

Rare corticioid fungi (Basidiomycetes, Aphyllophorales) from central Belarus

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SUMMARY: Fifteen rare non-poroid resupinate species of homobasidiomycetes are reported from Belarus. They were all found in one locality only and all the sites are in central Belarus, on elevated moraine ridge. The morphology of the species is described and illustrated, and some taxonomical features discussed.

Key words: *Athelium*, Belarusian Moraine Ridge, Corticiaceae s.l., *Leucogyrophana*, *Phanerochaete*

In the recent years our studies were focused on three physiographic districts in the central part of Belarus. Their borders are rather variable according to various physiographers, but the districts are constantly named Ashmyany, Minsk, and Orsha eminences (Fig. 1). Their area is characterized by rather mosaic landscape structure, and includes the highest parts of the country, reaching 300–340 m above sea level in some sites of Minsk and Ashmyany eminences).

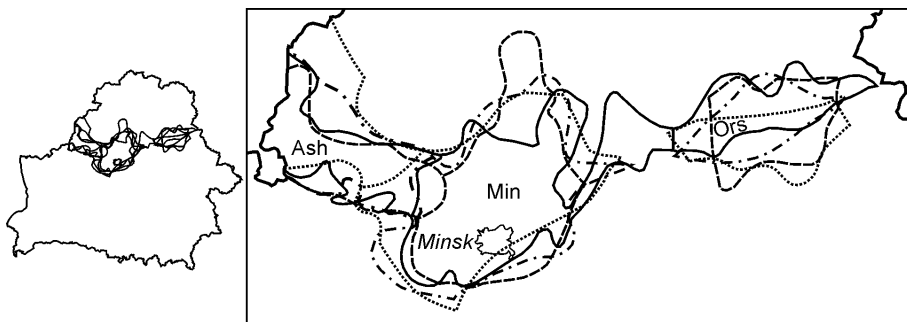


Fig. 1. Outlines of three studied physiographic districts — Ashmyany (Ash), Minsk (Min), and Orsha (Ors) eminences in borders according to: — Dzyaments'eu (1975), - - - Yakushko, Sinyakova (1990), ... Yakushka (2002), - · - Klitsunova *et al.* (2002).

Dzyaments'eu (1975) united these three districts in a physiographic province called Belarusian Moraine Ridge (eastern branch). The northern border of the eminences roughly coincides with the southern limit of the Poozerskoe (Valdaiskoe) glaciation. However, the relief of Belarusian

Moraine Ridge was formed during Sozhskoe (Moskovskoe) glaciation, which went further to the south. Minsk eminence is a traditional area for mycologist's collection trips and therefore rather many rare fungi derive from this district.

The species described below were collected in 1992–2003 and are still considered as very rare and known each from a single locality in Belarus. Reference specimens are kept in V.F. Kuprevich Institute of Experimental Botany Herbarium (**MSK-F**), personal collection of H. Kotiranta (**H.K.**), and several other herbaria. Preparations were made in 3% KOH water solution, by razor blade vertical section or by squash mounting. For examination of spore reaction with iodine Melzer's reagent (IKI), containing 0.5 g iodine, 1.5 g KI, and 22 g chloral hydrate dissolved in 20 g of distilled water, was used. For some species the average spore length (L), width (W) and spore quotient (Q*) were calculated. Microphotographs were made by digital cameras Nikon Coolpix 4500 on microscope Nikon Eclipse E200 and Olympus Camedia C-5060 on microscope Olympus BX51.

Species descriptions

1. *Athelia fibulata* M.P. Christ.

Figs. 2, 3.

Basidiomata very thin, arachnoid to pellicular-porulose, very loose and not closely attached to the substratum, net-like with basidial clusters scattered over the very loose subiculum, pure white, 1–11 × 0.6–6 mm; margin abrupt or diffuse; some small fruitbody patches connected by thin, arachnoid hyphal strings. Hyphal system monomitic, all hyphae hyaline. Subicular hyphae

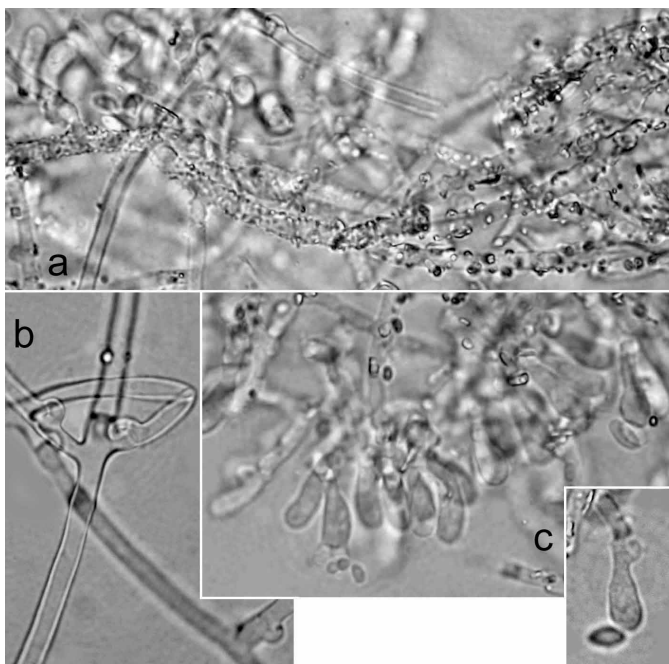


Fig. 2. *Athelia fibulata* (MSK 6328): a — encrusted subicular hyphae, b — smooth subicular hyphae, c — subhymenium, hymenium, and spores.

straight, branched at right angles or almost so, with both clamped and simple septa, long celled, 3.8–7.2 μm wide, wall moderately thin or slightly thickened, smooth or covered with small or middle-sized crystals. Subbasidial hyphae with clamped septa, 2–3 μm wide, thin-walled, smooth or encrusted by scattered crystals. Basidioles and basidia clamped at base, hyaline, with fine granular contents. Basidioles short clavate. Basidia clavate to short-stalked, 15–22.5 \times (4.5)5.3–5.7(6.3) μm , with four, rather short, slender sterigmata, 3–4.5(6.5) \times 0.5(0.8) μm . Spores smooth, narrowly ellipsoid or cylindrical, with distinct apiculus, 6.3–9(10.3) \times 2.8–4.2 μm , hyaline, thin-walled, IKI–.

The examined specimens differ from species concept of *A. fibulata* by having scattered simple septa on subcicular hyphae.

Specimens examined: Lahoisk district, ca 1 km NE of Litsvinkava village, permanent sample plot 'Piceetum1/Minsk eminence', *Picea abies* forest of *Stellaria holostea* type with *Betula pendula*, *Populus tremula*, and *Quercus robur* trees, on fallen bark of *Salix caprea* (MSK 6318), on bark of *Sorbus aucuparia* wood debris (MSK 6324), on bark of fallen *Corylus avellana* trunk (MSK 6328, H.K.), coll. E.O. Yurchenko 9 XI 2003.

The species is known from several countries in Central, SW, and North Europe (Jülich, 1984) and northwest Russia (Bondartseva *et al.*, 1999).

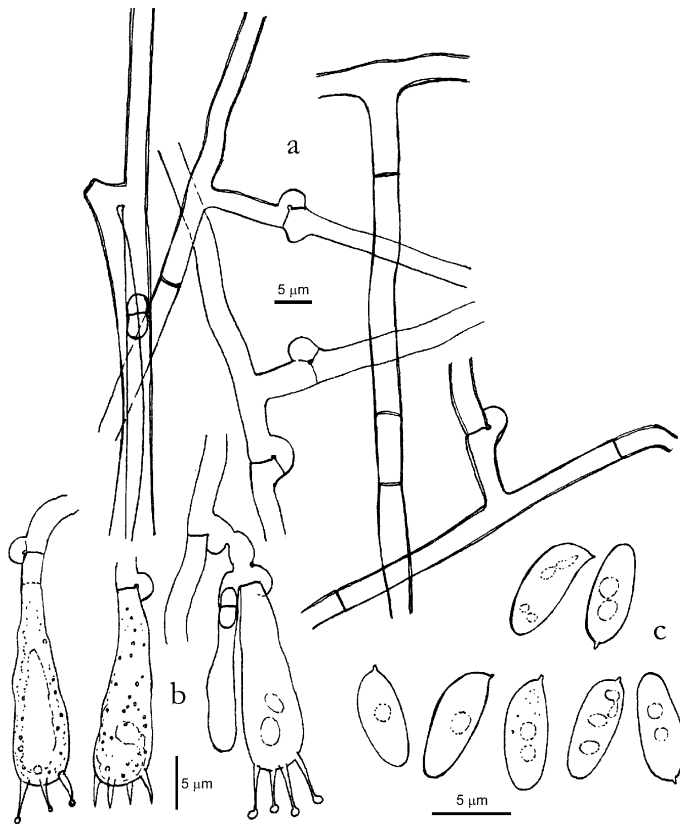


Fig. 3. *Athelia fibulata* (MSK 6328): a — subcicular hyphae, b — basidia, c — spores.

2. *Athelium* sp.

Fig. 4.

Basidioma resupinate, very thin, white, margin not differentiated. Hyphal system monomitic, all hyphae thin- or very thin-walled, without oily contents, clamped, smooth or encrusted. Subicular hyphae (2)3–4.5 μm wide, thin-walled, encrusted in IKI, almost smooth in KOH, richly branched and clamped. Cystidia none. Basidia basally clamped, clavate, stalked, (18)20–25 \times 7.5–9 μm , with two or three stout, normally 9 μm , seldom up to 15 μm long sterigmata. Spores ellipsoid or broadly ellipsoid, sometimes tapering to the apex, (9.2)10–12 \times 6–7.6(8.3), $L = 10.3$ μm , $W = 6.8$ μm , $Q = 1.1$ –2, $Q^* = 1.5$, thin-walled, IKI–.

The basidia are like in *Athelium stridii* K.-H. Larsson & Hjortstam, in being stalked and in having 2–3 (very seldom 4) stout sterigmata. However, the basidia of *A. stridii* are twice as long as in our specimen. Also the hyphae are wider and spores are much larger in *A. stridii*, in being 15–18 \times 7–10 μm (Hjortstam, Larsson, 1986). Some *Sistotrema* species also have large spores and less than four sterigmata, like *S. autumnale* Ryvar den & H. Solheim, but the basidia are quite differently shaped (urniform) and hyphae contain oily contents (Ryvar den, Solheim, 1977). *Athelia sibirica* (Jülich) J. Erikss. & Ryvar den also has large spores (Eriksson, Ryvar den, 1973; Kotiranta, Saarenoksa, 2000), but they are narrower, 4–5 μm wide. The key of bi-spore species by Boidin and Gilles (2003) does not include our *Athelium* species. We consider the specimen as an undescribed species, but richer material is needed for its description.

Specimen examined: Minsk NW outskirts, near Drazdy Reservoir, grove with *Populus tremula*, *Quercus robur*, *Corylus avellana*, *Stellaria holostea*, *Hepatica nobilis*, on bark at the base of living *Salix caprea* trunk and partly on living epiphytic mosses, coll. E.O. Yurchenko 11 XII 2000 (MSK 5745, GB, H.K.).

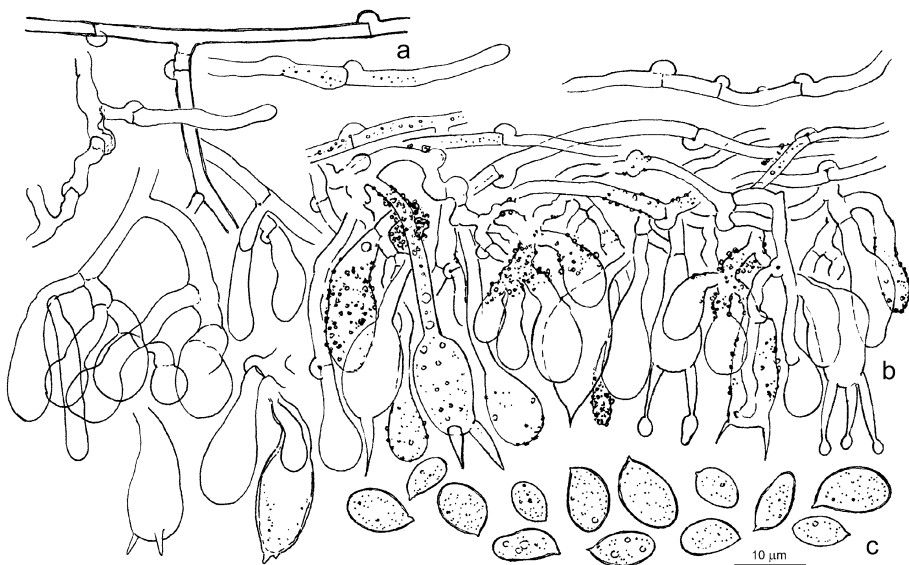


Fig. 4. *Athelium* sp. (MSK 5745): a — subicular hyphae, b — vertical section through basidioma, c — spores.

3. *Hyphoderma pallidum* (Bres.) Donk

Figs. 5, 6.

Basidiomata totally effused, closely adnate but rather easily removable from the substratum by a needle, very thin to transparent in some areas, soft, porulose, 6–10 × 3–5 mm; hymenial surface smooth, white, covered with numerous rust-brown or red brown minute dots (drops of resinous matter, lens ×50), so that the fruitbody looking light ochraceous; margin narrow, white or concolorous, mould-like, thinning out. Hyphal system monomitic, all hyphae hyaline, clamped with small clamps, walls thin to slightly thickened. Subicular hyphae richly branched, 2.5–6.5 μm wide. Subhymenium with red-brown middle- to big-sized resinous particles. Cystidia of two types: (1) fusoid, bottle-like, spindle-shaped with or without constrictions, sometimes narrowly clavate, straight or sinuous, with an acute, or more seldom, with an obtuse tip or a narrowed apical appendage, 44–63 × 6.7–7.5 μm, thin-walled, hyaline, frequently with refractive contents, basally clamped; (2) a few capitate hyphal ends with brown excretion at the tip. Basidioles clavate, distorted, hyaline or filled with red-brown substance. Basidia basally clamped (clamps often unclear), clavate or short clavate, 17.5–21 × 5–6.5 μm, hyaline to yellowish brown, with four sterigmata, 3.2–4 × 0.5 μm. Spores smooth, cylindrical, slightly curved to allantoid, (6.3)7.7–11.5(14.5) × (2.2)2.7–3.2(4.2) μm, thin-walled, contents heterogeneous, oily, subhyaline, greenish, or brownish, IKI–.

Specimen examined: Lahoisk district, 1 km E of Kalyuha village, permanent sample plot 'Pinetum2/Minsk eminence', *Pinus sylvestris* forest of *Pleurozium shreberi* type, on bark of fallen *Pinus sylvestris*, coll. E.O. Yurchenko 22 IX 2001 (MSK 6151).

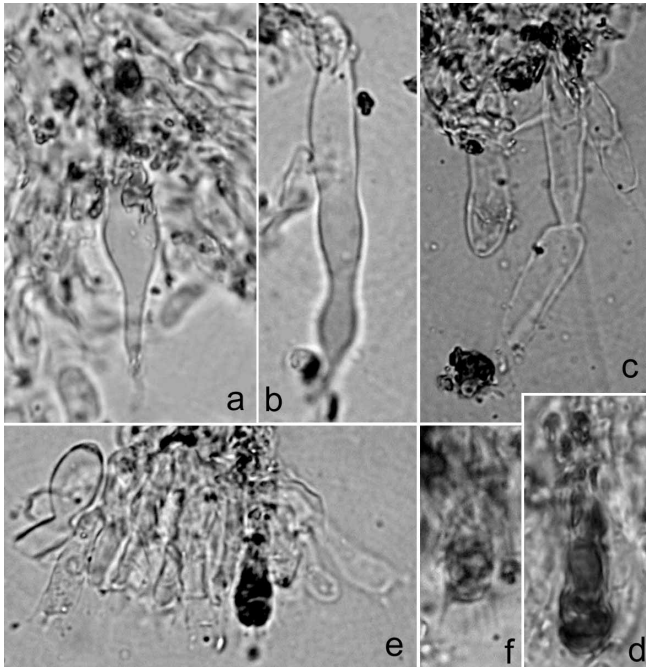


Fig. 5. *Hyphoderma pallidum* (MSK 6151): a, b — bottle-shaped cystidia, c — hyphal end with apical excretion, d — strongly pigmented basidiole, e — portion of hymenium, f — basidium with pigmented contents.

The species is known from Central and North Europe (Eriksson, Ryvarden, 1975; Jülich, 1984), NW Russia (Bondartseva *et al.*, 1999), North America.

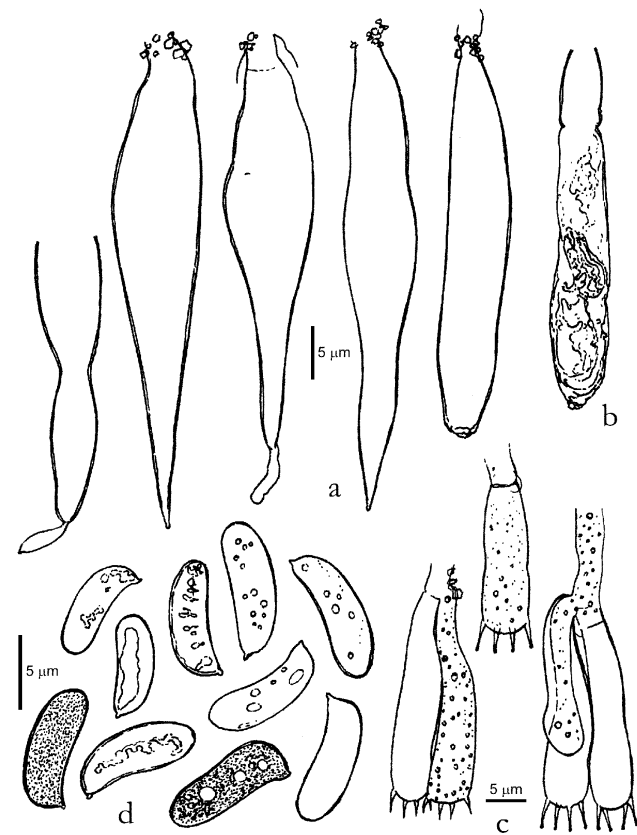


Fig. 6. *Hyphoderma pallidum* (MSK 6151): a — hyaline cystidia, b — cystidium with pigmented contents, c — basidia, d — spores.

4. *Hyphodontia borealis* Kotir. & Saarenoksa

Figs. 7, 8.

Basidioma totally effused, loosely attached, discontinuous, of irregular outline, 8 × 6 mm; hymenial surface whitish (under lens with yellowish spots), with scarce, conical, apically fimbriate aculei, margin abrupt or thinning out. Cystidia of several types: (1) hypha-like or narrowly cylindrical with slightly widened base, thin-walled except at the tip, 34–42 µm long, 1.7–1.8 µm wide at the narrowest part; (2) capitate, (3) clavate with hyphoid apical outgrowth; (4) occasional septate cylindrical; (5) cystidioles of intermediate morphology between cystidia and basidia. Basidia basally clamped (clamps often unclear), cylindrical or subcylindrical, with one or two constrictions, 13–20.5 × 4.5–5 µm, with four (sometimes two) sterigmata. Spores smooth, ellipsoid or broadly ellipsoid, 4.5–5.5 × 3–3.7 µm, thin-walled, hyaline or subhyaline, some with a drop, IKI–.

Specimen examined: Vitsebsk oblast, Orsha district, 3 km W of Vyaz'michy village, permanent sample plot 'Piceetum2/Orsha eminence', *Picea abies* forest of *Oxalis*-moss type, on a

scale of fallen *Picea abies* cone immersed in litter, coll. E.O. Yurchenko 19 IX 2001 (MSK 6436, H.K.).

The species was described rather recently (Kotiranta, Saarenoksa, 2000) and its distribution is still poorly known, but evidently it is a taiga species in Europe and Asian part of Russia, and becoming rare towards the south.

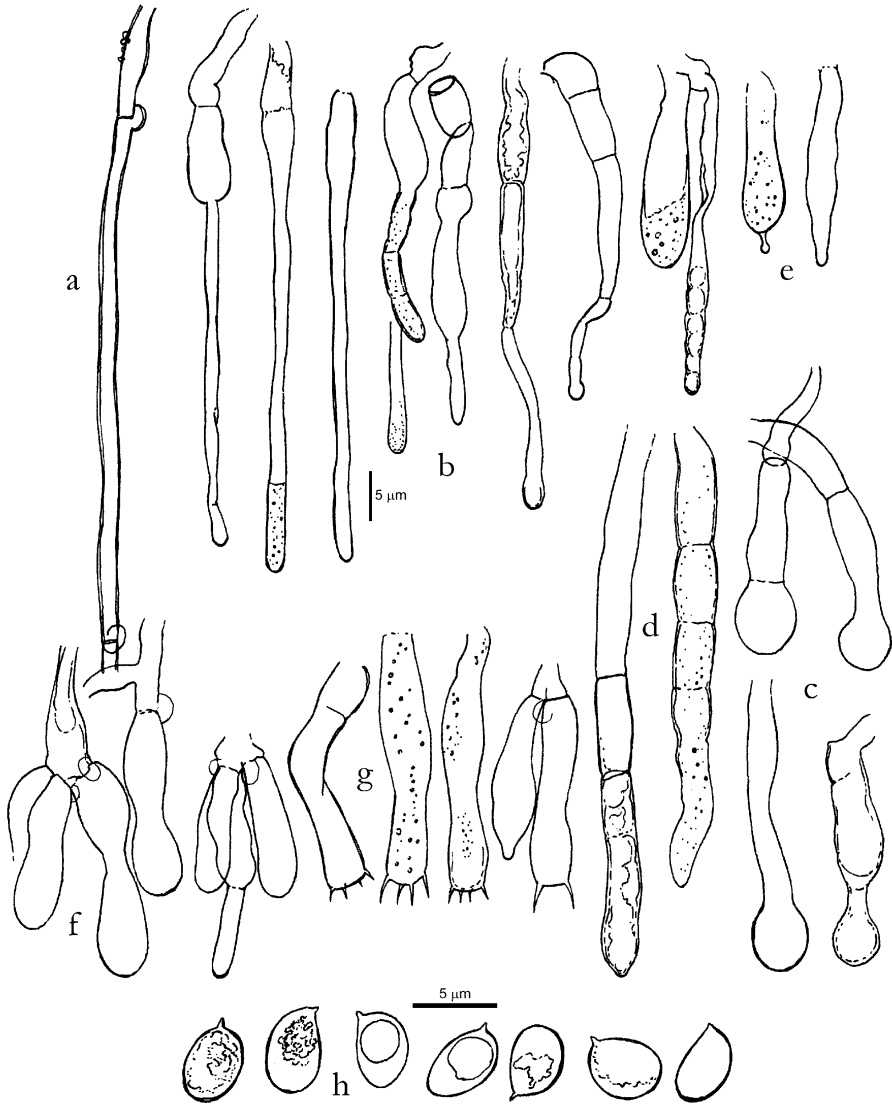


Fig. 7. *Hyphodontia borealis* (MSK 6436): a — subicular hypha, b — cystidia with hypha-like slightly capitate upper part and swollen lower part, c — capitate cystidia, d — septate cylindrical cystidia, e — cystidiolae, f — basidioles, g — basidia, h — spores.

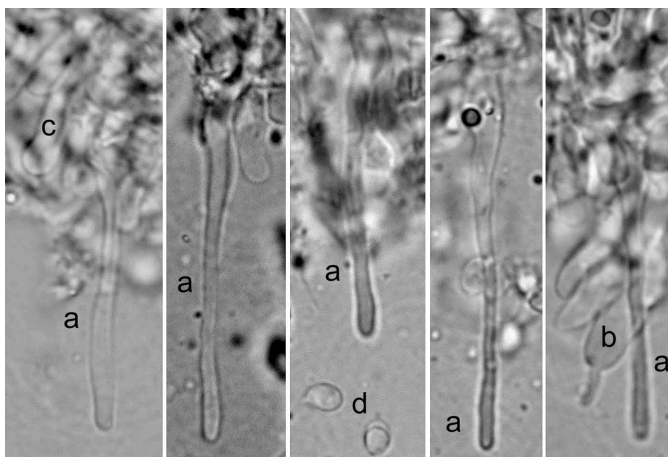


Fig. 8. *Hyphodontia borealis* (MSK 6436): a — cylindrical cystidia with swollen base, b — clavate cystidium with hyphoid apical outgrowth, c — capitulate cystidium, d — spores.

5. *Hyphodontiella multiseptata* Å. Strid

Figs. 9, 10.



Basidiomata totally effused, adnate, very thin, discontinuous, porulose-reticulate (lens $\times 50$), loose and easily removable from the substratum by a needle, very small, $1-17 \times 0.4-3.5$ mm, of irregular outline, pure white; margin thinning out. Hyphae partly clamped partly simple septate, often with closely arranged simple septa, commonly branching at right angles or almost so, some subicular hyphae sparsely branched, $1.8-2.5 \mu\text{m}$ wide, hyaline or with contents becoming heterogeneously colored in iodine. Basidia in clusters, basally clamped, short clavate, $12.5-13.5 \times 4-4.5 \mu\text{m}$, hyaline, normally with four pointed sterigmata. Spores navicular or biapiculate (like small spores of *Botryobasidium vagum*), slightly yellowish in IKI, thin-walled, inamyloid, indextinoid, $6.7 \times 3 \mu\text{m}$, with a prominent apiculus, some with oildrops.

Specimen examined: Vitsebsk oblast, Talachyn district, 1.3 km SE of Mikhailoushchyna village, permanent sample plot 'Piceetum1/Orsha eminence', *Picea abies* forest of *Dryopteris-Oxalis* type, with *Quercus robur* and *Populus tremula*, on bark of fallen *Picea abies* twigs 2–3.5 and more mm in diam, coll. E.O. Yurchenko 19 IX 2001 (MSK 6313).

Fig. 9. *Hyphodontiella multiseptata* (MSK 6313): a — subicular hyphae, b — cluster of basidia and basidioles, c — hymenium.

The species is very rare throughout Eurasia. It is known from three Fennoscandian countries (Jülich, 1984; Kotiranta, Larsson, 1989; Kotiranta, Saarenoksa, 1990) and SW Siberia (Zhukoff, 2005).

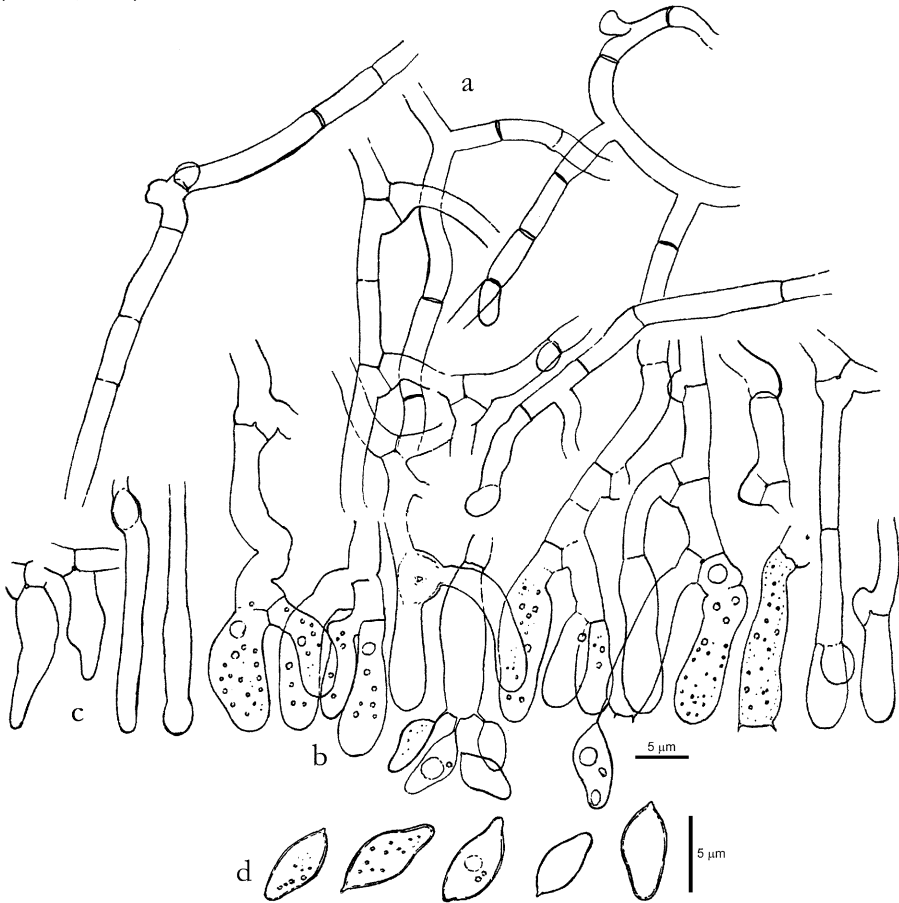


Fig. 10. *Hyphodontiella multiseptata* (MSK 6313): a — subicular and subhymenial hyphae, b — portion of hymenium, c — differently shaped hyphal ends in hymenium, d — spores.

6. *Leptosporomyces fusoides* (Jülich) Krieglst.

Basidioma resupinate, very thin, porose-reticulate, whitish. Hyphal system monomitic, all hyphae clamped. Subicular hyphae thin-walled, 2.5–3(3.5) μm wide. Subhymenial hyphae very thin-walled, richly branched, 2–2.5 μm in diam. Cystidia none. Basidia basally clamped, clavate or subcylindrical, sometimes stalked, 12–14 \times 4 μm , with four, up to 4 μm long sterigmata. Spores fusiform or subcylindrical, (5.2)5.5–6.5 \times 2.1–2.6(2.8) μm , L = 5.9 μm , W = 2.4 μm , Q = 2.2–2.9, Q* = 2.5, sometimes glued in pairs, with a relatively prominent apiculus, thin-walled, CB–, IKI– (n = 10).

The specimen is extremely small, hardly visible to the naked eye, but microscopically in good condition.

Specimen examined: Hrodna oblast, Smarhon' district, 2.8 km N of Kreva settlement, permanent sample plot 'Tremuleturn1/Ashmyany eminence', *Populus tremula* forest of *Vaccinium myrtillus*–*Oxalis* type, with *Picea abies*, on decorticated fallen branch of *Quercus robur*, coll. E.O. Yurchenko 28 V 2001 (MSK 5924 in H.K.).

The species is uncommon in Europe, but known e.g., from Germany, Sweden, and Finland (Jülich, 1984; Kotiranta, 2001), and found also in North America (Jülich, Stalpers, 1980).

7. *Leucogyrophana olivascens* (Berk. & M.A. Curtis) Ginns & Weresub Figs. 11, 12.

Basidioma ca 1 × 1 cm, effused, pellicular, very brittle, hymenophore with very scarce small rounded teeth and short ridges up to 0.3 mm high, brownish yellow to yellow towards the margin. Hyphal system monomitic, all hyphae clamped, with olivaceous brownish hue in mass in water preparation. Hyphal cords well developed, 25–35 µm wide, united in mould-like strands 2–4 cm long; cords consisting of several thin-walled hyaline to yellowish core hyphae up to 9.3 µm wide, surrounded by narrower hyphae, in some places covered with crystals 3.5–7 µm in diam. Subicular hyphae (2.3)3.2–6.5(7.5) µm wide, hyaline to yellowish, thin- to thick-walled (wall up to 1.6 µm), mostly smooth, but some of the wider basal hyphae rough due to fine incrustation. Subbasidial hyphae 4.5–6.2 µm wide. Cystidiole none, but one hyphoid, thin-walled, clamped cystidiolate seen. Basidia narrowly clavate to clavate, basally clamped, hyaline, thin-walled, 19–32 × 5.7–7 µm, with (3)4 sterigmata, 2.8–4.2 × 0.75 µm. Spores smooth, ellipsoid, 4.2–5.8(6.5) × 3.2–4.2 µm, golden yellow with brownish tint, with thickened walls, with irregular oily inclusions or sometimes a rounded oil drop, with minute apiculus, IKI–.

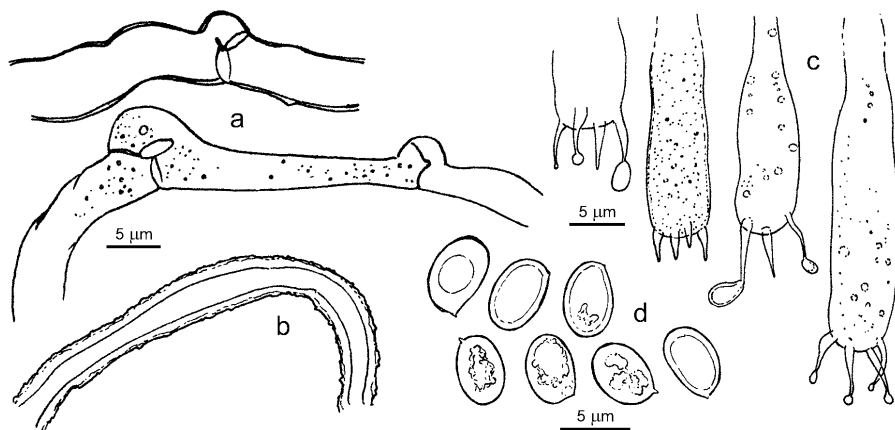


Fig. 11. *Leucogyrophana olivascens* (MSK 4945): a — smooth subicular hyphae, b — rough subicular hypha, c — basidia, d — spores.

The genus *Leucogyrophana* is rather complicated, in including species which share overlapping features both in macro- and micromorphology. Crystals observed on cord hyphae resemble those described for *L. romellii* (Ginns, 1978, fig. 14), but in the latter taxon they were in subiculum. *Leucogyrophana romellii* has no olivaceous pigmentation of hyphae typical to *L. olivascens*. The minutely tuberculate hymenophore, prominent hyphal strands, the size of basidia and spores fit well with *L. olivascens*. Moreover, the spores of *L. olivascens* are indextrinoid (or very faintly dextrinoid) while they are clearly dextrinoid in *L. romellii*. The only cystidiolate seen is similar to that illustrated by Martini (1988).

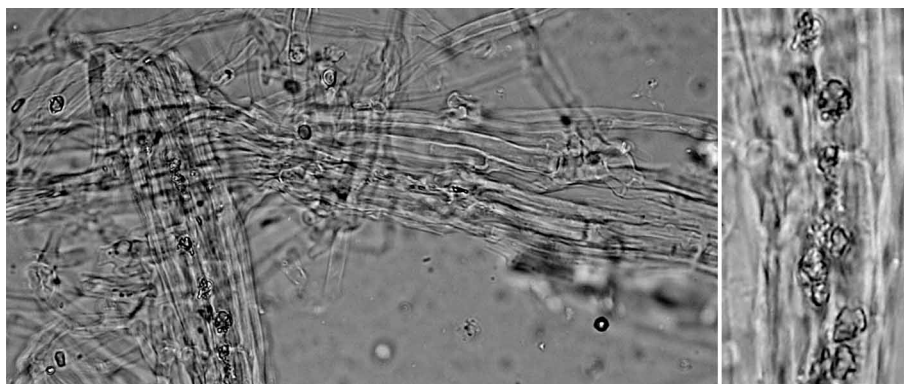


Fig. 12. *Leucogyrophana olivascens* (MSK 4945): hyphal cords with crystals.

Specimen examined: Minsk City, in house basement, on wall of vegetable storage pit consisting of sand and small brick pieces, coll. E.O. Yurchenko 30 IX 1999 (MSK 4945, H.K., LE).

The species is very rare in Eurasia. It is reported for France, India, Japan, North America and West Indies, on well rotted wood (Ginns, 1978). The fungus was found on mineral substratum indoor, but evidently had a connection with decaying boards.

8. *Leucogyrophana pinastri* (Fr. : Fr.) Ginns & Weresub

Figs. 13, 14.

Basidiomata effused, pellicular, very brittle, easily detachable from the substratum, ca 3.5–4.5 × 1.5–2.5 cm; hymenophore reticulate to poroid with large shallow pores, 1–2.5 per mm, to irpicoid with teeth up to 0.5 mm long or distinctly irpicoid with 1–2 mm high teeth; hymenial surface olivaceous yellow or brownish yellow, margin even, abrupt, paler than the hymenium, 1–2.5 mm wide. Subiculum loose, easily detaching from the subhymenium and hymenium, rich of crystalline material. Hyphal system monomitic. Subicular hyphae mostly clamped (often in whirls), occasionally simple septate, long-celled, 2.2–8.2 μm wide with swellings up to 10 μm (some very large clamps 15.5 μm wide), moderately thin-walled, hyaline to yellowish or brownish, smooth or slightly encrusted. Hyphae in teeth trama strictly parallel, mostly clamped, (2.3)3.8–8.7 μm wide, rarely with swellings up to 10.5 μm or even 15–20 μm wide, thin-walled, or with wrinkled wall thickenings, hyaline. Subbasidial hyphae 2–2.5 μm wide. Cystidia none. Basidia basally clamped and often bent, clavate, 14–25 × 4.3–5.7 μm (MSK 12124), 18–26.5 × 5.5–6.6 μm (MSK 12123), thin-walled, hyaline (basidioles yellowish), with 2–4 sterigmata, 2.5–4.7 × 0.5–0.7 μm. Spores smooth, ellipsoid, (4.3)5.3–6.2(6.5) × 3.2–4(5) μm, greenish golden yellow or brownish yellow in mass, often with an oildrop, apiculus negligible, with thickened wall, IKI–.

According to Jülich (1984) the diagnostic feature is the prominent irpicoid hymenophore, which is reticulate at early stages. *Leucogyrophana pulverulenta* also has raduloid hymenophore with ridges up to 1.5 mm high, but its basidia are longer, 20–52 μm, and spores are slightly larger, reaching 8 × 5 μm (Ginns, 1978). According to Domański (1991) the hymenophore of *L. pinastri* is reticulately folded to conically toothed, and of *L. pulverulenta* folded, raduloid, or reticulately ridged.

Specimens examined: Minsk oblast, Minsk district, Pyatryshki village near Radashkovichy railway station (Minsk eminence), private plot — collected at the same locality twice during

seven years: on greenhouse slats and firewood, coll. N.G. Kordiyako 20 VIII 1992 (MSK 12124), on timber and partly going on ground, coll. N.G. Kordiyako 11 IX 1999 (MSK 12123).

The species is reported from many European countries, and known from North America, Africa, New Zealand (Jülich, 1984; Domański, 1991).

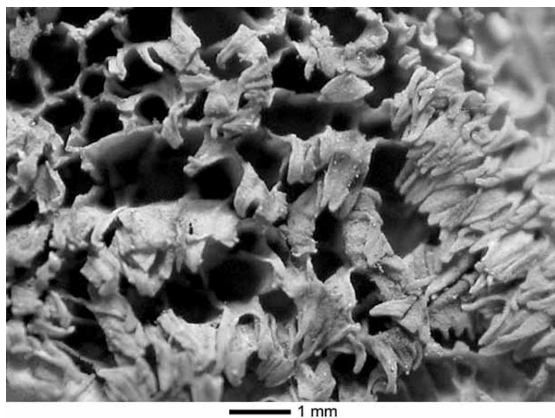


Fig. 13. *Leucogyrophana pinastri* (MSK 12123): view of hymenophore.

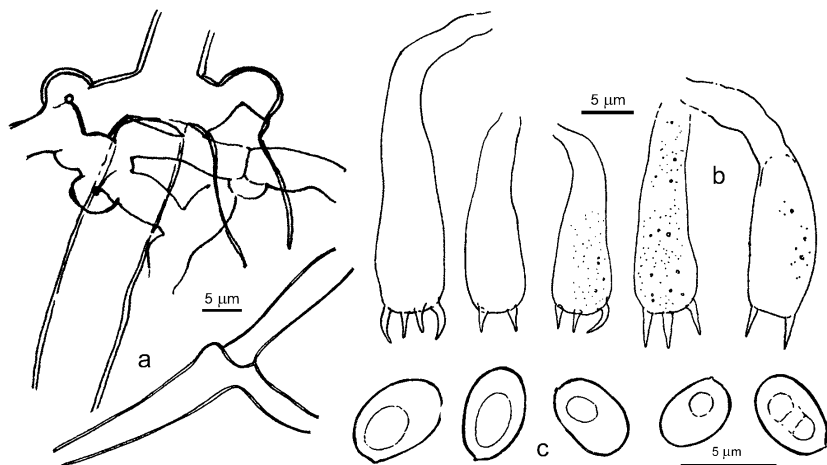


Fig. 14. *Leucogyrophana pinastri* (MSK 12123): a — subicular hyphae, b — basidia, c — spores.

9. *Phanerochaete calotricha* (P. Karst.) J. Erikss. & Ryvarden

Fig. 15.

Basidioma effused, membranaceous, more or less adnate, loosening from the substratum when old, 0.15–0.2 mm thick in dry state, ca 4 × 1 cm, cream-colored to light ochraceous; hymenial surface smooth, cracking and showing paler subiculum in cracks; margin distinct or thinning out, narrow, 0.3–0.5 mm wide, paler than hymenial surface, in some areas with prominent

cream-colored hyphal cords 0.3–0.5 mm wide. Hyphal system monomitic, hyphae clampless or with occasional clamps arranged single or double per septum, (2)4–6.5(8.5) μm wide, hyaline, yellow in central parts of hyphal cords, wall thin to thickened, smooth. Basal layer well developed, composed of horizontally arranged, rather densely packed hyphae. Cystidia few, little differentiated, cylindrical, slightly tapering to the apical end or fusoid, ca 30–35 \times 2.5–3.2 μm . Basidia narrowly clavate, 33–42 \times 5 μm , with four short sterigmata. Spores smooth, ellipsoid or short cylindrical, 4.5–5.5 \times 2.5–2.7 μm , hyaline or with refractive contents, with barely thickened wall, IKI–.

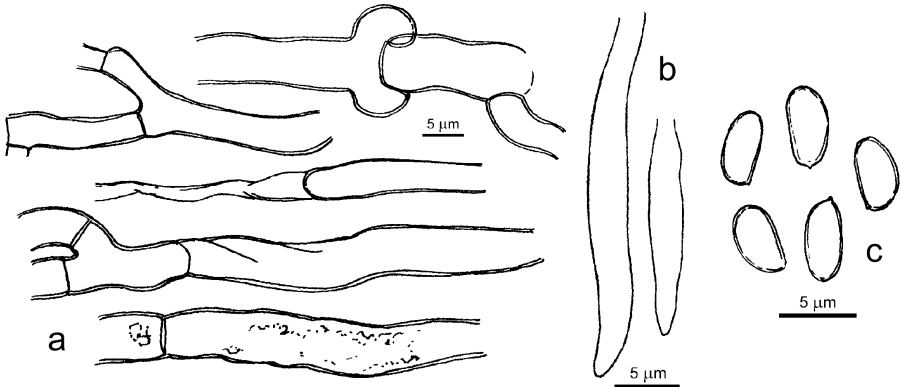


Fig. 15. *Phanerochaete calotricha* (MSK 4656): a — subicular hyphae, b — cystidia, c — spores.

The hymenium is partly destroyed by another fungus and the main features available are in the hyphal morphology. *Phanerochaete galactites* resembles *Ph. calotricha* and is sometimes without cystidia, but when occurring, they are heavily encrusted. Moreover in the subhymenium of *Ph. galactites* there is often amorphous oily matter and crystals in old specimens (Eriksson *et al.*, 1978).

Specimen examined: Minsk oblast, Lahoisk district, 0.6 km NE of Litsvinkava village (Minsk eminence), *Picea abies* forest of *Corylus avellana*–*Stellaria holostea* type, with *Alnus incana*, at base of a dead standing *Corylus avellana*, on naked wood under detached bark, coll. E.O. Yurchenko 16 II 1999 (MSK 4656; H.K., LE).

In Europe *Ph. calotricha* is known as a rare or scattered species in the Nordic countries (Eriksson *et al.*, 1978; Kotiranta, 2001), and reported also from NW Russia (Bondartseva *et al.*, 1999).

10. *Phanerochaete cremeoohracea* (Bourdot & Galzin) Hjortstam

Fig. 16.

Basidiomata effused, pale ochraceous (light isabelline), 3–8 \times 2.5–7 mm, margin fibrillose, radiating, then porulose and fragmented into minute patches; hymenial surface smooth, with age strongly cracking, showing pure white fibrillose subiculum in cracks. Hyphal system monomitic, hyphae thin-walled, hyaline, clampless. Subicular hyphae more or less horizontally arranged, 2.5–3.3 μm wide. Subbasidial hyphae 3.2–3.3(5.2) μm wide. Subhymenium and lower part of basidia and basidioles encrusted by yellowish crystalline material. Cystidia none. Basidia basally simple septate, clavate, 26–33.5 \times 4.5–6(7) μm , hyaline, moderately thin-walled, with four sterigmata at the beginning wide and rounded, when mature slender and acute, 3–5.5 μm

long. Spores smooth, short cylindrical to slightly allantoid, $(4.2)4.8\text{--}6.5 \times 2.5\text{--}2.8(3) \mu\text{m}$, hyaline, thin-walled, IKI—.

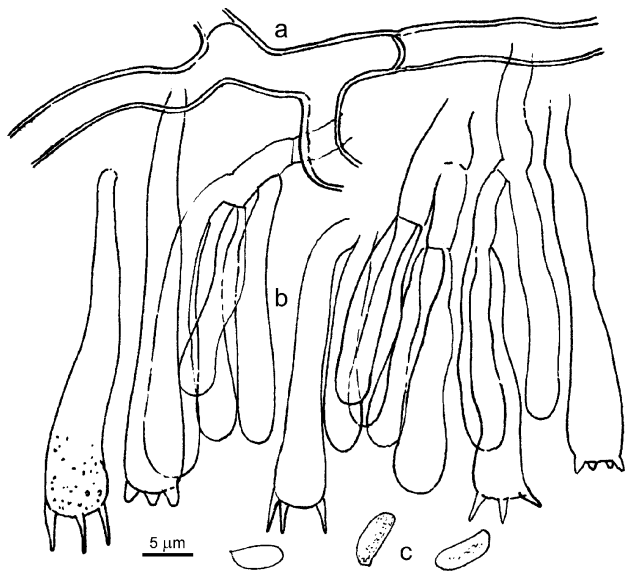


Fig. 16. *Phanerochaete cremeo-ochracea* (MSK 5120): a — subicular hypha, b — portions of hymenium, c — spores.

Ph. tuberculata is a close species, but it differs by tuberculate hymenophore, occasional clamps on subicular hyphae, and ellipsoid spores $3\text{--}4 \mu\text{m}$ wide (Eriksson *et al.*, 1978). Also very similar species is *Ph. jose-ferreirae*, but it has longer, slightly S-formed spores.

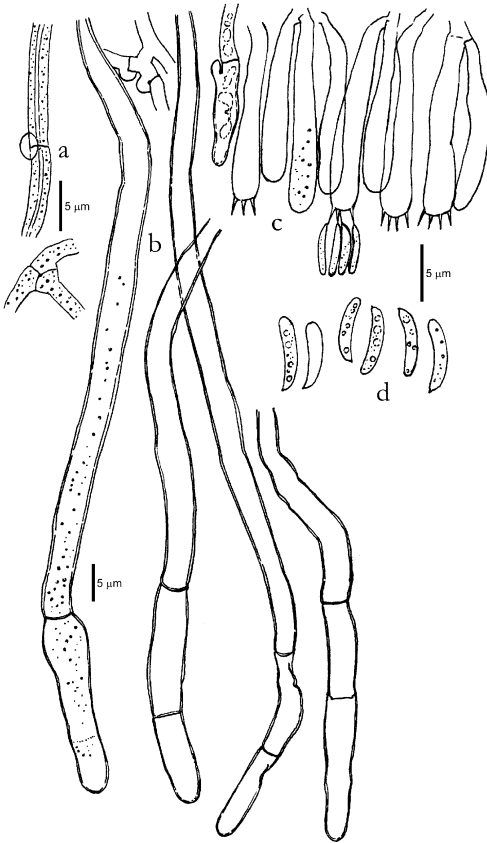
Specimen examined: Minsk district, 1.6 km NE of Dzyakhnouka village (Minsk eminence), *Picea abies* forest with *Alnus incana*, *Populus tremula*, and *Salix caprea*, on bark of dead, still-attached twigs of *Malus sylvestris*, 3–8 mm in diam, coll. E.O. Yurchenko 13 VI 1995 (MSK 5120, H.K., TAA).

The species is rare in Europe, known from Austria and France (Jülich, 1984).

11. *Phlebia tristis* (Litsch. & S. Lundell) Parmasto

Fig. 17, 18.

Basidiomata totally effused, closely adnate, very thin ($30\text{--}100 \mu\text{m}$ thick in dry state, $100\text{--}150 \mu\text{m}$ thick in KOH solution), translucent in some areas, dirty cream-colored, waxy, $15\text{--}25 \times 2\text{--}6$ mm. Margin white, thinning out, very narrow, minutely fibrillose. Hymenial surface (lens!) with scattered minute yellowish drops or tuberculi of resinous matter, dissolving in KOH. Hyphal system monomitic, hyphae clamped, sinuous, hyaline, very thin-walled. Subicular hyphae richly branched, $1.6\text{--}2.2 \mu\text{m}$ wide. Subbasidial hyphae with refractive contents, $1.3\text{--}2.3 \mu\text{m}$ wide. Cystidia narrowly clavate (tubular), with 1–4 refractive adventitious septa, $85\text{--}100 \times 3.3\text{--}6.3 \mu\text{m}$, hyaline, often refractive, slightly thick-walled. Basidia forming a dense palisade, hyaline or pale yellowish, basally clamped, narrowly clavate or cylindrical, $17\text{--}22 \times 2.3\text{--}3.7 \mu\text{m}$, with four very thin sterigmata *ca* $2.5 \mu\text{m}$ long. Spores smooth, slightly allantoid, $4.5\text{--}6.8 \times 0.8\text{--}1.2 \mu\text{m}$, hyaline, thin-walled, IKI—.



The specimen described from Finland (Kotiranta, Saarenoksa, 1993) had somewhat thicker (6–8 µm) cystidia without septa.

Specimen examined: Barysau district, 1.5 km SSE of Smolina village, at permanent sample plot 'Pinetum1/Minsk eminence', *Pinus sylvestris* forest of *Vaccinium myrtillus*-*V. vitis-idaea*-*Pleurozium schreberi* type, on fallen branch of *Pinus sylvestris*, on naked wood, coll. E.O. Yurchenko 12 VII 2003 (MSK 6322).

The species is rare in Europe, but known e.g., from Spain, Norway, Sweden, and Finland (Kotiranta, Saarenoksa, 1993).

Fig. 17. *Phlebia tristis* (MSK 6322): a — hyphae, b — cystidia, c — basidia and basidioles, d — spores.

12. *Phlebiella tulasnelloidea* (Höhn. & Litsch.) Bondartsev & Singer

Fig. 19.

Basidiomata effused, closely adnate, barely visible to the naked eye, very thin (20–30 µm thick when dry), 3–35 × 1.5–15 mm, waxy, smooth to minutely tuberculate, greyish, or dirty whitish, shining under a lens; margin thinning out. Subiculum consisting of closely packed thin layer of barely discernible hyphae intermixed with crystalline material, with projecting, loosely arranged basidioles and basidia. Cystidia none. Basidia almost pleural (with short side outgrowth at base), ca 15–17 × 5–7 µm, hyaline, thin-walled. Spores minutely but distinctly and densely warted, broadly ellipsoid or subglobose, depressed near the apiculus, 4.3–5.3 × 3.5–4.2 µm, hyaline, thin-walled, IKI–.

Specimen examined: Minsk oblast, Lahoisk district, ca 1 km NE of Litsvinkava village, permanent sample plot 'Piceetum1/Minsk eminence', *Picea abies* forest of *Corylus*-*Stellaria holostea*-*Oxalis* type, with *Populus tremula*, *Quercus robur*, and *Acer platanoides*, on naked wood and bark pieces of fallen *Populus tremula* branch, coll. E.O. Yurchenko 30 IV 2001 (MSK 5871, KRAM-F).

It is rather common species in Europe, but neglected due to inconspicuous basidiomata. It also occurs in North America, Australia, and New Zealand (Domański, 1991).

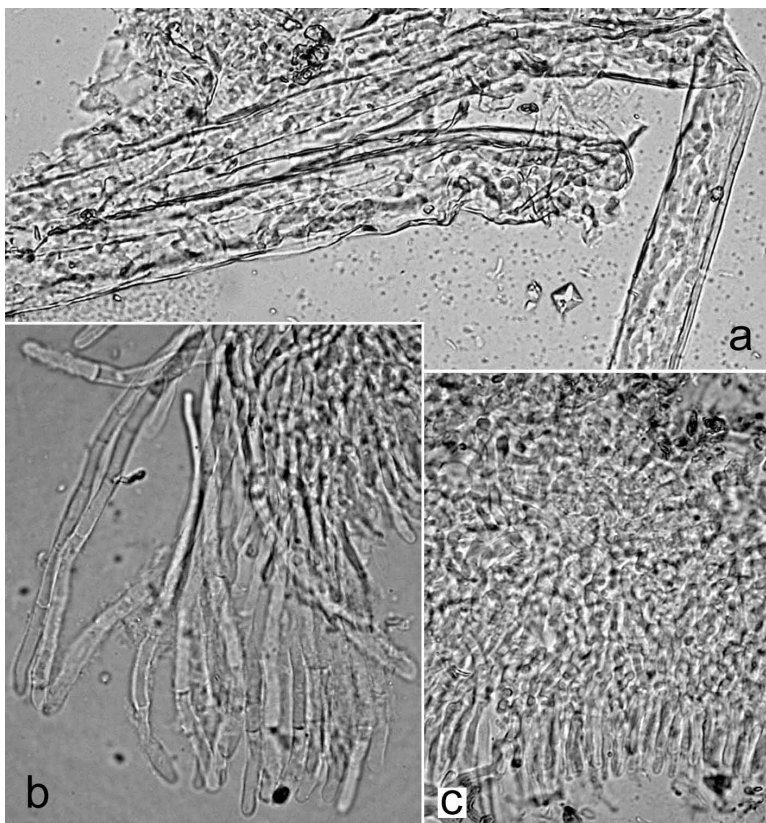


Fig. 18. *Phlebia tristis* (MSK 6322): a — hyphae inside wood vessels, b — cluster of cystidia, c — vertical section of the fruitbody.

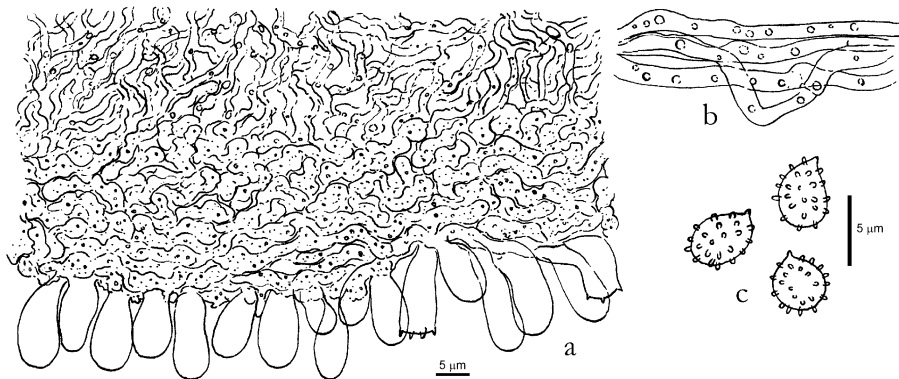
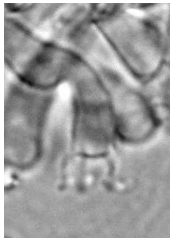
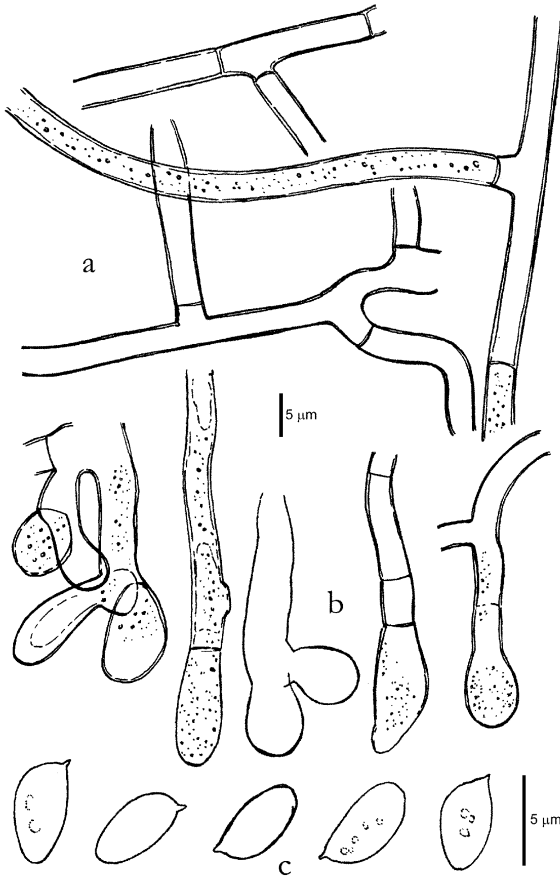


Fig. 19. *Phlebiella tulasnelloidea* (MSK 5871): a — section through basidioma, b — hyphae, c — spores.

13. *Sistotrema efibulatum* (J. Erikss.) Hjortstam

Figs. 20, 21.



Basidiomata very thin, almost invisible, discontinuous, consisting of very small porulose or fibrose patches, 0.5–3.5 × 0.4–1.2 mm, whitish or greyish, under a lens white, with indistinct margin. Hyphal system monomitic, hyphae hyaline, thin-walled, branching at right angles, clampless, 3.8–4.3 µm wide. Cystidia none. Basidia urniform, 19.5–20 × 6.3–6.7 µm, hyaline, thin-walled, with 4 or 6 sterigmata. Spores smooth, ellipsoid, narrowly ellipsoid, or ovoid, 4.2–6 × 2.5–3.3 µm, hyaline, thin-walled, IKI–.

Specimen examined: Minsk oblast, Lahoisk district, ca 1 km NE of Litsvinkava village, permanent sample plot 'Piceetum1/Minsk eminence', *Picea abies* forest of *Corylus-Stellaria holostea-Oxalis* type, with *Populus tremula*, *Quercus robur*, and *Acer platanoides*, on bark of fallen *Picea abies* twig 7 mm in diam, coll. E.O. Yurchenko 30 IV 2001 (MSK 5881, H.K.).

The species is rare in Europe, but known e.g., from Nordic countries (Eriksson *et al.*, 1984).

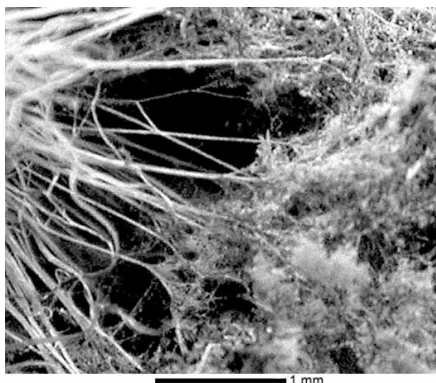
Fig. 20. *Sistotrema efibulatum* (MSK 5881): a — subicular hyphae, b — basidioles, c — spores.

Fig. 21. *Sistotrema efibulatum* (MSK 5881): basidium.

14. *Tomentella fibrosa* (Berk. & M.A. Curtis) Kõljalg

Figs. 22–24.

Basidioma very loose, pellicular, light brown, in patches, 2–10 × 1.5–9 mm, connected by numerous yellowish (lens!) hyphal cords. Hyphal system dimitic, all hyphae clampless. Hyphal cords 8–28 μm wide, consisting of skeletal and thin-walled hyphae. Generative subicular hyphae 3.3–3.5 μm wide, pale yellow to yellow in KOH, moderately thin-walled. Skeletal hyphae hair-like, slightly sinuous, 0.8–1.3 μm wide, yellowish. Subbasidial hyphae hyaline or subhyaline, 2–2.7 μm wide. Cystidia in clusters, with thickened walls, cylindrical, more or less distorted, uneven, apically obtuse, ca 200 μm long, 5–6.3 μm wide, with 10–11 simple septa, yellow-colored, paler and slightly widened towards the tip. Basidia basally simple septate, clavate, stalked, with constrictions, some with an adventitious septum, 48–62 × 5–8 μm, ca 2 μm wide at base, hyaline to yellowish, guttulate at early stages, thin- or slightly thick-walled, with 1–4 sterigmata 5.5–11.5 × 1.5–1.6 μm. Spores warted, globose or subglobose, slightly flattened near the apiculus, 5.2–6.5 × 4.5–6.2 μm, brownish yellow, apiculus clear, more or less prominent, subhyaline.



Hymenium and hyphal cords of this specimen were intermixed with living stipe base hairs of *Mycena galericulata* growing on the bark.

Fig. 22. *Tomentella fibrosa* (MSK 6282): fructification and hyphal cords (right) associated with stipe basal hairs of *Mycena galericulata* (left).



Fig. 23. *Tomentella fibrosa* (MSK 6282): a — hyphal cord with adhered echinulate spores of another *Tomentella* species, b — skeletal hypha, c — subicular hyphae, d — cystidia.

Specimen examined: Minsk oblast, Lahoisk district, ca 1 km NE of Litsvinkava village, permanent sample plot 'Piceetum1/Minsk eminence', *Picea abies* forest of *Corylus–Stellaria holostea–Oxalis* type, with *Populus tremula*, *Quercus robur*, and *Acer platanoides*, on bark of fallen *Corylus avellana*, coll. E.O. Yurchenko 9 XI 2003 (MSK 6282).

The species is not rare and known in many European countries.

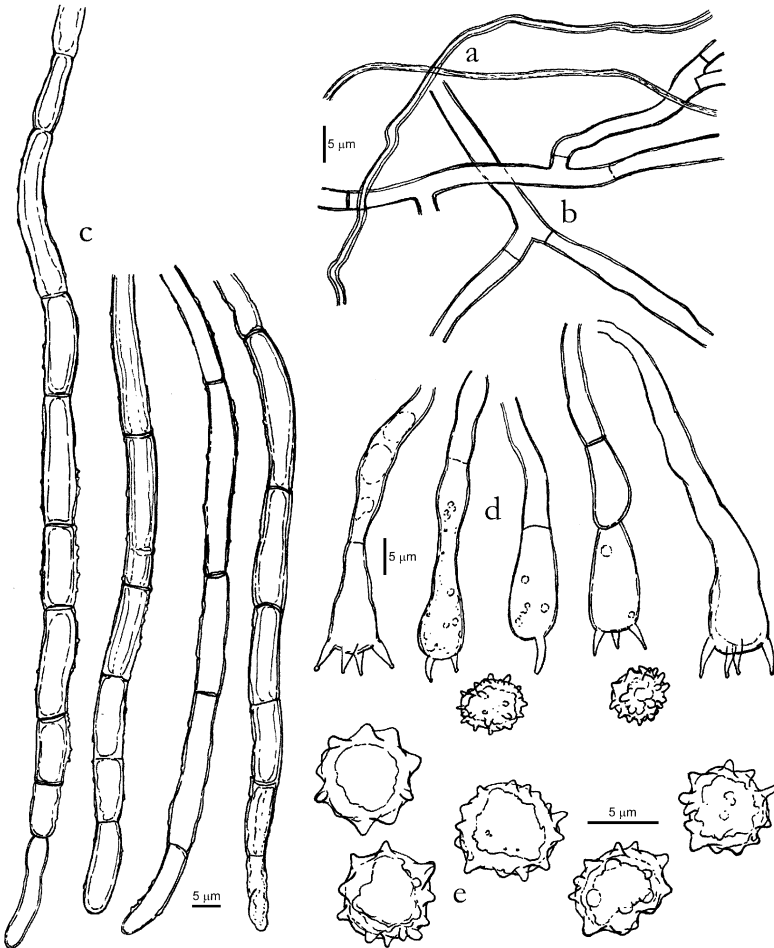


Fig. 24. *Tomentella fibrosa* (MSK 6282): a — skeletal, b — generative hyphae, c — cystidia, d — basidia, e — spores.

15. *Tubulicrinis sororius* (Bourdot & Galzin) Oberw.

Figs. 25, 26.

Basidiomata effused, closely adnate, very thin, ca 3–40 × 1.5–6 mm, greyish white, under a lens loose, discontinuous, more or less even or floccose, glittering due to the bristle-like projecting lycocystidia. Hyphal system monomitic, hyphae clamped, 1.7–2.2 µm wide, hyaline, thin-

slightly thick-walled. Lycocystidia distinctly capitate (occasionally cylindrical), $45\text{--}55 \times 7\text{--}9.5 \mu\text{m}$ (at base), apex $6\text{--}10 \mu\text{m}$ wide, with slightly thickened wall, smooth or coarsely encrusted, up to $12.5 \mu\text{m}$ wide including the incrustation, lumen mostly gradually widening towards the apex. Basidia basally clamped, $ca\ 10\text{--}12 \times 4\text{--}4.5 \mu\text{m}$. Spores smooth, allantoid, $(4.6)5.8\text{--}6.7(8) \times (1.3)1.5\text{--}1.7 \mu\text{m}$, hyaline, very thin-walled, IKI–.

Occasional lycocystidia in the specimen were observed 0.3–0.5 mm apart of fruitbody margin with connecting hyphae invisible under a binocular lens.

Specimen examined: Hrodna oblast, Smarhon' district, 2.8 km N of Kreva settlement, permanent sample plot 'Tremuletum1/Ashmyany eminence', *Populus tremula* forest of *Vaccinium myrtillus*–*Oxalis* type, with *Picea abies*, on fallen, naked *Pinus sylvestris* twig, 6–9 mm in diam, coll. E.O. Yurchenko 5 VI 2003 (MSK 6303).

The species is relatively little collected in Europe but known e.g., from Germany, France, Spain, Finland, Sweden, Denmark, Norway (Jülich, 1984; Hjortstam et. al., 1988; Kotiranta, 2001), and North America (Domański, 1992).

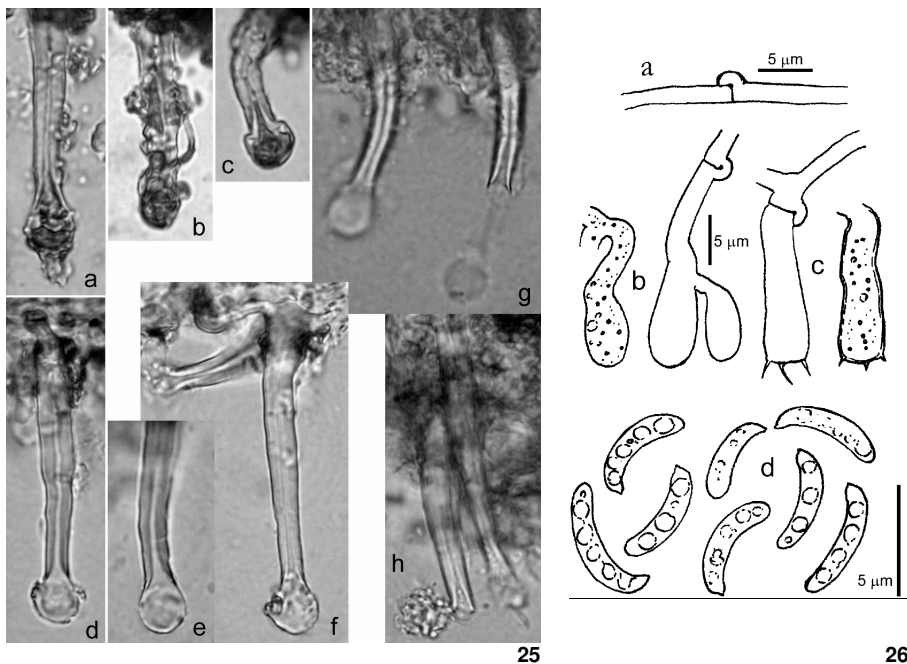


Fig. 25, 26. *Tubulicrinis sororius* (MSK 6303). Fig. 25: a–c — lycocystidia in IKI, d–h — lycocystidia in KOH, with differently dissolved incrustations and apical swellings. Fig. 26: a — hypha, b — basidioles, c — basidia, d — spores.

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