A re-evaluation of *Melanospora* Corda and similar Pyrenomycetes, with a revision of the British species

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INTRODUCTION

In the last comprehensive survey of *Melanospora* Corda (Pyrenomycetes, Sphaeriales/Hypocreales), Doguet (1955) adopted an extremely broad generic concept, informally arranging the species into four groups based on the shape and ornamentation of the ascospores. Investigations during the last two decades have made it clear that this approach results in an unacceptably heterogeneous assemblage of species under a single generic name. As a consequence of this, a number of genera have been segregated from the broad concept of *Melanospora* (von Arx & Müller, 1954; Udagawa & Cain, 1969; Hawksworth, 1975a; Hawksworth & Udagawa, 1977; Jeng & Cain, 1977; von Arx, 1981). No overall re-evaluation of generic concepts in this group according to modern taxonomic principles has hitherto been published.

The last detailed account of the British members of *Melanospora* and allied genera was that of Petch (1938). In the course of preparation of a new checklist of British ascomycetes, it became clear that in order to provide a satisfactory treatment of the British representatives of the group it would be necessary to reconsider the delimitation of the genera as well as the identities of the taxa recorded from the British Isles.

This paper aims first to clarify generic concepts in the group, and secondly to review the genera and species reported from the British Isles.

An SEM study was undertaken as, although spore shape and ornamentation have been considered as of paramount importance in the group, SEM illustrations of few species of the genera involved have previously been published. Representatives of as many pertinent genera and species as possible were examined with the SEM in order to provide a firm base for a revision of the British taxa. This yielded a considerable amount of new information which, when taken in conjunction with evidence from other sources, enabled a more satisfactory generic system for the group to be constructed (Table 1). The nature of the germ apertures proved to be of particular importance and unequivocally demonstrated the heterogeneity of Doguet’s broad concept of the genus.

**KEY TO *MELANOSPORA* AND SIMILAR GENERA**

1. Spores with longitudinal germ slits ........................................... 2
1'. Spores with germ pores ....................................................... 4

2. Spores smooth-walled .............................................................. 3
2'. Spores with pitted walls .......................................................... Poroconiochaeta

3. Spores yellow-brown; germ slits triangular in section ............... Scopinella
3'. Spores ± hyaline; germ slits very narrow .................................. Sphaeronaemella

4. Spores with one broad germ pore with a basal appendage ............ Phaeostoma
4'. Spores with two germ pores (sometimes inconspicuous) without basal appendages ......................................................... 5

5. Spores oblong or cylindrical-fusiform ........................................... 6
5'. Spores ellipsoid to citriform .................................................... 7
<table>
<thead>
<tr>
<th>Character</th>
<th>Melanospora</th>
<th>Persicostroma</th>
<th>Phaeostoma</th>
<th>Scopinella</th>
<th>Sphaerodes</th>
<th>Sphaeronaemella</th>
<th>Syxstospora</th>
<th>Viennotidea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroma</td>
<td>Absent (rarely present)</td>
<td>Absent</td>
<td>Present</td>
<td>Absent</td>
<td>Absent</td>
<td>Absent</td>
<td>Absent</td>
<td>Absent</td>
</tr>
<tr>
<td>Position of ascoma</td>
<td>Superficial</td>
<td>Immerged to superficial</td>
<td>Superficial</td>
<td>Superficial to immersed</td>
<td>Superficial to subimmersed</td>
<td>Superficial</td>
<td>Superficial</td>
<td>Superficial to immersed</td>
</tr>
<tr>
<td>Ostiole</td>
<td>Usually present</td>
<td>Present</td>
<td>Present</td>
<td>Present</td>
<td>Usually absent</td>
<td>Present</td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td>Perithecial neck</td>
<td>Absent to long, cellular</td>
<td>Short, cellular</td>
<td>Long, cellular</td>
<td>Long, hyphal</td>
<td>Absent to very short, cellular</td>
<td>Long, hyphal</td>
<td>Long, hyphal</td>
<td>Long, hyphal</td>
</tr>
<tr>
<td>Ostiolar setae</td>
<td>Present</td>
<td>Absent to very short</td>
<td>Absent</td>
<td>Absent to present</td>
<td>Absent (rarely present)</td>
<td>Present</td>
<td>Absent</td>
<td>Present</td>
</tr>
<tr>
<td>Ascus shape</td>
<td>Clavate (rarely ellipsoid)</td>
<td>Clavate to cylindrical</td>
<td>Ovoid</td>
<td>Clavate</td>
<td>Clavate to ellipsoid</td>
<td>Clavate to ovoid</td>
<td>Clavate</td>
<td>Sphaeroid to ovoid</td>
</tr>
<tr>
<td>Ascospore colour</td>
<td>Brown</td>
<td>Brown</td>
<td>Brown</td>
<td>Brown</td>
<td>Dark brown to black</td>
<td>Hyaline</td>
<td>Brown</td>
<td>Hyaline to pale brown</td>
</tr>
<tr>
<td>Ascospore shape</td>
<td>Citriform to ellipsoid (to discoid)</td>
<td>Ellipsoid-fusiform</td>
<td>Ovoid-ellipsoid</td>
<td>Oblong-ellipsoid to quadangular</td>
<td>Citriform</td>
<td>Ellipsoid</td>
<td>± cylindrical</td>
<td>Oblong to allantoid</td>
</tr>
<tr>
<td>Ascospore apertures</td>
<td>2 not or slightly apiculate pores</td>
<td>2 slightly apiculate pores</td>
<td>1 sunken pore</td>
<td>2 wide slits</td>
<td>2 terminal, strongly apiculate pores</td>
<td>1 narrow slit developing late</td>
<td>2 terminal, crateriform pores</td>
<td>1 small subterminal pore</td>
</tr>
<tr>
<td>Ascospore ornamentation</td>
<td>Smooth</td>
<td>Weakly pitted</td>
<td>Smooth</td>
<td>Smooth</td>
<td>Usually coarsely reticulate</td>
<td>Smooth</td>
<td>Smooth</td>
<td>Smooth</td>
</tr>
</tbody>
</table>

Table 1. Synopsis of characters separating the genera treated
6. Germ pores large, terminal, crateriform; spores brown

6'. Germ pores subterminal, small, very inconspicuous; spores hyaline to greenish

Sympastospora

Viennotidea

7. Spores smooth-walled, with depressed germ pores

Melanospora

7'. Spores not smooth-walled, with sessile to umbonate, sometimes tuberculate, germ pores

8

8. Spores with longitudinal ± hyaline wing-like appendages

Pteridiosperma

8'. Spores without wing-like appendages

9

9. Spores usually coarsely reticulate; germ pores ± conspicuously umbonate

Sphaerodes

9'. Spores always with indistinct ornamentation; germ pores only slightly apiculate

10

10. Ascomata cleistothecial; peridium cephalothecoid; spores rugulose

Rhytidospora

10'. Ascomata perithecial; peridium pseudoparenchymatous; spores faintly pitted

Persiciospora

Poroconiochaeta Udagawa & Furuya (1979), Pteridiosperma Krug & Jeng (1979) and Rhytidospora Jeng & Cain (1977) are not known in Britain and not considered further in this paper.

MELANOSPORA CORDA

Melanospora Corda, Icones Fungorum, 1: 24 (1837).

SYNONYMS: Microthecium Corda, Icones Fungorum, 5: 74 (1842).

Ceratostoma Fr., Summa Vegetabilium Scandinaviae, 2: 396 (1849).

Sphaeroderma Fuckel, Jahrbücher des Nassauischen Vereins für Naturkunde, 29/30: 23 (1875).

Ampullaria A.L.Sm., Journal of Botany, British and Foreign, 41: 258 (1903) [fide Mason (1933)].


Ascomata perithecial, rarely cleistothecial, superficial, rarely immersed, solitary to gregarious, usually ± globose, glabrous to strongly tomentose; wall membranous, translucent, usually rather thin, pale yellow to reddish brown, appearing dark brown or black when mature due to spore mass; wall composed of polyhedral pseudoparenchymatous cells forming a textura angularis, beak long to absent, with a ring of rigid hyaline smooth-walled setae around the ostiole, if this is present. Paraphyses absent. Asci usually clavate, thin-walled, lacking any distinct apical apparatus, evanescent, usually 8-spored. Ascospores ellipsoidal to citriform, rarely discoid or fusiform, with 2 apical germ pores, not or only slightly apiculate, pores depressed, without a raised rim, brown prior to release from the ascus, smooth-walled.

ANAMORPHS: These have been reported as belonging to a wide range of genera (fide Kendrick & Di Cosmo, 1979), including Acremonium Link ex Fr., Chlamydomyces Bain., Harzia Cost., Paecilomyces Bain. and Proteophiala R. Ciferri. We have not
attempted to investigate the anamorphs of the genus, but this is clearly required and needs the use of single-ascospore cultures to satisfactorily resolve the question of their identity.

**TYPE:** Melanospora zamiae Corda.

Members of this genus have been reported from almost all parts of the world. The genus is represented in the British Isles by nine species, and a further one is excluded pending confirmation. Several species, including Melanospora caprina and M. chionea, appear to be widespread in this country.

Most species are parasitic on other fungi. Those which have not been shown to be parasitic are nevertheless often associated with other fungi; cultural work has not been carried out to confirm the mode of life of the putatively saprophytic taxa.

Melanospora, as circumscribed here, is a well-defined genus with translucent ascomata, often with a long beak and with a well-developed ring of coronal setae around the ostiole, and smooth brown ascospores with two ± depressed germ pores. The ascospores accumulate in a cirrhus supported by the ostiolar setae, giving the fungus the appearance of a black head.

Of the synonyms cited above, Sphaeroderma Fuckel and Microthecium Corda are the only ones to have received widespread acceptance this century. Sphaeroderma was distinguished from Melanospora on the absence of an ostiolar beak, but this feature proves to be highly variable. Doguet (1955) considered that the production of a beak was significantly affected by cultural conditions. Petch (1938) stated that the genus additionally differed from Melanospora by the absence of coronal setae around the ostiole, but of the three species that he accepted, two in fact have setae and the third is cleistothecial.

Microthecium Corda was retained for non-ostiolate species otherwise similar to Melanospora by Udagawa & Cain (1969) and additional species were added to it by Hawksworth & Udagawa (1977), who also provided a key to the then known species. Subsequent studies on germ pores with the SEM have substantiated the suggestion of von Arx (1973) that both ostiolate and non-ostiolate species with reticulately-ornamented spores constitute a distinct genus, for which the name Sphaerodes Clem. is available (von Arx, 1981). As Microthecium is typified by a smooth-spored species with depressed germ pores, that generic name has to be placed as a synonym of Melanospora, while the species with reticulately ornamented spores formerly placed there are here referred to Sphaerodes (see below).

The present study has involved the examination of both living cultures and herbarium material but single spore isolates were not prepared. Data on anamorphs is therefore generally omitted. The evanescent asci in this genus are invariably difficult to observe: in many cases the descriptions and measurements of these given below have been taken from earlier reliable publications.

**Key to the British species of Melanospora**

1. Beak < 100 μm, usually much shorter than perithecial diameter . 2
1'. Beak > 100 μm, length more than half perithecial diameter . 7

2. Spores ellipsoid to citriform, often somewhat plataniform . 3
2'. Spores not this shape . . . . . . . . . . . . . . . . . . 5
3. Perithecial body 45–50 μm diameter, reddish; spores 18–22 μm long....................... *M. jimbriata*
3'. Perithecial body 125–400 μm diameter, variously coloured, spores 21–34 μm long........... 4
4. Bulbils present, 40–70 μm diameter............... *M. fallax*
4'. Bulbils absent.......................... *M. brevirostris*
5. Spores ellipsoid-fusiform, 20–25 μm long............... *M. fusispora*
5'. Spores discoid- or rhomboid-ellipsoid.................. 6
6. Perithecia superficial; coronal setae 50–60 (–120) μm long; asci 8-spored; spores rhomboid-ellipsoid, 18–25 × 10–14 μm.......................... *M. damnosa*
6'. Perithecia immersed to erumpent; coronal setae 250–350 μm long; asci 4-spored; spores discoid-ellipsoid, 14–19 × 12–14 × 8–9 μm.......................... *M. longisetosa*
7. Beak (400-)600–2000 μm.................. 8
7'. Beak 100–400 μm.......................... 9
8. Body strongly tomentose.......................... *M. caprina*
8'. Body hispid to very weakly tomentose.................... *M. lagenaria*
9. Body glabrous or almost so.......................... 10
9'. Body weakly to strongly tomentose.................. 11
10. Beak 20–50(–150) μm; some spores planiform....................... *M. brevirostris*
10'. Beak (80-)150–250 μm; spores all ellipsoid-citiform............... *M. zamiae*
11. Spores discoid-ellipsoid, 7.5–16 μm long; body usually strongly tomentose.................. *M. chionea*
11'. Spores rhomboid-ellipsoid, 18–25 μm long; body weakly tomentose.................... *M. damnosa*

*Melanospora brevirostris* (Fuckel) Höhn.


*C. helvellae* Cooke, *Grevillea*, 1: 175 (1873).


*Thielavia soppitii* Crossland, *The Naturalist* (Hull), 1900: 7 (1900).


*M. zobelii* auct. angl. [fide Udagawa & Cain (1969)].

**PERITHECIA** superficial to half-immersed, (solitary to) gregarious, ± globose, 125–400 μm diameter, glabrous or very sparsely hairy, pale yellow to brown; ostiolate, beak short, ± conical, 20–50(–150) μm long, crowned with a ring of hyaline setae 40–60(–100) μm long. *Asci* clavate (to ovoid), 50–90 × 25–35 μm,
Melanospora and similar genera

evanescence at an early stage, 8-spored. Ascospores ellipsoid-citriiform, often somewhat plataniform, smooth-walled, dark brown, with two terminal, usually slightly apiculate, pores c. 1.5 μm diameter, 21–34 × 11–17 μm.

Illustrations: Kers (1974: 349; fig. 1).
Figures 1–2, 10.

Hosts: Parasitic on various Discomycetes, usually Sepultaria (Cooke) Boud. species but also recorded from decaying truffles (Hydnocystis Tul. species) and from dead plant stems.

Figures 1–4. Melanospora breuiostris and M. chionea (SEM). Figs 1–2. M. breuiostris (IMI 16559). Fig. 1. Ascospores, × 2000. Fig. 2. Ascospore apex, showing depressed germ pore, × 6500. Figs 3–4. M. chionea (IMI 229732). Fig. 3. Ascospores, × 3500. Fig. 4. Ascospore apex with depressed germ pore, × 18 500.
DISTRIBUTION: Most common on coastal dunes; recorded from N.E. England and N. Wales in these habitats. Otherwise scattered throughout Britain, but rarely recorded. Reported from a number of countries in northern Europe.

*Melanospora tulasnei* Udagawa & Cain only differs from *M. brevirostris* as originally described by being half-immersed in the substrate rather than superficial. A study of the specimens available has revealed a gradation from one habit to the other, and colonies of the fungus which are densely crowded give the impression of being partially sunken, as only the upper halves of the perithecia are then visible. *M. tulasnei* has had an unstable taxonomic history due to confusion with *Microthecium zobelii* Corda (see Udagawa & Cain, 1969). Fuckel (1870) placed *M. tulasnei* (as *Melanospora zobelii*) in synonymy with *M. brevirostris*, and Petch (1938) suspected that the two taxa were the same, though he had not seen specimens of *M. tulasnei*. *Melanospora tulasnei* was first described from the truffle *Hydnocystis arenaria* Tul., but Udagawa & Cain (1969) also reported it as occurring on *Sepultaria*.

*Melanospora sphaerodennoides* Grove was reported from markedly different substrates, including dead stalks of *Heracleum* L. (Umbelliferae) and *Brassica* L. (Cruciferae), but this is its only distinguishing feature, although the perithecia and ascospores are at the upper end of their size ranges in *M. brevirostris sensu lato*. There are several other microfungi present on the type specimen, and the fungus may in fact have been parasitic on one of these.

Some tendency towards intergradation with *Melanospora zamiae* (p. 132) occurs, but the two species are unlikely to be confused.

A recent account of *Melanospora brevirostris* is provided by Kers (1974).

**SPECIMENS EXAMINED:** BRITISH ISLES: Anglesey: Newborough Warren, on *Sepultaria arenosa* (Fuckel) Rehm, 5 xi 1974, Dodds (K); Newborough Warren, on *S. arenosa*, xi 1972, Reid (K). Lancashire: Southport, on *Sepultaria* on sand dunes, ix 1936, Broadhead (K); Hightown, on *S. arenosa* by damp slack, 8 ix 1963, Palmer 11722 (K); Ainsdale, on *S. arenosa* by damp slack, 8 ix 1963, Palmer 11760 (K); S. Lancashire, on sand hills, vii 1920, Travis (K). Norfolk: North Wootton, on decaying stalks of *Brassica*, xi 1935, Petch (K). Nottinghamshire: Annerley Hall, on wheat straw in potato clamp, 10 i 1953, Webster (IMI 51449). Warwickshire: Bradnocks's Marsh, on herbaceous stem (*Heracleum*), 13 vii 1884, Grove (K). Yorkshire: Halifax, Morland, on *Cardus palustris* L., xi 1889 Soppitt (KIMI 89406); TYPE of *Thielavia soppiti*ii. Sine loc., on *Peziza sepulta* Fr. [collector not cited] (K).—EGYPT: Sine loc., isol. ex *Narcissus* L., 18 iv 1972, Shehata 14 (IMI 165591).—GERMANY: near Budenheim, in pinewoods on *S. arenosa* [collector not cited] [Fuckel, *Fungi Rhen.* no. 809, 1864.] (IMI).

*Melanospora caprina* (Fr. ex Hornem.) Sacc.

*Melanospora caprina* (Fr. ex Hornem.) Sacc., *Sylloge Fungorum*, 2: 462 (1883).

**SYNONYMS:** *Sphaeria caprina* Fr. ex Hornem. in Oeder, *Flora Danica*, 11: fasc. 31, no. 1829, fig. 2 (1825).

*Ceratostoma caprinum* (Fr. ex Hornem.) Fr., *Summa Vegetabilium Scandinaeviae*, 2: 396 (1849).


Perithecia superficial, usually gregarious, on a usually persistent brown-tomentose subiculum, 600–800 μm diameter, globose to depressed-globose, strongly white-tomentose, wall yellow to dark red-brown, rather hard, often slightly carbonaceous; ostiolar neck 1500–2000 μm in length, slightly tapering, with occasional short adpressed hairs, arising rather abruptly from the perithecial body and with a terminal ring of setae 150–200 μm in length, these often being broken off. Asci clavate, soon evanescent, 5–70(–100) × 20–25 μm, 8-spored. Ascospores ellipsoid to citriform, brown, smooth-walled with two terminal, slightly apiculate, pores, 16–23 × 9–16 μm.

Illustrations: Figure 10.

Hosts: On dead wood, particularly of coniferous trees, and on decaying fungi; usually in areas of acid soil.

Distribution: Evidently widely distributed and commonly encountered in suitable habitats throughout the British Isles.

A distinctive species, only likely to be confused with *Melanospora lagenaria*, these both having a very long neck emanating rather abruptly from the perithecial body. *M. caprina* is much more strongly tomentose than *M. lagenaria*. Hornemann attributed the species to Fries; there is apparently no record of this species in Fries’s earlier publications.

Specimens examined: British Isles: Angus: Glamis, on dead wood, i 1874, Stevenson (K); Glamis, 1885 [collector not cited] (K). Argyll: Mull, Gruline, on decayed Tomentella Pat. sp., 30 ix 1972 [collector not cited] (K). Cumbria: Carlisle, 16 xii 1883, Carlyle (K). Moray: Forres, on larch [collector not cited] (K). Warwickshire: Stratford-upon-Avon, Oversley Wood, on dead Betula L. sp., 18 iii 1968, Evans (K); Hay Wood, on birch branch, 2 v 1968, Evans (K); Mays Wood, on Tomentella tristis (Karst.) Höhnel & Litsch., 28 viii 1973, Evans 1233 (K); Wellesbourne Wood, Evans (IMI 194371); Alcester, Oversley Wood, “on some resupinated hyphal mat”, 13 iv 1969, Reid (K). Wiltshire: Rudloe, xi 1842, Berkeley (K); Rudloe, on soil, 1843, Berkeley (K); Shirlett, 29 ii 1904, Rea (K); near Rudloe, 11 ii 1842 [collector not cited] (K); Rudloe, on soil, 23 xi 1843 [collector not cited] (K). Worcestershire: near Stanton, on decaying Stereum Pers. sp., 7 ii 1971, Clark (K); Wyre Forest, on fallen, rotten Betula branch, on decaying Stereum sp., also on rhizomorphs of Armillaria mellea Vahl, 25 v 1968, Evans (K); Wyre Forest, on decaying resupinated fungus on old stump, vii 1968, Evans (K). Sine loc., xii 1873, Keith (K). Sine loc., on furze, Reeth (K). Sine loc., on bark, v 1874, Stevenson (K). Sine loc., Stevenson (K). Sine loc., 4 v 1899 [collector not cited] (K).—Sweden(?): Sine loc., Fries (K—? isotype).

Melanospora chionea (Fr.) Corda


Synonyms: *Sphaeria chionea* Fr., *Systema Mycologicum*, 2: 446 (1823).

*Ceratostoma chioneum* (Fr.) Fr., *Summa Vegetabilium Scandinaviae*, 2: 396 (1849).

Perithecia superficial, solitary to gregarious, subglobose to globose, 200–400(–500) μm diameter, yellow to pale brown, sparsely to densely white-
tomentose; ostiolate, beak 250–400 μm, slightly tapering, 35–40 μm diameter at base, 25–30 μm at tip, with a terminal ring of hyaline setae 35–80(-100) μm long. 

**asci** clavate, long-stalked, evanescent at an early stage, 35–55 × 14–18 μm, 8-spored. 

**ascomyces** ellipsoidal, discoid (flattened along one polar plane), smooth-walled, dark brown, with two terminal sessile pores c. 1.5 μm diameter, 7.5–16 × 6–12 × 4–7 μm.

**illustrations**: von Arx & Müller (1954: 143; fig. 43). Figures 3–4, 10.

**hosts**: On *Pinus* L. spp.; usually on the needles, but occasionally found on the cones. Once collected from *Fraxinus* L. According to Minter (personal communication) the fungus is typically found in, spring on the underside of dead pine needles which are still attached to old fallen branches lying in drier locations.

**distribution**: Common throughout the British Isles, particularly in the north.

*Melanospora chionea* is a distinctive species, with an unusual spore form for the genus, which is only paralleled by that of *M. longisetosa*. No confusion with other taxa is likely.


*Melanospora damnosae* (Sacc. & Berl.) Lindau


**perithecia** superficial, usually solitary, ± globose, 150–400 μm diameter, sparsely tomentose, pale yellow to orange-brown; ostiolate, neck 20–70(-170) μm, shortly conical, 30–60 μm diameter at base, 25–40 μm at tip, crowned with a ring of hyaline setae 50–60(-120) μm long. **asci** obpyriform or widely clavate, 34–38 × 25–30 μm, soon evanescent, 8-spored. **ascomyces** citriform to rhomboid-ellipsoidal, brown, smooth-walled, with two terminal, obtuse to slightly apiculate, pores 1–1.5 μm diameter, 18–25 × 10–14 μm. 

**illustrations**: Saccardo & Berlese (1895: 56–66; pl. 7–8); Doguet (1955: 268–271; figs 9–10).

Figures 5–6, 10.

**hosts**: On the dead stems of cereal crops, and from potato plants. Commonly
associated with *Fusarium culmorum* (W.G. Sm.) Sacc., and almost certainly parasitic on it.

**DISTRIBUTION:** Rarely reported in the British Isles, but perhaps more widespread than the few records imply. Evidently widely distributed in Europe, and in addition we have seen material from Bangladesh and Tunisia.

*Melanospora damnosa* is similar to *M. brevirostris* but is usually more densely
tomentose, and has citriform to rhomboid-ellipsoidal rather than citriform to plataniform spores. Occasional specimens of this species have the relatively long necks characteristic of *M. zamiae* but these can again be distinguished by their unusual spore shape.

The specimen described by Mason (1933) and Petch (1938) under this name is referable to *Melanospora longisetosa* (p. 130).

**SPECIMENS EXAMINED:** BANGLADESH: isolated from stem of potato plant, 8 ix 1958, Ishaque (IMI 74744).—BRITISH ISLES: Ayr: Auchanarine (?), on oats with *Fusarium culmorum*, 27 xi 1944, Douston (K). Hertfordshire: Broadbank, Rothamsted, on wheat with *Fusarium culmorum*, 17 vii 1961, Glynne (IMI 87860); Rothamsted, on oats with *Fusarium culmorum*, 30 vi 1961, Glynne (IMI 87861a). Sussex: Chichester,
Melanospora fallax Zukal

Melanospora fallax Zukal, Sitzungsberichte der Akademie der Wissenschaften, Wien, Mathematisch-Naturwissenschaftliche Klasse, I, 98: 549 (1889).

**SYNONYM:** *M. papillata* Hotson, Proceedings of the American Academy of Arts and Sciences, 1912: 251 (1912).

Similar to *Melanospora brevirostris*, but sometimes larger (perithecia 250–600 μm diameter) and accompanied by numerous bulbils 40–70 μm diameter, consisting of aggregations of thick-walled orange-brown cells.

**ILLUSTRATIONS:** Doguet (1955: 272–275; figs. 11–12); Calviello (1976: 99; fig. 3). Figures 10–12.

**HOSTS:** Originally described as parasitic on *Botrytis acinorum* Pers. but recorded in Britain from monocotyledonous bulbs; also isolated from dung and from *Picea* Dietr. seed.

**DISTRIBUTION:** Recorded only from Surrey (and an unknown locality) in the British Isles. Widespread in temperate areas.

The presence of bulbils, the only feature reliably distinguishing *Melanospora fallax* from *M. brevirostris*, may well be a function of the environmental conditions but cultural studies are needed to confirm this. The spores of this species tend to be more strongly plataniform than those of *M. brevirostris*, but this distinction is not marked enough to be of use in identification. The original descriptions of *M. fallax* and *M. papillata* are almost identical, but type material has not been seen, so precluding the definite establishment of synonymy.


**Melanospora fimbriata** (Rostrup) Petch


**SYNONYM:** *Sphaeroderma fimbriatum* Rostrup, Meddelelser om Grønland, 18: 67 ["1894"] (1896).

No British specimen of this species has been seen. Massee & Salmon (1901) reported the taxon from guinea-pig dung at Kew, but no specimen could be located in either K or IMI; Petch (1938) also failed to trace one. Rostrup’s original description gives little indication of the size of the perithecia, simply describing them as very small, and the species is probably closely related to *Melanospora brevirostris*, if not in fact synonymous with it. Massee & Salmon’s specimen had perithecia about 330 μm diameter, with inaequilateral, somewhat
Figures 11-15. *Melanospora fallax* and *M. zamiæ* (SEM). Figs 11-12. *M. fallax* (IMI 16922). Fig. 11. Ascospores, ×2000. Fig. 12. Ascospore showing the depressed apical germ pores, ×5000. Figs 13-15. *M. zamiæ* (IMI 62569a). Fig. 13. Ascospores, ×2000. Fig. 14. Ascospore, ×6500. Fig. 15. Ascospore apex showing a depressed germ pore, ×11500.
citriform, spores; it is therefore likely that their specimen did in fact belong to *M. brevirostris*. A Canadian specimen named as this species has very small reddish perithecia, 45–50 μm diameter, with a short truncate-conical neck 30–50 μm in length crowned with a ring of setae 130–160 μm in length, and with golden-brown, smooth-walled, citriform to plataniform spores 18–22 × 9–11 μm. This isolate seems to conform more closely with Rostrup’s description than that of Massee & Salmon. The species should therefore be excluded from the British list until further material is discovered.

ILLUSTRATIONS: Figures 7, 10.


Melanospora fusispora (Petch) Doguet


PERITHECIA superficial, solitary, globose, 200–300 μm diameter, yellow to orange but appearing dark brown when mature due to spore mass, glabrous or with a few adpressed hyphae; ostiolate, neck absent or very short, coronal setae to c. 125 μm. ASCI clavate, c. 66 × 12 μm, evanescent at an early stage, 8-spored. ASCOSPORES fusiform to ellipsoidal (to citriform), smooth-walled, brown, rather thin-walled, with two terminal pores 2.5–3 μm diameter, 20–25 × 7–12 μm.


Figure 10.

HOSTS: Parasitic on *Paecilomyces farinosus* (Holm) A. H. S. Brown & G. Sm. and *Beauveria bassiana* (Bals.) Vuill.

DISTRIBUTION: Only known from three collections in eastern Britain (see below), and from two in Japan (see Udagawa, 1970).

The spore shape in this species is somewhat intermediate between the ellipsoidal-citriform shape typical of most of the genus and the cylindrical-fusiform spores of *Syspastospora parasitica*, which shares its unusual habitat, both being parasitic on entomogenous fungi. It differs from *S. parasitica* in the absence of a long neck, which is hyphal in structure in the former species but apparently cellular in the latter (in common with the other species of *Melanospora*), and further in the size of the ascospores and especially in the nature of the germ pores.

Petch (1938) separated the genus *Sphaeroderma* from *Melanospora* by its reputed absence of a beak and of coronal setae, but he described *S. fusispora* as developing a collar round the ostiole, which is entirely analogous with the short necks characteristic of, among other species, *M. brevirostris*; well-developed coronal setae were found on examination of the type specimen. In any case, Doguet (1955) considered that the length of the neck varied markedly under different cultural conditions, and consequently did not recognize the genus *Sphaeroderma*.

Melanospora lagenaria (Pers.) Fuckel


Similar to M. caprina, but the perithecial body much less strongly tomentose, neck 800–1500 µm tall, glabrous, with a poorly developed crown of hyaline setae to 50 µm long; spores ellipsoid to citriform, 12–22 × 7–14 µm.

ILLUSTRATIONS: Figures 8–10.

HOSTS: On decaying polypores, including Bjerkandera adusta (Willd.) P. Karsten, Coriolus versicolor (L.) Quélet and species of Polyporus Micheli and Stereum Gray.

DISTRIBUTION: Scattered throughout the British Isles; known from as far north as S.W. Scotland. Evidently widespread in Europe.

This species is only reliably distinguished from Melanospora caprina by the difference in density of the indumentum. Doguet (1955) stated that the two species were very closely related, and he found intermediate specimens with a dense indumentum but lacking the felted appearance typical of M. caprina. No such intermediates were seen in this study and so the two species are therefore retained here for the present. Petch (1938) was under the impression that the two species could be distinguished by their substrate, but M. caprina also commonly occurs on rotting fungi.


Melanospora longisetosa P. Cannon & D. Hawksw.

Melanospora longisetosa P. Cannon & D. Hawksw. sp. nova

PERITHECIA immersa, erumpentes, plus minusve gregaria, ± globosa, 250–400 µm in diametro, membranacea, ochracea vel badia; ostiolata, cum collis brevibus cylindraceis 50–70 µm longis, c. 100 µm in diametro et setis coronatis effectissimis 250–350 µm longis, 3.5–5 µm latis, hyalinis, convergentibus instructae, colla aspecta conorum. ASCI late clavati, fasciculati, corpi 35–40 × 15–18 µm, pedicelli 5–10 µm, celeriter evanescenti, 4-spori. ASCOSPORAE late ellipsoidae, parum complanati, fusi, cum parietibus laevibus, et duo poribus terminalibus c. 2 µm, in diametro, non vel interdum parissime apiculatae, 14–19 × 12–14 × 8–9 µm.

PERITHECIA immersed, becoming erumpent, somewhat gregarious, ± globose,
250–400 μm diameter, membranous, yellow-brown to reddish; ostiolate, with a short cylindrical beak 50–70 μm long and c. 100 μm diameter, with very well-developed coronal setae 250–350 μm long, 3.5–5 μm wide, hyaline, thick-walled, convergent, giving the beak a conical appearance. Ascii broadly clavate, clustered in a fascicle, body 35–40 × 15–18 μm, stalk 5–10 μm, quickly evanescent, 4-spored. Ascospores broadly ellipsoid, slightly flattened along one polar plane, brown, smooth-walled, with two terminal pores c. 2 μm diameter, not or occasionally very slightly apiculate, 14–29 × 12–14 × 8–9 μm.

Figure 16. Melanospora longissima (IMI 16915—holotype). A, Peritheium. B, Young asci each containing four ascospores. C, Ascospores in face view (left and centre) and side view (right).
TYPE: BRITISH ISLES: Surrey: Kew, CMI garden, on elm twigs kept in damp chamber, 3 vi 1931, Mason 1211 (IMI 16915—HOLOTYPE).

ILLUSTRATIONS: Figures 10, 16.

HOST: On Ulmus L. sp.; growing in close association with, and probably parasitic on, the Tubercularia anamorph of Nectria cinnabarina (Tode) Fr.

DISTRIBUTION: Only known from the type collection.

The flattened-ellipsoid spores found in this species are only paralleled in Melanospora by those of M. chionea, from which M. longisetosa differs by its short neck and extremely long coronal setae, and from all other known Melanospora species by its immersed to erumpent habit. Its asci are four-spored, which is a further unusual feature of the species, though this condition also occurs in M. lagenaria and M. zamiae.

The type specimen was first reported upon by Mason (1933) as Melanospora damnosa, and Petch (1938) described it under this name in his work on the British Hypocreales. Judging from a letter sent by Petch to Mason (now attached to the herbarium sheet in IMI) he accepted Mason's determination without formality, and, as he had not seen (other) specimens of M. damnosa in Britain, his description was based entirely on this collection. Melanospora damnosa differs markedly from M. longisetosa in its much shorter setae, superficial habit, eight-spored asci, and the shape of the spores, which are rhomboid-ellipsoid rather than discoid-ellipsoid. M. damnosa has subsequently been correctly reported from the British Isles (see above).

Mason (1933) mentioned two anamorphic fungi which he found in association with his culture of Melanospora longisetosa. The first of these was Harzia acremonioides (Harz) Cost. (syn. Acremoniella atra auct.) which is a very common culture contaminant, and is unlikely to be connected with M. longisetosa. The other was an unnamed phialosporic fungus, which may have been a genuine anamorph of the Melanospora, but it is likely that it was in fact the Tubercularia on which M. longisetosa is putatively parasitic.

Melanospora zamiae Corda

Melanospora zamiae Corda, Icones Fungorum, 1: 24 (1837).

SYNONYMS: M. leucotricha Corda, loc. cit. 1: 25 (1837) [vide Doguet (1955)].
M. cirrhata Berk., British Fungi exs., no. 325 (1843); nom. inval. (Art. 32).
Ampullaria aurea A. L. Sm., Journal of Botany, British and Foreign, 41: 258 (1903) [vide Petch (1938)].


PERITHECIA superficial, solitary to gregarious, 150–300(–400) μm diameter, ± globose, reddish to yellow-brown, glabrous to sparsely hairy; ostiolate, neck (80–)150–250 μm, cylindrical to conical, 60–80 μm diameter at base, 30–50 μm at tip, with a terminal ring of hyaline setae 40–80(–200) μm in length. ASCI broadly clavate, 40–70 × 20–35 μm, evanescent at an early stage, 4- to 8-spored.
ASCOSPORES ellipsoid to citriform, brown, smooth-walled, with two terminal, usually slightly apiculate, pores c. 2 μm diameter, 15–23 × 10–16 μm.

ILLUSTRATIONS: von Arx & Müller (1954: 142; fig. 42); Doguet (1955: 252–267; figs 1–8); Calviello (1973: 37; fig. 3).
MEANOSPORA AND SIMILAR GENERA


HOSTS: Common on many kinds of rotting vegetation; it has recently been shown (Jordan & Barnett, 1978) to be parasitic on a wide range of fungi.

DISTRIBUTION: Very widespread in the tropics and warm temperate regions; recorded occasionally in the British Isles, often on imported material.

This is the type species of Melanospora. It is quite similar to M. brevirostris, but can be distinguished by its longer neck and smaller spores, which are never plataniform. Occasional individuals (e.g. IMI 182100, 202257) occur with necks intermediate in length between the two species, and more intensive study may show a gradation from one form to the other. However, the intermediates are relatively uncommon and most specimens are easily assignable to one or other taxon.

A recent description of this species is provided by Calviello (1973).


There is a large additional number of specimens in the CMI herbarium (IMI); these have not been examined in detail.

PERSICIOSPORA P. CANNON & D. HAWKSW.

Persiciospora P. Cannon & D. Hawksw. gen. novum

derivation: from “Persicum”, the Latin name for the peach, referring to the similarity of the spores to peach stones.

Ab Melanospora differt: parietibus ascosporarum cum leviter reticulatis, similis semen persicum.

Differs from Melanospora by the walls of the ascospores, which are ornamented with a faint reticulation similar to that found on a peach stone.


This new genus is probably closely related to Melanospora and Sphaerodes, sharing many features including an apparent parasitism on other microfungi, but differing essentially in the ornamentation of the spore wall. Poroconiochaeta Udagawa &
Furuya (1979) appears to have a broadly similar spore wall ornamentation, but the spores of this genus have longitudinal germ furrows, contrasting with the terminal germ pores in *Persiciospora*. No material of *Poroconiochaeta* has been seen.

The genus contains two species, *Persiciospora moreauii* P. Cannon & D. Hawksw. and *P. masonii* (Kirschst.) P. Cannon & D. Hawksw. They are easily distinguished by differences in habit, and in spore size and shape.

**Key to the species of Persiciospora**

1. Perithecia superficial; ascospores ellipsoid, 20–24 × 8–10 μm
   - *P. moreauii*

1'. Perithecia immersed to erumpent; ascospores ellipsoid-fusiform, 26–36 × 13–17 μm
   - *P. masonii*

**Persiciospora moreauii** P. Cannon & D. Hawksw.


**PERITHECIA** superficialia, sphaeroidea, flava vel aurantia, 200–350 μm in diametro, cum pilis usque ad 100 μm longis instructae; ostiolata, collum 20–100 μm longum, cum setis coroniformis hyalinis instructae. **ASCII** clavati, evanescenti, 65–75 × 20–25 μm, 8 spori. **ASCOSPORAE** ellipsoidae, fuscae, parietes cum leviter reticulati similis semen persicum, cum duo poris germinationis parvis terminalibus, 20–24 × 8–10 μm.

**PERITHECIA** superficial, sphaeroidal, pale to golden yellow, 250–350 μm diameter, covered with hairs to 100 μm long; ostiolate, neck 20–100 μm long, with a terminal ring of hyaline coronal setae. **ASCII** clavate, evanescent, 65–75 × 20–25 μm, 8-spored. **ASCOSPORAE** ellipsoid, brown, the walls delicately pitted like a peach stone, with two small terminal germ pores, 20–24 × 8–10 μm.

**TYPE:** NEW ZEALAND: Wellington, isol. ex *Pinus* seedling with *Fusarium oxysporum* Schlecht., 15 v 1979, Sheridan WU 9/79 (IMI 238745—**HOLOTYPE**).

**ILLUSTRATIONS:** Doguet (1955: 288–293; figs 19–21); Udagawa & Cain (1969: figs 33, 34).

Figures 17, 18.

**HOSTS:** Probably parasitic on *Fusarium oxysporum*; reported from pine seedlings and *Dianthus* L. plants in conjunction with this fungus.

**DISTRIBUTION:** France (?) and New Zealand; not recorded from the British Isles.

This species was first described by Doguet (1955) as *Melanospora moreauii*, but was invalidly published by him as no Latin diagnosis was provided. Von Arx (1981) transferred the species to *Sphaerodes*, but as the spore ornamentation is very distinct from the constituent members of both these genera, it is appropriate to separate it at the generic level, along with *P. masonii*, from these otherwise well-circumscribed genera.

As far as we know, the fungus has only been found once since the original collection, which was by Moreau from *Dianthus* plants infected with *Fusarium*
oxysporum, and reported by Doguet (1955). No locality was given for this collection; it is assumed that it came from France. The second collection is from New Zealand, and is designated the holotype for the species, as Moreau’s collection was not seen by us. The conspecificity of the two specimens is not in doubt, Doguet having provided a detailed description and a number of illustrations in his work; the epithet is attributed to ourselves alone as Doguet did not see the New Zealand isolate. It is likely to be more widespread than the two records suggest, bearing in mind the markedly disjunct nature of its distribution as presently known. Udagawa & Cain (1969) included light micrographs of the spores of this species in their work, but gave no indication of the provenance of their material.

Doguet described a conidial state for his species, but he did not make single spore isolates, and consequently it is possible that this is a microconidial anamorph of the *Fusarium* host rather than of the *Persiciospora*. The conidia were described as ovoid, hyaline, about \(4 \times 2.5 \mu m\) in size, borne in chains on phialides \(5-12 \times 3-5 \mu m\) in size. He also reported the presence of bulbils, as found in *Melanospora fallax* (see above); these are probably a response to unfavourable environmental conditions, and are not present in the type collection.

*Persiciospora masonii* (Kirschst.) P. Cannon & D. Hawksw.

**Persiciospora masonii** (Kirschst.) P. Cannon & D. Hawksw. **comb. nova**

SYNONYM: *Ceratostoma masonii* Kirschst., *Transactions of the British Mycological Society*, 18: 306 (1934); as “masoni”.

**Perithecia** somewhat gregarious, immersed to erumpent, ± globose, blackish, coriaceous, clothed with hyaline hyphae, 250–350 \(\mu m\) diameter; ostiolate, neck cylindrical, 100–200 \(\mu m\), coronal setae apparently lacking. **Asci** clavate to cylindrical-fusiform, evanescent, 180–200 \(\times\) 20–25 \(\mu m\), 8-spored. **Ascospores** ellipsoid-fusiform, faintly striate-reticulate, dark brown, with two terminal, rather small, slightly apiculate, pores, 26–36 \(\times\) 13–17 \(\mu m\).

**Illustrations:** Figures 19–22.

**Hosts:** Growing in the bark of a diseased oak tree.

**Distribution:** Only known from the type collection (see below).

The genus *Ceratostoma* was introduced by Fries (1818) but was not validated until 31 years later (Fries, 1849), with *C. chioneum* as type, and is therefore a synonym of *Melanospora* Corda (1837). The genus served as a repository for numerous necked pyrenomycetes in the last century (Mason, 1933), and its constituent members are now widely dispersed throughout the Pyrenomycetes.

*Persiciospora masonii* is closely related to *P. moreaui*, sharing a broadly similar spore ornamentation, but differing in habit, in colour, in spore shape and size, and in ascus size.

**Specimen examined:** **British Isles:** Surrey: Richmond Park, on *Quercus* L. sp., 24 viii 1930, Mason (IMI 16002—holotype).

**Phaeostoma v. Arx & E. Müller**

Figures 17–22. *Persicospora moreaui* and *P. masonii* (SEM). Figs 17–18. *P. moreaui* (IMI 238745)—holotype. Fig. 17. Ascospores, ×3500. Fig. 18. Portion of the ascospore wall showing the irregular pitted sculpturing, ×8500. Figs 19–22. *P. masonii* (IMI 16002—holotype). Fig. 19. Ascospores, ×3000. Fig. 20. Ascospore apex, ×15000. Fig. 21. Ascospore, ×6500. Fig. 22. Portion of the ascospore wall showing the sculpturing, ×15000.
Similar to *Melanospora*, but perithecia dark, coriaceous, set on a crustose stroma; ascospores ellipsoid, rounded at the apex, truncate at the base with a small basal appendage.

**Type:** *Phaeostoma vitis* (Fuckel) v. Arx & E. Müller.

*Phaeostoma vitis* (Fuckel) v. Arx & E. Müller


**Synonyms:** *Ceratostoma vitis* Fuckel, *Jahrbücher des Nassauischen Vereins für Naturkunde, 23/24*: 129 (1870).

*Ceratostoma graphioides* Sacc., *Michelia, 1*: 246 (1878).


Perithecia gregarious, situated on a subicular hyphal layer, ± globose, 300–400 μm diameter, dark brown to black, coriaceous to carbonaceous, glabrous or slightly hairy; ostiolate, beak long, cylindrical, often curved, 800–2000 μm in length. Asci ovoid, 14–18 × 10–14 μm, quickly evanescent, 4- or 8-spored. Ascospores ovoid-ellipsoid, brown, smooth-walled, the apex rounded, the base...
truncated and with a large sunken germ pore and small basal appendage collapsing as a central conical protuberance in SEM, 5–6 × 3–4 μm.


HOSTS: Recorded on the bark of *Vitis* L., *Humulus* L., *Juglans* L. and *Betula* L.

 DISTRIBUTION: Known from the British Isles, Germany, Italy and Switzerland.

The only British gathering of this species to date was reported by Dennis (1974), as *Chaetoceratostoma graphioides*, on *Betula*, and found to belong here during a reappraisal of *Chaetoceratostoma* Turc. & Maffei by Hawksworth (1975a).


*Phaeostoma juniperinum* (Ell. & Ev.) v. Arx & E. Müller


This species does not appear to be closely related to *Phaeostoma vitis*, and should be removed from the genus. Arnaud (1930) regarded the taxon as synonymous with *Lagenula nigra* (Schrader) Arnaud, as did Fitzpatrick (1942) when he subsumed the genus into *Caliciopsis*. This possible relationship has not been investigated during the present study.

A collection on *Juniperus* L. distributed by Saccardo (*Mycotheca Italica*, no. 1297, K) which conforms both to the type description and that of von Arx & Müller, has concavo-convex spores 3–4 μm diameter, with a verrucose convex surface and a verruculose concave surface (see Fig. 25),—completely different from those of *Phaeostoma vitis*.

The taxon has not been reported from the British Isles.

**SCOPINELLA LÉV.**


*Chaetoceras* Clem. & Shear, *Genera of Fungi*: 262 (1931).

See Hawksworth (1975a) for details of synonymy.

TYPE: *Scopinella barbata* (Pers.) Lév. ex Sacc.

The genus *Scopinella* was first proposed by Léveillé (1847) to accommodate the single species *S. barbata* (Pers.) Lév. ex Sacc., but it was ignored by other authors until its resurrection in 1975 (Hawksworth, 1975a), when a synonymy was
established between *S. barbata* and *Chaetoceratostoma hispidum* Turc. & Maffei. Malloch (1976 a, b) included three more species in the genus, *S. caulincola* (Fuckel) Malloch, *S. solani* (Zukal) Malloch and *S. sphaerophila* (Peck) Malloch. The genus was then characterized by a long-necked perithecium with quickly-evanescent asci containing cuboid-ellipsoidal spores with two prominent longitudinal germ slits. Two species occur in the British Isles, *S. caulincola* and *S. solani*. They are distinguished by differences in spore size and shape, and in the presence or absence of a (weakly developed) stroma.

The genus is superficially similar to *Melanospora*, but the major differences in spore form suggest that the two genera are only distantly related.

**Key to the species of Scopinella**

1. Perithecial neck terminated by short setae; ascospores with 
   ± straight lateral germ slits .......................... 2
1'. Perithecial neck spreading into a mass of hairs extending 700–850 
   μm beyond the fused portion and often re-fusing over the spore 
   mass; ascospores with diagonal germ slits, (5.5–)6–8.5 
   (–9) × 6–7 × 3–5.5 μm .......................... *S. barbata*

2. Ascospores exceeding 7 μm in length .......................... 3
2'. Ascospores (4.5–) 5–6(–7) × 4–5 × 3–4.5 μm .......................... *S. solani*

3. Asci 2-spored; ascospores 8–9 × 5–6.5 μm .......................... *S. sphaerophila*
3'. Asci 8-spored; ascospores 7–10 × 5–8 × 4–7(–8) μm .......................... *S. caulincola*

*Scopinella barbata* (Pers.) Lév. ex Sacc.


For a detailed description, drawings, and further synonyms see Hawksworth (1975a). The ascospores of this species were found to have diagonal germ slits when studied by SEM (Figs 26–28).

ILLUSTRATIONS: See Hawksworth (1975a).
Figures 26–28.

HOSTS: On fallen leaves of *Castanea sativa* Miller, *Quercus* L. and *Rhododendron ponticum* L.

DISTRIBUTION: Algeria, Canada, France, Germany, Italy, Pakistan and Switzerland. Mentioned as if British by Gray (1821: 523) “on the fallen leaves of oak trees”, but without a precise locality; no British material has been located by later workers.

SPECIMEN EXAMINED: PAKISTAN: Ghora Gali, Murree Hills, Lawrence College, on fallen *Quercus incana* Roxb. leaves, 30 viii 1960, S. Ahmad 14768 (IMI 82632).
Figures 26–30. *Scopinella barbata* and *S. caulincola* (SEM). Figs 26–28. *S. barbata* (IMI 82632), ascospores showing the diagonal germ slits, × 6500. Figs 29–30. *S. caulincola* (Fuckel, *Fungi rhcns.* no. 810, IMI). Fig. 29. Ascospores, showing the vertical germ slits on the edges of the spores, × 3500. Fig. 30. Ascospore, showing a vertical germ slit on the edge of the spore, × 6500.
MEANOSPORA AND SIMILAR GENERA

Scopinella caulincola (Fuckel) Malloch

Scopinella caulincola (Fuckel) Malloch, Fungi Canadenses, no. 82 (1976).

SYNONYMS: Ceratostoma caulincolum Fuckel, Fungi Rhenani, no. 810 (1864).


PERITHECIA superficial, scattered, 200–250 μm diameter, ± globose, brown to dark brown, subglabrous or with frequent hyaline hyphae; ostiolate, neck 600–800 μm, cylindrical, glabrous or with occasional adpressed hyphae, neck cells hyphal, with remote septa; terminal setae absent or poorly developed, 0–50 μm in length, weakly diverging. ASCI clavate, 15–20 × 8–12 μm, quickly evanescent, 8-spored. ASCOSPORES elliptical to oblong-elliptical in equatorial view, rectangular in polar view, brown, smooth-walled, with two prominent longitudinal germ slits, triangular in section, often giving the spore the appearance of a Z-shaped structure, 7–10 × 5–8 × 4–7.5 (–8) μm.

ILLUSTRATIONS: v. Arx & Müller (1954: 147; fig. 44); Malloch (1976a); Spooner (1981).

Figures 29, 30.

HOSTS: On decaying vegetation.

DISTRIBUTION: First reported from the British Isles by Spooner (1981: 273) who also gave a description and illustration of the fungus. Probably widespread in Europe but apparently rarely collected.

Malloch (1976a) gave the basionym of this taxon as Fuckel (1870: 130) but the name was validly published six years earlier on the exsiccatum label cited above which included a short description.


Scopinella solani (Zukal) Malloch

Scopinella solani (Zukal) Malloch, Fungi Canadenses, no. 82 (1976).


Melanospora poae Griffiths, Bulletin of the Torrey Botanical Club, 26: 433 (1899) [sde Malloch (1976a)].

Ceratostoma melanosporoides Winter in Rabenhorst, Kryptogamenflora von Deutschland, Oesterreich und der Schweiz, 1 (2): 254 (1887) [sde Malloch (1976a)].


PERITHECIA superficial to erumpent, often gregarious, on a weekly developed black stroma, (130–)200–300 μm diameter, ± globose, reddish brown, ± glabrous; ostiolate, neck (300–)500–600 μm, cylindrical, glabrous or with adpressed hairs near the sometimes swollen tip, terminal setae absent or poorly developed, 10–30 μm in length, not diverging. ASCI widely clavate, 13–25 × 7–12 μm, quickly
evanescent, 8-spored. Ascospores elliptical to elliptic-hexagonal in equatorial view, rectangular in polar view, brown, smooth-walled, with two prominent longitudinal germ slits, (4.5–)5–6(–7) × 4–5 × 3–4.5 μm.


HOSTS: On decaying plant material, but originally described as a culture contaminant.

DISTRIBUTION: Probably widespread in the cool temperate to subboreal zone. Not previously published as occurring in the British Isles.

Figures 31–34. Scopinella solani and S. sphaerophila (SEM). Figs 31–32. S. solani (IMI 241512), ascospores showing the vertical germ slits on the edges of the spores which appear like broad notches when viewed from above, ×6500. Figs 33–34. S. sphaerophila (IMI 175139). Fig. 33. Ascospores showing the vertical germ slits on the edges of the spores, ×6500. Fig. 34. Ascospore edge showing a vertical germ slit, ×18 500.
MEI.A.NOSPORA AND SIMILAR GENERA


Scopinella sphaerophila (Peck) Malloch

Phaeostoma sphaerophila (Peck) Barr, Rhodora, 64: 134 (1962).

For further synonyms and a detailed description see Malloch (1976b).

ILLUSTRATIONS: See Malloch (1976b).
Figures 33–34.

HOSTS: On stromata of Apiospora morbosa (Schw.) v. Arx.

DISTRIBUTION: Apparently restricted to Canada where Malloch (1976b) recorded it from Newfoundland, Nova Scotia, Ontario and Quebec.

Sphaerodes Clem.

Vittadinula (Sacc.) Clem. & Shear, Genera of Fungi: 281 (1931).

Similar to Melanospora, but often cleistothecial; neck very short or absent, and ascospores very dark brown to black, coarsely reticulate with strongly apiculate to umbonate or tuberculate pores.

TYPE: Sphaerodes episphaeria (Phill. & Plowr.) Clem.

The genus Sphaerodes was erected by Clements (1909) to contain S. episphaeria, and was distinguished from Sphaeroderma by the lack of a subiculum. He also (erroneously) stated that S. episphaeria had smooth spores, while contrasting it with Neocosmospora, which has verruculose spores. The genus was not adopted by later authors, and indeed Clements & Shear (1931) incorrectly suppressed the name in favour of Vittadinula (Sacc.) Clem. & Shear, which Saccardo (1883) had recognized as a subgenus of Sphaeroderma with the same diagnostic feature as Sphaerodes. Other authors combined the genus with Sphaeroderma (e.g. Petch, 1938), Melanospora (e.g. Doguet, 1955) or Microthecium (e.g. Hawksworth & Udagawa, 1977), but von Arx (1981) recently re-introduced it for Melanospora-like fungi with reticulations on the ascospores.

Apart from the coarsely reticulate spores (see Figs 35–40), the structure of their germ pores differs from that in Melanospora. Sphaerodes has strongly protruding tuberculate pores, the walls of which usually support a net-like growth (see Figs 36–37, right), while those in Melanospora are either level with the spore surface, or slightly sunken, and always lack the net-like surface structure.

A number of non-British taxa with reticulately-ornamented spores, previously placed in the genus Microthecium, are also referable to Sphaerodes. For completeness these are briefly described below, keyed, and the necessary new combinations
made; more detailed accounts may be found in Udagawa & Cain (1969) and Hawksworth & Udagawa (1977).

The smooth-spored, cleistocarpic representatives formerly referred to *Microthecium* (including the type species *M. zobelii* Corda) should be placed in *Melanospora*, the only distinction between these two genera being the presence or absence of an ostiole. *Microthecium ciliatum* Udagawa & Cain and *M. foveolatum* Udagawa & Horie have spores with almost hyaline longitudinal wing-like appendages, and have consequently been placed in a separate genus, *Pteridiosperma*, by Krug & Jeng (1979). *Microthecium inordinatum* Malloch & Cain (Malloch & Cain, 1972) has a rugulose ornamentation which, according to a drawing in the original publication, is longitudinally orientated and so may belong with the two previously-mentioned species, but we have seen no material of that taxon. Similarly, *Leuconeurospora pulcherrima* (Winter) Malloch & Cain (Malloch & Cain, 1970) provisionally placed this genus in the *Sphaerodes* as although the ascospores are evidently entirely smooth their germ pores are apparently surrounded by a raised annulus as is usual in *Sphaerodes*. As we have seen no authentic material of these species we refrain from transferring them to that genus here.

According to the original descriptions, *Melanospora singaporenensis* Morinaga et al. (Morinaga et al., 1978: 142), *Microthecium ellipsosporum* Takada (Takada, 1973: 527) and *M. levitum* Udagawa & Cain (Udagawa & Cain, 1969: 1917) may also belong to *Sphaerodes* as although the ascospores are evidently entirely smooth their germ pores are apparently surrounded by a raised annulus as is usual in *Sphaerodes*. As we have seen no authentic material of these species we refrain from transferring them to that genus here.

### Key to the accepted species of *Sphaerodes*

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fruit bodies ostiolate</td>
<td><em>S. fimbriata</em></td>
</tr>
<tr>
<td>1'</td>
<td>Fruit bodies cleistothecial</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Ascospores exceeding 20 μm in length</td>
<td></td>
</tr>
<tr>
<td>2'</td>
<td>Ascospores not exceeding 20 μm in length</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Asci 8-spored; apices of ascospores abruptly constricted and umbonate at the germ pore</td>
<td><em>S. episphearia</em></td>
</tr>
<tr>
<td>3'</td>
<td>Asci 4-spored; apices of ascospores mainly tapered to the germ pore</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Ascospores (25-)28–34 × 14–16(-18) μm; all coarsely reticulate when mature</td>
<td><em>S. beatonii</em></td>
</tr>
<tr>
<td>4'</td>
<td>Ascospores 22–28 × 12–15 × 9–11 μm; about one-third coarsely reticulate, the others smooth</td>
<td><em>S. perplexa</em></td>
</tr>
<tr>
<td>5</td>
<td>Ascospore reticulation covering the whole of the spore</td>
<td></td>
</tr>
<tr>
<td>5'</td>
<td>Ascospore reticulation only on narrow sides of the spore, wide sides smooth</td>
<td><em>S. compressa</em></td>
</tr>
<tr>
<td>6</td>
<td>Ascospore reticulations prominent, with 10–12 deep lumina</td>
<td><em>S. retispora</em> var. <em>retispora</em></td>
</tr>
<tr>
<td>6'</td>
<td>Ascospore reticulations inconspicuous, with about 15 shallow lumina 3–4 μm wide on each face</td>
<td><em>S. retispora</em> var. <em>inferior</em></td>
</tr>
</tbody>
</table>
**Sphaerodes beatonii** (D. Hawksw.) P. Cannon & D. Hawksw.  

**Sphaerodes beatonii** (D. Hawksw.) P. Cannon & D. Hawksw. **comb. nova**  


Ascomata cleistothecial, superficial or immersed in the hymenium of the host, scattered to gregarious, ± globose, (80–100–200(–225) μm diameter, pale ochraceous, appearing black when mature due to spore mass. **Asc**i clavate, 40–65 × 15–33 μm, evanescent, 4-spored. **Ascospores** citriform, very dark brown, very coarsely reticulate, with two terminal germ pores 1.5–2(–3) μm diameter, (25–)28–34(–40) × 14–18(–20) μm.

**Host**: On or in the hymenium of the truffle *Labyrinthomyces tessellatus* Beaton & Weste.

**Distribution**: Only recorded from Australia.

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**Sphaerodes compressa** (Udagawa & Cain) P. Cannon & D. Hawksw.  

**Sphaerodes compressa** (Udagawa & Cain) P. Cannon & D. Hawksw. **comb. nova**  


Ascomata cleistothecial, ± embedded, globose, 150–400 μm diameter, glabrous, pale yellow-brown, appearing black when mature due to spore mass. **Asc**i broadly clavate to ellipsoidal, 50–60 × 20–25 μm evanescent, 8-spored. **Ascospores** citriform, compressed on two sides, the narrow faces coarsely reticulate and the wide faces ± smooth; olivaceous-brown, with two terminal germ pores 1–2 μm diameter, 15–19 × 11–13 × 8–9 μm.

**Habitat**: Isolated in culture from soil, cow dung, dead leaves and as an aerial contaminant.

**Distribution**: Canada, U.S.A., Japan and New Caledonia.

The New Caledonian collection agrees in all details with authentic cultures kindly supplied by Dr Udagawa (IMI 212200) and studied with SEM.

**Specimens examined**: **Japan**: Chiba, Y. Horie (IFM 4519, IMI 212200).—**New Caledonia**: Plateau de la Chute de la Rivière de Lacs, isol. ex dead leaves of *Dacydium araucarioides* Brongn. & Gris., 15 xi 1966, Huguenin 75 (IMI 123503).

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**Sphaerodes episphaeria** (Phill. & Plowr.) Clem.  


**Synonyms**: Melanospora episphaeria Phill. & Plowr., Grevillea, 10: 71 (1881).  

**Sphaeroderma episphaeria** (Phill. & Plowr.) Sacc., Sylloge Fungorum, 2: 460 (1883).  

**Microthecium episphaeria** (Phill. & Plowr.) Höhnel, Sitzungsberichte der Akademie der Wissenschaften Wien, Abt. I, 123: 50 (1914).  

**Vittadinula episphaeria** (Phill. & Plowr.) Clem. & Shear, Genera of Fungi: 281 (1931).
Microthecium epimyces (Höhn.) Höhn., Sitzungsberichte der Akademie der Wissenschaften Wien, Abt. 1, 123: 50 (1914).

Ascomata cleistothecial, superficial, often somewhat gregarious, ± globose, 250–350 μm diameter, yellow to brown. Ascii pyriform, c. 70 × 40 μm, quickly evanescent, 8-spored. Ascospores citriform, dark brown to black, very coarsely reticulate, with two terminal, apiculate, pores, 25–34 × 12–18 μm.

Illustrations: Hawksworth & Udagawa (1977: 148; fig. 2).

Hosts: Parasitic on Hypomyces ochraceus (Pers.) Tul. (Hypocreales).

Distribution: We have seen material from Austria, the British Isles and France.

Various authors (e.g. Petch, 1938; Udagawa & Cain, 1969) have regarded this species as ostiolate, but Hawksworth & Udagawa (1977) examined the original collection and found it to be cleistothecial in nature, and so assigned it on this basis to the genus Microthecium. It has been shown, however (von Arx, 1973), that under certain cultural conditions the development of the ostiole can be suppressed.

Martin (1955) reported an isolate from beech litter from Box Hill, Surrey, which he identified as Sphaeroderma (= Sphaerodes) episphaerium, but his account was at variance with the original description in spore size and in the presence of an ostiole. Udagawa & Cain (1969) re-examined his specimen and referred it to Melanospora ornata (= Sphaerodes fmicola).

Specimens examined: Austria: Wiener Wald, Sauerbrunnleiten, on Hypomyces ochraceus, 23 vii 1906, von Höhn (K).—British Isles: Norfolk: North Wootton & Holt House Wood, near King’s Lynn, on H. ochraceus, x 1880, Plowright (K—holotype of Melanospora episphaeria).—France: Montmorency, on H. ochraceus, xi 1880, Boudier (K).

Sphaerodes fmicola (Hansen) P. Cannon & D. Hawksw.

Sphaerodes fmicola (Hansen) P. Cannon & D. Hawksw. comb. nova
Synonyms: Melanospora fmicola Hansen, Aftryk af Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening i Kjøbenhavn, 1876: 305 (1876).
Sphaeroderma fmicolum (Hansen) Sacc., Syll. Fungorum, 2: 460 (1883).
Sphaeroderma hulseboschii Oudem., Contributions à la Flore Mycologique des Pays Bas, 11: 23 (1886).
Figures 35-40. *Sphaerodes compressa* and *S. fimicola* (SEM). Figs 35-37. *S. compressa* (IMI 212200). Fig. 35. Ascospores, x 2000. Fig. 36. Ascospore, face view, showing the almost smooth surface and tuberculate germ pores, x 6500. Fig. 37. Ascospore, side view, showing reticulate depressions, x 6500. Figs 38-40. *S. fimicola* (IMI 105411). Fig. 38. Ascospores, x 2000. Fig. 39. Ascospore apex, viewed from above, showing the tuberculate margin around the germ pore, x 18500. Fig. 40. Ascospore apex, side view, x 18500.
ASCOMATA perithecial, superficial, often gregarious, ± globose, (200-)250–500 µm diameter, rather thin-walled, glabrous or sparsely hairy, orange to golden-brown; ostiolate, neck very short or absent, to 40 µm in length, ostiole 40–80 µm wide, coronal setae absent or poorly developed, few and 30–50 µm long if present. ASCI oblong to clavate, 40–55 x 25–30 µm, quickly evanescent, 4- to 8-spored. ASCOSPORES citriform, dark brown to almost black, coarsely reticulate, with two terminal, strongly apiculate, pores, 14–26 x 10–17 µm.


HOSTS: Reported from dung, isolated from surface litter and soil, and also found on other fungi, including Sclerotinia sclerotiorum (Libert) de Bary (see below) and Polyporus zonatus Berk. (fide Zukal, 1885).

DISTRIBUTION: Fairly widespread and not uncommonly isolated in the British Isles. It has been reported from a number of countries in central and western Europe, and we have also seen material from Madeira and the U.S.A.

Sphaerodes fimicola is distinguished from S. episphaeria by its possession of an ostiole, usually surrounded by a poorly-developed corona of hyaline setae; and by its smaller spores. Sphaerodes hulseboschii is only separable from S. fimicola as originally circumscribed by its slightly larger size, and by its eight-spored rather than four-spored asci; Petch (1938) suspected that the two taxa were conspecific. Melanospora ornata is simply a small-spored morph of the species, also with 8-spored asci. Judging from the descriptions given by its author and by Doguet (1955), M. manginii is also conspecific with Sphaerodes fimicola. We have seen no material of this taxon.


Sphaerodes perplexa (D. Hawksw.) P. Cannon & D. Hawksw. comb. nova

ASCOMATA cleistothecial, superficial or immersed in the hymenium of the host, ± globose, (75–)100–150(-200) µm diameter, pale yellowish, appearing black when mature due to spore mass. ASCI clavate, 40–55 x 15–25 µm, evanescent, 4-
spored. Ascospores citriform, very dark brown, with two terminal germ pores 1.5–2 µm diameter, about one-third of the spores with a coarsely reticulate ornamentation, the other two-thirds smooth, 22–28 × 12–15 × 9–11 µm.

Host: On or in the hymenium of a truffle, *Sphaerozone echinulatum* G. Beaton.

Distribution: Only known from Australia.

*Sphaerodes retispora* (Udagawa & Cain) P. Cannon & D. Hawksw.

*Sphaerodes retispora* (Udagawa & Cain) P. Cannon & D. Hawksw. **comb. nova**


*Sphaerodes retispora* var. *retispora*

Ascocoma cleistothecial, superficial to immersed, ± globose, 80–230 µm diameter, glabrous, flesh-coloured to yellowish-orange, appearing black when mature due to spore mass. Ascii broadly clavate, 37–65 × 18.5–21.5 µm, evanescent, 8-spored. Ascospores citriform, dark olive-brown, very coarsely reticulate, with 10–12 deep lumina 3–6.5 µm in width on each face of the spore, 17.5–20 × 10–12 × 7.5–9 µm.

Habitat: Isolated from soil, from *Coriolus hirsutus* (Wulfen) Quélet and from an unnamed polypore.

Distribution: Known from Japan and New Guinea.

*Sphaerodes retispora* var. *inferior* (Udagawa & Cain) P. Cannon & D. Hawksw. **comb. nova**


Differs from var. *retispora* by having spores which are indistinctly reticulate, with about 15 shallow lumina 3–4 µm wide on each face.

Habitat: Isolated from soil.

Distribution: Japan.

*Sphaeronaemella* P. Karsten


This genus is rather close to *Scopinella*, but differs in the much paler, translucent perithecia and hyaline ellipsoid ascospores. It is not closely related to *Melanospora*. **Type:** *Sphaeronaemella helvellae* (P. Karsten) P. Karsten.

*Sphaeronaemella* is considered here to be monotypic, containing only *S. helvellae* (P. Karsten) P. Karsten. The only other species commonly placed in this genus, *Sphaeronaemella fimicola* Marchal, is transferred to the genus *Viennotidea* in this revision (see below); it has subapical germ pores rather than germ slits and has a Gabarnaudia anamorph. No anamorph has been definitely connected with *S. helvellae*; Seeler (1943) described a conidial fungus recalling *Gabarnaudia* associated with a collection of the teleomorph, but Samson (1974) did not confirm this
Figures 41–48. *Sphaeronamella heluellae* and *Melanospora zamiæ*. Figs 41–47. *S. heluellae* (H-KARST 1106—? holotype). Figs 41–42. Perithecia on the host showing their superficial nature, long necks, and drop-like spore masses, × 50. Fig. 43. Ascospores, interference contrast, × 2500. Fig. 44. Ascospores (SEM) showing the germ slits on the edges of the spores, × 6500. Fig. 45. Perithecial neck showing the coronal setae supporting a mass of ascospores, × 500. Fig. 46. Ascospore edges showing the germ slit (SEM), × 12750. Fig. 47. Perithecial neck showing that it is made of vertically orientated parallel hyphae (SEM), × 3500. Fig. 48. *Melanospora zamiæ* (IMI 62569a), portion of perithecial neck (below the setae), showing the elongate pseudoparenchymatous cells of which it is composed (SEM), × 3300.
Sphaeronaemella helvellae is obligately fungicolous, while those referred to Viennotidea are dung, soil and plant saprophytic fungi. Sphaeronaemella subulata (Grev.) Grove (syn. S. oxyspora (Berk.) Sacc.) is a synonym of Eleutheromyces subulatus (Tode) Fuckel, and the identity of S. glomerata Grove, described from Birmingham as a culture contaminant, is obscure. No material of this species could be found in the Kew herbarium (K).

*Sphaeronaemella helvellae* (P. Karsten) P. Karsten


**SYNONYMS:**
- *Sphaeria helvellae* P. Karsten, *Fungi Fenniae exs.*, no. 674 (1867).

**PERITHECIA** superficial to partially immersed, densely gregarious, ± globose, 90–250 μm diameter, glabrous; ostiolate, beak ± cylindrical, to 600 μm, with a ring of coronal setae 20–50 μm in length. **PARAPHYSES** absent. **ASCII** clavate to ovoid, 14–25 × 10.5–16 μm, evanescent at an early stage, 8-spored, **ASCOSPORES** elliptical in face view, flattened-elliptical in side view, smooth-walled, ± hyaline, with narrow longitudinal germ slits, 8–11 × 3–4.5 μm.

**ILLUSTRATIONS:** See Malloch (1974).

Figures 41–47.

**HOST:** On decaying apothecia of *Gyromitra infusa* (Schaeffer) Quélet.

**DISTRIBUTION:** Known from various locations in the northern U.S.A., from Canada (Ontario), Alaska, and North and Central Europe (Finland and Switzerland). Not correctly reported from the British Isles (see below).

This species was reported by Clark (1980: 113—as *Melanospora karstenii*) as occurring in Britain, but a re-examination of his material, on *Fraxinus* from Warwickshire (IMI 200172) showed it to be in fact *Melanospora chionea* (Fr.) Corda (see above). *Sphaeronaemella helvellae* appears to be widespread, but is rarely found. It was described in detail by Malloch (1974), from which the above description has largely been adapted. However, in common with all previous authors, he failed to notice the longitudinal germ slits (see Fig. 44). These are narrow, develop just before the spores are ready to germinate, and are very difficult to see without the aid of SEM. The slits suggest a close affinity with *Scopinella* (see above), but the two genera can be distinguished by the form of the germ slits, the peridium pigmentation, and the colour of, and the presence or absence of thickened regions in, the spores.

Karsten’s epithet is usually cited as first validly published in 1884 but as a description was printed on the exsiccatum label issued in 1867 it dates from the latter. The date 24 ix 1867 is given on the printed exsiccatum labels. The collection dated 25 ix (cited below) is presumed to be part of the collection sent out by Karsten, as there is no material of the exsiccatum in H-KARST.

**Syspustospora** P. Cannon & D. Hawksw.

**Syspustospora** P. Cannon & D. Hawksw. **gen. novum**

**DERIVATION**: From συπτός, the Greek word for “to draw tight”, referring to the form of the ends of the spores.

Ab Melanospora differt: collis longis hypharum parallelarum adhaerentium cum septis remotis instructae; setis coroniformis absentes; ascosporis cylindricis vel cylindrico-fusiformis, poris germinationis magnis leviter depressis cum parietibus cingentibus crispis, interdum parum constrictis, instructae.

Differs from Melanospora in the long neck composed of parallel adhering hyphae with remote septa; the absence of coronal setae; the cylindrical to cylindrical-fusiform spores, with large terminal slightly sunken germ pores, the surrounding walls being crinkled and sometimes slightly constricted.

**TYPE**: **Syspustospora parasitica** (Tul.) P. Cannon & D. Hawksw. (holotype).

**Syspustospora parasitica** (Tul.) P. Cannon & D. Hawksw.

**Syspustospora parasitica** (Tul.) P. Cannon & D. Hawksw. **comb. nova**


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Figures 50-56. 

**Figures 50-52.** *Syspastospora parasitica* (SEM). Figs 50-52 (IMI 82086), cylindrical-spored morph. Fig. 50. Ascospores, ×6500. Fig. 51. Ascospore apex showing the puckered rim to the germ pore, ×18,500. Fig. 52. Ascospore apex, ×50,000. Figs 53-55. (IMI 147185), doliform-spored morph. Fig. 53. Ascospores, ×6500. Fig. 54. Ascospore apex showing the puckered margin round a broad apical germ pore, ×18,500. Fig. 55. Ascospores, ×6500. Fig. 56. (IMI 82086), portion of the perithecial neck showing that it is made up of vertically orientated parallel hyphae, ×3,300.
**Melanospora parasitica** (Tul.) Tul. & C. Tul., *Selecta Carpologia Fungorum*, 3: 10 (1865).

*Ceratostoma biparasiticum* Ell. & Ev., *Bulletin of the Torrey Botanical Club*, 24: 127 (1897) [fide Wilson (1907)].


**Perithecia** scattered, superficial to partially immersed, 110–200 (-230) × 120–210 μm, pyriform to sphaeroidal, pale to dark brown, usually appearing darker due to spore mass, glabrous or with occasional hyphae emanating from body wall; membranous, rather thin walled, composed of a textura angularis; ostiolate, beak 400–1800(-3000) μm, straight or slightly curved, glabrous, occasionally with a few vertically-orientated hairs near the tip, 45–60 μm diameter at base, 20–30 μm at tip, tip truncate to obtuse, without coronal setae; beak cells hyphoid, 25–40 μm in length, 3–4 μm diameter. **Asci** (fide Doguet, 1955) clavate, ± pedicellate, 25–30 × 6–10 μm, quickly evanescent, 8-spored. **Ascospores** widely to narrowly cylindrical or fusiform-cylindrical, pale to dark brown, smooth-walled, sometimes 1- to 2-guttulate; germ pores 2, terminal, 1–2 μm diameter, the spore walls slightly convoluted around the pore and sometimes slightly constricted just behind it; spores variable in size, ranging from 4 × 2.5 μm to 9(−10.5) × 2 μm.

**Illustrations:** Doguet (1955: 294–299; figs 22–24).

**Hosts:** Parasitic on various moniliaceous hyphomycetes; particularly common on *Paecilomyces* Bain. species, but also known on *Beauveria bassiana* (Bals.) Vuill., *Hirsutella flocosa* Speare and *Verticillium lecanii* (Zimm.) Viégas (syn. *Cephalosporium longisporum* Petch).

**Distribution:** Widely distributed; common in the British Isles, recorded from several countries in Europe, and from Sri Lanka, Kenya, South Africa, Trinidad, U.S.A. and Canada.

The fungus was first described by Tulasne (1857) as *Sphaeronema parasitica*, but only eight years later, he and his brother transferred it to the genus *Melanospora* (Tulasne & Tulasne, 1865). It has consistently been allied with the members of *Melanospora* since then, though several workers have recognized it as an outlying member of the group. Doguet (1955), in his monograph of *Melanospora*, separated the species informally on the shape of its spores, and Malloch (1976a) considered removing it from *Melanospora* to *Scopinella* on spore morphology, but rightly refrained from this action as the spores are distinct from this genus also.

A number of features link *Syspastospora* with *Melanospora*. These include the possession of a perithecium which is membranaceous rather than carbonaceous, with a globose body and a long neck, and the asci, which are evanescent at an early stage, liberate the immature ascospores into the perithecial cavity. None of these features, however, is confined to these two genera, being also found in other members of the *Melanosporaceae* and *Chaetomiaceae*.

Distinctions between *Melanospora* and *Syspastospora* are as follows: the neck structure, which in *Syspastospora* consists of more or less parallel hyphae with remote septa, and in *Melanospora* is made up of relatively short pseudoparenchymatous cells similar to those of the body wall, though they are usually longer and narrower; the ring of hyaline setae around the ostiole which is
universally present in *Melanospora*, though it is poorly developed in some species, is lacking in *Syspastospora*; the ascospores, which in *Syspastospora* are cylindrical or fusiform-cylindrical with truncate ends, with large terminal germ pores round which the wall is crinkled and sometimes slightly constricted, while in *Melanospora* they are usually ellipsoid or citriform, but never cylindrical, the two extremities containing small, slightly sunken, germ pores. In addition, *Melanospora* species commonly have simple phialidic anamorphs whereas this does not seem to be so in *Syspastospora*.

No conidia were seen in the present study. However, Kihlman (1885) found verticillate phialides bearing ovoid hyaline conidia, and Doguet (1955) reported similar phialides but with ovoid-globose conidia arranged in chains. He was unable to establish a definite link between these and the perithecial state, and judging from his illustration, the conidia are probably those of the host species (usually *Paecilomyces* spp.) rather than those of *Syspastospora*.

Spore size in *Syspastospora* has been recorded as $6.5 \times 2.5 \, \mu m$ (Tulasne, 1857); $5.8 \times 2-2.5 \, \mu m$ (Petch, 1938); $4.5 \times 2-3 \, \mu m$ (von Arx & Müller, 1954), and $6-8 \times 2.5 \, \mu m$ (Doguet, 1955). In the present study it was found that the taxon exhibits a unusual range of spore size, to the extent that, from the first specimens examined, it was thought that two distinct species were present, one with short cylindrical spores $4.5 \times 2.5-3 \, \mu m$ in size, and the other with long fusiform-cylindrical spores with a size range of about $8-10 \times 2-2.5 \, \mu m$. However, upon further study, an almost complete gradation of spore size and shape was found between these two extremes. The range of variation is illustrated in Fig. 49.


**VIENNUTOIDEA P. CANNON & D. HAWKSW.**

*Viennnotoidea* P. Cannon & D. Hawksw. _gen. novum_

SYNONYM: *Viennnotoidea Negru & Verona, Mycopathologia, 30*: 305 (1966); nom. inval. (Art. 37).

PERITHECIA solitaria ad gregaria, superficialia vel semi-immersa, glabra vel molliter pilosa, aurea vel badia, ostiolata, colla cylindrica, apicibus fimbriatis instructae. ASCI sphaeroidi vel ovoidei, evanescentes, 2- ad 8-sporiis instructae.
ASCOSPORAE sphaeroideae, ellipsoideae, pyriformes vel reniformes, interdum allantoideae, continuae.
PERITHECIA solitary to gregarious, superficial or half-immersed, glabrous or softly hairy, yellow or golden-red: ostiolate, beak cylindrical, fimbriate at the apex. ASCI sphaeroidal or ovoid, evanescent, 2- to 8-spored. ASCOSPORES sphaeroidal, ellipsoidal, pyriform or reniform, sometimes allantoid, hyaline, 1-celled.

ANAMORPH: Gabarnaudia Samson & W. Gams (known in two species).

TYPE SPECIES: Viennotidea fimicola (Marchal) P. Cannon & D. Hawksw. (HOLOTYPE).

The genus Viennotidea was first erected by Negru & Verona (1966) to contain V. spermosphaerici and V. raphani. However, they failed to designate a type species for their genus, and it is accordingly invalid under Art. 37 of the Code. The species were combined with V. fimicola by Malloch (1974) into the genus Sphaeronaemella, and this constitutes the first valid publication of these species. However, as the type species of the genus Sphaeronaemella, S. helvellae (P. Karsten) P. Karsten has markedly different spores from those of S. fimicola Marchal (see above), the genus Viennotidea is re-erected to contain this last species and S. humicola Samson & W. Gams, along with the two described by Negru & Verona.

We have attributed this generic name to ourselves alone as Negru & Verona were not familiar with the species we have selected as the holotype of Viennotidea.

The relationships of the genus are obscure; it may be fairly close to Sphaeronaemella, but exhibits major differences in spore form. It is not closely related to Melanospora.

Figures 57-58. Viennotidea fimicola (IMI 63872) (SEM). Fig. 57. Ascospore apices showing the massive, depressed, subterminal germ pores, ×12 000. Fig. 58. Portion of the perithecial neck showing that it is made up of vertically orientated parallel hyphae, ×3 000.
Key to the species of Viennotidea

1. Ascospores mainly exceeding 3 μm wide ........................................... 2
1'. Ascospores 6–8 × 2–3 μm ................................................................. V. fimbicola

2. Ascomata always ostiolate with ostiolar setae ............................... 3
2'. Ascomata usually not ostiolate, sometimes with a long tuft of
ostiole-like hyphae .................................................................................. V. humicola

3. Ascomata superficial; ascospores ovoid to ellipsoid, pyriform or reniform,
5–7 × 3–5 μm ......................................................................................... V. spermosphaerici
3'. Ascomata immersed to erumpent; ascospores spherical, ovoid or
ellipsoid, 4–6.5 × 4–4.5 μm ................................................................. V. raphani

Viennotidea fimbicola (Marchal) P. Cannon & D. Hawksw.

**Viennotidea fimbicola** (Marchal) P. Cannon & D. Hawksw. **comb. nova**


**Perithecia** half-immersed or immersed to base of neck, scattered, 120–300 μm diameter, globose to globose-pyriform, thin-walled, yellow to golden-brown, glabrous; ostiolate, neck cylindrical, 500–900 μm, 25–30 μm diameter at base, 10–15 μm at tip, glabrous, composed of parallel hyphal elements, diverging at the tip to form a gently spreading corona of hyaline setae 50–70 μm long. **Asci** subglobose, 10–15 × 10–12 μm, quickly evanescent, 8-spored. **Ascospores** obovate-ellipsoid, sometimes allantoid, ± hyaline, 6–8 × 2–3 μm, with a crateriform germ pore near one end of the spore (see Fig. 57); spores aggregating at the tip of the neck giving the appearance of a white head.

**Anamorph**: Gabarnaudia fimbicola Samson & W. Gams (see Samson, 1974).

**Illustrations**: Pease (1948: 114–124; figs 1–19); Cain & Weresub (1957: 119–131; figs 1–33); Samson (1974: 93; fig. 40).

Figures 57–58.

**Hosts**: On dung; recorded from cow, deer, rabbit, hare, dog, wolf, possum, and wallaby or kangaroo dung.

**Distribution**: Evidently widely distributed; known from Europe (including the British Isles), Canada, and Australia.

**Specimens examined**: Australia: Victoria: Mount Pilot, on possum dung, 5 x 1963, Dade V156Ac (IMI 104305); Strathbogie Hills, on wallaby or kangaroo dung, 16 v 1964, Dangerfield (IMI 109611).—British Isles: Surrey: Richmond Park, on deer dung, 1 x 1956, Hawksins (IMI 63872). Sussex: Bignor Hill, on rabbit dung, iv 1960, Scott (IMI 103655).—Canada: Ontario: Peel County, N. of Bolton, on cow dung, 8 x 1955, Cain 31350 (IMI 123067); Haliburton County, Grindstone Lake, on deer dung, 17 September 1965, Cain 44943 (IMI 208321).
The last two specimens are immature, and no spores were seen. Identification is therefore tentative, but since the collector published a detailed study of high quality on the species (Cain & Weresub, 1957) it is very likely that the specimens are correctly determined.

Viennotidea humicola (Samson & W. Gams) P. Cannon & D. Hawksw.

Viennotidea humicola (Samson & W. Gams) P. Cannon & D. Hawksw. **comb. nova**


**PERITHECIA** superficial or immersed in agar, 80–250 μm diameter, globose, yellow-brown or red-brown, glabrous; non-ostiolate, but with an ostiole-like elongate tuft of loose hyphae, 200–750 μm long. **ASC** globose, 10–15 μm diameter, evanescent, 8-spored. **ASCOPHORES** broadly ellipsoid, brownish, 5–6 × 4–5 μm.

**ANAMORPH:** Gabarnaudia fmicola Samson & W. Gams (see Samson, 1974).

**ILLUSTRATIONS:** Samson (1974: 95; fig. 41, pl. 2).

**HOST:** Isolated from agricultural soils.

**DISTRIBUTION:** Netherlands and Germany.

We have not seen any material of this fungus and the above description is based on the original account of the species, but as it has a Gabarnaudia anamorph and the ascoma wall and asci are typical of Viennotidea it is conveniently placed here.

Viennotidea raphani (Malloch) P. Cannon & D. Hawksw.

**Viennotidea raphani** (Malloch) P. Cannon & D. Hawksw. **comb. nova**

**SYNONYMS:** Viennotidea raphani Negru & Verona, *Mycopathologia, 30:* 307 (1966); **nom. inval.** (Arts 37, 43).


**PERITHECIA** immersed to erumpent, globose to depressed-globose, yellowish red, 75–120 μm diameter; ostiolate, beak cylindrical, 300–600 μm, terminated by a ring of hyaline setae. **ASCI** globose to ellipsoid, 15–25 × 11–15 μm, evanescent, 2- to 8-spored. **ASCOPHORES** sphaeroid, ovoid or ellipsoid, 1-celled, hyaline, sometimes 1- to 2-guttulate, 4–6.5 × 4–4.5 μm.

**ILLUSTRATION:** Negru & Verona (1966: 307; fig. 2).

**HOST:** On germinating seeds and in the seed cavities of Raphanus sativus L.

**DISTRIBUTION:** Roumania: Mures, Nazna.

As with Viennotidea spermosphaerici, type material is apparently not in existence, and Malloch’s name is lectotypified by the illustration in the paper by Negru & Verona (1966). It is distinguished from V. fmicola and V. spermosphaerici by its spore size and shape, and from V. spermosphaerici by its immersed to erumpent, rather than superficial, habit.
**MEANOSPORA AND SIMILAR GENERA**

*Viennotidea spermosphaerici* (Malloch) P. Cannon & D. Hawksw.

*Viennotidea spermosphaerici* (Malloch) P. Cannon & D. Hawksw. **comb. nova**


**PERITHECIA** ± solitary, globose, yellow or golden, 95–150 μm diameter; ostiolate, beak cylindrical, 600–1200 μm, terminated by a ring of hyaline setae. **ASCII** sphaeroidal or ellipsoid, 10–20 μm, evanescent, 4- or 8-spored. **ASCOSPORES** ovoid or ellipsoid, rarely pyriform or reniform, 1-celled, hyaline, usually 2-guttulate, 5–7 × 3–5 μm.

**ILLUSTRATION:** Negru & Verona (1966: 307; fig. 1).

**HOSTS:** In the seed cavity of fruits of *Capsicum annuum* L., *Cucurbita pepo* L. and *Vicia sativa* L.

**DISTRIBUTION:** Roumania: Tiges-Mures district.

No specimens have been seen of this species, and apparently (von Arx, personal communication) no type material is available. The epithet is accordingly lectotypified by the illustration cited above. There seems little doubt of this species’ relationship with *V. fmicola*, the only difference of note being in the size of the spores. The two guttulae in the spores of *V. spermosphaerici* may correspond to the crateriform germ pores in those of *V. fmicola*, but these are difficult to see except with the scanning electron microscope.

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