Coprophilous fungi from the Faroe Islands

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Úrtak
59 sløg av taðfrekum soppum eru skrásett úr 20 taðsýnum, ið eru tikin í Føroyum, og sum eru ald í ráligum kømrum. Nógv nýggj sløg eru funnin fyri fyrstu ferð í Føroyum. Fleiri sløg eru funnin í sýnum, sum eru tikin av seyða- og harusparlum, og eru tey tikin á 7 ymsum støðum. Greiningar av hesum sløgum hava gjørt tað møguligt at gera ein partleysan samanburð av soppamegninum í tveimum ymsum sløgum av tøðum og til at vísa, at hesi megn eru týðiliga ymisk, hóast tey stava frá sama búøki.

Abstract
Fifty-nine species of coprophilous fungi are recorded from 20 dung samples collected from the Faroe Islands and incubated in moist chambers. Many new records for the Faroe Islands are reported. Analysis of the species occurring on pairs of sheep and hare samples collected from seven different localities have allowed an objective comparison of the mycobiota on two different dung types to be made, and the demonstration that they are clearly different, although derived from the same habitat.

Introduction
During a visit to the Faroe Islands in June 2004, 20 samples of herbivore dung were collected and, on return to the UK, incubated in damp chambers. The coprophilous fungi which developed were recorded. Details of the fungi developing on the samples are provided and discussed. Some coprophils are more or less ubiquitous, while others are more likely to be found on some dung types than on others (e.g. van Brummelen, 1967; Lundqvist, 1972; Richardson, 2001), but such conclusions have been drawn from general observations, rather than from a study of different substrates collected from the same locality and habitat. In eight of the localities sampled both hare and sheep were present, so the animals were grazing the same vegetation. Comparison of the species occurring on the paired samples from sheep and hare allowed the mycobiota of the two different dung types to be compared directly.

Material and methods
Samples were collected between 18 and 23 June 2004 (Table 1). Most were wet when collected, and were gently air-dried and placed in paper envelopes. Samples were rehydrated and incubated on 24 June 2004 on moist paper towelling, in plastic boxes with lightly fitting transparent lids, under ambient light and at room temperature (*ca* 15-18^{o}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 accommodate approx. 2-4 g D.W. (= 15 sheep or hare

Sample no.*	Locality, longitude and latitude (°), and elevation	Date	Substrate
31/04	Høgareyn, Vestmanna, Streymoy. W7.14. N62.13. 280 m.	18.6.04	sheep
32/04	Sornfelli, Streymoy. W6.96. N62.08. 590 m.	18.6.04	hare
33/04	Kirkjubøur, Streymoy. W6.78. N61.95. 30 m.	19.6.04	sheep
34/04	Kirkjubøur, Streymoy. W6.78. N61.95. 30 m.	19.6.04	hare
35/04	Eiði, Eysturoy. W7.08. N62.31. 5 m.	19.6.04	sheep
36/04	Oyndfjarðfjall, Eysturoy. W6.87. N62.28. 155 m	20.6.04	hare
37/04	Oyndfjarðfjall, Eysturoy. W6.87. N62.28. 155 m.	20.6.04	sheep
38/04	Elduvík, Eysturoy. W6.90. N62.29. 37 m.	20.6.04	hare
39/04	Elduvík, Eysturoy. W6.90. N62.29. 37 m	20.6.04	sheep
40/04	Eiðisskarð, Eysturoy. W7.00. N62.29. 450 m.	21.6.04	hare
41/04	Eiðisskarð, Eysturoy. W7.00. N62.29. 430 m.	21.6.04	sheep
42/04	Middalur, Viðoy. W6.50. N62.33. 75 m.	21.6.04	hare
43/04	Middalur, Viðoy. W6.50. N62.33. 75 m.	21.6.04	sheep
44/04	Buðadalur, Kunoy. W6.61. N62.30. 40 m.	22.6.04	hare
45/04	Buðadalur, Kunoy. W6.61. N62.30. 40 m.	22.6.04	sheep
46/04	Litlidalur, Borðoy. W6.55. N62.31. 90 m.	22.6.04	hare
47/04	Litlidalur, Borðoy. W6.55. N62.31. 90 m.	22.6.04	sheep
48/04	Húsadalur, Vágar. W7.30. N62.08. 140 m.	23.6.04	hare
49/04	Húsadalur, Vágar. W7.30. N62.08. 140 m.	23.6.04	sheep
50/04	Sørvágur, Vágar. W7.29. N62.07. 60 m.	23.6.04	horse

* MJR sample no. and year identified (year identified omitted from some collection details in text and Table 2.)

Table 1. Details of Faroese dung samples and collection localities.

pellets), or 13 x 8 cm for horse (approx. 10 - 20 g D.W.). Samples were examined frequently at intervals of a few days, with a **x** 7-45 magnification stereomicroscope. Fruiting bodies were removed and mounted in water for examination and identification at higher magnification. Samples were incubated for up to 15 wk, with observations continuing whilst new fungi were being observed. Localities (latitude and longitude, European Geodetic 50 Datum) were determined with a Magellan GPS 4000 XL satellite navigator, and place names given are according to the 1:100000 Topografiskt Atlas (Kort and Matrikelstyrelsen, 2001). Selected material has been placed in the Herbarium of the Botanical Museum, Copenhagen (C). Although the number of samples was rather small, an estimate of species richness of the Faroese coprophilous mycobiota was made. A cumulative species curve was constructed for the same suite of taxa as used by Richardson (2001) who, from a world-wide study of a similar range of substrates, demonstrated a latitudinal gradient of species richness in coprophilous fungi. The equation for that curve ($y = ax^b$, where y = cumulative

Sample pair	No. of species on		Species common to both	Similarity coefficient	
	sheep	hare		Jaccard	Sørensen
33/34	7	2	2	0.29	0.44
36/37	10	13	6	0.35	0.52
38/39	11	12	4	0.21	0.35
42/43	20	16	7	0.24	0.39
44/45	17	11	5	0.22	0.36
46/47	15	14	5	0.21	0.34
48/49	17	11	6	0.27	0.43
Mean	13.9	11.3	5.0	0.26	0.40
S.E.	1.75	1.69	0.62	0.020	0.024
Pooled data from all 7 samples	41	31	20	0.38	0.56

Table 2. Coefficients of similarity of species assemblages from paired samples of sheep and hare dung

no. of species observed in x samples) can be used to estimate the number of species to be expected from 50 samples, for comparison with estimates for the number to be expected for that latitude. The similarity of the mycobiota from pairs of hare and sheep samples collected from eight different localities were compared by using the Jaccard and Sørensen coefficients (Magurran, 2003).

Results and discussion

The twenty samples provided a total of 233 records of 59 species. Many of these are new records for the Faroe Islands. The equation for the cumulative species curve was $y = 10.345x^{0.563}$, which provides an estimate of 94 species of the relevant groups to be expected from 50 samples. This value is of a similar order to, but slightly lower than, those found for similar collections of samples from similar or slightly lower latitudes, e.g. Iceland (Richardson, 2004) and the UK (Richardson, 2001).

In comparing the mycobiota from the pairs of hare and sheep samples, one hare collection comprised only two pellets, which yielded two species. It was considered that this small sample would not provide a representative comparison with the mycobiota of the contrasting sheep sample, so that sample pair was omitted from the comparison of similarity of the sheep and hare samples. Analysis of the records from the other seven pairs, each collected from a different locality, showed no significant difference in the number of species occurring on individual sheep and hare samples (mean 13.9 vs 11.3 per sample, $p = 0.11$, 6 d.f.). Overall the seven sheep samples yielded 41 species compared to 31 from hare. The community composition of the sheep and hare pellet mycobiotas were significantly different (Tables 2, 3). The Jaccard and Sørensen indices, of 0.26 and

Species occurring only on:-		Species common to both
sheep	hare	sheep and hare
Ascobolus furfuraceus	***Bombardioidea stercoris***	*Ascobolus albidus*
Cheilymenia fimicola	***Coniochaeta hansenii***	*A. stictoideus*
C. leucoplaca	***C. polymegasperma***	*Coniochaeta ligniaria*
C. scatigena	***Hypocopra planispora****	*Coprinus cordisporus*
Coprinus filamentifer	***Phycomyces blakesleeanus***	*C. heptemerus*
C. miser	*Schizothecium glutinans*	*C. stercoreus*
C. vermiculifer	*Sordaria fimicola*	*Hypocopra parvula*
Coprobia granulata	*S. humana*	*Pilaira moreaui*
Hypocopra equorum	***Sporormiella bipartis***	*Pilobolus crystallinus*
Iodophanus carneus	*Trichodelitschia minuta**	*Podosordaria tulasnei*
Lasiobolus ciliatus	*Volutella sp.*	*Podospora decipiens*
L. diversisporus		*Psilocybe merdaria*
Pilobolus kleinii		*Saccobolus versicolor*
Saccobolus depauperatus		*Schizothecium conicum*
Sporormiella dakotensis		*S. vesticola*
S. grandispora		*Sporormiella australis*
Stropharia semiglobata		*S. intermedia*
Thelebolus caninus		*Thelebolus nanus*
Thelebolus cf dubius		*T. polysporus*
T. microsporus		*T. stercoreus*
Viennotidia fimicola		

* but was present on one of the unpaired sheep samples

Table 3. Species occurring on only sheep or hare dung, or common to both, in seven pairs of samples. Species especially characteristic of lagomorph dung are in bold.

0.40 respectively, were highly significantly different from 1.0 (*F* = 19.8 (Jaccard); 12.8 (Sørensen), d.f. = 6), the value which would indicate complete similarity of the mycobiotas of the two substrates. Of all species from the paired samples, 20 were common to both sheep and hare, 11 were recorded only from hare, and 21 only from sheep (Table 3). Of the species on hare, some at least (Table 3) are identified as being particularly characteristic of lagomorph droppings, both from the literature and from a database of records from 768 other samples, excluding those collected in the Faroe Islands, which included 81 from hare and 230 from rabbit. Since the animals were feeding in the same area, and ingesting the same inoculum of coprophils, it is concluded that the differences observed, both in community structure and species richness, are due either to differences in the digestive systems of the animals or the physical and/or chemical nature of the droppings of the two species.

Records

Information on the dung samples and their origin is given in Table 1. Following the convention of Vesterholt (1998), the islands on which fungi occurred are indicated by the following abbreviations :- Borðoy, Bo; Eysturoy, Ey; Kunoy, Ku; Streymoy, St; Vágar, Va; Viðoy, Vi. Notes on species, and the sample numbers on which they were recorded, are given below. Species not recorded for the Faroe Islands in the checklist of Vesterholt (1998), which includes all records from Møller (1945; 1958), are in bold type. Dried material and/or slides of samples annotated with (H) has been placed in the Herbarium of the Botanical Museum, Copenhagen (C).

ZYGOMYCOTINA

Phycomyces blakesleeanus Burgeff
Ey, Ku. 38, 44/04.

Pilaira moreaui Y. Ling
St, Vi. 33, 34, 42/04.

Pilobolus crystallinus (F.H. Wigg.) Tode
Bo, Ey, Ku, St, Va, Vi. This is perhaps positive confirmation of the presence of *P. crystallinus* in the Faroe Islands, since the record in the check list (Vesterholt, 1998) is presumably based on that in Møller (1958), in which he states that 'The author has not seen any material…but Mr. N. Petersen.…describes it so well in his letter that there can be little doubt that this species belongs to the Faröese flora.' There is no indication of any microscopic examination which would have been necessary to identify the species. 33, 36, 38, 41, 42, 44, 45, 47-49/04.

Pilobolus kleinii Tiegh.
Bo, Ey, Ku, St, Va. 33, 37, 45, 47, 50/04.

ASCOMYCOTINA

Pezizales

Ascobolus albidus H. Crouan & P. Crouan (Fig. 1)
Bo, Ey, Ku, St, Va, Vi. One of the commonest fungi on the Faroese samples, occurring on 80 % of the collections. An interesting phenomenon was observed on material from collection 43(H)/04, on which both *A. albidus* and *A. stictoideus* occurred. One apothecium was typical of *A. albidus*, but the asci contained four typical *A. albidus* spores and four spores of the same size but with ornamentation chracteristic of *A. stictoideus*, raising the possibility that hybridization may have occurred. 31, 32, 36-39, 41(H)-50/04.

Ascobolus furfuraceus Pers.
Ey. 39(H)/04.

Ascobolus stictoideus Speg. (Figs 2-4)
Bo, Ey, St, Vi. Some material on collection 47/04 was of a variant with no exospore pigment or ornamentation. The spores

were completely smooth and colourless in ripe asci, although the typical unilateral gel was present. The identity was confirmed by the presence of a single apothecium, identical in all respects except for two asci with lightly verrucose and pale purple pigmented spores. Normally pigmented spores were observed at later examinations and, in some asci, spores with peeling terminal areas of exospore which would be considered to be *A. degluptus* Brumm. Also present on the same material (q.v.) were very small apothecia of a *Saccobolus*, with no pigment at all, which appeared not to develop to maturity. 33, 36, 37, 41, 43, 4(H)7/04.

Cheilymenia fimicola (de Not. & Bagl.) Dennis
Ku. 45/04.

Coprobia granulata (Bull.) Boud.
Ey. 39/04.

Coprotus sexdecimsporus (P. Crouan & H. Crouan) Kimbr.
Ey. 35(H)/04.

Iodophanus carneus (Pers.) Korf (Figs 5-6)
Bo, Ey, Ku, Vi. Spores of all collections were larger than described for *I. carneus s.s.* by Kimbrough *et al.* (1969, 15-20 x 7.5-10.5 µm), within the range 19.5-25.5 x 11.2-13.5 µm for five of the collections, and are nearer to the size Kimbrough *et al.* (1969) give for *I. testaceus* (18-22.5 x 11-14.5 µm), which is, however, described as non-coprophilous. They also had slightly denser callose ornamentation at the ends of the spores. The sixth collection (43/04) had even larger spores, 26-32 x 13-16 µm, but in all other respects was similar to the other collections. Doveri (2004) prefers to take the view that *I. carneus* is very variable, and gives a wider range of spore size for *I. carneus* (17-26.2 x (9.5)10-14.7 µm), a view which I and others have also followed (e.g. Richardson and Watling, 1997, and Dissing, in Hansen and Knudsen, 2000). 35, 37, 39, 43, 45(H), 47/04.

Lasiobolus ciliatus (J.C. Schmidt : Fr.) Boud.
Ku, Va. 45, 50/04.

Lasiobolus diversisporus (Fuckel) Sacc.
Ku. 45/04.

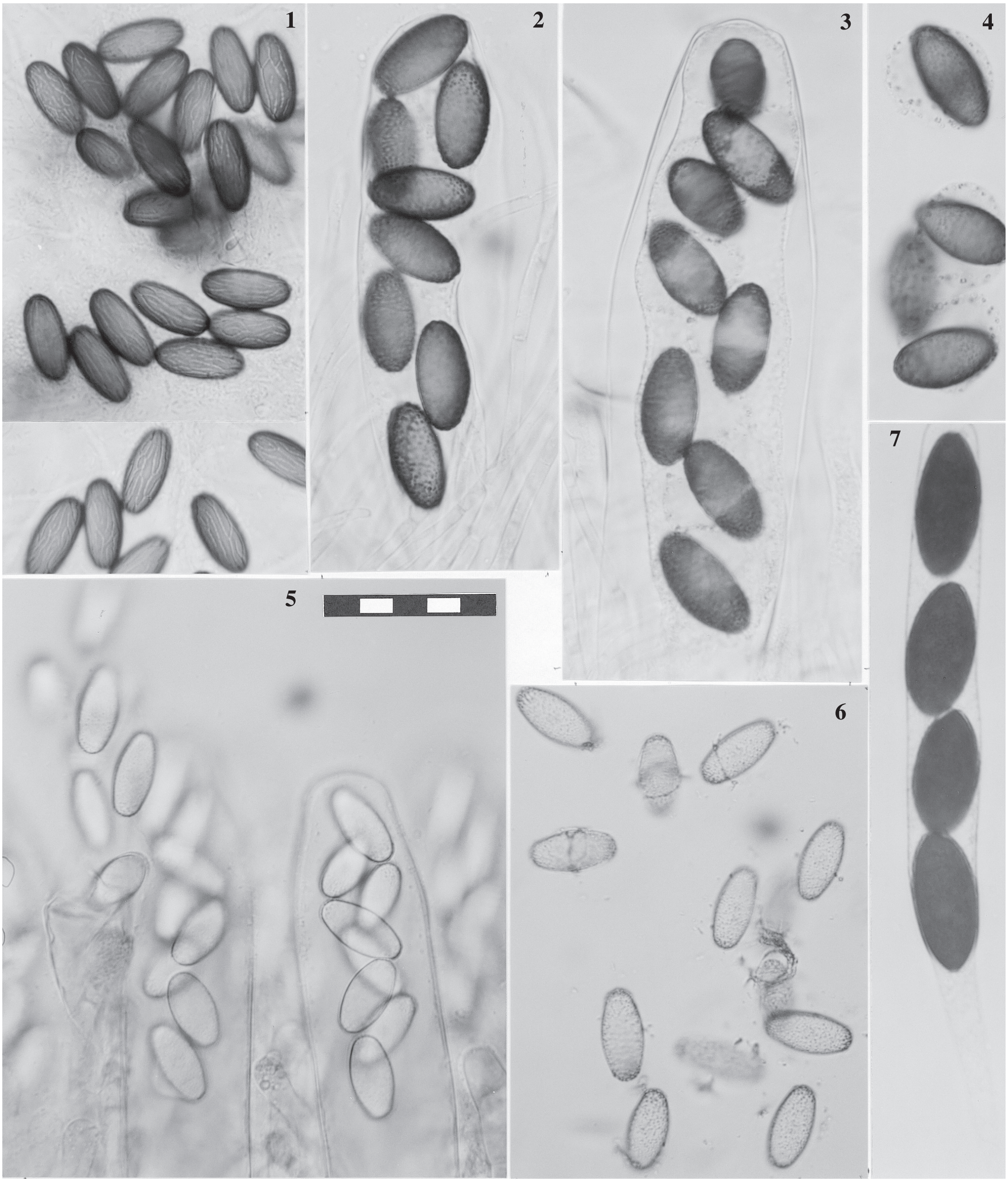
Lasiobolus lasioboloides Marchal
Ey, St. 31, 41/04.

Saccobolus depauperatus (Berk. & Broome) E.C. Hansen
Bo. Small apothecia with unpigmented and unmaturing spores, were otherwise very like those of *S. depauperatus*. See note under *Ascobolus stictoideus*. 47/04.

Saccobolus versicolor (P. Karst.) P. Karst.
Ey, Ku, St, Va. 31(H), 35, 38, 39, 45, 49/04.

Thelebolales

Thelebolus microsporus (Berk. & Broome) Kimbr.
Ey, St. 33(H), 39/04.



Figs 1-7. Ascopores of *Ascobolus* spp. **Fig. 1.** *Ascobolus albidus*. **Fig. 2.** *A. stictoideus*. **Figs 3.** *A. stictoideus*, '*A. degluptus*-type' spores in ascus. **Fig. 4.** Normal-type *A. stictoideus* spores from the same apothecium as the *A. degluptus*-type spores in fig. 3. **Fig. 5.** *Iodophanus carneus* spores and ascus. **Fig. 6.** *I. carneus* spores in KI, with iodine staining particles helping to define the gelatinous sheath. **Fig. 7.** *Bombardioidea stercoris* spores in the ascus. Scale bar for all figs: 50 μm.

Thelebolus stercoreus Tode : Fr.
Ey, Ku, St, Va, Vi. These records refer to 'classical' *T. stercoreus*, with more or less globose cleistohymenial ascomata, with a single, large, ascus up to 250 x 200 µm, with very many spores (estimates of up to or more than 2000). 32, 36(H), 38, 40, 42, 44, 48, 49/04.

De Hoog *et al*. (2005), on the basis of molecular studies, accept only four species of *Thelebolus* :– *T. microsporus*, *T. stercoreus* and two new species described from biomats in Antarctica. They found that many cultures from phenotypically very different teleomorphs are indistinguishable. The range of species found to be molecularly indistinguishable from *T. stercoreus s.s.*, as described above, included cultures from uniascal and polyascal types, with small to large asci, and few to very many-spored types. Other records of *Thelebolus* species from the Faroese collections are listed below, identified as far as possible from descriptions in the literature, which has always been difficult. After de Hoog *et al*. (2005), it may well be that they can all be recorded as *T. stercoreus*. It may, however, be useful to distinguish between the morphospecies, since there do appear to be ecological distinctions. *T. stercoreus* is very frequent on hare dung (on 51 % samples), but was observed on less than 10 % of sheep (Richardson, 2001), while *T. nanus* was almost twice as frequent on sheep than hare dung (43 % vs 26 %). *T. polysporus* occurs on about 20 % of rabbit and hare pellets, but on less than 10 % of sheep, deer and cattle, and some of the other poorly characterised and less frequent species, e.g. *T. caninus*, *T. crustaceus* and *T. dubius*, are often reported from the droppings of herbivorous birds.

Thelebolus caninus (Auersw.) Jeng & J.C. Krug
Vi. Limited material, seen only once, associated with other *Thelebolus*-like apothecia, with broad clavate/globose asci, 65-75 x 35 µm, with a distinct, thickened subapical ring. Asci 32-spored, with hyaline ellipsoid spores 6 x 3 µm. In the absence of further material firm identification was not possible. 43/04.

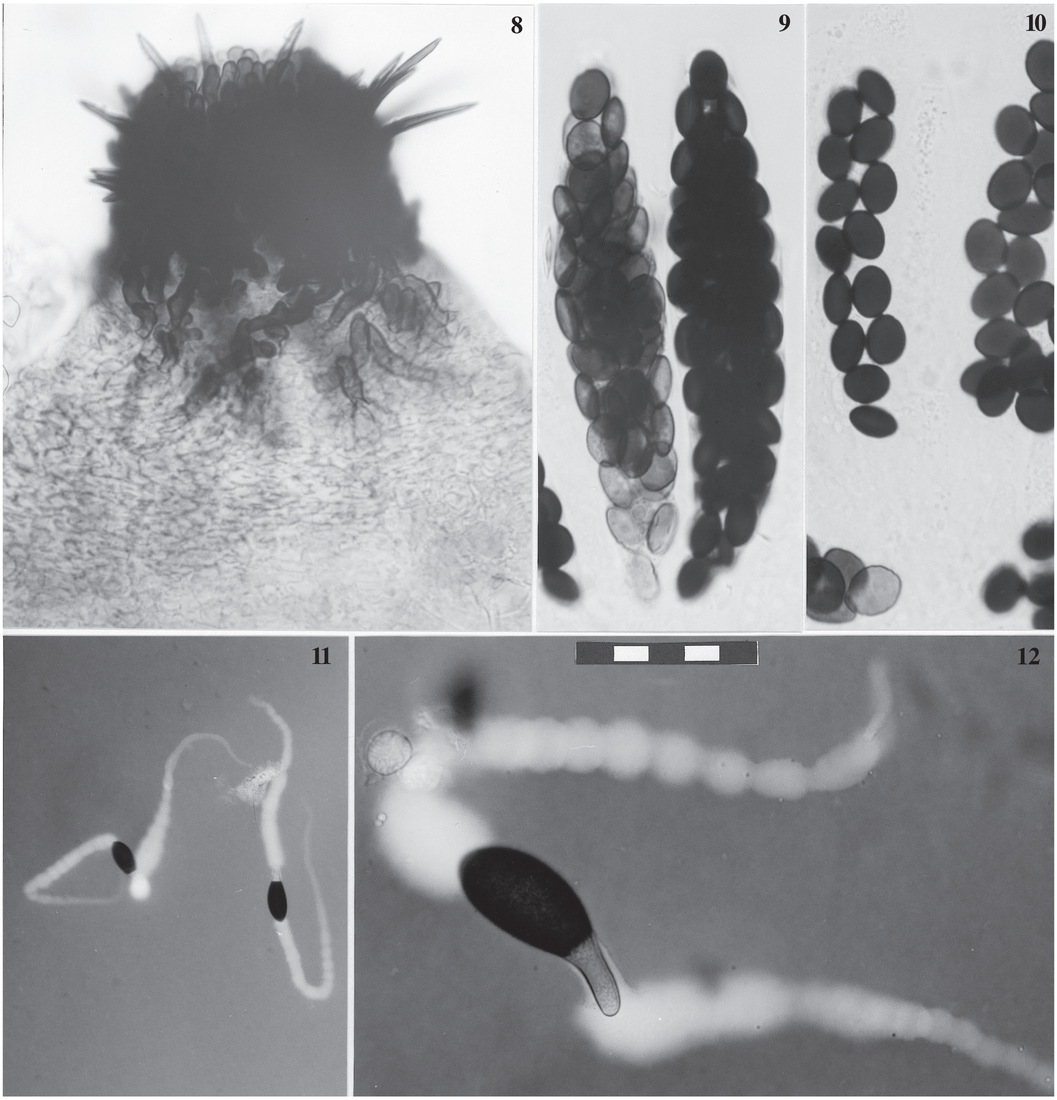
Thelebolus dubius (Boud.) Doveri and T. dubius var. lagopi (Rea) Doveri
Ey, St. 39, 32/04.

Thelebolus nanus Heimerl
Bo, Ey, Ku, Va, Vi. Globose cleistohymenial ascomata, with a single, small, ascus 40-80 x 30-60 µm, with very many spores. 36, 37, 43(H), 44, 46, 47, 49/04.

Thelebolus polysporus (P. Karst.) Y. Otani & Kanzawa
Bo, Ey, Va, Vi. Similar in morpology and stature to *T. nanus*, but with several asci in each ascoma. 36, 38, 41, 43, 46, 47, 49/04.

Sordariales

Bombardioidea stercoris (DC.) N. Lundq. (Fig. 7)
Bo, Va. Species of this genus seem to be widespread but infrequent. Lundqvist (1972) notes that they 'are mostly confined



Figs 8-10. *Coniochaeta polymegasperma*. **Fig. 8.** Perithecial neck. **Fig. 9.** Asci. **Fig. 10.** Ascospores. **Figs 11-12.** *Podospora intestinacea* ascospores, negatively stained in Indian ink to show appendages. Scale bar: Figs 8-10, 12 = 50 µm; fig. 11 = 200 µm.

to the droppings of leporine and cervine animals … from the temperate and boreal areas of Europe and North America.' This agrees with my experience, with only seven other records from over 800 samples world-wide, although two were austral rather than boreal (*B. stercoris* from hare from Scotland, S. France, Falkland

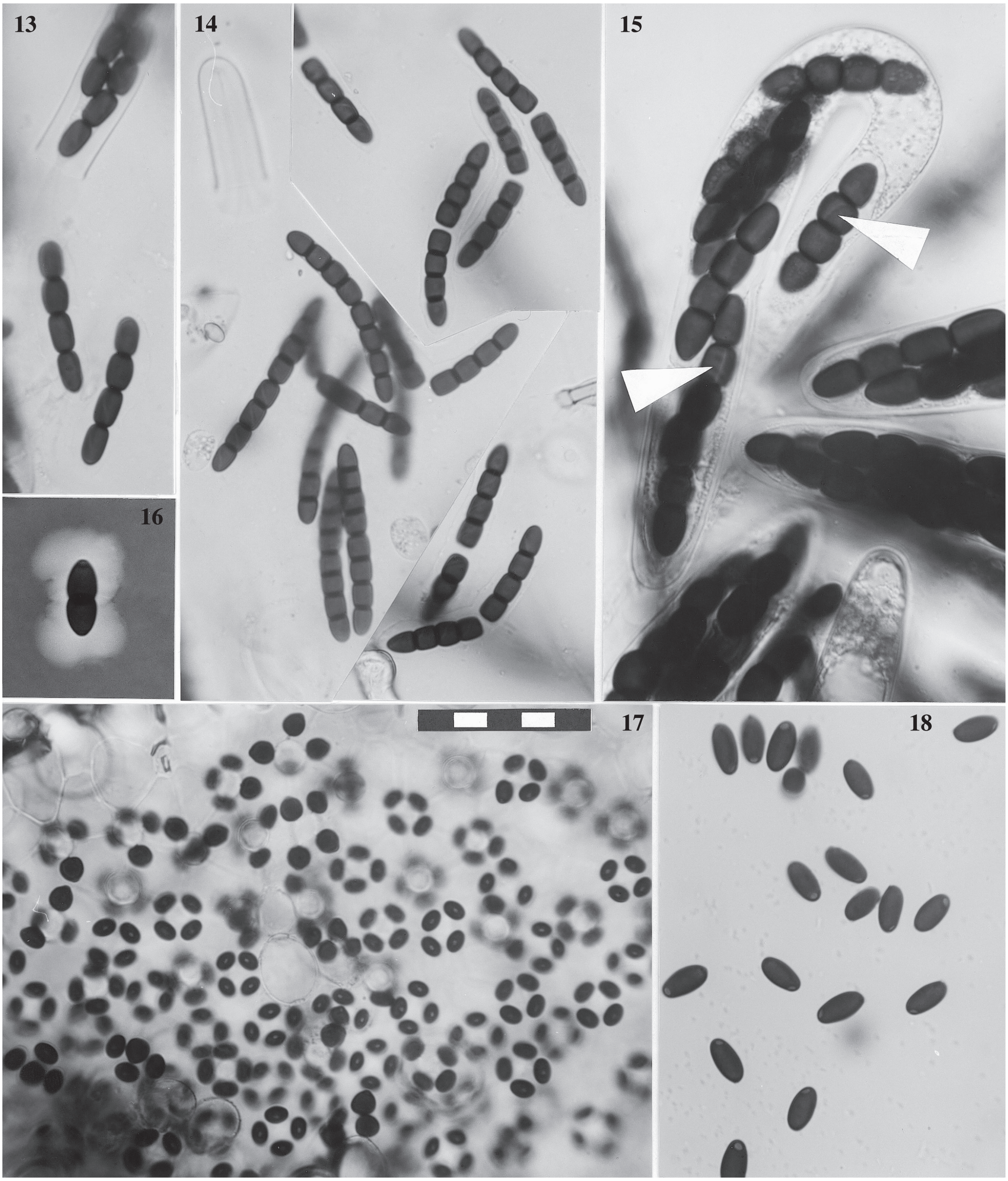
Islands (2), and from rabbit from Tenerife, Spain (not boreal, but at an elevation of 1400 m on the northern slopes of Mt Teide), and *B. bombardioides* from moose (*Alces alces*) from Colorado, USA, and the Yukon, Canada. 46(H), 48(H)/04.

Coniochaeta hansenii (Oudem.) Cain
Va. A *Coniochaeta* with polyspored asci, but with very small discoid spores, 6.5-8.5 x 5-7 x 4-5 µm (cf. *C. polymegasperma* below), which is also most frequently recorded from hare and rabbit dung. 48(H)/04.

Coniochaeta leucoplaca (Sacc.) Cain
Ku, Vi. 43, 45(H)/04, and

Coniochaeta vagans (Carestia & de Not.) N. Lundq.
Bo, St, Va, Vi. 31, 32(H), 42, 43, 46, 48-50/04.
There is some uncertainty about the identification and nomenclature of some of the Faroese material of *Coniochaeta*. Doveri (2004) discusses in detail the difficulties he and others have had in identifying 8-spored *Coniochaeta* species with spores of varying morphology from distinctly discoid to almost ellipsoid, with the largest dimension in the range 9-16 µm. Doveri (2004), citing in detail correspondence from Lundqvist, accepts that the correct name for the coprophilous fungus with discoid or broadly ellipsoidal spores in face view, in the range 12-16 x 8-16 µm, and 6-9 µm across the smallest axis, is *C. vagans* (syn. *C. discospora* (Auersw. ex Niessl)). The latter name has been considered by some to be a synonym of C. *ligniaria* (Grev.) Massee, a lignicolous species, the difference in substrate being considered to be unimportant in the light of the morphological similarity of *C. discospora* (= *C. vagans*) and *C. ligniaria*, with the latter name having priority. Lundqvist (in Doveri, 2004), however, considers that there are sufficient characters, particularly in the structure of the peridium, to distinguish the two. Quite a few of the Faroese specimens (as listed above) were identified as *C. vagans*, although the spores were mostly at the lower end of the accepted range, and some approaching the upper end of the range for *C. leucoplaca*, which has smaller discoid spores, 7-9.5 x 6-8 x 4-6 µm. Indeed, in some cases the spore sizes overlapped the ranges given for the two species. The spores of the various samples of these collections were in the range 9.5-14.5 x 7-11.5 x 4.5-7.5 µm. Two other collections, listed above under *C. leucoplaca*, had spores which were much more ellipsoid, 9-11 x 5-8 x 4-6.5 µm.

Coniochaeta polymegasperma M. J. Richardson (Figs 8-10)
St, Vi. This species has been known in Scotland since the 1960s (Richardson, 1998). From 1990-2004 there were 16 records of this fungus, all from Scotland, and all on droppings of the blue or mountain hare (*Lepus timidus*), out of a total of 41 blue hare samples collected in Scotland. In contrast, it has not been found on samples of blue hare collected in England (1) or Ireland (2), or on samples of other species of hare from Scotland (3), England (6), France (19), USA (8), Chile (1) or the Falkland Islands (5). It was also not recorded from eight samples from Finland collected in August 2004, some



Figs 13-15. Ascospores of *Sporormiella* spp. **Fig. 13.** *S. australis*. **Fig. 14.** *S. bipartis*. Note tendency of 8-celled spores to break into two 4-celled units. **Fig. 15**. *S. grandispora*. Note tapering end cells of spores and variable orientation of germ slits (arrows). **Fig. 16.** *Trichodelitschia munkii* ascospore negatively stained in Indian ink to show gelatinous sheath. **Fig. 17.** *Coprinus cordisporus* gill face and spores. **Fig. 18.** *Coprinus heptemerus* spores. Scale bar for all figs: 50 µm.

of which, based on habitat and locality, were probably from mountain rather than brown hare. It is interesting to find it in the Faroe Islands, extending its known geographical range, but still on its type substrate. 32(H), 42/04.

Coniochaeta scatigena (Berk. & Br.) Cain
Bo, Ku. 45, 47/04.

Podospora decipiens (G. Winter ex Fuckel) Niessl
Bo, Ey, Va, Vi. 36, 37, 41, 43, 46, 47, 50/04.

Podospora intestinacea N. Lundq (Figs 11-12)
Ey. 35(H)/04.

Schizothecium conicum (Fuckel) N. Lundq.
Ey, Bo, Ku, St, Va, Vi. 31, 33, 35, 37-39, 41, 43, 45, 47, 49, 50/04.

Schizothecium glutinans (Cain) N. Lundq.
Vi. 42(H)/04.

Schizothecium vesticola (Berk. & Broome) N. Lundq.
Bo, Ey, Ku, St, Va, Vi.
31, 32, 35-39, 41-47, 49, 50/04.
Sordaria fimicola (Roberge) Ces. & De Not.
Ku. 44/04.

Sordaria humana (Fuckel) G. Winter
Va. 48/04.

Xylariales
Hypocopra cf. equorum (Fuckel) G. Winter
Vi. Material with single perithecia erumpent through a splitting stroma. Incompletely mature spores, but some coloured spores of variable size, 17.5-19.5 x 8-10.5 µm. No sign of a second basal cell. 43/04.

Hypocopra parvula Griff.
Ku, St, Va. This material agrees with other material described from Iceland and the U.K. It has been suggested that it is not *H. parvula* (J. Krug, pers. comm.), but a new species still to be described. For further details and discussion see Richardson (2004). 31(H), 44(H), 49/04.

Hypocopra cf. planispora J.C. Krug and Cain
Bo, Ey, St. Va, Vi. Gregarious, but stromata apparently with single perithecia. Stromatic surface brown/black velvety with erect hyphae. Asci 190-225 x 20 µm, pore variable in KI, bright blue to brown. Spores narrowly ellipsoid, more than twice as long as wide (Q = 2-2.25), very slightly asymmetrical in some views, (24)25.5-32 x 11.2-14 µm, a slight vestige of second cell in very immature spores. Gel expanding in water to 8 µm. Germ slit 16-20 µm, 32(H), 36(H), 38(H), 40(H), 41(H), 42, 46(H), 48(H)/04.

Podosordaria tulasnei (Nitschke) Dennis
Ey, St, Va, Vi. Identification of this species is based on the development of the characteristic long, branching stromata

which grow from the dung. They have never produced perithecia in my cultures. 33, 34(H), 38, 42, 43, 48/04.

Microascales

Viennotidia fimicola (Marchal) P. Cannon & D. Hawksw.
Vi. 43(H)/04.

Dothideales

Sporormiella australis (Speg.) S.I. Ahmed & Cain (Fig. 13)
Bo, Ey, Ku, St, Va, Vi. 31, 32(H), 36, 42, 43(H), 44, 46, 48, 49/04.

Sporormiella bipartis (Cain) S.I. Ahmed & Cain (Fig. 14)
Bo, Vi. An infrequent species, most often found on hare and rabbit dung. 42, 46/04.

Sporormiella cf. dakotensis (Griff.) S.I. Ahmed & Cain
Va. A collection with asci with tapering bases and very small 4-celled spores, 25.5-28.5 x 3.5 µm, with terminal cells slightly tapering, and slightly longer than the intercalary cells, readily halving and fragmenting into component cells. Germ slits almost parallel to the length of the spore. The combination of short and relatively narrow spores, transverse septa, tapered and slightly longer terminal cells, germ slit alignment and tapered ascus bases does not agree completely with that of any described species, but is near to *S. dakotensis* as described by Ahmed & Cain (1972), or possibly *S. obliqua* (Khan & Cain, 1979). 49/04.

Sporormiella dubia S.I. Ahmed & Cain
Ey, Va. 35, 50/04.

Sporormiella grandispora (Speg.) S.I. Ahmed & Cain (Fig. 15)
Ey, Va. 35(H), 49/04.

Sporormiella intermedia (Auersw.) S.I. Ahmed & Cain
Bo, Ey, Ku, St, Va, Vi. One of the commonest *Sporormiella* species.
31, 36, 38, 41-46, 48, 49/04.

Trichodelitschia minuta (Fuckel) N. Lundq.
Ey, Bo, Vi. 35, 42, 46/04.

Trichodelitschia munkii N. Lundq. (Fig. 16)
St. Distinguished from *T. minuta* (syn. *T. bisporula* (H. Crouan & P. Crouan) Munk) by the smaller spores (19-19.5 x 6-7 µm) with more conical cells and non-prominent germ pores. 32/04.

BASIDIOMYCOTINA

Coprinus cordisporus Gibbs (Fig. 17)
Ey, Ku, Va, Vi. 41, 42(H), 45, 50/04.

Coprinus filamentifer Kühner
Va. 49/04.

Coprinus heptemerus M. Lange & A.H. Sm. (Fig. 18)
Bo, Ey, Ku, Va, Vi. 38(H), 41, 43(H), 45, 47, 49/04.

Coprinus miser Karst.
Ey, Ku, St, Vi. 31, 35, 39(H), 41, 43, 45/04.

Coprinus stercoreus (Bull.) Fr.
Bo, Ey. 39(H), 46/04.

Coprinus vermiculifer Joss. ex Dennis
Bo, Ey, Vi. 37(H), 43, 47/04.

Panaeolus antillarum (Fr. : Fr.) Dennis ?
Va. Limited material, and not as pale as illustrated for *P. antillarum*, for example in Doveri (2004), so only a provisional identification. 50(H)/04.

Psathyrella stercoraria (Kühner & Joss.) Arnolds ?
Va. Limited material in poor condition, but best fitting the description of *P. stercoraria*. 50(H)/04.

Psilocybe merdaria (Fr.) Ricken
Bo, Ey, Ku, St, Va, Vi. 31, 36, 37, 41-44, 45(H), 46, 49/04.

Stropharia semiglobata (Batsch: Fr.) Quél.
Bo. Present on samples when collected in the field. 47/04.

MITOSPORIC FUNGUS

***Volutella* sp.**
Ey. This may not be a particularly coprophilous species, but the related *V. ciliata* is often recorded on lagomorph dung. It differs from *V. ciliata* in having long black setae, up to 550 µm long, and hyaline, slightly allantoid spores 9-10 x 2 µm. 36/04.

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References

Ahmed, S.I. and Cain, R. 1972. Revision of the genera *Sporormia* and *Sporormiella*. *Can. J. Bot.* 50: 419-477.

De Hoog, G.S., Göttlich, E., Platas, G., Genilloud, O., Leotta, G. and van Brummelen, J. 2005. Evolution, taxonomy and ecology of the genus *Thelebolus* in Antarctica. *Studies in Mycology,* No. 51: 33-76.

Doveri, F. 2004. *Fungi Fimicoli Italici*. Associazione Micologica Bresadola, Trento, Italy

Hansen, L. and Knudsen, H. 2000. *Nordic Macromycetes*. Vol. 1. Nordswamp, Copenhagen.

Kimbrough, J.W. Luck-Allen, E.R. and Cain, R.F. 1969. *Iodophanus*, the Pezizeae segregate of *Ascophanus* (Pezizales). *Am. J. Bot*. 56: 1187-1202.

Khan, R.S. & Cain, R.F. 1979. The genera *Sporormia* and *Sporormiella* in east Africa. *Can. J. Bot*. 57: 1174-1186.

Lundqvist, N. 1972. Nordic Sordariaceae s. lat. *Symbolae Botanicae Upsalienses* XX: 1-374 + pl. 1-63.

Magurran, A.E. 2003. *Measuring Biological Diversity*. Blackwell, Oxford.

Møller, F.H. 1945. *Fungi of the Færöes. Part I. Basidiomycetes*. Munksgaard, Copenhagen

Møller, F.H. 1958. *Fungi of the Færöes. Part II. Myxomycetes, Archimycetes, Phycomycetes, Ascomycetes, and Fungi Imperfecti*. Munksgaard, Copenhagen

Richardson, M.J. 1998. *Coniochaeta polymegasperma and Delitschia trichodelitschioides*, two new coprophilous ascomycetes. *Mycol. Res.* 102: 1038-1040.

Richardson, M.J. 2001. Diversity and occurrence of coprophilous fungi. *Mycol. Res.* 105: 387-402.

Richardson, M.J. 2004. Coprophilous fungi from Iceland. *Acta Bot. Islandica* 14: 77-103.

Richardson, M.J. and Watling, R. 1997. *Keys to Fungi on Dung*. British Mycological Society, Stourbridge, UK.

van Brummelen, J. 1967. A World Monograph of the Genera *Ascobolus* and *Saccobolus* (Ascomycetes, Pezizales). *Persoonia*, Supplement, Vol. 1: 1-260 + 17 plates.

Vesterholt, J. 1998. A Check-list of Fungi recorded from the Faroe Islands. *Fróðskaparrit* 46: 33-65.