

# New lichenicolous fungi from Eurasia

MIKHAIL P. ZHURBENKO

Zhurbenko, M. 2007: New lichenicolous fungi from Eurasia. *Graphis Scripta* 19: 1–9. Stockholm. ISSN 0901–7593.

Five lichenicolous ascomycetes, *Polycoccum ventosicola*, *Pronectria protopannariae*, *Skyttea dacampiae*, *Stigmidium leprariae* and *Sphaerellothecium soechtingii*, are described as new to science from Norway. *S. soechtingii* is also present in Russia and Austria.

Mikhail P. Zhurbenko, Komarov Botanical Institute, Russian Academy of Sciences, Professor Popov 2, St. Petersburg, 197376 Russia. E-mail: zhurb@MZ3838.spb.edu

In August 2003, during an excursion of the Nordic Lichen Society to Norway, Troms County, Storfjord Municipality of the Skibotn area, in the boreal and alpine vegetation zones, five new species of lichenicolous fungi were collected and are herein described. Additional specimens of one of the species were later found in collections from Siberia and Austria.

## Materials and Methods

Materials were examined using standard microscopic techniques and LOMO microscopes MBS-1 and MBR-3. Microscopic characters were studied using hand-made sections or squash preparations in water, 10 % KOH (K), erythrosin, Congo red (CR), or lactophenol cotton blue (LCB). Amyloid reactions were tested in 1% Lugol's Iodine solution, directly (I) and after a KOH pre-treatment (K/I). A 1 % solution of Brilliant Cresyl blue (BCr) was used to study metachromatic reactions of the ascospores, peridium and vegetative hyphae. Micrographs were taken with the use of a Nikon Coolpix 5400 digital camera. Ascospore measurements and length/breadth (l/b) ratios are given as: (min.–){X–SD}–X–{X+SD}–(max.) rounded to the nearest 0.5 µm,

where min. and max. are the extreme values, X the arithmetic mean, and SD the corresponding standard deviation. Specimens examined are housed in the Komarov Botanical institute herbarium (LE), unless otherwise indicated.

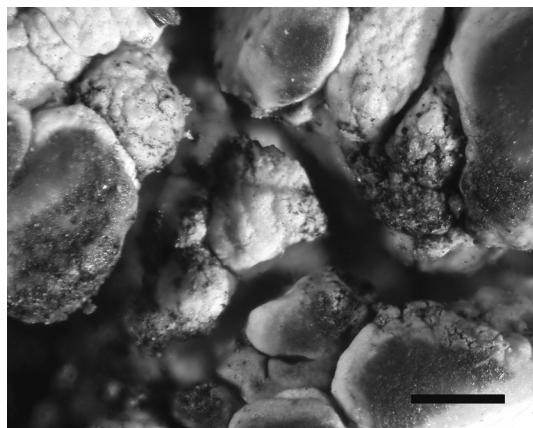
## The species

### ***Polycoccum ventosicola* Zhurb. sp. nov.**

Fungus in thallis et apotheciis lichenis *Ophioparma ventosa* parasiticus. Similis *Polycoccum minutulum*, sed ab ea imprimis differt peritheciis minoribus, ascosporis latioribus, cecidiis non producentibus, et hospite diverso.

Type: Norway, Troms, Storfjord, Skibotn, between Luheavarri and E part of Davimus Viessogasgaisi, 69°15'N, 20°24'E, alt. 800 m, mountain slope with siliceous boulders among dwarf-shrub-lichen-moss tundra, on apothecia and thallus of *Ophioparma ventosa* growing on a boulder, 9 Aug. 2003, Zhurbenko 03248 (LE, holotype).

Fig. 1.

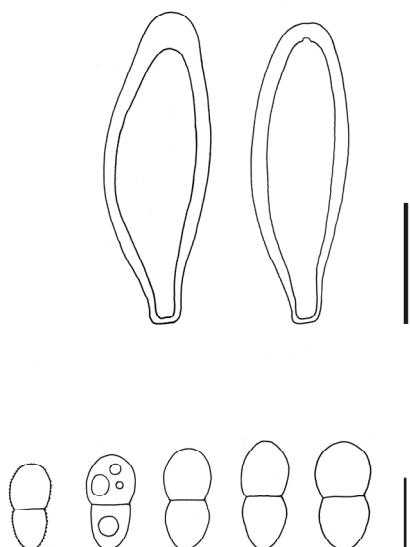


**Figure 1.** *Polycoccum ventosicola*, holotype. Left. Habitus. Upper right. Ascii. Lower right. Ascospores. Bars: Left = 1 mm, Upper right = 20 µm, Lower right = 10 µm.

*Vegetative hyphae* pale to dark olive-brown, flexuose, 2–4 µm diam., immersed. *Perithecia* subglobose, 40–80 µm diam., ostiolate, more or less immersed. Peridium olive-brown, turning olive in KOH. Hamathecium composed of septate, branched-anastomosed filaments 1–1.5 µm diam. Hymenial gelatine I–. *Asci* subcylindrical to elongate-clavate, with thick wall and short stalk, 45–60 × 14–16 µm, with short ocular chamber, 8-spored, I–. *Ascospores* broadly soleiform, with rounded apices, 1-septate, with a larger upper cell, constricted at the septum, coarsely verruculose, halo not seen, at first almost colourless but soon medium olive to finally dark brownish olive (turn olive in KOH), (12)–13–14–15 × (6)–6.5–7–7.5(–8) µm, l/b = 1.8–2–2.2(–2.5) (n = 37, in water), irregularly biseriate. *Anamorph* not found.

*Matrix and biology.* The fungus grows on thalli and apothecia of *Ophioparma ventosa*. It is clearly pathogenic, since it causes conspicuous dark infection spots on the host thallus.

*Distribution.* Known from two localities in Northern Norway.



*Discussion.* *Polycoccum ventosicola* is very similar to *P. minutulum* Kocourk. & F.Berger (Kocourková & Berger 1999) growing on *Trapelia placodiodoides*, but differs by its smaller perithecia, wider ascospores, the absence of gall-formation, and different host (Ophioparmaceae R.W.Rogers & Hafellner vs. Trapeliaceae M.Choisy ex Hertel, both within Lecanorales). *Polycoccum rugulosarium* (Linds.) D.Hawksw. is similar to *P. ventosicola* in its ascospore size and small perithecia, but differs by having broader interascal filaments and more or less equal-celled ascospores. It also grows on different hosts (*Caloplaca* spp.) and is known only from the Southern Hemisphere (Hawksworth & Diederich 1988). Just two other lichenicolous fungi have been previously reported on *Ophioparma ventosa*: *Muellerella ventosicola* (Mudd) D.Hawksw., which is not uncommon on the host, and *Taeniolella pertusariicola* D.Hawksw. & H.Mayrhofer; however, the latter report is somewhat uncertain (Alstrup & Hawksworth 1990).

*Additional specimen examined:* Norway. Troms: Storfjord, Skibotn, Skibotn River, 700

m WNW of summit Bremfjellet, 69°20'N, 20°21'E, alt. 50 m, in deciduous forest, on *Ophioparma ventosa* (thallus) on a boulder, 6 Aug. 2003, Zhurbenko 0315 (LE).

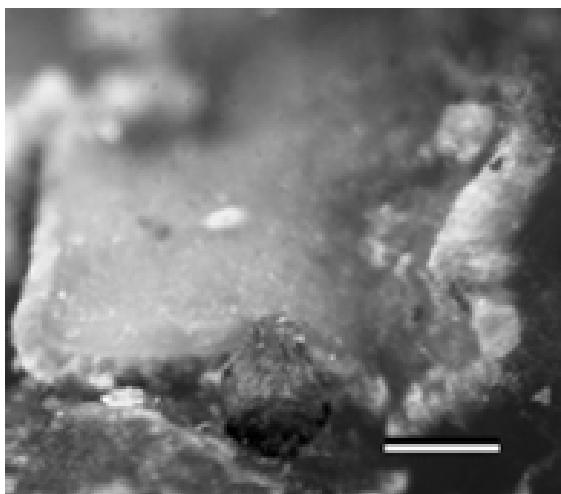
**Pronectria protopannariae** Zhurb. sp.  
nov.

Fungus in thallis et apotheciis lichenis *Protopannaria pezizoides* parasiticus. Speciei *Pronectria leptalea* similis, sed ab ea imprimis differt ascosporis partim simplicibus, majoribus, (9.5–)10.5–12–13(–15) × (6.5–)6.5–7.5–8.5(–9.5) µm, et hospite diverso.

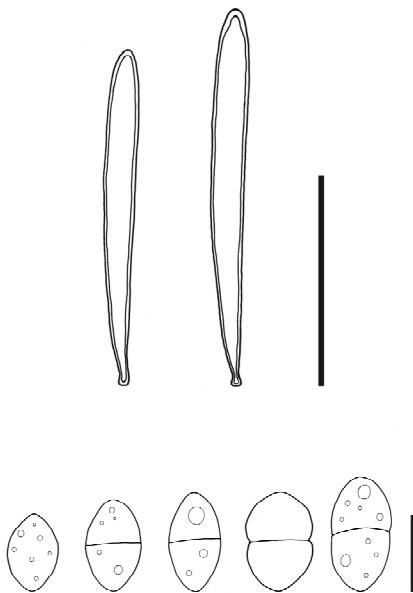
Type: Norway, Troms, Storfjord, Skibotn, between Luhcavari and Stuoraoaivi, 69°16'N, 20°25'E, alt. 700 m, mesic gravelly roadside, on *Protopannaria pezizoides* (thallus and apothecia), associated with *Cercidospora punctillata*, 8 Aug. 2003, Zhurbenko 03126 (LE, holotype).

Fig. 2.

*Perithecia* narrowly obpyriform, 400 µm high and 200–250 µm diam. with a truncate, non-setose papillae c. 100 µm wide; carmine to wine red, exposed parts more intensively pigmented; immersed with only the ostiole protruding to sessile (wall rough when exposed). Peridium c. 50 µm thick, composed of two layers, inner layer of thin-walled, elongate cells, orange in squash preparation, K+ purple, getting yellow in lactic acid. The ostiolate canal with numerous periphyses. Ascii unitunicate, cylindrical, 80–89–100(–110) × 7–8–9.5(–10) µm (n = 7, in water), 8-spored, I–, K/I–. Ascospores symmetrical, mostly 1-septate and ellipsoidal to broadly ellipsoidal, and usually slightly constricted at the septum, sometimes simple and subglobose, wall smooth to tuberculate with age, colourless or occasionally pale brownish grey when old, with conspicuous, sometimes bulging guttules, (9.5–)10.5–12–13(–15) × (6.5–)6.5–7.5–8.5(–9.5) µm, l/b = (1.1–)1.4–1.6–1.9(–2.3) (n = 58, in



**Figure 2.** *Pronectria protopannariae*. holotype. Above. Habitus. Upper right. Ascii. Lower right. Ascospores. Bars: Above = 0.25 mm, Upper right = 50 µm, Lower right = 10 µm.

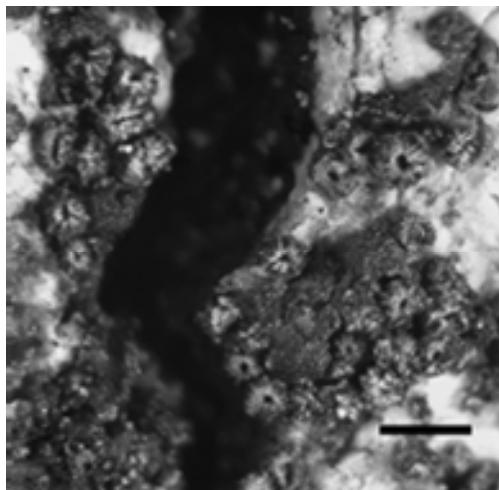


water, phloxin or K), uniseriate and sometimes slightly overlapping in ascus. Anamorph not found.

**Matrix and biology.** The fungus grows on healthy-looking *Protopannaria pezizoides*, mostly in thallus, occasionally in the hymenium. No pathogenic effect was observed.

**Distribution.** The species is known only from the type locality which is within the alpine zone. The species has also been searched for on host material (about 100 specimens) from the Arctic (mainly from Siberia), but as no specimen has been found, it may be rare or absent in that zone.

**Discussion.** After Rossman et al. (1999), the new species is closest to *Pronectria leptalea* (J. Steiner) Lowen (= *Xenonectriella leptaleae* (J. Steiner) Rossman & Lowen). However, that species differs from *Pronectria protopannariae* by always having 1-septate and smaller ascospores ( $8-12 \times 6.5-8 \mu\text{m}$ ) and by different host family (Physciaceae Zahlbr. vs. Pannariaceae Tuck.). The present work follows



**Figure 3.** *Skyttea dacampiae*, holotype. Above. Habitus. Upper right. Ascii and excipular hairs. Lower right. Ascospores. Bars: Above = 0.25 mm, Upper right = 20  $\mu\text{m}$ , Lower right = 10  $\mu\text{m}$ .

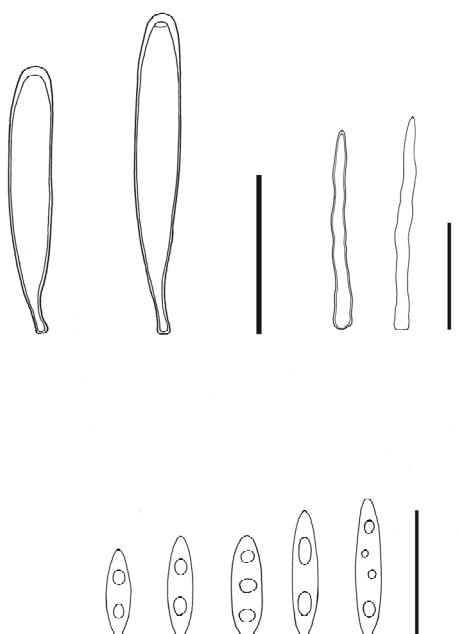
that of Diederich (2003) by referring the species to *Pronectria*, rather than to *Xenonectriella*. Previously known nectrioid fungi on the Pannariaceae are: *Paranectria affinis* (Grev.) Sacc. on *Fuscopannaria ahlneri*, *Paranectria oropensis* (Ces.) D.Hawksw. & Piroz. on *Parmeliella atlantica* and *Nectriopsis lecanodes* (Ces.) Diederich & Schroers on *Degelia plumbea*.

### **Skyttea dacampiae** Zhurb. sp. nov.

Fungus in thallis lichenis *Dacampia hookeri* incolens. *Skyttea thelotrematis* similis, sed ab ea imprimis differt ascomatibus sessilibus, pilis excipularibus longioribus, et hospite diverso.

Type: Norway, Troms, Storfjord, Skibotn, between Luhcavarri and E part of Davimus Viessogasgaisi,  $69^{\circ}16'N$ ,  $20^{\circ}24'E$ , alt. 900 m, top of a mountain, mesic to dry calcareous fellfield with *Dryas*-lichen-moss tundra, on thallus of *Dacampia hookeri*, 9 Aug. 2003, Zhurbenko 0388 (LE, holotype).

Fig. 3.



*Ascomata* apothecoid, initially closed except for a pore-like opening, urceolate at maturity with an opening up to 0.15 mm diam., applanate-globose, sessile, markedly constricted at the base, 0.15–0.35 mm diam., about 0.2 mm tall, aggregated to contiguous, blackish with white striate rim around the pore produced by excipular hairs. Excipular hairs colourless, cylindrical, simple, straight to somewhat flexuose, 2–2.5 µm diam. and up to 40 µm long, with smooth and uniformly thin (not refractive) wall, bordering all lateral excipite and protruding around the pore. Epiphyllum pale glaucous green. Hymenium colourless, 30–40 µm tall. Subhymenium pale brownish olive, c. 5 µm tall. Excipite massive, composed of subglobose cells 3–8 µm diam. at the base and of elongate cells laterally, aeruginose green, but with an olivaceous hue in the basal part. All parts of apothecial sections  $\text{HNO}_3-$ ,  $\text{K}-$ , or excipite  $\text{K}+$  more olivaceous; paraphyses I+ (and  $\text{K}/\text{I}+$ ) yellow; ascoplast I+ orange; excipite partly I+ orange. Paraphyses filiform, straight, not branched, apically not enlarged, 1–1.5 µm diam. Asci subcylindrical, long-stalked, apices usually rounded or rarely flattened, unitunicate, thin-walled except for being apically thickened to 3 µm, ocular chamber not seen, opening by a pore,  $27–45 \times 4–6 \mu\text{m}$ , 8-spored, without any amyloid reaction. Ascospores colourless, fusiform, straight, simple, with a few large guttules, smooth-walled,  $(7–)7.5–8.5–10(–11) \times 2–2.5 \mu\text{m}$ ,  $l/b = 3.2–4.2–5.1(–5.5)$  ( $n = 10$ , in water), overlapping biseriate in ascus. Anamorph not found.

*Matrix and biology.* The fungus grows on healthy-looking thallus of *Dacampia hookeri*. No pathogenic effect was observed.

*Distribution.* The species is known only from the type locality which is in the alpine zone, and it seems to be rather rare. It was searched for but not found in 12 host collections from the Russian Arctic.

*Discussion.* According to Diederich & Etayo (2000), this new species is closest to *Skyttea thelotrematis* Diederich & Etayo, but the latter differs in its initially immersed, later erumpent ascomata, shorter excipular hairs which are up to 16 µm long, thicker paraphyses (1.5–2 µm diam.), higher hymenium, thicker and colourless subhymenium and a different host (*Thelotrema lepadinum*). Other previously known fungi on this host are *Stigmidium schaeferi* (A.Massal.) Trevis., which is more common, and *S. allogenum* (Nyl.) D.Hawksw.

### ***Sphaerellothecium soechtingii* Zhurb. & Alstrup sp. nov.**

Fungus lichenicola in thallis generis *Arthrorhaphis* crescents. Hyphae fuscae, verruculosae, BCr+ cyaneae vel aeruginosae. Ascomata perithecioidea, globosa, ostiolata, (fusc-)atra, 30–60 µm in diametro, semi-immersa. Peridium fuscum, textura angulari. Gelatina hymenialis I-, K/I-. Filamenta interascalia et ostiolaria non observata. Asci bitunicati, ellipsoidei vel subglobosi, (21–) 26.5–31–35.5(–41) × (12–)14–16.5–19(–22) µm magni, K/I-, 8-spori. Ascosporae anguste pediformes vel fusiformes, (1–)3(–5)-transseptatae vel submuriformes, ad septa constrictae, non halonatae, primo incoloratae deinde maxime pallide brunneae, (10–)11.5–13–14.5(–15) × (3.5–)4–4.5–5 µm, longitudinis/ latitudinis ratio (2.5–)2.7–3–3.3(–3.7), plasma BCr+ cyanea vel aeruginosa, irregulariter 2–3-seriatae. Conidiomata non observata.

Type: Russia, Siberia, Taimyr Peninsula, Byrranga Mts., at Levinson-Lessing Lake, boulder field among dwarf shrub-lichen-moss tundra, 74°24'N, 98°49'E, alt. 100 m, on thallus of *Arthrorhaphis alpina*, associated with *Cercidospora soror*, 30 July 1995, Zhurbenko 95231 (LE, holotype).

Fig. 4.

**Etymology.** Dedicated to the Danish lichenologist Ulrik Søchting.

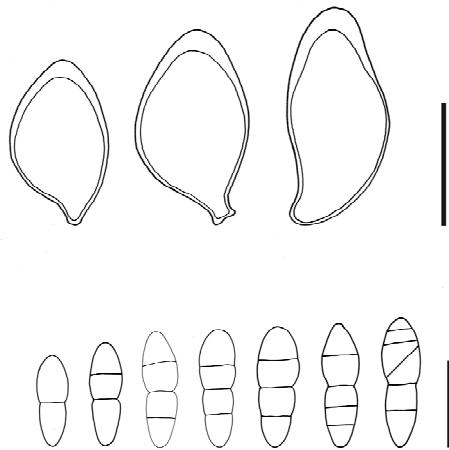
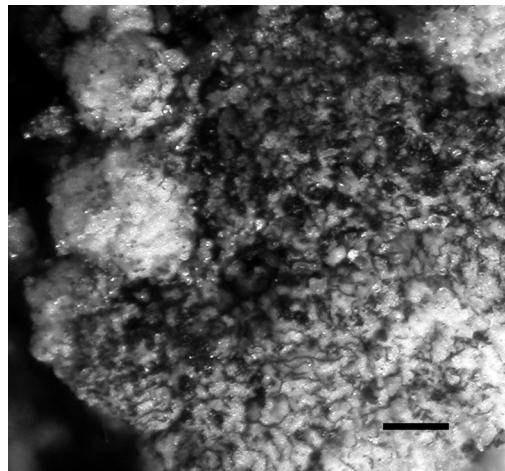
*Vegetative hyphae* conspicuous, blackish, c. 5  $\mu\text{m}$  diam., forming a hyphal net, moderately branched, flexuose, superficial to subimmersed, with occasional upright branchlets; in squash preparations brown, pale and smooth or dark, verruculose and unevenly pigmented, BCr+ blue to blue-green. *Perithecia* evenly brownish black, glossy, globose, ostiolate, 30–60  $\mu\text{m}$  diam., semi-immersed to occasionally nearly sessile, scattered. *Peridium* brown, of *textura angularis*, consisting of polyhedral cells 5–10  $\mu\text{m}$  across, BCr+ dark blue, becoming more olive in K. Hymenial gel I–, K/I–. Interascal and ostiolar filaments not seen. *Asci* bitunicate, ellipsoidal to subglobose, tholus to 3  $\mu\text{m}$  thick, with no or a short foot, (21–)26.5–31–35.5(–41)  $\times$  (12–)14–16.5–19(–22)  $\mu\text{m}$  (n = 37, in water), 8-spored, K/I–, wall BCr–, plasma BCr+ blue. *Ascospores* narrowly soleiform (skittle-shaped), lower cells narrower than the upper ones, (1–)3(–5)-transseptate or rarely submuriform, constricted at the septa,

particularly at the central one, at first colourless then often pale olive-brown, smooth-walled, without halo, (10–)11.5–13–14.5(–15)  $\times$  (3.5–)4–4.5–5  $\mu\text{m}$ , l/b = (2.5–)2.7–3–3.3(–3.7) (n = 65, in water, BCr, or K), plasma BCr+ blue to blue-green, irregularly 2–3-seriate. *Anamorph* not found.

*Matrix and biology.* The fungus grows on the thalli of *Arthrorhaphis alpina*. It is a mild pathogen, since the host thallus turns grey with heavy infections.

*Distribution.* Known from the Alps (Austria) and northern Eurasia (Norway, Siberia).

*Discussion.* *Sphaerellothecium* species generally have 1-septate or sometimes 3-septate ascospores and submuriform ascospores have not before been reported. The spores of *S. soechtingii* are markedly constricted at the median septum, which is untypical for the genus. A key to the six species of lichenicolous fungi, formerly known on *Arthrorhaphis*, is presented in Hafellner & Obermayer (1995).



**Figure 4.** *Sphaerellothecium soechtingii*, holotype. Above. Habitus. Upper right. Ascii. Lower right. Ascospores. Bars: Above = 0.25 mm, Upper right = 20  $\mu\text{m}$ , Lower right = 10  $\mu\text{m}$ .

The one most similar to the new species is *Stigmidium arthrorhaphidis* Hafellner & Obermayer, known from the mountains of China and Nepal. However, it differs from *Sphaerellothecium soechtingii* in the absence of a superficial net of dark hyphae and 1-septate ascospores.

*Additional specimens examined* [all on thalli of *Arthrorhaphis alpina*]: **Norway.** *Troms:* Storfjord Municipality, Skibotndalen Valley, Skibotnelva River, 500 m NW of Kavelnes, 69°19'N, 20°21'E, alt. 70 m, slope with rocks and boulders in deciduous forest, 6 Aug. 2003, M. Zhurbenko 03252. *Finnmark:* Kautokeino, Virdneguoikka, S of Virdnejau'ri, UTM: FC063195, 17 Aug. 1983, Søchting 4346 (C). **Austria.** *Salzburg:* Hohe Tauern, Glocchner-Gruppe, Madelz südlich über der Rudolfshütte am Weissee in Stubachtal, alt. 2300–2500 m, 8 Sept. 1973, Søchting 2822 (C). **Russia.** *S. Chukotka:* Televeem River, 65°50'N, 175°05'E, nival mountain slope, 23 July 1979, I. Makarova 130.

### *Stigmidium leprariae* Zhurb. sp. nov.

Fungus lichenicola in thallis generis *Lepraria* crescents. Hyphae, hamathecium et conidiomata non observata. Ascomata perithecioidea, subglobosa, atra, 50–80 µm in diametro, semi-immersa vel sessilia, dispersa. Peridium olivaceo-fuscum, textura angulari, inaequaliter pigmentatum, BCr+ aeruginosum. Gelatina hymenialis I–, K/I–. Ascii bitunicati, anguste elliptici vel clavati, 30.5–36.5–42.5(–50) × (10–)11–12.5–14(–15) µm, 8-spori, K/I–, pariete BCr+ leviter violascenti. Ascosporeae incoloratae vel saepe leviter olivascentes, anguste pediformes, cellulis inaequalibus, 1(–3)-septatae, ad septum non sive leniter constrictae, guttatae, laeves, non halonatae, (12–)12.5–14–15(–17) × 4–4.5–5(–5.5) µm, longitudinis/latitudinis ratio (2.2–)2.7–3.1–3.5(–4.3), BCr+ violacea, irregulariter 2–3-seriate.

Type: Norway, Troms, Storfjord, Skibotn, between a road and Grustavsvingen River, 69°17'N, 20°29'E, alt. 160 m, slope with siliceous rocks and boulders in sparse deciduous forest, on thallus of *Lepraria neglecta* growing on soil, 7 Aug. 2003, Zhurbenko 03254 (LE, holotype).

Fig. 5.

*Vegetative hyphae* not observed. *Perithecia* evenly black, glossy, subglobose, sometimes somewhat conical above, ostiolate, 50–80 µm diam., semi-immersed to sessile, scattered. Peridium olive-brown, of *textura angularis*, consisting of unevenly pigmented polyhedral cells 3–8 µm across, K–, BCr+ blue-green. Hymenial gel I–, K/I–. Interascal and ostiolar filaments indistinct. *Asci* bitunicate, ellipsoidal to gradually clavate, sometimes with c. 5 µm thick tholus and long ocular chamber, stalk short or rather long, sometimes absent, 30.5–36.5–42.5(–50) × (10–)11–12.5–14(–15) µm (n = 8, in water), 8-spored, K/I–, wall BCr+ pale violet, plasma in immature asci BCr+ blue. *Ascospores* colourless to often pale grey-olive, narrowly soleiform (skittle-shaped), lower cell often slightly narrower than the upper one, occasionally fusiform, apices rounded or sometimes acute, 1(–3)-septate, not or slightly constricted at the septum, (12–)12.5–14–15(–17) × 4–4.5–5(–5.5) µm, l/b = (2.2–)2.7–3.1–3.5(–4.3) (n = 64, in water), distinctly guttulate, smooth-walled, without halo, BCr+ violet, overlapping and irregularly 2–3-seriate. *Anamorph* not found.

*Matrix and biology.* The fungus grows on the thallus of *Lepraria neglecta*. It is most probably parasymbiotic, since no damage to the host thallus was seen.

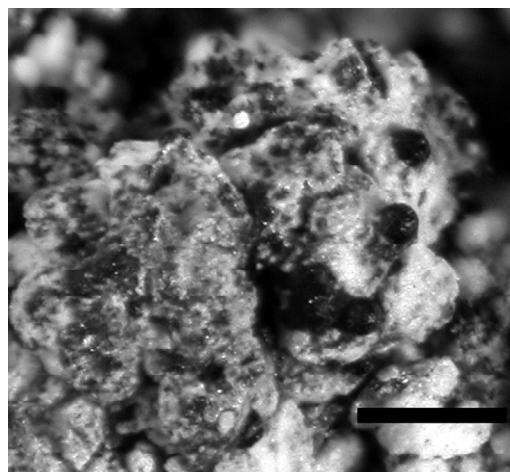
*Distribution.* The species is known only from the type locality.

*Discussion.* To the best of my knowledge, no *Stigmidium* or *Sphaerellothecium* species have been described from *Lepraria* as a host genus. Seven of 66 *Stigmidium* species known to me (*S. bellemerei* Cl.Roux & Nav.-Ros., *S. degelii* R.Sant., *S. frigidum* (Sacc.) Alstrup & D.Hawksw., *S. icmadophilae* R.Sant., *S. mycobilimbiae* Cl.Roux, Triebel & Etayo, *S. rivulorum* (Kernstock) Cl.Roux & Nav.-Ros., *S. xanthoparmeliacarum* Hafellner) are similar to *S. leprariae* by their ascocarps and ascospore sizes, metachromatic reactions (where known), negative reaction of the hymenial gel (where known), and hamathecial elements (where known) (Santesson 1984 & 1993, Hafellner 1994, Roux & Triebel 1994, Ihlen 1995, Zhurbenko & Santesson 1996, Molitor & Diederich 1997, Ihlen 1998, Roux et al. 1998, Calatayud & Triebel 1999, Sérusiaux et al.

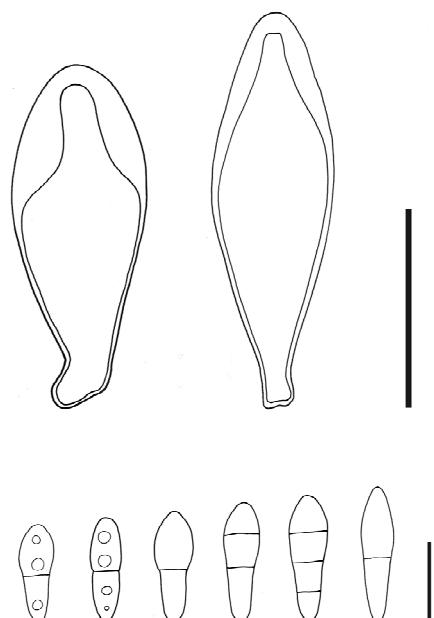
1999). *Stigmidium icmadophilae*, *S. rivulorum*, and *S. xanthoparmeliacarum* differs from *S. leprariae* by their pathogenicity. The remaining four species differ from *S. leprariae* by their permanently colourless ascospores. Within the species group, only *Stigmidium mycobilimbiae* and *S. xanthoparmeliacarum* have 1(–3)-septate ascospores, similar to those of *S. leprariae*; the others having just 1-septate ascospores.

### Acknowledgements

I wish to thank Dr. Arve Elvebakk, who made it possible for me to take part in the Nordic Lichen Society excursion to Norway. Dr. Gary Laursen is acknowledged for editing the English text and Dagmar Triebel for improving the Latin diagnoses.



**Figure 5.** *Stigmidium leprariae*, holotype. Above. Habitus. Upper right. Ascii. Lower right. Ascospores. Bars: Above = 0.25 mm, Upper right = 20 µm, Lower right = 10 µm.



## References

- Alstrup, V. & Hawksworth, D. L. 1990. The lichenicolous fungi of Greenland. *Meddelelser om Grønland, Bioscience* 31: 1–90.
- Calatayud, V. & Triebel, D. 1999. Stigmadium neofusceliae (Dothideales s.l.), a new lichenicolous fungus from Spain. *Nova Hedwigia* 69: 439–448.
- Diederich, P. 2003. New species and new records of American lichenicolous fungi. *Herzogia* 16: 41–90.
- Diederich, P. & Etayo, J. 2000. A synopsis of the genera *Skyttea*, *Llimoniella* and *Rhymbocarpus* (lichenicolous Ascomycota, Leotiales). *Lichenologist* 32: 423–485.
- Hafellner, J. 1994. Über Funde lichenicoler Pilze und Flechten auf Korsika (Frankreich). *Bulletin de la Société Linnéenne de Provence* 44: 219–234.
- Hafellner, J. & Obermayer, W. 1995. Cercidospora trypetheliza und einige weitere lichenicole Ascomyceten auf Arthrorhaphis. *Cryptogamie, Bryologie-Lichénologie* 16: 177–190.
- Hawksworth, D. L. & Diederich, P. 1988. A synopsis of the genus *Polycoccum* (Dothideales), with a key to accepted species. *Transactions of the British Mycological Society* 90: 293–312.
- Ihlen, P. G. 1995. The lichenicolous fungi on *Thamnolia vermicularis* in Norway. *Graphis Scripta* 7: 17–24.
- Kocourková J. & Berger, F. 1999. *Polycoccum minutulum* (Dothideales, Ascomycetes), a new lichenicolous fungus on *Trapelia placodioides*. *Czech Mycology* 51: 171–177.
- Molitor, F. & Diederich, P. 1997. Les pyrénolichens aquatiques du Luxembourg et leurs champignons lichénicoles. *Bulletin de la Société des Naturalistes Luxembourgeois* 98: 69–92.
- Rossmann, A. Y., Samuels, G. J., Rogerson, C. T. & Lowen, R. 1999. *Genera of Bionectriaceae, Hypocreaceae and Nectriaceae (Hypocreales, Ascomycetes)*. Studies in Mycology 47, Centraalbureau voor Schimmelcultures, Baarn/Delft.
- Roux, C. & Triebel, D. 1994. Revision des espèces de *Stigmadium* et de *Sphaerelloothecium* correspondant à *Pharcidia epicymatica* sensu Keissler ou à *Stigmadium schaeferi* auct. *Bulletin de la Société Linéenne de Provence* 45: 451–542.
- Roux, C., Navarro-Rosinés, P. & Tranchida, F. 1998. *Stigmadium bellemerei* sp. nov., champignon lichenicole non lichenisé (Verrucariales). *Cryptogamie, Bryologie-Lichénologie* 19: 221–228.
- Santesson, R. 1984. Fungi Lichenicoli Exsiccati Distributed by the Herbarium, University of Uppsala, Sweden. Fasc. I-II (No. 1–50). *Publications from the Herbarium, University of Uppsala, Sweden* 13: 1–20.
- Santesson, R. 1993. *Stigmadium degelii*, a new lichenicolous fungus. *Graphis Scripta* 5: 3–4.
- Sérusiaux, E., Diederich, P., Brand, A. M. & van den Boom, P. 1999. New or interesting lichens and lichenicolous fungi from Belgium and Luxembourg. VIII. *Lejeunia* 162: 1–95.
- Zhurbenko, M. & Santesson, R. 1996. Lichenicolous fungi from the Russian Arctic. *Herzogia* 12: 147–161.