

Coniochaeta polymegasperma and *Delitschia trichodelitschioides*, two new coprophilous ascomycetes

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Coniochaeta polymegasperma sp. nov. is described from hare dung from Sutherland, Orkney and Inverness. With 64-spored asci, it differs from other *Coniochaeta* spp. with asci with more than eight spores by its much larger spores. *Delitschia trichodelitschioides* sp. nov. is described from hare dung from Sutherland and Inverness, differing from other *Delitschia* spp. in its distinctively setose pseudothecial neck.

While examining dung samples from Orkney, as a contribution to a survey of Orcadian fungi being conducted by the Royal Botanic Garden, Edinburgh, a *Coniochaeta* with 64-spored asci was observed on dung of the mountain or blue hare (*Lepus timidus* L.) which could not be identified as a described species. Samples were collected and dried on 16 Aug. 1992, and rehydrated and incubated in Aug. 1996. Perithecia were found within a day or two of rehydration, so it is assumed that the fungus had already developed on the pellets in the field when collected. There was no new growth of the fungus on incubation, and a complete description could not be obtained. The fungus was collected again in 1997 on mountain hare dung collected in Sutherland. It also was present when collected, and developed to provide good material on incubation.

***Coniochaeta polymegasperma* M. J. Richardson, sp. nov.**
(Figs 1–4)

Etym.: from the combination of asci with more than eight spores and relatively large spores

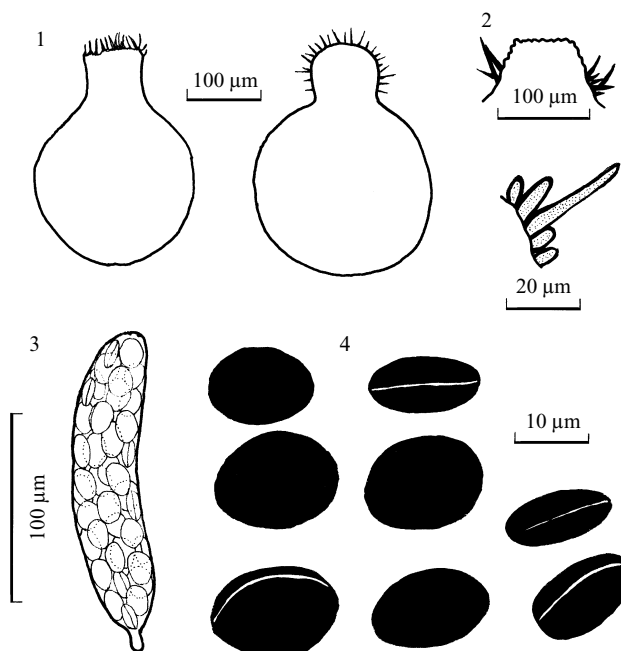
Perithecia 175–330 µm diam., solitaria, immersa, globosa, deorsum semipellucida, olivaceobrunnea, collo nigro opaco 50–90 µm longo, 65–110 µm diam. Collum cum setis attenuatis subacutis usque ad 35 µm longis × 4–5 µm diam., nonnumquam perbrevibus et rarioribus. *Asci* 160–200 × 35–45 µm, clavati, 64-sporei. *Ascospores* 13–16.5 × 9.5–13.5 × 5.5–9 µm, atrobrunneae, discoideae, fissura germinali circumnexusima.

Perithecia solitary, immersed, globose, 175–330 µm diam., translucent brownish olive below, with much darker opaque neck 50–90 µm long, 65–110 µm diam. Neck with tapering subacute setae up to 35 µm long × 4–5 µm diam. at their base, sometimes much shorter and relatively infrequent. *Asci* clavate, 160–200 × 35–45 µm, 64-spored. *Spores* very dark brown, discoid, 13–16.5 × 9.5–13.5 × 5.5–9 µm, with germ slit around the circumference.

Holotype: On blue hare (*Lepus timidus* L.) dung, Suilven, Sutherland, U.K. (NC186154), M. J. Richardson, 17 Jun. 1997. IMI 376333.

Other specimens examined: On blue hare dung, Ward Hill, Hoy, Orkney, U.K. (HY215031), R. Watling, 16 Aug. 1992; Coire na Ciste, Cairngorm, Inverness, U.K. (NJ001069), M. J. Richardson, 28 May 1997; Stac Pollaidh, Sutherland, U.K. (NC108106), M. J. Richardson, 16 Jun. 1997.

Mahoney & LaFavre (1981), in discussing substrate preference and number of spores, noted that there are four



Figs 1–4. *Coniochaeta polymegasperma*. **Fig. 1.** Outline of perithecia. **Fig. 2.** Detail of perithecial neck and setae. **Fig. 3.** Ascus and spores. **Fig. 4.** Ascospores.

multi-spored *Coniochaeta* species (i.e. those with more than eight spores in an ascus), all of which have been reported only from dung. They are *C. philocoproides* (Griffiths) Cain (32-spored asci), *C. hansenii* (Oudem.) Cain (64–128), *C. polysperma* Furuya & Udagawa (512), and *C. multisporea* Cain (1000+). None of the spores of these exceeds 10 µm in their largest dimension. Those of *C. hansenii*, the nearest in terms of number of spores, are variously reported as 7–9 µm diam., discoid (Oudemans, 1882), 7–9 × 4–7 µm (Cain, 1934), 7–9 × 7–9 × 4–7 µm (Dennis, 1978), 7–10 × 5–6 × 4.5 µm (Bell, 1983), 7.5–9.5 × 4.5–7 × 4–6.5 µm (Checa *et al.*, 1988) and 6.5–8.3 × 5–7 × 3.75–4.5 µm (Richardson, six collections, unpublished). In comparison, those of *C. polymegasperma* are 13–16.5 × 9.5–13.5 × 5.5–9 µm. An additional point of distinction is in the length of the setae, which are up to 35 µm long in *C. polymegasperma*, whereas those of *C. hansenii* are much longer, up to 120 × 6.5 µm.

Given the known occurrence of *C. polymegasperma* it may be that it is not particularly rare on the dung of mountain hare in north temperate latitudes, but that its discovery has been delayed by the relative infrequency with which that substrate is collected and incubated. Another collection was made on mountain hare dung collected on Cairngorm (27 May 1997, NH9804; A. Henrici, pers. comm.), 3 km distant from and 150 m higher than the Coire na Ciste collection. It was not observed on sheep, red deer or red grouse dung collected and incubated at the same time from either of the two Sutherland localities or from Coire na Ciste, which could be taken to indicate that it is adapted to lagomorph digestive systems or their products. It is, however, clearly less frequent than other *Coniochaeta* spp. which occur on dung, inasmuch as it has not been observed during extensive collecting by others who have collected coprophilous fungi in north temperate regions, e.g. Lundqvist (1972, 609 samples), Richardson (1972, 137 samples) and, in North America, Cain and colleagues over many years. By contrast *C. scatigena* (Berk. & Broome) Cain and *C. ligniaria* (Grev.) Massee are much more frequent on all types of dung. In this recent study 176 samples have been examined, 89 from lagomorphs (74 rabbit, 15 hare), and the remainder from other animals, mostly sheep (26), red grouse and ptarmigan (19), red and roe deer (17), cow (12) and horse (4). *C. ligniaria* was the most frequent *Coniochaeta*, occurring on 20% of lagomorph and 17% of non-lagomorph samples. The frequency of *C. scatigena* was 15 and 14%, respectively. The small differences in frequency of these two species on different dung types are not significant ($\chi^2_{1 \text{ d.f.}} = 1.09$ [$P = 0.30$], *C. ligniaria*; $\chi^2_{1 \text{ d.f.}} = 0.02$ [$P = 0.87$], *C. scatigena*).

A *Delitschia* was also observed on the Suilven hare dung which, with its distinctively setose pseudothecia, did not match the description of any described species. Superficially, in pseudothecial structure and spore size, it closely resembles *Trichodelitschia bisporula* (P.Crouan & H. Crouan) Munk, but the longitudinal germ slits, rather than apical germ pores, clearly place it in *Delitschia*.

***Delitschia trichodelitschioides* M. J. Richardson, sp. nov.**

(Figs 5–7)

Etym.: from the resemblance to *Trichodelitschia*

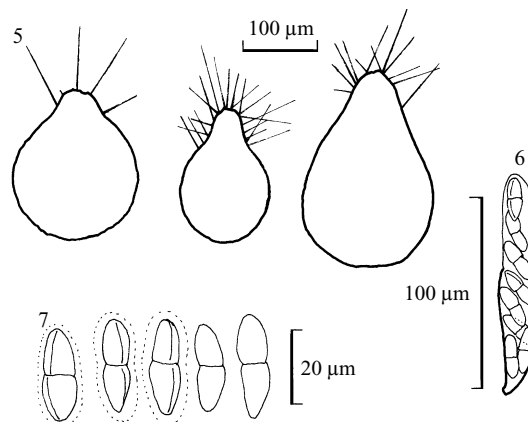
Ascomata pseudothecia (100–) 150–300 µm × 100–200 µm diam., solitaria, immersa, pyriformia vel globosa, atrobrunnea, deorsum pilis flexuosis brunneis. Collum 30–50 µm altum et 45–65 µm diam., nigrum, setosum. Setis atrobrunneis vel nigris attenuatis acutis, usque ad 120 µm longis et 3–3.5 µm diam. *Asci* bitunicati, octospori, clavati, 60–75 × 22–26 µm ante rumpentes, 100–165 × 14–16 µm post rumpentes. *Ascospores* (19.5–) 22–28 (–32) × 7–9.5 µm, brunneae, strato mucoso hyalino in aqua tumescenti. Cellulae ascosporarum hemiellipsoideae vel parum attenuatae ad apicem, similes vel leniter asymmetricae, prima leviter brevior et magis attenuata quam altera, fissura germinali recta, longitudinali.

Pseudothecia solitary, immersed, pyriform to globose, (100–) 150–300 µm high, 100–200 µm diam., dark brown, with brown flexuose hairs below, and very dark neck 30–50 µm high × 45–65 µm diam. Neck with very dark brown/black tapering acute setae, inserted at various angles, up to 120 µm long × 3–3.5 µm diam. at their base. *Asci* bitunicate, 8-spored, clavate, 60–75 × 22–26 µm before rupture of outer layer, 100–165 × 14–16 µm after expansion. *Spores* brown, 2-celled, (19.5–) 22–28 (–32) × 7–9.5 µm, with clear sheath expanding to 3–5 µm in water. Cells of spores hemiellipsoid to slightly tapered towards the apex, symmetrical about the septum to slightly asymmetrical with one cell slightly shorter and more tapered than the other. Germ slit parallel to the long axis.

Holotype: On blue hare (*Lepus timidus* L.) dung, Suilven, Sutherland, U.K. (NC186154), M. J. Richardson, 17 Jun. 1997. IMI 376334.

Other specimens examined: On blue hare dung, Coire na Ciste, Cairngorm, Inverness, U.K. (NJ001069), M. J. Richardson, 28 May 1997.

It is interesting to note that *D. trichodelitschioides* was found on the same sample as the other new species described in this paper, and sometimes on the same pellet, with other *Coniochaeta* spp. and *Trichodelitschia bisporula*. Twenty pellets were incubated, and after intensive inspection *D. trichodelitschioides* was found on at least eight, and *C. polymegasperma* on six, with two occurrences of both on the same pellet. Other *Coniochaeta* spp. were more prevalent, both in the number of pellets on which they occurred and in the number of perithecia produced.



Figs 5–7. *Delitschia trichodelitschioides*. Fig. 5. Outline of pseudothecia. Fig. 6. Expanded ascus and spores. Fig. 7. Ascospores.

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