

Lichenopeltella rangiferinae sp. nov. and some other lichenicolous fungi from Iceland

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ABSTRACT: Records of 22 taxa of lichenicolous fungi from Iceland are presented. *Endococcus brachysporus*, *Lichenochora obscuroides*, *Licheniconium pyxidatae*, *Lichenopeltella santessonii*, *Merismatium heterophractum*, *Minutoexcipula mariana*, *Muellerella lichenicola*, *Phaeospora rimosicola*, *Phaeosporobolus alpinus*, *Sphaerellothecium parmeliae*, *S. reticulatum*, *Stigmidium pseudopeltidae*, and *Thelocarpon epibolum* f. *longisporum* are new for Iceland. The new species *Lichenopeltella rangiferinae* is described.

INTRODUCTION

Some lichenicolous fungi which I had the opportunity to collect in an excursion to Iceland in August 2008 are presented here. Few papers on lichenicolous fungi in Iceland have been published until now (ORANGE 1990, KRISTINSSON 1999, BERGER 2000, SVANE & ALSTRUP 2004). According to HALLGRÍMSSON & EYJÓLFSDÓTTIR 2004 and KRISTINSSON & HEIÐMARSSON 2006 less than 100 species are known for the island, which may represent 20-30% of the expected number of species. In the following list of 22 species 13, marked with *, are new for Iceland and one is new for science.

MATERIAL AND METHODS

Lichenicolous fungi were collected in Skaftafell in Austur-Skaftafellssýsla, southeastern Iceland, at the hill Kollur near Lagarfljót at the SW edge of the village Egilsstaðir in Fljótsdalshérað, East Iceland, and in Hrótey, an island in the river Blanda near the village Blönduós in Austur-Húnavatnssýsla, North Iceland (Fig. 1). In the laboratory the specimens were studied macroscopically with a Zeiss stereo microscope at magnifications up to 40x and microscopically with an Olympus BX 51 microscope fitted with Normarski differential interference contrast optics. Measurements were taken on thin hand-cut sections mounted in water using an Olympus C 5060 digital camera and Quickphoto Camera 2.1 software. Conidial and ascospore measurements $\bar{x} \pm \sigma_x$ are given as (minimum-) –(–maximum) followed by the number of measurements. The specimens are deposited in the private herbarium of the

author at the Institut für Vegetationskunde und Landschaftsökologie (hb ivl), except the holotype of *Lichenopeltella rangiferinae* in M.

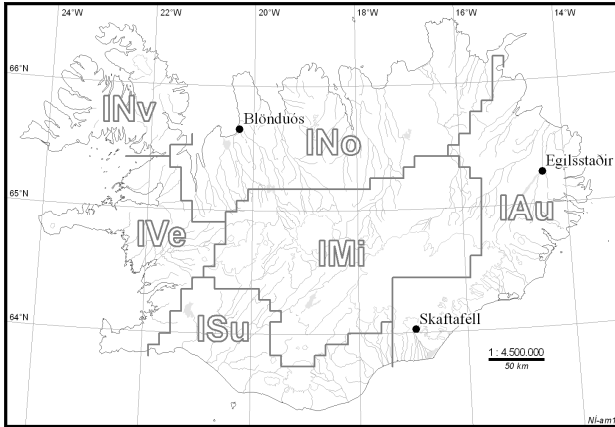


FIGURE 1. Map of Iceland showing the different provinces used in floristic literature with the three collection-sites marked.

RESULTS

All specimens have been collected by W. & G. v. Brackel and identified by the author. Species with an asterisk (*) are new for Iceland. An overview of the species and their hosts is given in table 1.

Carbonea supersparsa (Nyl.) Hertel

Suður-Múlasýsla, Kollur hill SW Egilsstaðir, rocks, on *Lecanora cenisia*, 65° 15'29"N, 14°24'59"W, 60 m, 13.08.2008 (hb ivl 4828).

This is a widespread species in the northern hemisphere and its first record for Iceland was published by ORANGE (1990) on *Lecanora polytropa*.

Carbonea vitellinaria (Nyl.) Hertel

Suður-Múlasýsla, Kollur hill SW Egilsstaðir, rocks, on *Candelariella vitellina*, 65° 15'29"N, 14°24'59"W, 60 m, 13.08.2008 (hb ivl 4829).

Carbonea vitellinaria has a worldwide distribution and is common on siliceous rocks in the Rhizocarpetea geographici communities. SVANE & ALSTRUP (2004) added records on *Candelariella* spp. to the known distribution in Iceland (HALGRÍMSSON & EYJÓLFSDÓTTIR 2004).

**Endococcus brachysporus* (Zopf) Brand & Diederich

Austur-Húnavatnssýsla, Hrútey, island in the river Blanda near Blönduós, on small outcrops in the heath, on *Porpidia speirea*, 65°39'30"N, 20°16'15"W, ca. 30 m, 18.08.2008 (hb ivl 4819).

Austur-Skaftafellssýsla, Skaftafellsheiði near Skaftafellsjökull, heath, on *Porpidia tuberculosa*, 64°02'38"N, 16°55'47"W, 550 m, 11.08.2008 (hb ivl 4823).

Endococcus brachysporus was accepted by LETTAU (1920, as *Discothecium brachysporum*) and later by Brand & Diederich (SÉRUSIAUX et al. 1999) as a distinct species within the *Endococcus propinquus* complex; other authors

TABLE 1. List of species found in the study, their hosts and locations.

Species	Hosts	Sites
<i>Carbonea supersparsa</i>	<i>Lecanora cenisia</i>	Egilsstaðir
<i>Carbonea vitellinaria</i>	<i>Candelariella vitellina</i>	Egilsstaðir
<i>Endococcus brachysporus</i>	<i>Porpidia speirea</i> , <i>P. tuberculosa</i>	Hrútey W, Skaftafell: Skaftafellsheiði
<i>Endococcus</i> sp.	<i>Porpidia</i> cf. <i>speirea</i>	Hrútey W
<i>Geltingia associata</i>	<i>Ochrolechia upsaliensis</i>	Hrútey E
<i>Lichenochora obscuroides</i>	<i>Physcia</i> sp.	Egilsstaðir
<i>Lichenocodium pyxidatae</i>	<i>Cladonia rangiferina</i>	Hrútey W
<i>Lichenopeltella cetrariae</i>	<i>Cetraria aculeata</i>	Hrútey E
<i>Lichenopeltella rangiferinae</i>	<i>Cladonia rangiferina</i>	Hrútey W
<i>Lichenopeltella santessonii</i>	<i>Peltigera aphthosa</i>	Skaftafell: Svartifoss
<i>Merismatium heterophractum</i>	<i>Lecidea</i> aff. <i>berengeriana</i>	Hrútey E
<i>Minutoexcipula mariana</i>	<i>Pertusaria chiodectionoides</i>	Egilsstaðir
<i>Muellerella lichenicola</i>	unidentified crust	Egilsstaðir
<i>Muellerella ventosicola</i>	<i>Rhizocarpon geographicum</i>	Egilsstaðir
<i>Phaeospora rimosicola</i>	<i>Rhizocarpon concentricum</i>	Egilsstaðir
<i>Phaeosporobolus alpinus</i>	<i>Ochrolechia frigida</i>	Hrútey E, Egilsstaðir
<i>Sphaerellothecium araneosum</i>	<i>Ochrolechia frigida</i>	Hrútey E
<i>Sphaerellothecium parmeliae</i>	<i>Parmelia sulcata</i>	Hrútey W
<i>Sphaerellothecium reticulatum</i>	<i>Parmelia sulcata</i>	Hrútey E
<i>Stigidium pseudopeltideae</i>	<i>Peltigera rufescens</i>	Skaftafell, Skaftafellsjökull
<i>Thelocarpon epibolum</i> f. <i>longisporum</i>	<i>Peltigera leucophlebia</i>	Hrútey NE
<i>Weddelomyces tartaricola</i>	<i>Ochrolechia frigida</i>	Hrútey W

treated it as a variety of, or synonymous with *Endococcus propinquus* (e. g. KEISSLER 1930, TRIEBEL 1989). The species is characterized by small spores each with a 1–1.5(–1.7) μm thick septum.

****Endococcus* sp.**

Austur-Húnavatnssýsla, Hrútey, island in the river Blanda near Blönduós, on small outcrops in the heath, on *Porpidia* cf. *speirea*, 65°39'30"N, 20°16'15"W, ca. 30 m, 18.08.2008 (hb ivl 5417).

The specimen differs from *E. brachysporus* (which was described on *P. spirea*) by narrower and distinctly verruculose spores measuring 8–9.5 × 3.5–4.5 µm.

Geltingia associata (Th. Fr.) Alstrup & D. Hawksw.

Austur-Húnavatnssýsla, Hrótey, island in the river Blanda near Blönduós, heath, on *Ochrolechia upsaliensis*, 65°39'30"N, 20°16'08"W, ca. 25 m, 18.08.2008 (hb ivl 4813).

A circumpolar species of the arctic and subarctic regions on *Ochrolechia* spp., also reported on *Pertusaria* spp. and *Thamnolia vermicularis*(?); a report on *Phaeophyscia* from Salamanca in Spain (MARCOS LASO 2001) is dubious. First recorded for Iceland by SVANE & ALSTRUP (2004), also on *Ochrolechia upsaliensis*.

****Lichenochora obscuroides*** (Linds.) Triebel & Rambold

Suður-Múlasýsla, Kollur hill SW Egilsstaðir, rocks, on *Physcia* sp., 65°15'29"N, 14°24'59"W, 60 m, 13.08.2008 (hb ivl 4826).

Lichenochora obscuroides is a gall inducing parasite on members of the Physciaceae. It is widely distributed in the northern hemisphere.

****Lichenocodium pyxidatae*** (Oudem.) Petr. & Syd.

Austur-Húnavatnssýsla, Hrótey, island in the river Blanda near Blönduós, heath, on *Cladonia rangiferina*, 65°39'30"N, 20°16'15"W, ca. 30 m, 18.08.2008 (hb ivl 4810).

In addition to *Lichenocodium pyxidatae* there are two other *Lichenocodium* species living on *Cladonia*, *L. erodens* and *L. usneae*. With the pale brown, small and slightly truncate conidia of 2.5–3.5 µm diam. and missing the black line around the infection spot this specimen clearly belongs to *L. pyxidatae*.

Lichenopeltella cetrariae (Bres.) Höhn.

Austur-Húnavatnssýsla, Hrótey, island in the river Blanda near Blönduós, heath, on *Cetraria aculeata*, 65°39'30"N, 20°16'08"W, ca. 25 m, 18.08.2008 (hb ivl 4815).

Ascomata catathecioid, 62–100 µm diam., ostiole almost triangular, without setae; asci 22–31 × 10 µm, 4-spored; ascospores (12–)12.5–14.3(–15) × (3–)3.2–3.9 (–4) µm (n=10), 1-septate, hyaline, with 3 pairs of setulae.

Two species of *Lichenopeltella* have been described on *Cetraria*: *Lichenopeltella cetrariae* (Bres.) Höhn. (as *Microthyrium cetrariae* Bres.) and *L. cetrariicola* (Nyl.) R. Sant. (as *Verrucaria cetrariicola* Nyl.). Whilst the elder authors (e. g. VOUAUX 1913, KEISSLER 1930) treated them as different species (in different genera), SANTESSON (1989) and others consider them as synonymous; something that VAINIO (1921) already suspected: "Ab hac specie forsan non differt *Microthyrium cetrariae* Bres.". The original descriptions of both species are short; the incomplete description of *L. cetrariicola* was emended by VAINIO (1921) based on the type material, whilst apparently all later descriptions of *L. cetrariae* (VOUAUX 1913, KEISSLER 1930) were only translations, in the case of Keissler

with an addition of unclear origin ("asci 8-spored"). Apart from the size of the spores, in *L. cetrariae* 15–18 × 3 µm and in *L. cetrariicola* 15–16 × 3.5 µm [(12.5–) 14–16 × 2.5–3.5(–4) µm in SPOONER & KIRK 1990, 12–15 × 3–4 µm in ETAYO & SANCHO 2008] they differ in the septation of the spores, being 1-septate in *L. cetrariae* and (1–)3-septate in *L. cetrariicola*.

The diagnostic feature of the number of setulae of the ascospores is not noted in the original descriptions. Later examinations (SPOONER & KIRK 1990, ETAYO & SANCHO 2008) showed that *L. cetrariicola* has two pairs of setulae. Unfortunately the number of setulae on the ascospores of *L. cetrariae* has not been examined since we could not locate the type material.

In the material from Blönduós (as well as in a specimen from Greenland on *Cetraria andrejevii*) the ascospores are 1-septate and have three pairs of setulae; which exclude them from *L. cetrariicola* but are at least not in contradiction to the description of *L. cetrariae*, to which they are identified pending examination of the type material.

***Lichenopeltella rangiferinae* Brackel sp. nov.** – MycoBank MB561181 (Fig. 2).

Type: Iceland, Austur-Húnavatnssýsla, Hrótey, island in the river Blanda near Blönduós, heath, on *Cladonia rangiferina*, 65°39'30"N, 20°16'15"W, ca. 30 m, W. & G. v. Brackel, 18.08.2008 (M – holotype, hb ivl 4832 – isotype).

Ascomata catathecia, superficialia, atrobrunnea, dispersa, 80–120 µm diam., 25–45 µm alta, ostiolata. Setae ostiolares divergentae, brunneae, rectae, non-septatae, apicem acutae, 25–40 × 3–4(–5) µm. Asci (17–)19–25(–29) × 8–9 µm, ovoidei ad obclavati, 4-sporei. Ascosporeae (13–)13.9–15.5(–16) × (3–)3.3–4 µm, ellipsoideae, hyalinae, (1–)3-septatae, ad septa constrictae, 4(–6)-guttulatae, hyalinae, cum 3 paribus setularum.

Ascomata lichenicolous on *Cladonia rangiferina*, catathecioid, single, ± rounded in surface view, slightly convex, 80–120 µm in diam., 25–45 µm high, dark brown, black around the ostiole; the upper layer one cell thick, composed of radially arranged brown quadrangular cells of 3–5 × 4–5 µm; around the ostiole forming a clearly delimited, dark brown collar, 2–3(–4) cells high, of thick-walled cells of 3–4 × 3–4 µm, the upper ones somewhat attenuated, with 4–7 cells of the middle row extended into a crown of divergent setae; ostiole almost triangular, ca. 9 µm wide; basal layer one cell thick, composed of radially arranged, pale brown, quadrangular cells of 4–8 × 2–7 µm; margin entire, slightly sinuate. Setae 25–40 × 3–4(–5) µm, dark brown, thick-walled, smooth, acute, non-septate. Paraphyses not visible. Asci (17–)19–25(–29) × 8–9 µm, ovoid to obclavate, 4-spored, rarely 8-spored. Ascospores (13–)13.9–15.5(–16) × (3–)3.3–4 µm (n=10), ellipsoid, hyaline, smooth, with (1–)3-septa, 4(–6)-guttulate, asymmetrically septate, slightly constricted at the septa; the bigger of the two inner cells bearing 3 pairs of setulae, inserted in the middle of the spore, not connected to a septum, each 7–8 µm long.

Host: *Cladonia rangiferina*, mainly on the basal parts of the podetia, but also on the upper parts.

Distribution: The species is known only from the type locality in Iceland.

Discussion: *Lichenopeltella rangiferinae* is similar to *L. peltigericola* (D. Hawksw.) R. Sant. in several features (e. g. the divergent setae, 4-spored asci and 3 pairs of setulae), but differs by the bigger ascomata (80–120 μm vs. 50–70 μm), smaller ascospores [(13–)13.9–15.5(–16) \times (3–)3.3–4 μm vs. (13.5–)15–22 \times 3.5–4.5 μm], septation of the ascospores [(1–)3-septate vs. 1-septate], and the different, not closely related host genus. These two are the only lichenicolous species of *Lichenopeltella* with divergent setae. There is another species of *Lichenopeltella* living on hosts of the genus *Cladonia*, *L. cladoniarum* E.S. Hansen & Alstrup (HANSEN & ALSTRUP 1995). It differs from the new species in lacking setae as well as setulae, smaller ascomata (50–70 μm) and having 8-spored asci. DIEDERICH (in APTROOT et al. 1997) mentions an undescribed *Lichenopeltella* on *Cladonia* sp., which differs in smaller but higher ascomata (45–70 μm wide, 50–60 μm high) and convergent, shorter and narrower setae (12–15 \times 2.5–3 μm). Paraphyses are often difficult to observe in species of *Lichenopeltella* (DIEDERICH loc. cit.). In *L. rangiferinae* no paraphyses were found despite of careful examination.

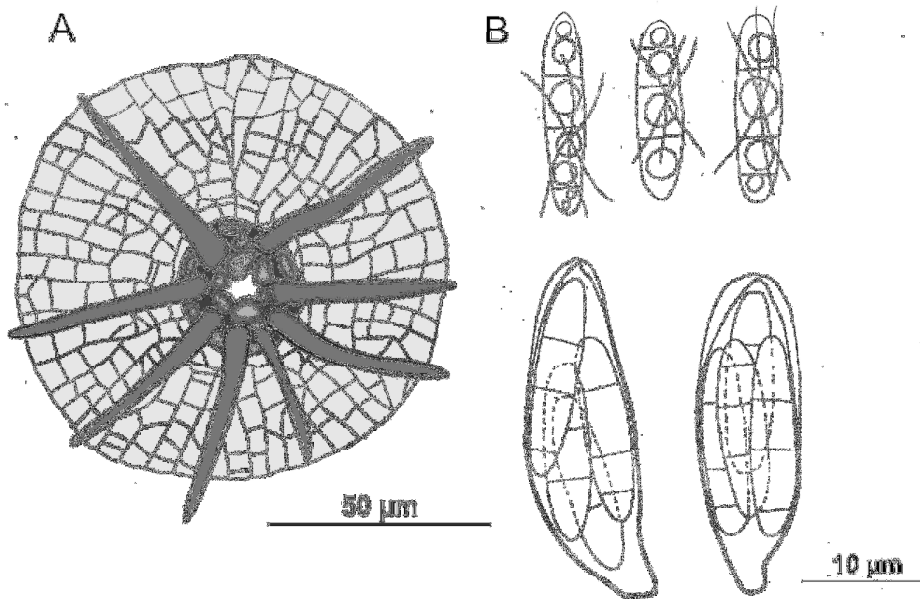


FIGURE 2. *Lichenopeltella rangiferinae* (holotype). A - Ascoma in surface view; B - Ascospores with setulae and asci in optical section.

**Lichenopeltella santessonii* (P.M. Kirk & Spooner) R. Sant.

Austur-Skaftafellssýsla, near Svartifoss, heath, on *Peltigera aphthosa* (lower side of the thallus), 64°01'40"N, 16°58'13"W, ca. 200 m, 10.08.2008 (hb ivl 4821).

Two species of *Lichenopeltella* have been described on *Peltigera*: *L. santessonii* with convergent setae and ascospores without setulae and *L. peltigericola* with divergent setae and ascospores with 3 pairs of setulae. The former is known only from a few countries in the northern hemisphere (where it is rare), the latter has a worldwide distribution and does not seem to be rare.

**Merismatium heterophractum* (Nyl.) Vouaux

Austur-Húnavatnssýsla, Hrútey, island in the river Blanda near Blönduós, heath, on *Lecidea* sp. (*Lecidea* aff. *berengeriana*), 65°39'30"N, 20°16'08"W, ca. 25 m, 18.08.2008 (hb ivl, in the specimen of *Geltingia associata* 4813).

There are several reports of *Merismatium decolorans* on *Lecidea* (*Mycobilimbia berengeriana*), but not of *M. heterophractum* (TRIEBEL 1989). The host could not be identified with certainty, but it is surely close to *L. berengeriana*. In the specimen of *Merismatium* from Hrútey the spores are 10–12 × 4.5–5 µm and usually with 3 transversal septa; most of the spores have one additional longitudinal septum, several of them two. The two outer cells of the spores are usually paler than the two inner ones and have thinner walls. These are all typical features of *M. heterophractum* and the spores are shorter than those of *M. decolorans* (13.5–16.5 µm long).

**Minutoexcipula mariana* V. Atienza

Suður-Múlasýsla, Kollur hill SW Egilsstaðir, rocks, on *Pertusaria chiodectonoides*, 65°15'29"N, 14°24'59"W, 60 m, 13.08.2008 (hb ivl 4827a).

Three of the known species of *Minutoexcipula* are confined to species of the genus *Pertusaria*. *M. mariana* is distinguished from the two other species (*M. tuckerae*, *M. tuerkii*) by concave to convoluted sporodochia and the presence of simple to 2-branched conidiophores (ATIENZA 2002). *Pertusaria chiodectonoides* is a new host for the species.

**Muellerella lichenicola* (Sommerf.: Fr.) D. Hawksw.

Suður-Múlasýsla, Kollur hill SW Egilsstaðir, rocks, on an unidentified whitish crust, 65°15'29"N, 14°24'59"W, 60 m, 13.08.2008 (hb ivl 4830).

This specimen had asci with ca. 100 ascospores of 5–5.5 × 2.5–3 µm, pale brown and thinwalled. The only feature that does not fit the description is the larger size of the perithecia of ca. 240 µm diam. According to TRIEBEL (1989) the perithecia growing on the thallus are usually bigger than those growing in the apothecia of the host.

Muellerella ventosicola (Mudd) D. Hawksw. s. l.

Suður-Múlasýsla, Kollur hill SW Egilsstaðir, rocks, on *Rhizocarpon geographicum*, 65°15'29"N, 14°24'59"W, 60 m, 13.08.2008 (hb ivl 4827b).

This specimen fits well to the description of *Muellerella ventosicola*, except for the radial furrows around the ostiolar region mentioned by HAFELLNER & OBERMAYER (2007), which are missing in our specimen; they also presume that the species is restricted to hosts of the genus *Ophioparma*, so the specimens on *Rhizocarpon* may actually belong to another (undescribed) species of the *Muellerella pygmaea* complex.

****Phaeospora rimosicola*** (Leight. ex Mudd) Hepp

Suður-Múlasýsla, Kollur hill SW Egilsstaðir, rocks, on *Rhizocarpon concentricum*, 65°15'29"N, 14°24'59"W, 60 m, 13.08.2008 (hb ivl 4825).

Of the two *Phaeospora* species growing on *Rhizocarpon*, *P. rimosicola* has small spores (16–19 × 5–7 µm) and grows on *Rhizocarpon concentricum* and *R. hochstetteri*, while *P. parasiticum* has bigger spores (18–23 × 8–11.5 µm) and grows on *Rhizocarpon umbilicatum* (SÉRUSIAUX et al. 1999). The spores of our specimen are 13–16.5 × 6–7(–8) µm which was thus identified as *P. rimosicola*.

****Phaeosporobolus alpinus*** R. Sant., Alstrup & D. Hawksw.

Austur-Húnavatnssýsla, Hrótey, island in the river Blanda near Blönduós, heath, on *Ochrolechia frigida*, 65°39'30"N, 20°16'08"W, ca. 25 m, 18.08.2008 (hb ivl 4811). Suður-Múlasýsla, Kollur hill SW Egilsstaðir, heath on rocks, on *Ochrolechia frigida*, 65°15'29"N, 14°24'59"W, 60 m, 13.08.2008 (hb ivl 4824).

Phaeosporobolus alpinus has a worldwide distribution on members of the genera *Lecanora*, *Ochrolechia*, *Pertusaria* and *Varicellaria*, on soil inhabiting species as well as on epiphytic species. In some regions it seems almost common (for instance in arctic regions on *Ochrolechia frigida*) but it is not easy to see because its conidiomata are minute (30–75 µm) and it does not cause any visible harm to the host.

Sphaerellothecium araneosum (Rehm ex Arnold) Zopf

Austur-Húnavatnssýsla, Hrótey, island in the river Blanda near Blönduós, heath, on *Ochrolechia frigida*, 65°39'30"N, 20°16'08"W, ca. 25 m, 18.08.2008 (hb ivl 4812).

This worldwide distributed species was already recorded in Iceland by BERGER (2000) on *Ochrolechia* sp. and SVANE & ALSTRUP (2004) on *O. frigida* and *O. parella*. The type of the species is described on *Ochrolechia upsaliensis* and it seems to be able to grow on different members of the Pertusariaceae. Reports on *Stereocaulon*, *Sphaerophorus*, *Cladonia*, *Arctoparmelia* and others should be checked because of possible confusion with the later described species *Sphaerellothecium stereocaulorum*, *S. cladoniae* or *Lichenostigma cosmopolites*.

****Sphaerellothecium parmeliae*** Diederich & Etayo

Austur-Húnavatnssýsla, Hrótey, island in the river Blanda near Blönduós, on small outcrops in the heath, on *Parmelia sulcata*, 65°39'30"N, 20°16'15"W, ca. 30 m, 18.08.2008 (hb ivl 4818).

In our specimen, *S. parmeliae* was growing intermixed with *S. reticulatum*. Contrary to the latter, *S. parmeliae* produces black necrotic areas on the host thallus, so that neither the ascomata nor the immersed vegetative hyphae are easy to see.

****Sphaerellothecium reticulatum* (Zopf) Etayo**

Austur-Húnavatnssýsla, Hrútey, island in the river Blanda near Blönduós, heath, on *Parmelia sulcata*, 65°39'30"N, 20°16'08"W, ca. 25 m, 18.08.2008 (hb ivl 4814).

The former *Echinothecium reticulatum* is a common parasite on the members of the genus *Parmelia* s. str.; reports on other hosts than *Parmelia* s. str. should be checked.

****Stigmatidium pseudopeltideae* Cl. Roux & Triebel**

Austur-Skaftafellssýsla, initial heath in the run-up of the Skaftafellsjökull, on *Peltigera rufescens*, 64°01'12"N, 16°55'44"W, ca. 85 m, 12.08.2008 (hb ivl 4820).

In our specimen the spores measured 12–12.5 × 4.5–5 µm. *S. peltideae*, which had been reported for Iceland (BERGER 2000, SVANE & ALSTRUP 2004), has smaller spores of (8–)9–11.5(–12) × (2.5–)3–3.5(–4.5) µm (ROUX & TRIEBEL 1994).

****Thelocarpon epibolum* f. *longisporum* H. Magn. (ined.)**

Austur-Húnavatnssýsla, Hrútey, island in the river Blanda near Blönduós, heath, on *Peltigera leucophlebia*, 65°39'31"N, 20°16'03"W, ca. 20 m, 18.08.2008 (hb ivl 4816).

With ascospores of 7–8 × 2.5–3 µm and thick paraphyses of 1.5–2 µm our specimen of *Thelocarpon epibolum* belongs to the f. *longisporum*, which is typically living on *Peltigera* thalli.

***Weddellomyces tartaricola* (Linds.) Alstrup & D. Hawksw.**

Austur-Húnavatnssýsla, Hrútey, island in the river Blanda near Blönduós, heath, on *Ochrolechia frigida*, 65°39'30"N, 20°16'15"W, ca. 30 m, 18.08.2008 (hb ivl 4817).

The species had been recorded for Iceland by BERGER (2000) and SVANE & ALSTRUP (2004), also on *Ochrolechia frigida*. In addition to Iceland it is known from Greenland, Scandinavia, Svalbard, and the Russian Arctic, and restricted to *Ochrolechia* species.

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