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Additions to the Coprophilous Mycota of Iceland

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ABSTRACT: Seventy-five species mostly of coprophilous fungi were recorded from 44 herbivore dung samples collected from Iceland in 2006 and 2008 and incubated in moist chambers. Nineteen species are newly recorded for Iceland: - *Pilaira moreaui*, *Ascobolus crenulatus, Saccobolus citrinus*, *Pseudombrophila cervaria*, *Thecotheus crustaceus*, *Camptosphaeria citrinella*, *Podospora intestinacea*, *P. pilosa, Schizothecium tetrasporum, Sordaria alcina*, *Hypocopra merdaria*, *Syspastospora parasitica*, *Viennotidia fimicola*, *Unguiculella tityrii*, *Sporormiella heptamera*, *Sp. longispora, Sp. octonalis, Laetisaria fuciformis*, and *Coprinus radiatus*. Collections are described and the occurrence and distribution of species is discussed. The species richness and community structure of the Icelandic coprophilous mycota from this and an earlier collection are compared, and the value of such studies for assessing diversity is discussed and validated.

KEY WORDS: ascomycetes, basidiomycetes, biogeography, diversity, ecology, fimicoles, Surtsey.

INTRODUCTION

The coprophilous mycota of Iceland is documented in the checklists of HALLGRÍMSSON & EYJÓLFSDÓTTIR (2004, and in preparation), which list just over 100 microfungi and 26 basidiomycetes. RICHARDSON (2004) recorded 78 species from a collection of 32 herbivore dung samples made from central and north-eastern areas of Iceland in 2002. These included 33 species in addition to those in the microfungus checklist, and 12 agarics that were included in the basidiomycete list above. The microfungus checklist includes some fungi that were recorded on dung, but are not part of the suite of taxa traditionally considered to be specialist coprophils. If they are excluded, then the current recorded coprophilous mycota consists of about 110 species. A further 38 samples were collected in 2006, mainly from southwestern Iceland and the Snæfellsnes peninsula. Additionally, in 2008 a sample of rabbit pellets was collected in Reykjavík and five samples of goose dung were obtained from the volcanic island of Surtsey, which was formed in 1963. The samples were subsequently incubated in damp chambers and the coprophilous zygomycetes, ascomycetes and basidiomycetes that developed were recorded. Details of the fungi recorded from the 2006 and 2008 samples are provided, and their distribution

and occurrence are discussed in the context of records from the earlier Icelandic collection and from over 1000 samples providing over 11000 records from samples collected worldwide in recent years by the author, and in relation to the observations of others, especially BELL (1983), VAN BRUMMELEN (1967), and LUNDQVIST (1972).

In earlier studies, the author has suggested that fungal diversity can be monitored by recording the coprophils that develop on a collection of dung samples from a particular area or habitat (RICHARDSON 2001). Construction of species richness curves allow an estimate to be made of the number of species to be expected from a standard collection of for example 50 samples. This second collection from Iceland allows comparison with the results obtained from an earlier collection (RICHARDSON 2004), to validate that suggestion, and to compare the composition of the mycota of a region as assessed on two separate occasions.

MATERIAL AND METHODS

Mainland samples were collected between 29 July and 7 August 2006 (Table 1, Fig. 1), and one on 11 July 2008. Samples from Surtsey were collected on 8 July and 11-13 August 2008 (see EYJÓLFSDÓTTIR 2009 for the Surtsey 100 x 100 m grid system). They were collected in paper envelopes and gently air-dried, if not already dry when collected. Localities (latitude and longitude, WGS84 datum) were determined with a Magellan eXplorist 100 satellite navigator, and place names are given according to the 1:300000 Kortabók (2001, Mál og menning, Reykjavík). Samples were rehydrated and incubated soon after collection on moist paper towelling in plastic boxes with lightly fitting transparent lids, under ambient light and at room temperature (ca. 15-18 °C). Care was taken to ensure that cultures were not too wet. Samples were generally of similar size, with incubation chambers 10 x 7 cm, which would accommodate approx. 2-4 g dry wt (= 15 sheep/ptarmigan pellets), or 13 x 8 cm for horse (approx. 10-20 g dry wt). Samples were examined frequently at intervals of a few days, with a x7-45 magnification stereomicroscope. Fruiting bodies were removed and mounted in water for examination and identification at higher magnification. Samples were incubated for 6 to 16 wk, with observations continuing whilst new fungi were being observed (one sample was discarded after 3 wk because of damage from insect larvae). Selected material has been placed in the Herbarium of the Icelandic Institute of Natural History, Akureyri Division (AMNH). In considering diversity, an estimate of species richness was made by constructing a cumulative species curve and deriving the equation for that curve ($y = ax^b$, where y = cumulative no. of species observed in x samples) and solving for x = 50 samples (RICHARDSON 2001). This was done for the collection of 38 samples made in 2006 and compared with the estimate from 32 samples collected in 2002, and from a combined curve for all 70 samples. The similarity of the mycotas of the two sets

of samples was compared using the Sørensen, Bray & Curtis and Morisita-Horn indices (MAGURRAN 2004).

FIGURE 1. Map of western Iceland showing collection localities. Numbers are the MJR sample numbers of 2006, as in Table 1, with the exception of 21 and samples 26-30 from Surtsey, which were collected in 2008.

RESULTS AND DISCUSSION

Information on the dung samples and their origin are given in Table 1. Three hundred and sixty-six records of 75 species were obtained during the period of incubation. Nineteen of the species recorded were new for Iceland. Records from the six samples from 2008 have not been included in the analyses of species richness that follow.

TABLE 1. Details of Icelandic dung samples and collection localities.

Sample no.*	Locality	Altitute (m a.s.l.)	Lat. (°N)	Long. (°W)	Habitat	Date	Sub-strate
27/06	nr Hotel Garður, Reykjavík (Hljómskálagarður)	65	64.14	21.95	urban grass	29.7.06	goose
28/06	Svínárnes Hrunamannaafréttur	395	64.47	19.74	highland grassland	30.7.06	sheep
29/06	Svínárnes Hrunamannaafréttur	395	64.47	19.74	highland grassland	30.7.06	goose
30/06	Svínárnes Hrunamannaafréttur	395	64.47	19.74	paddock	30.7.06	horse
31/06	Deild, north of Tungufellsdalur Hrunamannahreppur	290	64.32	20.10	gravelly, sparsely vegetated, with *Racomitrium*/*Salix*/Ericaceae	30.7.06	sheep
32/06	Tungufellsdalur Hrunamannahreppur	205	64.30	20.11	riverside grass and *Betula*	30.7.06	horse
33/06	Tungufellsdalur Hrunamannahreppur	205	64.30	20.11	riverside grass and *Betula*	30.7.06	sheep
34/06	Laugarvatnshellar Grímsnesafréttur	180	64.22	20.88	paddock	31.7.06	horse
35/06	Laugarvatnshellar Grímsnesafréttur	185	64.22	20.88	rocky grassland	31.7.06	sheep
36/06	Laugarvatnshellar Grímsnesafréttur	320	64.22	20.88	*Racomitrium*/lichen rocks	31.7.06	ptarmigan
37/06	Þingvellir	130	64.27	21.11	*Racomitrium*/lichen rocks	31.7.06	ptarmigan
38/06	Þingvellir	130	64.26	21.12	*Racomitrium*/lichen rocks	31.7.06	ptarmigan
39/06	route 36 Þingvallahraun, Þingvellir	130	64.27	21.07	*Racomitrium*/lichen rocks, amongst birch	31.7.06	ptarmigan
40/06	Haukadalur Biskupstungur	130	64.33	20.29	*Racomitrium*/*Erica* heath	1.8.06	ptarmigan
41/06	path to hot pool, Hrunalaug Hrunamannhreppur	135	64.13	20.26	rocky grassland with *Racomitrium*	1.8.06	sheep
42/06	Skollagróf, Hrunamannahreppur	120	64.19	20.30	heathy ridgetop grassland	2.8.06	sheep
43/06	Skollagróf, Hrunamannahreppur	130	64.19	20.30	heathy ridgetop grassland	2.8.06	cattle
44/06	Skollagróf, Hrunamannahreppur	130	64.19	20.30	heathy ridgetop grassland	2.8.06	horse
45/06	by river Hvítá, Skollagróf, Hrunamannahreppur	70	64.18	20.31	riverside vegetation and farm track	2.8.06	goose
46/06	Skollagróf, Hrunamannahreppur	95	64.19	20.35	paddock	2.8.06	horse
47/06	by river Hvítá, Bryðjuholt, Hrunamannahreppur	65	64.19	20.30	riverside vegetation	2.8.06	cattle
48/06	by river Hvítá, Bryðjuholt, Hrunamannahreppur	60	64.16	20.36	riverside gravel and vegetation	2.8.06	goose
49/06	route 34 between river Ölfusá and Eyrarbakki	1	63.88	21.19	roadside by dunes	3.8.06	goose
50/06	route 33 lighthouse Knarrarósviti east of Stokkseyri	6	63.83	20.98	horse track	3.8.06	horse
51/06	Gunnarsholt Rangárvellir	80	63.86	20.23	pasture	3.8.06	horse
52/06	Syðra-Langholt, Hrunamannahreppur	85	64.08	20.44	paddock	3.8.06	horse
53/06	route 54, Stórahraun, Snæfellsnes	36	64.83	22.29	track in lava field	5.8.06	sheep
54/06	Barðastaðir, Snæfellsnes	5	64.83	23.29	grass at edge of shore	5.8.06	horse
55/06	Öndverðarnes, Snæfellsnes	10	64.89	24.04	rough grassland	5.8.06	sheep
56/06	by Snæfellsjökull NP Visitor Centre, Hellnar, Snæfellsnes	45	64.75	23.65	rough grassland	5.8.06	horse
57/06	route 54, Hamrar, Grundarfjörður, Snæfellsnes	25	64.94	23.20	rough grassland	6.8.06	sheep
58/06	route 54, Rjúpnaborgir, Snæfellsnes	330	64.85	23.48	rocky moorland, *Racomitrium*/lichen	6.8.06	sheep
59/06	route 54, Úlfarsfell, Álftafjördur, Snæfellsnes	90	64.99	22.61	rocky bank, *Salix*/ Ericaceae	7.8.06	goose
60/06	route 54, Narfeyri, Álftafjörður, Snæfellsnes	80	65.49	22.60	roadside moorland	7.8.06	sheep
61/06	route 711, nr lighthouse, Þorvaldsfjall, Vatnsnes	70	65.01	20.98	roadside moorland	7.8.06	sheep
62/06	route 711, nr lighthouse, Þorvaldsfjall, Vatnsnes	70	65.01	20.98	roadside moorland	7.8.06	horse
63/06	Hindisvik, Vatnsnes	5	65.68	20.71	rough grassland	7.8.06	horse
64/06	Hindisvik, Vatnsnes	5	65.68	20.71	rough grassland	7.8.06	sheep
21/08	Öskjuhlíð, Reykjavík	40	64.12	21.93	suburban scrubland	11.7.08	rabbit
26/08	Surtsey, spit (grid D16)**	8	63.31	20.60	sand	8.7.08	goose
27/08	Surtsey, spit (grid D16)**	8	63.31	20.60	sand, near *Honckenya*	8.7.08	goose
28/08	Surtsey, spit (grid B16)**	5	63.31	20.60	sand	8.7.08	goose
29/08	Surtsey, south (grid P11)**	20	63.30	20.61	gull colony grassland	11.8.08	goose
30/08	Surtsey, south (grid O11)**	25	63.30	20.61	gull colony grassland	13.8.08	goose

* MJR sample no. and year identifier
**Surtsey 100 x100 m grid (see EYJÓLFSDÓTTIR 2009: 107)

In considering diversity, the species richness of individual samples is much as expected from earlier studies (RICHARDSON 2001), with a mean of 11 per sample (range 4-20) being recorded from the 13 sheep and 12 horse and 2 cattle samples, and fewer (mean 4, range 1-8) from the avian substrates. The cumulative species curve (total no. of species recorded with successive samples, Fig. 2), plotted in the sequence of sample collection, gives an estimate of 86 species from 50 samples, which compares with a revised estimate of 95 obtained from the 2002 collection of 32 samples. The estimate from the cumulative species curve of both sets of samples (n = 70, plotted in random order, Fig. 2) is 81 species. These values of 81-95 species per 50 samples for separate and combined samples from the two collections are comparable with the predicted value of 89 species per 50 samples for latitude 64-66°N, obtained by solving the equation for the relationship between latitude and species richness from the data of RICHARDSON (2001), who demonstrated that there is a latitudinal gradient of species richness in coprophilous fungi, with 94-108 species expected from 50 samples from latitudes 60-55°N, compared to 123 from 50-40° N/S and 151-153 from 40-0°N/S. Earlier data sets only included *Coprinus* species from the basidiomycetes, so non-*Coprinus* basidiomycetes recorded from the Icelandic samples were excluded from the calculations to ensure comparability.

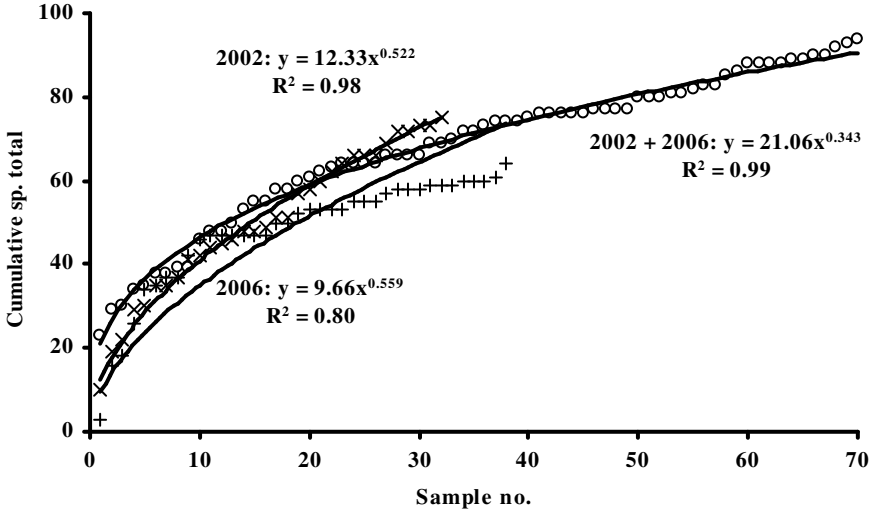

FIGURE 2. Cumulative totals of taxa observed on 32 and 38 samples of dung collected from Iceland in 2002 and 2006, respectively, after incubation in moist chambers. Curves are plotted in order of collection. A curve is also given for the pooled data of the two collections, plotted in a random order. Equations and R^2 values are given adjacent to the respective curves.

In addition to the second collection from Iceland allowing a comparison to be made with an earlier estimate of species richness from the same area, it has also allowed a comparison to be made of the similarity of the coprophilous mycotas observed from the two collections, to understand how well a modest collection of 30-40 samples of various dungs can be used to identify the composition of the mycota with a reasonable level of confidence. The Sørensen index measures the similarity of two communities, based on the number of species common to both communities, and is considered to be one of the most effective qualitative similarity measures (SOUTHWOOD & HENDERSON 2000). The Bray & Curtis and Morisita-Horn indices are similar, but take into account, in addition to presence/absence, the abundance of the different taxa. MAGURRAN (2004) notes that the Bray & Curtis index is a particularly satisfactory measure of quantitative similarity, and that the Morisita-Horn index is highly sensitive to the abundance of the most abundant species. The values for these indices (Table 2) are quite high (1 = complete similarity, 0 = no similarity), suggesting that individual collections of 30-40 samples are sufficient to provide a representative qualitative list of the mycota. The particularly high value of 0.89 for the Morisita-Horn index suggests that the sampling was adequate to provide an indication of the most prevalent species of the Icelandic coprophilous mycota. Of the total of 102 species recorded from both collections 45 (44%) were common to both, and 48% were 'rare', occurring only once or twice. Fourteen species comprised 50% of all records (Fig. 3).

TABLE 2. Similarity of the Icelandic coprophilous mycota, as assessed from collections of 32 and 38 samples collected in 2002 and 2006, respectively.

	2002 collection (n=32)	**2006 collection (n=38)**
No. of species	78	69
No. of species common to both collections	45	
No. of species in only one collection	33	24
Coefficients of similarity:		
Sørensen (presence/absence)	0.62	
Bray & Curtis (quantitative)	0.59	
Morisita-Horn (quantitative)	0.89	
See SOUTHWOOD & HENDERSON (2000) for equations for these indices.		

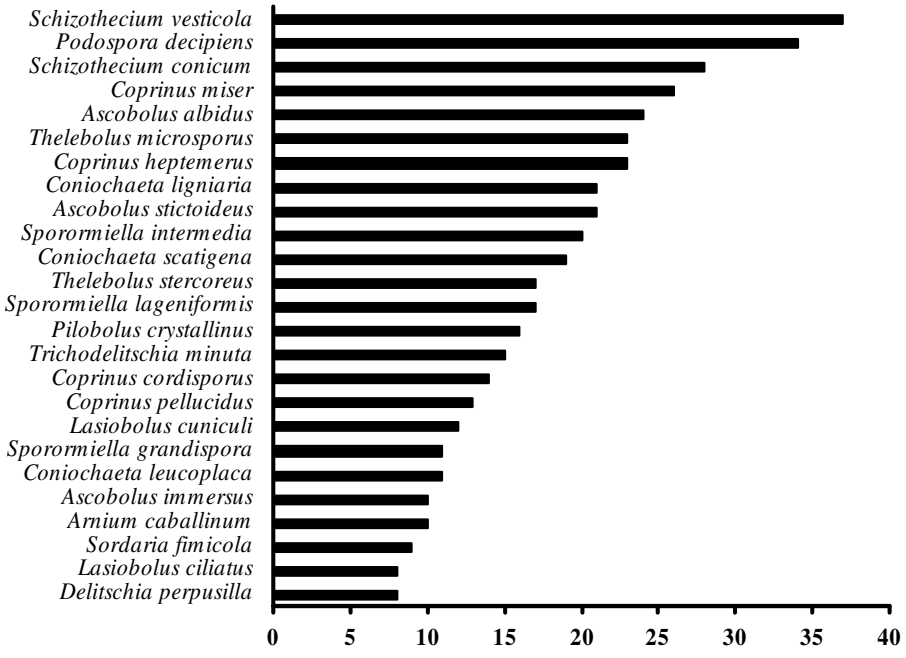

FIGURE 3. Frequency of occurrence of the 25 most abundant species of coprophilous fungi in 70 collections of herbivore dung from Iceland.

BELL (2005), DOVERI (2004), and RICHARDSON (2004), have all commented on the difficulty in determining *Sporormiella* species. Many species have been distinguished on the basis of ascus and ascospore morphology: whether or not the asci have a long or short tapering stalk or are abruptly contracted at the base (stipitate or button-like, respectively, *sensu* BELL, 2005); spore size; transverse or oblique septa; alignment of germ slits and whether or not they have a kink; and the relative size and shape of the component cells. The ascus shape (tapering base or not) and spore shape (fusoid, with tapering end cells or more or less cylindrical) seem to go together and be consistent, but the other spore characters are very variable, even within the contents of a single pseudothecium, and with much overlapping from collection to collection and species to species. BELL (2005) discussed the difficulties in detail, and concluded that 'evidence from sources other than anatomy and morphology may elucidate the situation'. As further evidence of the difficulty, Fig. 4 shows the extent of variation in spore length and width recorded from members of the stipitate-ascus complex of species studied from the 2002 and 2006 collections from Iceland. The determination of these collections have been reexamined and carefully considered. As a result, the 2002 determinations of this group have been revised, and some amended identifications of material from the 2002 col-

lections are given under the individual species entries that follow. AHMED & CAIN's (1972) treatment is the most recent comprehensive treatment of the genus, but since then many new species have been described and new species are still being described, often on the basis of single collections and molecular differences (e.g. ARENAL et al. 2005). It is not clear, without cultural and mating studies, how distinct these new, or some of the older, species are.

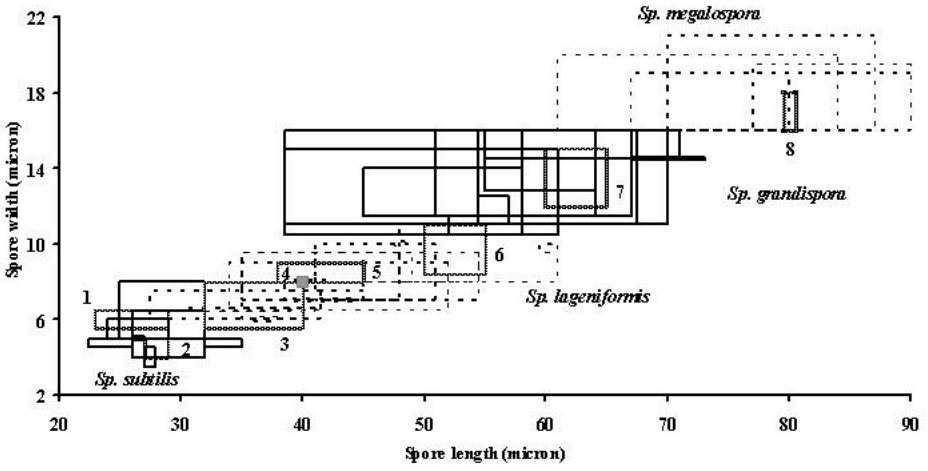

FIGURE 4. Plot of the range of spore size recorded from various collections of Icelandic *Sporormiella* spp. with tapered spores and ascal foot. Each box represents the minimum and maximum spore length and width observed. Different 'species groups' are distinguished by different line styles. Spore size of the various species, as in the original description, are identified by the thickest lines as follows: 1, *Sp. subtilis*; 2, *Sp. leporina*; 3, *Sp. isomera*; 4, *Sp. lageniformis*; 5, *Sp. dubia*; 6, *Sp. grandispora*; and 7, *Sp. megalospora*.

RECORDS

Notes on species, and the sample numbers on which they were recorded, are given below. Dried material and/or slides (M) has been deposited in the herbaria of the Icelandic Institute of Natural History, Akureyri Division (AMNH) or, for one collection, the University of Gothenburg (GB). Species that have not previously been recorded for Iceland are marked with an asterisk (*).

Abbreviations:

NM 1 or NM 2: recorded for Iceland in Nordic Macromycetes, vol. 1 & vol. 2, respectively (HANSEN & KNUDSEN 2000, 1992).

H & E: Checklist of Icelandic Fungi, HALLGRÍMSSON & EYJÓLFSDÓTTIR (2004, and in preparation).

CFFI: Coprophilous fungi from Iceland (RICHARDSON, 2004).

Zygomycota

Pilaira anomala (Ces.) J. Schröt.
MJR 46, 58, 59/06. H & E, CFFI.

*****Pilaira moreaui*** Y. Ling
MJR 27, 29, 45, 48/06.

Pilobolus crystallinus (F.H. Wigg.) Tode
MJR 35, 41, 55, 57-58, 60-61, 64/06. H & E, CFFI.

Pilobolus kleinii Tiegh.
MJR 43, 45, 47, 57, 60, 64/06. H & E, CFFI.

Ascomycota

Pezizales

Ascobolus albidus P. Crouan & H. Crouan
MJR 28, 30(M)-32, 41-43, 51-54(M), 58, 60-61, 63-64/06. H & E, NM 1, CFFI.

Ascobolus brantophilus Dissing
MJR 45(M)/06. CFFI.

*****Ascobolus crenulatus*** P. Karst.
Apothecia yellowish-green, furfuraceous, <1.8 mm diam., flat at maturity, with a central point of attachment, and a crenulate margin. They appeared after 6 weeks incubation, initially on the pellet and then on the paper. Asci cylindrical, 130-200 x 12-16 µm, spores relatively small, 14.5-17.5 x 8-9 µm, paraphyses cylindrical, yellowish-green. Although not uncommon worldwide, and originally described by Karsten from Scandinavia, it has apparently not been recorded from Iceland. MJR 26(M)/08.

Ascobolus furfuraceus Pers.
MJR 35, 41(M), 43, 56/06. H & E, NM 1.

Ascobolus immersus Pers.
MJR 35, 43(M), 47, 59, 60(M)/06. H & E, NM 1, CFFI.

Ascobolus stictoideus Speg.
MJR 27-29, 31, 35, 43, 45, 48, 54(M), 55, 59-61, 64/06, 26-30/08. CFFI.

Iodophanus carneus (Pers.) Korf
MJR 35, 47, 53, 64(M)/06. H & E, NM 1, CFFI.

Lasiobolus ciliatus (J.C. Schmidt: Fr.) Boud.
MJR 31, 35, 50-51, 54-55, 63/06. H & E, NM 1, CFFI.

Lasiobolus cuniculi Velen.
MJR 28, 31(M), 35, 55, 60/06. H & E, NM 1, CFFI.

Lasiobolus lasioboloides Marchal
MJR 64/06. CFFI.

****Pseudombrophila cervaria*** (W. Phillips) Brumm. (Fig. 5).
Apothecia are relatively large, up to 2 mm diam., lilaceous at first becoming purplish brown with age, with a raised margin, which later becomes reflexed. Asci cylindrical 160-225 x 11-16 µm and KI¯. Spores smooth, ellipsoid, 14-19.5 x 8-10 µm, obliquely uniseriate, with surrounding gel swelling to 3 µm wide in water. Paraphyses crowded, hyaline, cylindrical, with a septum 10-15 µm below the tip, 2-3 µm diam., with little interparaphysal pigment in young material, but purplish brown in older material. The first record of *Pseudombrophila* species for Iceland was that of *P. theioleuca* Rolland (PFISTER & EYJÓLFSDÓTTIR 2008), but no records are in NM 1 for the subarctic/subalpine or arctic/alpine zones of Norway, Sweden and Finland, so it is interesting that *P. cervaria* occurred on 4 out of 11 collections of horse dung, and it was present in the field on MJR 46/06. MJR 30, 46(M), 54, 56(M)/06.

****Saccobolus citrinus*** Boud. & Torrend (Fig. 6).
Apothecia amber yellow, up to 700 µm diam., with a waxy appearance. Asci 125-130 x 25-26 µm. Spores clusters 38-48 x 15 µm, with spores in a 4 x 2 arrangement (pattern I, BRUMMELEN 1967), asymmetrically fusoid, slightly truncate, smooth, 14.5-16 x 6.5-7 µm. Paraphyses with yellow green contents, slightly widened at the tip. This material was identified as *S. citrinus,* although it did not agree completely with BRUMMELEN´S (1967) description, and the specimen had some characters nearer to those of *S. truncatus*, *S. glaber* and *S. minimus* as described by BRUMMELEN (1967). On balance, the current material fits *S. citrinus* better than the other possibilities. MJR 54(M)/06.

****Thecotheus crustaceus*** (Starbäck) Aas & N. Lundq. (Fig. 7).
Apothecia small, pale, hyaline, shortly pedicellate, 500-750 x 550 µm high. Excipulum of hyaline globose-polygonal cells up to 15 µm diam. Asci cylindrical, projecting above hymenial surface when ripe, 255-260 x 16 µm, KI^+ (blue). Spores obliquely uniseriate, smooth, ellipsoid, 17.5-19.5 x 8-9.5 µm, with an irregular, all-round gel swelling in water to 3 µm. AAS (1992) notes that *T. crustaceus* is mainly found on horse dung, and has been recorded from the four mainland Nordic countries. It appears to be widespread but not common, and AAS (1992) studied material from Europe, Azerbaijan, Canada, USA and Argentina, and noted records from New Zealand and Japan. I have a record from rabbit dung from Tenerife in the Canary Islands (MJR 62/02). These four Icelandic records are from a similar latitude north to those of the northernmost of the earlier records, that from the Yukon Territory at about 63.6°N (AAS 1992). MJR 30(M), 32, 51(M)-52(M)/06.

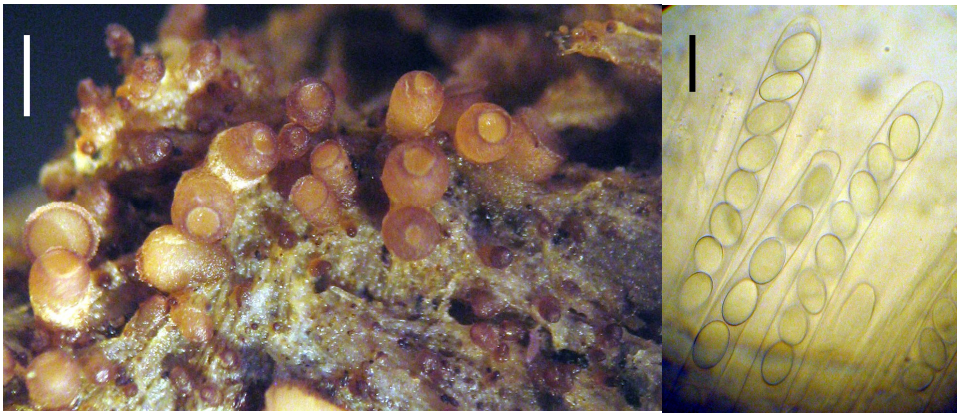

FIGURE 5. *Pseudombrophila cervaria*. Apothecia and asci. Scale bars: 2 mm (left); 25 µm (right).

FIGURE 6. *Saccobolus citrinus*. Asci and ascospores. Scale bars: 50 µm.

Thelebolales

Coprotus sexdecimsporus (P. Crouan & H. Crouan) Kimbr. & Korf
MJR 60/06. CFFI.

Coprotus disculus Kimbr., Luck-Allen & Cain
This is the same fungus as found in two 2002 collections (MJR 27, 46/02 RICHARDSON 2004), recorded as *Coprotus* sp. It has white discoid apothecia, up to 275 µm diam., slightly conical with a short stalk, with irregularly polygonal excipular cells 10-15 µm diam. Asci ± cylindrical, 95-110 x 14-19 µm. Spores uni- to biseriate, ellipsoid, hyaline, 10.5-11.5 x 6.5 µm. Paraphyses 1.5 µm wide, not enlarged at the apex but distinctly uncinate. Although the apothecia are

consistently much smaller than described for *C. disculus* (500-1000 µm in KIMBROUGH et al. 1972; <700 µm in AAS 1983), all other features agree well with the original description. MJR 64/06. CFFI.

Thelebolus microsporus (Berk. & Broome) Kimbr.
Following DE HOOG et al. (2005), the records here include those of smaller apothecia with brownish excipular cells, 8-spored asci, but no capitate paraphyses with yellowish-green contents, as well as those of more typical apothecia, which are yellowish from the contents of the capitate paraphyses. MJR 31(M), 35, 41(M)-43, 47, 53, 55(M)-57, 59-61, 63-64/06. H & E, NM 1, CFFI.

Thelebolus stercoreus Tode: Fr.
Again, following DE HOOG et al. (2005), the records under this entry include those of all *Thelebolus* with asci with more than 8-spores. They include a range of morphological and ecological types that would previously been determined as *T. nanus*, *T. polysporus*, *T. dubius*, *T. crustaceus* etc., with from 16-1000+ spores in single or multiple ascal apothecia. MJR 28, 31-32, 35-36, 53, 55-56, 60-61, 64/06, 26-29/08. CFFI.

Helotiales

Unguiculella tityrii (Velen.) Huhtinen & Spooner (Fig. 8).
Apothecia are white, in the Icelandic material 150-250 µm diam. x 340-440 µm high, with short erect and appressed hairs <20 x 2 µm on the upper part of the excipulum (not forming a fringe around the apothecial margin as in other material seen). Asci cylindrical, 48-58 x 7 µm, with no operculum or apical structure. Spores biseriate, ellipsoid, hyaline 6.5 x 3.2 µm. Paraphyses not seen.

This interesting fungus grows on the perithecia of coprophilous ascomycetes, especially *Schizothecium* species (HUHTINEN & SPOONER 2003). It is widely distributed in central and western Europe, Greenland and the USA and, as noted by HUHTINEN & SPOONER (2003), very variable in relation to hymenial and hair morphology. They observed that material from Greenland showed additional variability, beyond that seen in 'lowland' populations, especially in respect of the hairs which, as in the Icelandic material, were scant or lacking, especially at the apothecial margin. MJR 33/06.

Coniochaetales

Coniochaeta leucoplaca (Berk. & Ravenel) Cain
MJR 36(M), 38(M)-39(M), 40(M)-42, 63/06. H & E, CFFI.

Coniochaeta ligniaria (Grev.) Massee
MJR 29, 30, 32, 34, 39(M), 42-43, 44(M), 49(M)/06, 21/08. H & E, CFFI.

Coniochaeta saccardoi (Marchal) Cain
MJR 50(M)/06. H & E, CFFI.

FIGURE 7. *Thecotheus crustaceus*. Apothecia. Scale bar: 500 µm.

Coniochaeta scatigena (Berk. & Broome) Cain
MJR 28(M), 33(M)-34, 41-43, 49(M)-50, 53, 58(M), 62-64/06. H & E, CFFI.

Sordariales

Arnium caballinum N. Lundq.
MJR 31/06. H & E. CFFI.

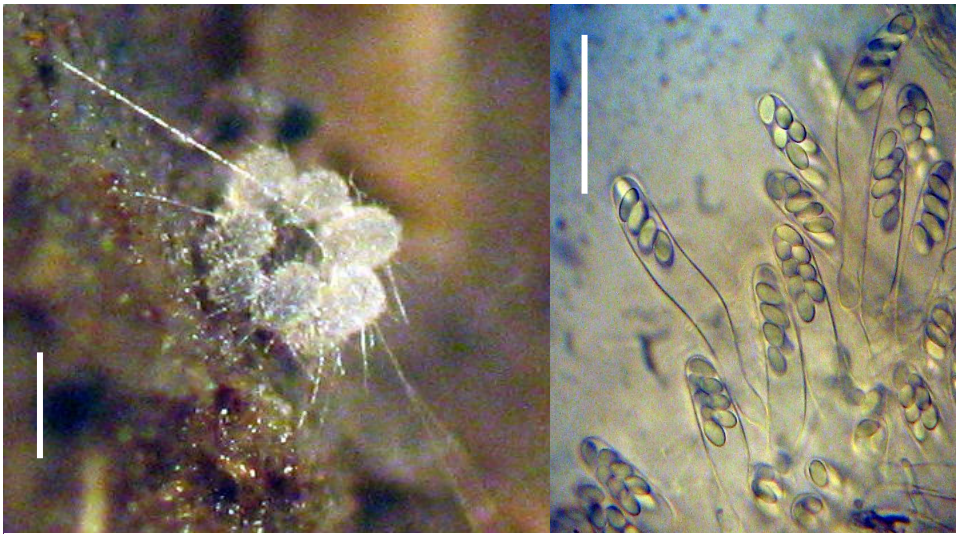

FIGURE 8. *Unguiculella tityrii*. Apothecia and asci. Scale bars: 500 µm (left); 50 µm (right).

Camptosphaeria citrinella (N. Lundq.) J.C. Krug & Jeng (Fig. 9)
Perithecia semi-immersed, 480-650 x 250-385 µm, perithecial wall dull yellow, semi-translucent, neck and ostiole dark, opaque, surrounded by tapered tufts of yellow hyphae, up to 250 µm long x 80 µm wide at the base. Asci narrowly clavate, 230 x 20 µm, tapered below, and with a narrower cylindrical apical region ca. 16 µm wide and a small but distinct apical ring visible in most. Asci frequently with an irregularly globose, and sometimes indistinct, apical globule 6-8 µm diam. Paraphyses yellow, septate, 3 µm wide. Spores obliquely uniseriate, hyaline, smooth, clavate, broader towards the ascus tip, with globular contents, 25-32 x 9-11 µm, and with a gelatinous appendage at each end ca. 16 µm long. No pigmented spores seen. MJR 21(M)/08.

This would appear to be a rare fungus, with no records since its description from Sweden by LUNDQVIST (1972) and it is unlikely to be overlooked, as it is very recognisable with a crown of lemon yellow hyphae around the dark neck and ostiole, and a yellow, semitranslucent, perithecial wall, although this latter feature was not so obvious *in situ* as the perithecia were semi-immersed. LUNDQVIST (1972) considered *Camptosphaeria* as a subgenus of *Cercophora*, and described *Cercophora citrinella* as a new species. KRUG & JENG (1977) treated *Camptosphaeria* as distinct from *Cercophora* at the generic level, and provided a key to the four species they accepted. Apart from a collection they described as a new species (*C. venezuelensis* J.C. Krug & Jeng), however, they presented no additional records. Both *C. clavispora* (S.I. Ahmed & J.H. Mirza) J.C. Krug & Jeng (originally described as *Podospora clavispora*) have much larger spores (65-90 x 15-23 µm) than those of *C. citrinella* and the type species *C. sulphurea* Fuckel, which are 26-36 x 6-12 µm. All are coprophilous except *C. sulphurea*, which was described from stems of *Peucedanum officinale*.

There appear to be no records of any of the four species subsequent to their original publication, although LUNDQVIST (1972) described *C. citrinella* on the basis of three collections from Sweden, one each from horse, hare and rabbit dung. The collection from Iceland agrees in most respects with that of LUNDQVIST (1972) for *C. citrinella*, apart from the extensive development of the yellow crown of hyphae around the neck, which was more developed than implied by the original description, and the apparent lack of any spore ornamentation. According to LUNDQVIST (1972) both *C. sulphurea* and *C. citrinella* have verruculose spores, but the ornamentation is illustrated as being very fine. This may be a variable feature – the spores of *C. venezuelensis* are described as being smooth, and the generic description is that they are smooth or minutely granulate to verruculose.

Chaetomium elatum Kunze: Fr.
MJR 45(M)/06. H & E, but not on dung.

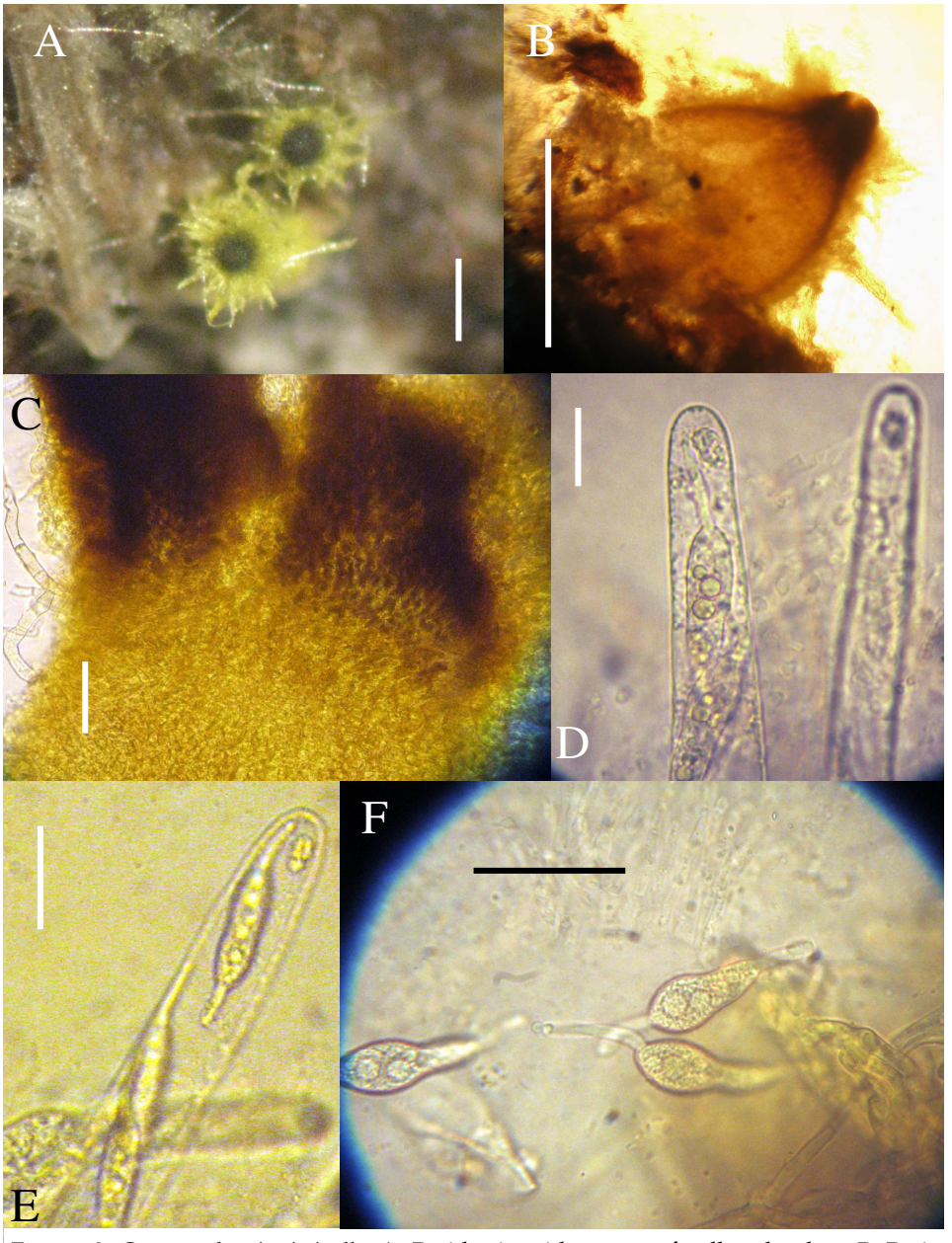

FIGURE 9. *Camptosphaeria citrinella*. A. Perithecia with crown of yellow hyphae; B. Perithecium; C. Peridium and base of neck; D. Ascus tips, with apical globule: E, F. Ascospores. Scale bars: 500µm (A, B), 25 µm (C-F).

Podospora appendiculata (Auersw. ex Niessl) Niessl
Particularly abundant on horse dung in the field. MJR 32-34, 40(M), 44(M), 62 (M)/06. H & E.

Podospora decipiens (G. Winter ex Fuckel) Niessl
MJR 28, 30-31, 34-35, 41-43, 47, 50, 51, 53, 55, 57, 60-61, 63-64/06. H & E, CFFI.

****Podospora intestinacea*** N. Lundq.
Described by LUNDQVIST (1972) with 10 finds on dung of horse (5), cattle (4) and sheep, these three records from horse and one from sheep dung are the first for Iceland, but it has also been found on sheep dung in the Faroe Islands (RICHARDSON 2005), and Doveri (2004) reported collections on pig, horse and cattle dung from Italy, and cited collections from Europe, South America and New Zealand. MJR 30, 34(M), 41, 50(M), 64(M) /06.

****Podospora pilosa*** (Mouton) Cain
Perithecia superficial, pyriform, with sparse setae at the neck up to 95 µm long. Asci round-headed (cf. *Arnium*) and tapered below with a long foot, 190-200 x 22.5-25.5 µm, with no obvious apical structure. Young spores distinctly clavate, 1-2 seriate, some almost limoniform, 17.5-21 x 11-11.5 µm with a pedicel 6 x 3 µm, not readily visible in mature spores, an apical germ pore and short apical appendages. MJR 30(M)/06.

Schizothecium conicum (Fuckel) N. Lundq.
MJR 30-31, 35(M), 41, 43, 46-47, 50-51, 53, 55(M)-58, 60-61, 64/06. H & E, CFFI.

****Schizothecium tetrasporum*** (G. Winter) N. Lundq.
There appears to be no record of *S. tetrasporum* from Iceland (HALLGRÍMSSON & EYJÓLFSDÓTTIR 2004; RICHARDSON 2004). It is highly probable that the finding of *S. tetrasporum* is associated with the presence of rabbits because from 1000 samples of the most frequently collected dung types I have obtained world-wide, *S. tetrasporum* occurs much more frequently on rabbit pellets than on any other dung type (Table 3). Rabbits (*Oryctolagus cuniculi*) are not native to Iceland, but occur in a few places as a result of naturalization from the release of unwanted domestic pets. MJR 21/08.

Schizothecium vesticola (Berk. & Broome) N. Lundq.
MJR 27-34, 41-42, 45, 51-53, 56, 58, 62-64/06, 26, 29/08. H & E, CFFI.

****Sordaria alcina*** N. Lundq.
MJR 50(M)/06.

Sordaria baltica N. Lundq.
MJR 30/06. H & E, CFFI

Sordaria fimicola (Roberge ex Desm.) Ces. & De Not.
MJR 30, 32, 46, 50-52, 54, 56(M)/06, 26/08. H & E, CFFI.

TABLE 3. Relative frequency of occurrence of *Schizothecium tetrasporum* on dung of different animals.

Substrate (no. of samples)	**Occurrence of *S. tetrasporum* (%)**
Rabbit (n = 303)	74
Hare (n = 155)	25
Deer (n = 133)	20
Sheep/goat (n = 253)	10
Horse (n = 57)	4
Tetraonidae (n = 52)	2
Cattle (n = 47)	0

Sordaria minima Sacc. & Speg.
See RICHARDSON (2004) for comment and observation on this fungus in Iceland. It was present on one sample of goose dung collected on Surtsey. MJR 27/08. H & E, CFFI.

Xylariales

****Hypocopra merdaria*** (Fr.: Fr.) J. Kickx f.
Perithecia single in limited stromata, with the ostiole surrounded by a white mycelial weft of hyphae. Asci 350 x 30 µm. Spores uniseriate, with the pigmented cell 35-42 x 13-18.5 µm, germ slits 19-30.5 µm long, and a distinct, small hyaline basal cell. HANSEN & KNUDSEN (2000) include *H. merdaria* ss. auct. as a synonym of *H. lojkaeana* (Rehm) J.C. Krug & N. Lundq., but this Icelandic material is not *H. lojkaeana* as described by them, i.e. with 1-celled spores 27-35 x 13-18 µm, with germ slits extending the full length. According to the treatment of KRUG & CAIN (1974) it is either *H. festucacea*, which is described and illustrated, or *H. merdaria*, which is not. DOVERI (2004) refers to the confusion between *H. lojkaeana* and *H. merdaria*, and describes both *H. merdaria* and *H. festucacea*, and it is clear from his descriptions that this material is *H. merdaria*, which is somewhat larger than *H. festucacea* in many respects. MJR 28 (M), 60(M)/06.

Hypocopra parvula Griff.
MJR 28(M), 63/06. CFFI.

Hypocreales

Selinia pulchra (G. Winter) Sacc.
MJR 31(M)/06. CFFI.

Melanosporales

Melanospora brevirostris (Fuckel) Höhn.
Perithecia golden-brown, superficial, 210-330 µm diam., with short beak, <65 µm, and ostiolar setae sparse, 65 x 5 µm, or absent. Asci clavate, 48-79 x 22-29, 4-spored, spores ellipsoid-citriform, often slightly asymmetrical, 19.5-29 x 10-16 µm. This material agrees with the description of *M. brevirostris*, apart from 4-spored asci. The only consistently 4-spored *Melanospora* in CANNON & HAWKSWORTH (1982) is *M. longisetosa* which, as well as having long ostiolar setae, has discoid spores. *M. zamiae* is reported as having 4-8 spored asci, but is distinguished from *M. brevirostris* by its longer neck and smaller spores, although CANNON & HAWKSWORTH (1982) note that intermediates do occur. MJR 45(M)/06. CFFI.

****Syspastospora parasitica*** (Tul.) P.F. Cannon & D. Hawksw.
Perithecia were semi-immersed, pale golden-brown, 120-130 µm diam., with a neck 200-450 µm long x 65 µm wide at the base tapering to 40 µm diam. at the tip, brownish below, clearer above, composed of long, interlocking wavy cells ca. 20 µm long x 2-3 µm wide. From observation, although the neck is relatively broad, the inner diameter appears only wide enough to allow a single file of spores to be released. Asci are ephemeral, and none were seen. Spores dark grey, short barrel shaped, 4.5 x 4 µm, with a clear germ pore at each end. According to CANNON & HAWKSWORTH (1982) this is parasitic on moniliaceous hyphomycetes, so it is not strictly a coprophilous fungus. MJR 36(M)/06.

Microascales

****Viennotidia fimicola*** (Marchal) P.F. Cannon & D. Hawksw.
An unmistakable fungus with long-necked, reddish brown, globose perithecia, with the immersed thecial body <250 µm diam., and a neck 1-3 mm long, terminating with cilia at the tip holding a droplet of liquid, with hyaline elliptical-allantoid spores 5.5-7 x 1.5-2 µm. It is a mycoparasite (WEBER & WEBSTER 1997), and is most frequently found on dung from rabbit and deer, being recorded from 21-22% of samples of those substrates, so its occurrence on sheep dung, where the incidence is about 10%, is relatively unusual. MJR 57 (M)/06.

Pleosporales

Delitschia perpusilla Speg.
MJR 53(M)/06. CFFI.

Pleospora herbarum (Pers.: Fr.) Rabenh.
MJR 29/08. H & E.

Sporormiella australis (Speg.) S.I. Ahmed & Cain
MJR 29, 39(M)/06, 21/08. H & E. CFFI.

Sporormiella grandispora (Speg.) S.I. Ahmed & Cain
This species is part of a morphological series that has asci with tapering stalks, and spores with end cells that are tapered to some extent. Individually they exhibit much variation in spore size, and in septa and germ slit orientation. BELL (2005) in particular has discussed the difficulties of drawing boundaries between the various taxa that have been described. SPEGAZZINI (1878) gives the spore size for *Sp. grandispora* as 60-65 x 12-15 µm, while AHMED & CAIN (1972), DOVERI (2004) and BELL (2005) all accept spores shorter than described by SPEGAZZINI (45-60 µm, 47.5-58.9 µm and 50-56 µm, respectively) in their understanding of *Sp. grandispora*. Three collections from 2006 with spores 51-64 x 11.5–16 µm (MJR 28/06), 55-64 x 12.8–14.5 (MJR 33/06) and 54.5-57 x 11-12.5 (MJR 42/06), and spore fragments from a fourth suggesting a size of 60 x 9.5-10, are considered to fit the description of *Sp. grandispora* as accepted by the above authors. Icelandic material from 2002 with a spore length ranging from (38.5-)45-67(-71) x (8-)11.5-16 µm over all collections was recorded as *Sp. grandispora*. The lower end of this range encompasses material that would be excluded from *Sp. grandispora* as understood above (see Fig. 4). In a re-examination of records from 2002, individual specimens had spore lengths varying, in an individual collection, over a range of <20 µm, e.g. 48-67.5 µm (MJR 47/06), supporting the acceptance by AHMED & CAIN (1972), DOVERI (2004) and BELL (2005) of spores shorter than described by SPEGAZZINI (1878) as being within the circumscription of *Sp. grandispora*, so eight collections from 2002 recorded as *Sp. grandispora* remain as initially reported (RICHARDSON 2004). Two others, however, after review, are now considered to be within the range of *S. lageniformis*. MJR 28(M), 33, 42, 44/06. CFFI.

Amendment to records for 2002: delete records of *Sp. grandispora* on 42, 46/02; the material has been re-identified as *Sp. lageniformis*.

****Sporormiella heptamera*** (Auersw.) S.I. Ahmed & Cain (Fig. 10).
A distinctive but apparently uncommon species, with relatively large ±immersed pseudothecia <700 µm diam. Asci 320 x 35 µm, tapering to the base; ascospores 7-celled, 86-93 x 17.5-19.5 µm, with the third cell from the apex the widest; end cells hemi-ellipsoidal, as long as wide, the intercalary cells wider than long, deeply constricted at the septa; germ slits oblique to almost transverse. Newly recorded for Iceland, but known from North America (AHMED & CAIN 1972), France (RICHARDSON, unpublished), Italy (DOVERI 2004) and Spain (BARASSAS 1985), Chile (MUROI & UDAGAWA 1984) and Japan (FUROYA & UDAGAWA 1972). MJR 64(M)/06.

Sporormiella intermedia (Auersw.) S.I. Ahmed & Cain
MJR 28, 31, 33, 42, 45, 53, 58, 60/06, 21/08. H & E, CFFI.

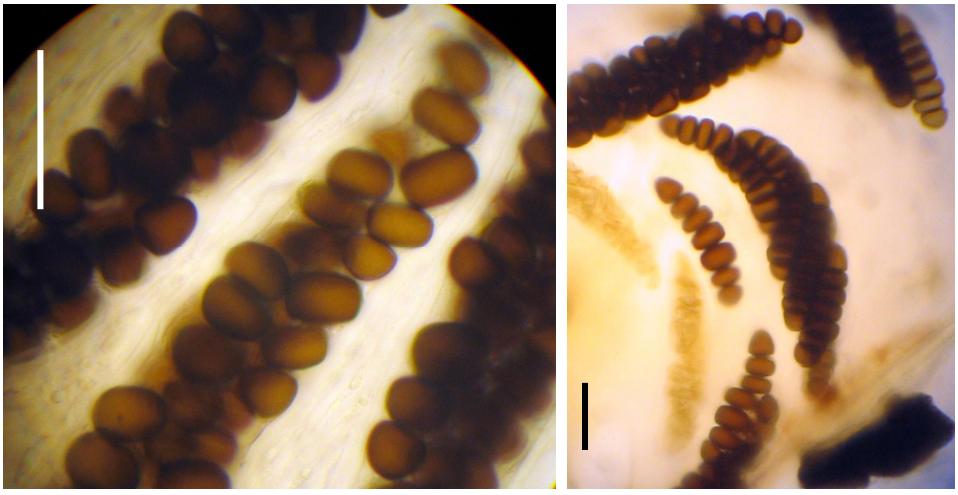

FIGURE 10. *Sporormiella heptamera*. Ascospores. Scale bars: 50 µm.

Sporormiella lageniformis (Fuckel) S.I. Ahmed & Cain

The most frequent member of the stipitate ascus, tapered-spore complex in the 2002 and 2006 collections comprised 17 records of species with spores in an overlapping range from 27.5-54.5 µm x 4.5-10 µm. Given the amount of variation observed within even a single pseudothecium, it is considered that all these collections probably belong to a single species which, depending on the particular parameter selected in the various treatments of the genus – spore size, relative size of cells, germ slit orientation and septa orientation – can be identified as *Sp. leporina*, *Sp. lageniformis, Sp. isomera* or *Sp. dubia*. In any one collection germs slits might be parallel or oblique to the long axis, and septa transverse or oblique.

The original descriptions of the spore size of these species were: - *Sp. leporina* 27-29 x 4-5 µm (NIESSL 1878) *Sp. lageniformis* 40 x 8 µm (FUCKEL 1869), *Sp. isomera* 32-40 x 5.5-8 µm (AHMED & CAIN 1972), and *Sp. dubia* 38-45 x 8-9 µm (AHMED & CAIN 1972). The 2002 collections, recorded as *Sp. leporina*, all with spores in the range 30-41.5 x 4.5-8 µm, were slightly longer and wider than reported by AHMED & CAIN (30-37 X 5.5-6.5 µm, 1972), and DOVERI (31.5-34.6 x 5.2-6.3 µm, 2004), while in BELL (2005) they key to *Sp. tetramera*, another AHMED & CAIN (1972) species, with spores 32-40 x 6-8 µm. The 2006 collections cover a wider range of spore size, 34-54.5 x 7-10 µm, but the narrowness of the spores, all <10 µm, preclude the largest of these collections being determined as *Sp. grandispora*. I believe these 17 records are all one species that, for the time being, I identify as *Sp. lageniformis*. One of the main distinctions between *Sp. leporina* and *Sp. lageniformis* is that the spores of the latter are described and illustrated by both AHMED & CAIN (1972) and DOVERI (2004) as having distinctly oblique septa, while *Sp. leporina* has is described as having spores with transverse septa; spores with both oblique and transverse septa have been

observed in much of the material examined, but not consistently, and the majority of material has spores which are notably longer than described for the type of *Sp. leporina*, which I have not, however, examined. It is also worth noting here that DOVERI (2004) considers *Sp. isomera* to be possibly synonymous with *Sp. leporina*. MJR 28, 30, 33, 35, 41-42, 49, 51, 53, 62(M)-64/06, 21/08. CFFI.

Additional records for 2002: 42, 46/02, to replace the records of *Sp. grandispora* on those samples.

****Sporormiella longispora*** (Cain) S.I. Ahmed & Cain (Fig. 11).
A striking and recognisable species by virtue of its distinctive, relatively elongated, deeply constricted at the septa, 4-celled spores, in this material 99-109 x 14.5-16 µm (Q = 6.5-7). The terminal cells are gently tapered to a rounded end, while the intercalary cells are straight-sided, almost rectangular. AHMED & CAIN (1972) distinguish between *Sp. longispora*, with spores (80-)90-100(-108) x 12-14 µm, and *Sp. longisporopsis* with relatively broader spores (75-)80-100(-104)

FIGURE 11. *Sporormiella longispora*. Ascospores. Scale bars: 50 µm.

x 14-17 µm. They illustrate *Sp. longispora* spores with the almost rectangular intercalary cells described above, while *Sp. longisporopsis* spores are illustrated with more rounded intercalary cells and less tapered terminal cells. BELL (2005) illustrates straight-sided spores, at the lower end of the size range 82-93 x 13-16 µm as *Sp. longisporopsis*, and DOVERI (2004) illustrates spores with rounded cells as *Sp. longisporopsis*, 89.2-105 x 13.6-15.7 µm. Although wider than described for *Sp. longispora*, the spore shape of the Icelandic material is otherwise much more in agreement with the description of *Sp. longispora*, as originally illustrated by CAIN (1934) than of *Sp. longisporopsis*, and the two species may well be synonymous. I have seen four other collections, three with broader spores, originally determined, therefore, as *Sp. longisporopsis* and one as *Sp. longispora*. Doveri notes that *Sp. longisporopsis* is rare, with three records from Italy and one from Kenya (KHAN & CAIN 1979). The type of *Sp. longisporopsis* is from Canada, with additional material from Canada, USA, Mexico and Argentina (AHMED & CAIN 1972), while the type of *Sp. longispora* is also from Canada, with additional material from Canada and USA (AHMED & CAIN 1972), and Kenya (KHAN & CAIN 1979). MJR 31(M)/06.

Other material examined: **FRANCE**. Brown hare (*Lepus capensis*) dung: Domaine de Garenaud, Montazels, Aude (42.95°N; 2.23°E), 12.3.05 (MJR 1/05 (E)); **SPAIN (CANARY ISLANDS)**. Rabbit (*Oryctolagus cuniculus*) dung: Tafada, Anaga, Tenerife (28.58°N; 16.16°W), 13.11.02 (MJR 62/02 (E)); **USA.** Mule deer (*Odocoileus hemionus*) dung: Bryce Canyon NP, Utah (37.60°N; 112.21°W), 12.9.01 (MJR 65/01). Jack rabbit (black-tailed, *Lepus californicus*?) dung: Bryce Canyon NP, Utah (37.60°N; 112.21°W), 12.9.01 (MJR 66/01).

Sporormiella megalospora (Auersw.) S.I. Ahmed & Cain (Fig. 12).
AUERSWALD (1868) gives the spore size for *Sp. megalospora* as 80 x 16-18 µm, while AHMED & CAIN (1972), BELL (2005) and DOVERI (2004) are in agreement, describing spores 65-85 x 15-18 µm, 70-90 x 13.5-20 µm and 70-85 x 15-17 µm, respectively. The spores of the material from Tungufellsdalur (31/06) were deeply constricted at the septa, 67-80 x 16-19 µm, and agree with the description of *Sp. megalospora* as understood by the above authors. The five Icelandic records of *Sp. megalospora* from 2002 have been re-examined. Samples from MJR 24, 25, 32 and 35/02, all with similar-sized spores ranging from 61-90 x 16-21 µm form a clear cluster (Fig. 4), and are considered to be correctly identified as *Sp. megalospora*. Collection MJR 33/02, with smaller, and narrower, spores, 67-73 x 14.5 µm, is much closer to the range accepted for *Sp. grandispora*, which was also recorded from that sample, and the record of *Sp. megalospora* for that sample should be deleted. MJR 31(M)/06. CFFI.

Sporormiella minima (Auersw.) S.I. Ahmed & Cain
MJR 36, 39/06. H & E.

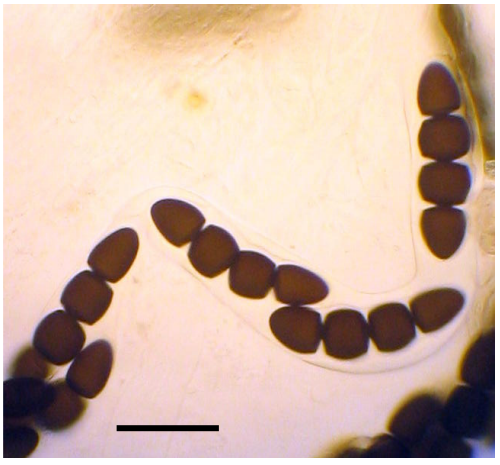

FIGURE 12. *Sporormiella megalospora*. Ascospores. Scale bar: 50 µm.

Sporormiella octomera (Auersw.) S.I. Ahmed & Cain (Fig. 13).

This species is particularly prevalent on ptarmigan droppings in Iceland, occurring on 3 of 5 of the 2002 samples and 4 of the 2006 collections, and not on any of the other dung types. RICHARDSON (2004) commented on the range of spore size observed in the three 2002 Icelandic collections, and the overlap with *Sp. schadospora*. They had spores 42-55 x 6-9 µm. The spore size of the four more recent collections was less variable, all within the range (40)41-48(50) x 5-7 µm, which agrees well with AUERSWALD's (1868) original description (40 x 5-6 µm), and AHMED & CAIN's (1972) values ((37-)40-48(-50) x 7-8 µm) for *Sp. octomera*, although slightly narrower. MJR 37(M), 38(M), 39(M), 40(M)/06. CFFI.

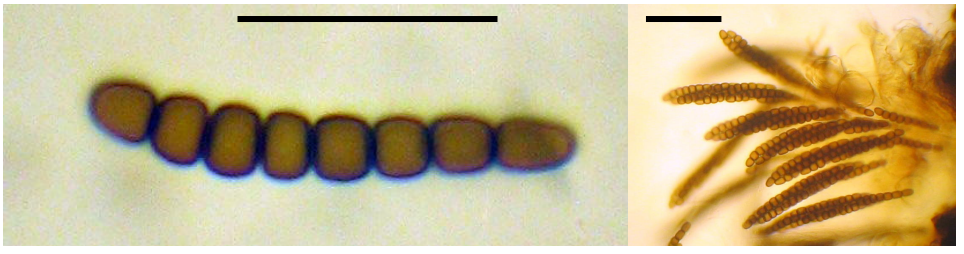

FIGURE 13. *Sporormiella octomera*. Asci and ascospores. Scale bars: 25 µm (left), 50 µm (right).

****Sporormiella octonalis*** S.I. Ahmed & Cain (Fig. 14).

Pseudothecia with dark neck and paler, more translucent body. Spores 8-celled, not deeply constricted at the septa, long ellipsoid, 42-51 x 12.5-13 µm, with intercalary cells wider than long, and the third cell from apex the widest, but not markedly so, end cells hemispherical. This is an uncommon species, reported from Canada and USA by AHMED & CAIN (1972), from Italy by

FIGURE 14. *Sporormiella octonalis*. Ascospores. Scale bars: 50 µm.

DOVERI (2004), and I have records from Scotland and France (Corsica). MJR 53 (M)/06.

Sporormiella subtilis S.I. Ahmed & Cain
This is one of the smaller spored species with tapered spores and tapering asci and, as with the other members of the group, it is difficult to define its boundaries. Specimens with a mean range of spore length <30 µm have been determined as *Sp. subtilis*, and the range 23-32 x 5.5-8 µm encompasses AHMED & CAIN's (1972) type description, BELL's (2005) understanding of the species, the spore sizes observed in the three samples from 2002 recorded as *Sp. subtilis*, and the three additional records from the current collection. It also includes the spore size given by NIESSL (1878) for *Sp. leporina*, but AHMED & CAIN (1972) and DOVERI (2004) both consider that species to have larger spores (30-37 x 5.5-6.5 µm). MJR 31, 35, 41/06. CFFI.

Additional record for 2002: 34/02, to replace the record of *Sp. leporina*.

Trichodelitschia minuta (Fuckel) N. Lundq.
MJR 31, 33, 58(M)/06. H & E, CFFI (as *T. bisporula*).

Trichodelitschia munkii N. Lundq.
MJR 33/06. H & E, CFFI.

Basidiomycota

Coprinellus heptemerus (M. Lange & A.H. Sm.) Vilgalys, Hopple & Jacq. Johnson (*Coprinus heptemerus* M. Lange & A.H. Sm.)
MJR 28, 31, 35(M), 41, 43, 47, 53, 55(M), 57-58(M), 60-61/06. CFFI.

Coprinellus pellucidus (P. Karst.) Redhead, Vilgalys & Moncalvo (*Coprinus pellucidus* P. Karst.)
MJR 30, 34-35, 43(M), 46, 47, 50(M)-52, 57/06. CFFI.

Coprinopsis cordisporus (T. Gibbs) Watling & M.J. Richardson (*Coprinus cordisporus* T. Gibbs)
MJR 28, 30(M), 34, 46, 51-52(M), 56, 60, 62-63(M), 64/06. H & E, NM 2, CFFI.

Coprinopsis ephemeroides (DC.: Fr.) Watling & M.J. Richardson (*Coprinus ephemeroides* (DC.: Fr.) Fr.)
MJR 63(M)/06. H & E, NM 2. Also present in the field on horse dung at Hamrar, Grundarfjörður, Snæfellsnes, where sample 57/06 was collected.

Coprinopsis nivea (Pers.: Fr.) Redhead, Vilgalys & Moncalvo (*Coprinus niveus* (Pers.: Fr.) Fr.)
MJR 43(M), 47(M), 64(M)/06. H & E, NM 2. CFFI.

**Coprinopsis radiata* (Bolton: Fr.) Redhead, Vilgalys & Moncalvo (*Coprinus radiatus* (Bolton: Fr.) Gray)
MJR 35(M), 47(M), 52, 56(M)/06.

Coprinopsis stercorea (Fr.) Redhead, Vilgalys & Moncalvo (*Coprinus stercoreus* Fr.)
MJR 43, 51, 57, 63-64/06. NM 2, CFFI.

**Laetisaria fuciformis* (McAlpine) Burds.
Fruiting indeterminate over the surface of the dung, hymenium pale, white-buff. Clamp connections not seen. Basidia 4-spored, cylindrical, 20-30 x 6-7 µm. Spores hyaline, ellipsoid–amygdaliform, non-amyloid, 9.5 x 6-6.5 µm. There are no records of *L. fuciformis* from Iceland, and it is not known to be coprophilous, but its occurrence on goose dung is, perhaps, not suprising, since it is well known as a grass pathogen, the cause of red thread disease. MJR 30(M)/08. Det. K.-H. Larsson, material in GB.

Panaeolus papilionaceus (Bull.: Fr.) Quél.
MJR 63(M)/06. H & E, NM 2.

Panaeolus semiovatus (Sowerby: Fr.) var. ***phalaenarum*** (Fr.) Ew. Gerhardt (*P. antillarum* (Fr.) Dennis)
MJR 56(M)/06. H & E, NM 2, CFFI.

Parasola misera (P. Karst.) Redhead, Vilgalys & Hopple (*Coprinus miser* P. Karst.)
MJR 28, 30(M), 34-35, 43(M), 46-47, 51-53, 63(M)/06. H & E, NM 2, CFFI.

Psilocybe coprophila (Bull.: Fr.) P. Kumm.
MJR 34(M), 41, 44, 49(M), 62(M), 63(M), 64(M)/06. NM 2.

Anamorphic Fungi

Truncatella angustata (Pers.: Link) S. Hughes
Described as a caulicolous, corticolous, foliicolous and fructicolous species (NAG RAJ 1993), but not known to be coprophilous, so its occurrence on a ptarmigan pellet is of interest, although perhaps not surprising, since they are composed of partially digested pieces of vegetation. MJR 36(M)/06. H & E.

Mycetozoa, Myxogastria, Trichiales

Arcyria cinerea (Bull.) Pers.
MJR 62(M)/06. H & E.

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