; spores cylindrical, allantoid or navicular, (4.5) 5–6.5 \times 2–2.5 (2.7) μm , with moderately thin wall.

Specimen examined: Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on dead organs of *Pleurozium schreberi* (*Betula pendula* Roth), 3 VI 1999 (MSK 4756).

8. *C. microsporus* K.H. Larss. in K.H. Larss. et E. Larsson, Folia Cryptog. Estonica 33: 75, 1998.

Hymenial surface even to minutely meruloid, cream-coloured, avellaneous or light ochraceous; margin white, mould-like; subicular hyphae 2.5–5 μm wide, clamped, smooth or loosely encrusted, hyaline to yellowish, most septa clamped; subhymenial hyphae 2–2.5 μm wide, even or sinuous; cystidia-like protruding elements occasional, 30–50 \times 4–5 μm , cylindrical, blunt or acute, smooth or loosely encrusted; basidia narrowly clavate, 19–32 \times 3.3–5 μm , clamped or clampless at base, usually with small guttules; spores ellipsoid or ovate, commonly with an excentric oil drop, 2.5–5.5 \times 1.5–2.2 μm .

Specimens examined: Byarezinski Biosphere Reserve, *Populus tremula*–*Picea abies*–*Milium effusum* forest, on alive *Brachythecium oedipodium* (Mitt.) Jaeg. (unknown tree), 10 VI 2000 (MSK 5614). — Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on alive and dying organs of *Pleurozium schreberi* (*Pinus sylvestris*), 14 XI 1997 (MSK 4368).

9. *Hymenochaete cinnamomea* (Pers.: Fr.) Bres., Atti Imp. Reg. Accad. Rovereto III 3 (1): 110, 1897.

Basidioma brownish yellow or skin brown, effused, margin distinct or hypochnoid; setae 60–230 \times (4) 6–8.5 μm , in mature basidiomata in 1–3 levels; hyphae yellowish to chestnut brown, clampless, 3.0–5.5 μm ; spores cylindrical to allantoid, 6–7 \times 1.7–3 (3.5) μm , with two small polar drops.

Specimens examined: Byarezinski Biosphere Reserve, *Picea abies*–*Populus tremula*–*Oxalis acetosella* forest, on alive and dead organs of *Brachythecium oedipodium* (*Populus tremula* L.), 15 VII 1997 (MSK 4127). — *ibid.*, on alive *Brachythecium* sp. (*P. tremula*), 13 XI 1997 (MSK 4360).

10. *Hyphoderma praetermissum* (P. Karst.) J. Erikss. et Å. Strid in J. Erikss. et Ryvardeen, Cort. N. Eur. 3: 505, 1975.

Basidioma whitish, cream, ceraceous, even; hyphae hyaline, subhyaline, 3–4.5 μm wide; cystidia refractive, fusiform, cylindrical with swollen base, 15–55 \times 10–12 μm ; stephanocysts rare; spores subhyaline, with granular contents or hyaline with a big greenish drop, 8.5–10 \times (3.5) 4–5 μm .

Specimen examined: Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on alive and dying organs of *Pleurozium scheberi* (*Pinus sylvestris*), 3 VI 1999 (MSK 4934).

11. *Hyphodontia aspera* (Fr.) J. Erikss., Symb. Bot. Ups. **16 (1)**: 104, 1958.

Basidioma white to cream, even to odontoid, teeth conical, of not dense arrangement; rounded crystalline concretions abundant in hymenium and subhymenium; hyphae 1.7–5 μm wide; cystidia capitate, with or without resinous halo, subcapitate, cylindrical, moniliform, hypha-like, subulate, sometimes with clamped and simple septa, ca. 30 \times 3.3–5.5 μm , halo 6–8.5 μm wide; basidia 14 \times 3.3 μm ; spores ellipsoid, (3) 3.3–4.3 \times (2.7) 3–3.5 (4) μm , with a big greenish oil drop.

Specimen examined: Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on alive *Brachythecium* sp. (*Pinus sylvestris*), 10 VI 1998 (MSK 4510).

The specimen has atypically small spores. In previous work (Yurchenko, 2000) it was published as *Hyphodontia* aff. *aspera*.

12. *H. barba-jovis* (Bull.: Fr.) J. Erikss., Symb. Bot. Ups. **16 (1)**: 104, 1958.

Basidioma cream colored, hydroid to poroid, teeth 0.5–1.5 mm high, pores 0.1–0.3 mm diam; subiculum thin to 0.8 mm thick, sponge-like; hyphae 2.3–3 μm wide, of *Hyphodontia*-type, with small clamps and moderately thin walls; cystidia tubular, 5.5–6 μm wide, forming central fascicles in teeth, walls even or wavy, thick, tip rounded or slightly capitate; spores 3.5–5.5 \times 3–3.3 μm , commonly with a small drop.

Specimen examined: Byarezinski Biosphere Reserve, *Picea abies*–*Pinus sylvestris*–*Hylocomium splendens* forest, on alive *Pleurozium schreberi* (*Quercus robur*), 4 VI 1999 (MSK 4706).

13. *H. breviseta* (P. Karst.) J. Erikss., Symb. Bot. Ups. **16 (1)**: 104, 1958. — Fig. 7.

Basidioma whitish to cream, in MSK 4922 thin (ca. 0.05–0.1 mm), subarachnoid, even, grandinioid or odontoid, with dense, blunt or acute teeth, continuous or not; subiculum loose; big rounded or angular crystals present on hyphae; hyphae distinct, clamped at most septa, with moderately thin or thickened walls, 1.5–3.3 μm wide, even or swollen in subhymenium; cystidia capitate and hypha-like, blunt or some tapering, even or with constrictions, with or without excrete cap, 2.2–6 μm wide, smooth or encrusted; young stages of capitate cystidia with a constriction present; immersed cystidia with refractive contents (gloeocystidia-like structures) present, difficult to find in many specimens, fusiform or moniliform, 30–50 \times 5–6 μm ; basidia 13–19 \times 5.5 μm ; spores hyaline or subhyaline, (3.3) 4–5 (6.5) \times 2.5–3.3 (3.5) μm , commonly with an oil drop, wall thin or slightly thickened.

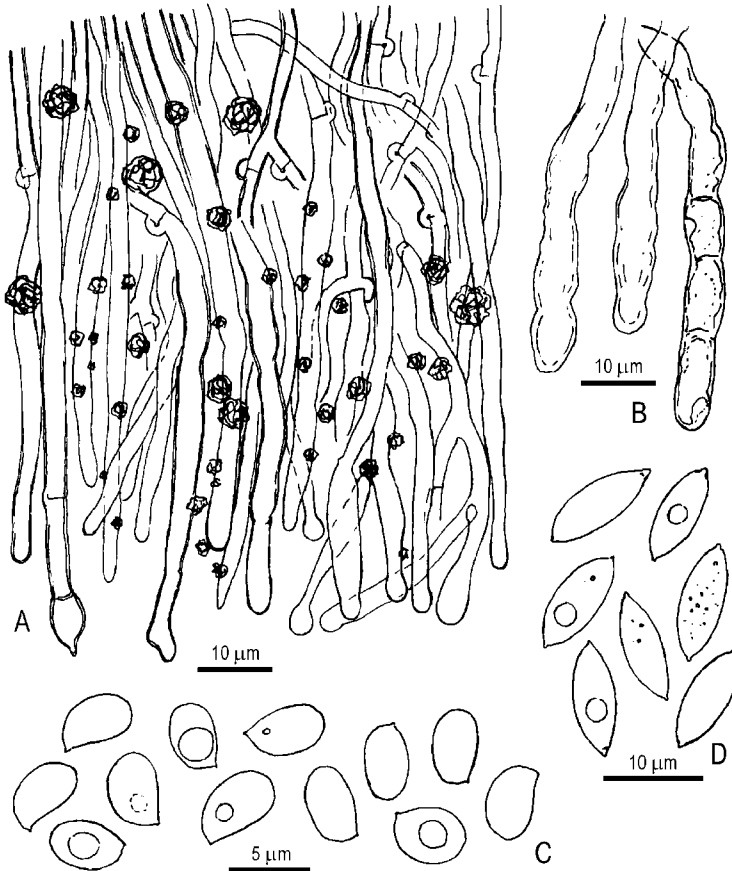


Fig. 7. *Hyphodontia breviseta* (P. Karst.) J. Erikss. (MSK 5105): A — fragment of hymenium and subhymenium with sterile elements only, B — gloeocystidia-like structures; C — basidiospores; D — conidia of *Denticularia limoniformis* de Hoog.

Specimens examined: Byarezinski Biosphere Reserve, Pinetum pleuroziosum, scarcely on alive *Dicranum polysetum* (*Pinus sylvestris*), 11 VII 1998 (MSK 4489). — Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on dead *Pleurozium schreberi*, abundantly (*P. sylvestris* and litter), 3 VI 1999 (MSK 4922). — Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on dead organs of *P. schreberi* (*Pinus sylvestris*), 10 VI 2000 (MSK 5105, 5106).

In MSK 5105 conidia of the anamorph *Denticularia limoniformis* de Hoog are present (fig. 7 D) — hyaline or subhyaline, lentic-like, $6\text{--}12 \times 3.3\text{--}3.7 \mu\text{m}$. Earlier specimens of *H. breviseta* with the anamorph stage

were collected also near the former Pastrezhzhzha village in the reserve, but in 1964 by Emma Komarova (MSK 3876, 3961, 3995, 4000) and in 1969 by Alina Golovko (MSK 3997) — see Yurchenko (1998).

* 14. *H. floccosa* (Bourdot et Galzin) J. Erikss., Symb. Bot. Ups. **16 (1)**: 104, 1958.

Basidiomata not continuous, floccose; aculei short, conical or rounded; hyphae 1.3–2 μm wide, thin-walled; cystidia tubular, terminal or pleural, aseptate or with 1–2 adventitious septa in upper part, 75–145 \times 4.5–6.3 μm (young ca. 60 \times 4.3–4.5), in clusters, with worm-like bases united together mainly in central axis of the aculei, wall up to 1.3 μm thick in basal part of cystidium; spores hyaline, allantoid, (5.5) 6–6.3 \times 0.8–1.2 μm .

Specimen examined: Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on dead and alive organs of *Dicranum polysetum*, on dead *Pleurozium schreberi* (*Pinus sylvestris*), 3 VI 1999 (MSK 4755).

15. *H. pallidula* (Bres.) J. Erikss., Symb. Bot. Ups. **16 (1)**: 104, 1958.

The fungus appears as scarce basidioma and sterile hyphae. Basidioma cream, loose, 0.07–0.1 mm thick (dry state); hyphae distinct, 2.5–3 μm wide, wall moderately thin to thickened; cystidia cylindrical or subcapitate, sometimes subulate, with several constrictions or even, with clamped and simple septa; spores ellipsoid to short cylindrical, 3.5–4 \times 2–3 μm , commonly with a drop, wall thin, sometimes slightly thickened.

Specimen examined: Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on dying *Pleurozium schreberi* (*Pinus sylvestris*), 28 V 1997 (MSK 4080).

16. *H. sambuci* (Pers.: Fr.) J. Erikss., Symb. Bot. Ups. **16 (1)**: 104, 1958.

Basidioma pure white to cream, even or odontoid, aculei blunt, conical; hyphae hyaline, thin-walled, 1.7–3 μm wide; the crystalline material very abundant between hyphae; cystidia capitate, bottle-like, with or without resinous halo, and subcylindrical, 18–50 \times 4–6 μm , smooth or loosely encrusted; basidia 17–25 \times 3.5–6 μm , typically utriform, guttulate; spores of variable size, 3.5–7.5 \times 3.2–4.5 μm , hyaline or subhyaline, with some thickened wall and commonly a big greenish drop in protoplasm.

Specimens examined: Byarezinski Biosphere Reserve, *Betula pendula*–*Alnus glutinosa*–*Thelypteris palustris* forest, on dead organs of *Brachythecium* sp. (*Salix cinerea*), 14 VI 1997 (MSK 4155). — Ushachy district, Dvor Plina, Pinetum pleuroziosum, on alive *Pleurozium schreberi* (*Pinus sylvestris*), 25 IX 1999 (MSK 5553).

17. *Phanerochaete sanguinea* (Fr.: Fr.) Pouzar, *Česká Mykol.* **27 (1)**: 26, 1973.

The fungus commonly appears as sterile white or reddish film 0.03–0.05 mm thick, ochraceous to red hyphal cords (0.03) 0.1–0.3 mm wide, and reddish net of hyphae; hyphae hyaline to yellowish or with red brown inclusions (bubbles or guttules) in cytoplasm, 2.5–6.5 μm wide, with inflations, thin to thick-walled (wall up to 1.7 μm), clampless or with occasional clamp connections (single per septum); hyphae of cords subhyaline to red brown, 3–6 (9.5) μm wide, smooth or with scattered crystals. Well-developed hymenium-bearing structures are not so common event and were not observed on mosses.

Specimens examined: Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on dead organs of *Dicranum polysetum* and *Pleurozium schreberi* (*Pinus sylvestris*), 28 V 1997 (MSK 4052). — Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on dead organs of *P. schreberi* (*P. sylvestris*), 10 VII 1998 (MSK 4469). — Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on dead organs of *P. schreberi* (*P. sylvestris*), 11 VII 1998 (MSK 4459). — Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on alive *Ptilium crista-castrensis* (*P. sylvestris*), 14 XI 1997 (MSK 4292).

18. *Ph. sordida* (P. Karst.) J. Erikss. et Ryvarden in J. Erikss., *Hjortstam et Ryvarden, Cort. N. Eur.* **5**: 1023, 1978.

Basidioma white (mostly when fresh), membranaceous, cream or ochraceous, effused; margin distinct or mould-like; subicular hyphae loosely arranged, with thickened walls, 3.2–9.3 μm wide, hyaline; subhymenial hyphae densely agglutinated, 2.5–3.3 μm wide, mainly of vertical orientation, subhyaline in mass; cystidia fusiform, 45–145 \times 5–7.5 (8.5) μm , protruding up to 45 μm , encrusted on the top or in median part, incrustation loose or heavy; basidia ca. 25 \times 3 μm ; spores (4.5) 5–7 \times 2.5–3 μm , hyaline, with or without guttules, in MSK 4048 seemingly dextrinoid.

Specimens examined: MSK 4048, on *Brachythecium oedipodium* (unknown wood; Yurchenko, 1998). — Byarezinski Biosphere Reserve, *Alnus glutinosa*–*Athyrium filix-femina*–*Filipendula ulmaria* forest, on alive and dead organs of *Plagiomnium elatum* (Bruch et Schimp.) T. Kop., dead *Brachythecium oedipodium* (*Alnus glutinosa* (L.) Gaertn.), 5 VI 1999 (MSK 4867).

19. *Phlebiella sulphurea* (Pers.: Fr.) Ginns et Lefebvre, *Lignic. Cort. N. Amer.*: 126, 1993.

Basidioma and hyphal cords isabelline or avellaneous (dry state); basidioma arachnoid; hyphae hyaline, yellowish in mass, commonly turning reddish in KOH solution, loosely encrusted by mostly rectangular crystals (up to 12 \times 2.5 μm), united closely together in cords;

hyphal cords 5–32 μm wide (the smallest consist of 2 hyphae), simple or multistrand, sterile or basidia-bearing; basidia and basidioles ca. 5.5–11 \times 5–6 μm ; spores hyaline to brownish, subglobose, ovoid, ellipsoid, echinulate, 3.3–5 \times 3–3.7 μm .

Specimen examined: Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on dead organs of *Pleurozium schreberi* (*Pinus sylvestris*), 10 VI 2000 (MSK 5665).

20. *Piloderma byssinum* (P. Karst.) Jülich, Ber. Deutsch. Bot. Ges. **81** (9): 418, 1969 var. ***minutum*** Jülich.

Basidioma cream to yellowish with brown tint, pellicular; hyphae clampless, encrusted by minute grains or smooth, pale yellowish, 1.7–3.2 μm wide; spores subhyaline or yellowish, 2.5–3 \times 2–2.5 μm , with a drop.

Specimen examined: Byarezinski Biosphere Reserve, *Picea abies*–*Pinus sylvestris*–*Hylocomium splendens* forest, on alive and dead organs of *Pleurozium schreberi*, alive *Brachythecium* sp. (litter near *Juniperus communis* trunk), 4 VI 1999 (MSK 4790).

21. *Radulomyces confluens* (Fr.: Fr.) M. P. Christ., Dansk Bot. Ark. **19** (2): 230, 1960.

Basidioma white or cream, even, ceraceous, with basal layer; margin hypochnoid; hyphae (1) 2–3.3 μm wide; hyphidia 1.7–3 μm wide; basidia and basidioles stalked, ca. 20–37 μm long without stalk, 5–8.5 μm wide, multiguttulate; spores yellowish, with slightly thickened wall, 6.5–10.5 \times 5.7–6.5 (7.5) μm , some seemingly immature spores 5.5 \times 4.5 μm , contents granular or as a big oil drop.

Specimen examined: MSK 4289, on *Brachythecium oedipodium* (*Fraxinus excelsior*; Yurchenko, 1998).

22. *Steccherinum fimbriatum* (Pers.: Fr.) J. Erikss., Symb. Bot. Ups. **16** (1): 134, 1958.

Basidioma light ochraceous, grandinioid; margin fimbriate; rhizomorphs abundant, flabelliform, 0.1–0.5 mm wide, forming basidiomata on terminal parts; skeletal hyphae yellowish, 1.7–5 μm wide; generative hyphae clamped, ca. 2.5 μm wide, difficult to discern among skeletal; skeletocystidia with dense or loose incrustation, ca. 6.5 μm wide, encrusted part 30–60 μm long, forming fascicles in the center of teeth; basidia ca. 18.5 \times 3.2 μm ; spores cylindrical, 4.2 \times 1.7 μm , with a greenish drop.

Specimen examined: Byarezinski Biosphere Reserve, Piceetum oxalidosum, on alive *Brachythecium* sp. (*Corylus avellana* L.), 11 VI 1998 (MSK 4486).

23. *Thelephora terrestris* Ehrh.: Fr., Syst. mycol.: 431, 1821 f. ***resupinata*** Donk.

Basidioma membranaceous, chocolate brown; hyphae yellow-brown, brown, 3–4 μm , inflated up to 6 μm , with clamped and simple septa;

spores brown, warted, irregular, $6-7.5 (10.5) \times 5-6.7 \mu\text{m}$, with or without a central drop.

Specimen examined: Masty district, Kurylovichy, Pinetum pleuroziosum, on alive *Dicranum polysetum* (near *Juniperus communis* trunk), 27 X 1997, collected by Dasha Belomesyatseva (MSK 8047a).

24. *Tomentella fuscocinerea* (Pers.: Fr.) Donk, Med. Bot. Mus. Herb. Rijks-Univ. Utrecht 9: 30, 1933. — Fig. 8.

Fungus appears on moss as sterile hyphal wool; dark brown arachnoid or crust-like basidiomata present on wood; hymenium not continuous; hyphae clampless, $2.5-5.5 \mu\text{m}$ wide, chestnut brown, mainly straight and branched at right angle, walls thickened ($1-1.3 \mu\text{m}$) or thin; spores warted, brown, gray brown, irregularly-globose, subglobose or 3-lobed, $6.7-8.5 \mu\text{m}$ in diam or $7-9 \times 6-8.5 \mu\text{m}$.

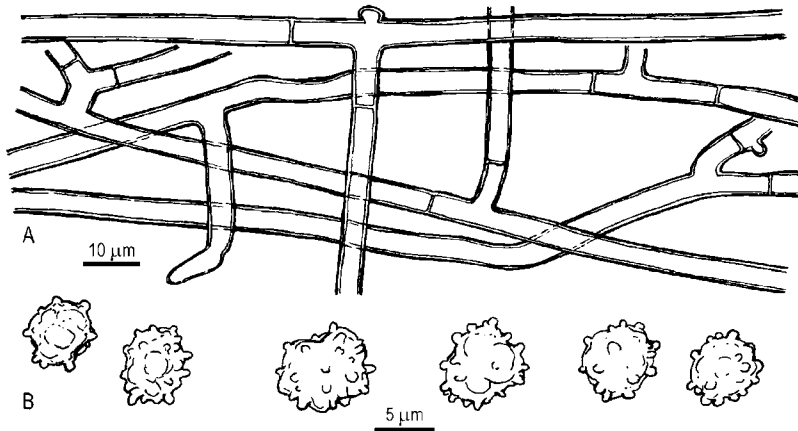


Fig. 8. *Tomentella fuscocinerea* (Pers.: Fr.) Donk (MSK 4767): A — subicular hyphae, B — spores.

Specimen examined: Byarezinski Biosphere Reserve, *Picea abies*—*Pinus sylvestris*—*Hylocomium splendens* forest, on dying *Brachythecium* sp. (*Picea abies* (L.) Karst.), 4 VI 1999 (MSK 4767).

25. *T. lapida* (Pers.) Stalpers, Stud. Mycol. 24: 65, 1984.

Fungus appears as dark brown pellicular basidiomata and loose net of dark sterile hyphae; subicular hyphae massive, $3.7-9.5 \mu\text{m}$ wide, chestnut brown, yellow-brown, light brown, brown, clamped, moderately straight or torulose, walls thickened; subhymenial hyphae (3.3) $4-5.5 \mu\text{m}$ wide, pale brown to brown, wall thickened to thick; cystidial elements absent; basidia clavate, $40-53 \times 6.7-8.5 \mu\text{m}$,

clamped or clampless at base, guttulate, sometimes bluish or greenish in KOH solution; spores brownish, grayish brown, brown (especially in mass), greenish-brown in KOH solution, globose, subglobose, ellipsoid, sometimes irregular, echinulate, $6\text{--}10 \times 5.5\text{--}8 \mu\text{m}$, with prominent apiculus, uni- or multiguttulate.

Specimens examined: Byarezinski Biosphere Reserve, *Picea abies*—*Pinus sylvestris*—*Hylocomium splendens* forest, on alive *Brachythecium* sp., dead organs of *Pleurozium schreberi* (litter and *Juniperus communis*), 4 VI 1999 (MSK 4790). — Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on alive and dead organs of *P. schreberi* (*J. communis*), 10 VII 1998 (MSK 4452).

26. *T. punicea* (Alb. et Schwein.: Fr.) J. Schröt. in Cohn, Krypt.-Fl. Schles. 3: 420, 1889. — Fig. 9.

Basidioma blackish; subicular hyphae brownish to brown, $3.5\text{--}6.5 \mu\text{m}$ wide; subhymenial hyphae subhyaline, yellowish, $4\text{--}5.5 \mu\text{m}$ wide; basidia subhyaline, subcylindrical or clavate, $30\text{--}35 \times 7.5\text{--}9.5 \mu\text{m}$; spores brown, especially in mass, irregular-globose to lobed, echinulate, with blunt hyaline echinuli, (5.5) $7\text{--}7.5 \times (4.5) 6\text{--}7 \mu\text{m}$.

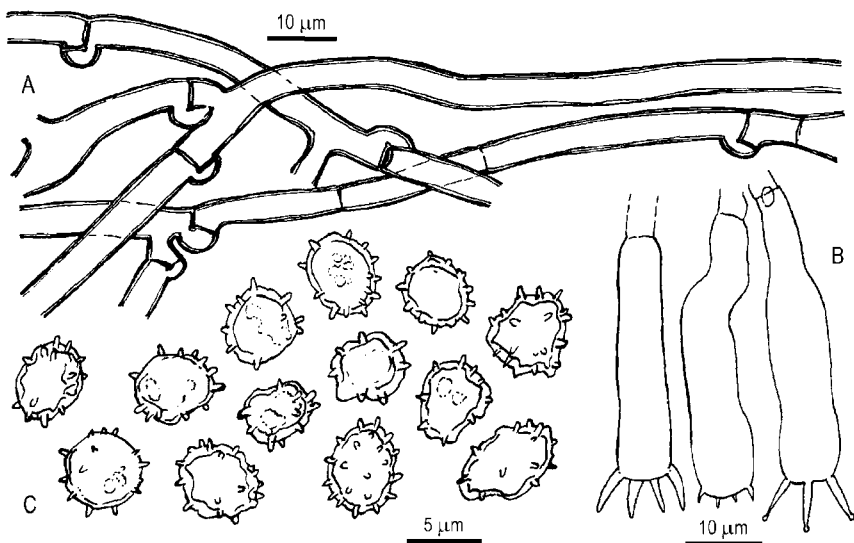


Fig. 9. *Tomentella punicea* (Alb. et Schwein.: Fr.) J. Schröt. (MSK 4725): A — subicular hyphae, B — basidia, C — spores.

Specimen examined: Byarezinski Biosphere Reserve, *Betula pubescens*—*Alnus glutinosa*—*Thelypteris palustris* forest, on dying organs of *Brachythecium* sp. (*Salix cinerea* L.), 2 VI 1999 (MSK 4725).

27. *T. cf. sublilacina* (Ellis et Holw.) Wakef., *Mycologia* **52**: 931, 1960. — Fig. 10.

Only hyphae and spores were found. Hyphae brownish to dark brown, chestnut brown, 5–7.5 μm wide, swollen up to 10 μm , smooth or slightly rough, septa clampless and clamped, walls thickened, contents homogeneous or granular; spores light brown or greenish in KOH solution, globose, angular-globose, ellipsoid or irregular, 7.5–10 \times 6.3–8.5 μm , warted or echinulate, with blunt or acute echinuli 0.8–2.5 μm long.

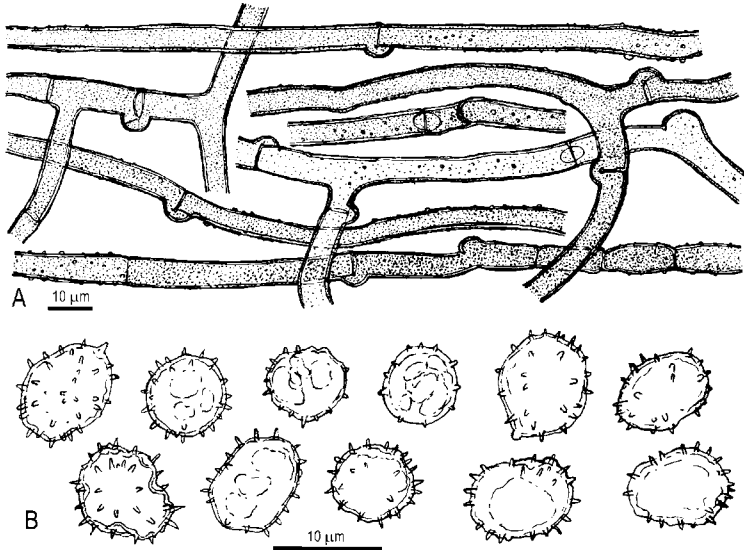


Fig. 10. *Tomentella cf. sublilacina* (Ellis et Holw.) Wakef. from *Hylocomium splendens* (MSK 4708): A — sterile hyphae, B — spores.

Specimen examined: Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on dead and dying organs of *Hylocomium splendens*, 4 VI 1999 (MSK 4708).

28. *Trechispora farinacea* (Pers.: Fr.) Liberta, *Taxon* **15** (8): 318, 1966.

Basidioma ca. 0.04–0.05 mm thick (dry state), even, cream; margin gradually thinning out; hyphae hyaline, subhyaline, rough, 1.7–3.7 μm wide, septa both simple and clamped, wall thickened; hymenium in the specimen absent; arthrospores triangular to 3-lobed, hyaline or subhyaline, with central greenish drop, 2.7–5.5 \times 2.5–4.2 μm .

Specimen examined: Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on alive and dying organs of *Pleurozium schreberi* (*Betula pendula*), 3 VI 1999 (MSK 4915).

* 29. **T. subphaerospora** (Litsch.) Liberta, Can. J. Bot. **51**: 1887, 1973.

Basidioma hypochoid, grandinoid, not continuous, cream, 0.05–0.08 mm thick; subicular hyphae 1.7–3 μm , clamped, subhymenial 1.8–2.5 μm ; basidia short clavate, 8.5–12 \times 3.5–5.5 μm , terminal and pleural; spores hyaline, rounded-triangular, with scattered warts, 3–3.5 \times 2.5–3.5 μm , with or without a drop.

Specimen examined: Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on dead organs of *Pleurozium schreberi* (*Pinus sylvestris*), 3 VI 1999 (MSK 4932).

30. **Tubulicrinis subulatus** (Bourdot et Galzin) Donk, Fungus **26**: 14, 1956. — Fig. 11.

Basidioma cream colored, not continuous, even, 0.05–0.08 mm thick (dry state); hyphae hyaline, 1.3–2 μm wide; lycocystidia 55–150 \times 6–10 (12) μm , weakly to strongly amyloid, more or less cylindrical, gradually narrowed to the blunt apex, lumen capillary-like; spores 6.3–6.5 \times 1.5–2 μm , straight or allantoid.

Specimen examined: Byarezinski Biosphere Reserve, Pinetum pleuroziosum, on alive and dead organs of *Ptilium crista-castrensis* (*Pinus sylvestris*), 10 VII 1998 (MSK 4451).

31. **Vesiculomyces citrinus** (Pers.) E. Hagstr., Bot. Not. **130**: 53, 1977.

Basidioma whitish, cream colored, yellowish, with radiating white fibrillose strands at margin; hyphae clampless, smooth or encrusted, 2.5–3 μm wide; vesicular cystidia immersed, fusiform, 35–45 \times 4.5–7.5 μm ; hyphidia simple, subulate, 33–47 \times 1.5–1.7 μm ; basidia ca. 38 \times 3.7–4.2 μm , guttulate; spores subglobose, slightly angular, with prominent apiculus, subhyaline, slightly amyloid, with heterogeneous contents, smooth, 5–6 μm diam.

Specimen examined: Minsk district, Kryzhouka, *Picea abies*—moss forest, on alive and dying organs of *Brachythecium oedipodium* (*Picea abies*), 29 X 2000 (MSK 5736).

The particular cases regarded by us are the corticioid fungi with massive, effuse-reflexed basidiomata involving bryophytes in fungus fruitbody during fruitbody growth:

32. **Amylostereum areolatum** (Chaillat ex Fr.: Fr.) Boidin — Byarezinski Biosphere Reserve, *Picea abies*—*Populus tremula*—moss forest, on alive and dead organs of *Brachythecium oedipodium* (*Picea abies*), 31 XII 1999 (MSK 5682);

33. **Phlebia radiata** Fr.: Fr. — Minsk district, Azyartso, *Picea abies*—*Quercus robur*—moss forest, on dead *Brachythecium* sp. (*Quercus robur*), 27 X 1991 (MSK 5121);

34. **Ph. tremellosa** (Schrad.: Fr.) Nakasone et Burds. — Minsk district, Hlebkavichy, *Picea abies*—*Betula pendula*—*Galeobdolon luteum* forest, on alive *Brachythecium oedipodium* (*Betula pendula*), 23 IX 2000, collected by Dr. Dmitrii Tret'-

Fig. 11. *Tubulicrinis subulatus* (Bourdot et Galzin) Donk (MSK 4451): bristle-like protruding lycocystidia indicating the spreading of fungus over organs of alive *Ptilium crista-castrensis*.



yakov (MSK 3683); Minsk district, Kryzhouka, garden, on alive and dead organs of *Brachythecium salebrosum* (Web. et Mohr) Schimp. (*Malus domestica*), 20 VI 1995 (MSK 5110);

35. *Stereum subtomentosum* Pouzar — Byarezinski Biosphere Reserve, *Alnus glutinosa*—*Athyrium filix-femina*—*Filipendula ulmaria* forest, on alive *Brachythecium oedipodium* (*Alnus glutinosa*), 5 VI 1999 (MSK 4865).

Conclusion

From the present study we conclude many of corticioid fungi are able to associate with bryophytes. From such point of view the list of species is expected to be larger than 35 taxa described above. Among fungi registered by us *Amphinema byssoides* and *Athelia epiphylla* complex have regular connection with different mosses. Both are constant components in forest communities with *Pinus sylvestris* and *Pleurozium schreberi*. On the other hand, the abundance of a fungus in forest ecosystems not always correlates with

its inhabitation on mosses. The example is *Phlebiella sulphurea*, one of the main destroyers of coniferous wood, which was observed on mosses only once. Few fungal species produce basidiomata or sterile hyphae on moss organs without any connection with wood: *Athelia* aff. *ovata*, *Amphinema byssoides*, and *Athelia epiphylla* s. ampl. In other specimens the fungus encrusts the parts of mosses both appressed to wood surface and rather erect: *Hymenochaete cinnamomea*, *Hyphodontia breviseta*, *H. floccosa*, *H. pallidula*, *Vesiculomyces citrinus*. In a number of specimens the moss organs covered with fungal thallus have pale green aspect and are surely dying off. The question about the fungus role in moss pathology is rather difficult. Possibly, limitation of light, gas- and mineral entering through the fungal thallus leads to dying of autotrophic host. However, the single true corticioid parasite on mosses observed by us was *Athelia arachnoidea*.

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SUMMARY: The close contact of alive and dead bryophytes with fungal fruitbodies and vegetative mycelium is widespread phenomenon in corticioid fungi.

Key words: *Corticaceae* s. l., bryophilous fungi, *Amphinema byssoides*, *Athelia arachnoidea*, *A. epiphylla*, *Pleurozium schreberi*.

* The code of Universal Decimal Classification (URSS).

5 IV 2001

Some new combinations in Polyporaceae: sapienti sat

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Genus *CERRENA* Gray

Nat. Arrang. Brit. Pl. **1**: 649, 1821. — *Hexagonia* Fr., 1835 ex part. — *Funalia* Pat., 1900. — *Corioloopsis* Murrill, 1905. — *Datronia* Donk, 1966 ex part. — *Fuscocerrena* Ryvarden, 1982.

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Cerrena drummondii (Klotzsch) Zmitrovich comb. nov. — Basionymum: *Polyporus drummondii* Klotzsch, Linnaea **8**: 487, 1833.

Cerrena fulvocinerea (Murrill) Zmitrovich comb. nov. — Basionymum: *Corioloopsis fulvocinerea* Murrill, N. Am. Fl. **9**: 1908.

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Cerrena hydroides (Sw.: Fr.) Zmitrovich comb. nov. — Basionymum: *Boletus hydroides* Sw.: Fr., Syst. mycol. **1**: 362, 1821.

Cerrena mollis (Sommerf.: Fr.) Zmitrovich comb. nov. — Basionymum: *Boletus mollis* Sommerf.: Fr., Elench. **1**: 71, 1828.

Cerrena nigrocinerea (Murrill) Zmitrovich comb. nov. — Basionymum: *Corioloopsis nigrocinerea* Murrill, N. Am. Fl. **9**: 77, 1908.

Cerrena occidentalis (Klotzsch) Zmitrovich comb. nov. — Basionymum: *Polyporus occidentalis* Klotzsch, Linnaea **8**: 486, 1833.

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Cerrena portoricensis (Fr.) Zmitrovich comb. nov. — Basionymum: *Polyporus portoricensis* Fr., Elench. **1**: 115, 1828.