

***Sporormia fimetaria* (Rabenh.) De Not. – AEB 721 (= PDD 73881). A variant with unusual ascospore caudae**

Collection site: Western Australia, Kalumburu road, Kimberley region

Substrate: wallaroo/wallaby dung – Australian dung collection #A405

Collection date: 28 August 2000

Collector: Pat Grey

Identifiers: A.E. Bell and D.P. Mahoney

Voucher material: Packet 1: dried herbarium material [AEB 721 (= PDD 73881)] accompanied by 2 Shear's mounting fluid (SMF) semi-permanent microscope slides prepared in 2001. Packet 2: 8 more SMF semi-permanent microscope slides prepared in 2001; Dan's in-situ photos, in September 2021, of ascomata & ascospore bundles on the dried herbarium specimen and his compound-scope photos from SMF & SMF/aniline blue lactic acid microscope slide mounts on 5–6 April, 2001 and again (from the original SMF slides) on 10 September 2021; Ann's and Dan's description and comments.

Description:

Ascomata: Small, globose (<200 µm diameter), cleistothecioid but with a small distinct ostiole, partially immersed but obvious as numerous 'raised bumps' on the dung surface. Peridium thin, a textura angularis with a distinct purple tinge. When ascomata were removed and immersed in water on a slide, they rapidly absorbed it -- splitting open irregularly and discharging their ascospores, as ascospore bundles, into the free water on the slide surface.

Asci: Numerous, arranged in a palisade which filled the ascoma, broadly cylindrical and of uniform width through most of their length, with a rounded apex and narrowing abruptly below to a short stubby stipe. Ascospores filling all but portions just beneath the apex and above the stipe where the hyaline ascospore sheath extensions were located. Asci very uniform in size (75–)82–90(–95 × 13–19 µm (n=25). Ascospore discharge occurred readily in water mounts with the exoascus wall breaking near the uppermost portion of the ascospore bundle and the endoascus wall expanding quickly. Immediately following extension of the endoascus wall, the ascospore bundle floated free at the point where the exoascus wall had broken. Occasionally, the portion of the exoascus above the break could be seen as a cap on the extended endoascus wall.

Ascospores: Eight per ascus, arranged parallel to each other in a bundle surrounded by a hyaline sheath. Ascospore bundle with a central ascospore surrounded by 7 ascospores. Each ascospore consisting of 16 golden brown, smooth cells, the apical cells longer than wide and tapering to a rounded apex [5.5–6.5 × (3–)3.5–4 µm] and the middle cells wider than long (uniformly 5 × 3–3.5 µm). The free face of the outer 7 ascospores slightly convex while those faces, adjacent to other ascospores, flattened. Individual ascospores 50–58 × 5 µm (n=50) and remarkably similar in size within the same ascospore bundle. **Continued on the next page.**

The sheath of each ascospore seemingly contributing along its length to the common sheath of the ascospore bundle (approx. 2 µm) but emerging at both apices as a separate hyaline extension (cauda). This hyaline extension wedge-shaped, narrower at the ascospore apices and gradually broader as it extends away from the spore, mostly 7–12 µm long × 5–7 µm wide, not including the flame-like fingers which extend some distance beyond the flattened distal portion of each wedge. The caudal wedges are of unknown importance to the spore but provide a truly spectacular view as the 8 flame-tipped caudal wedges radiate at the end of the each ascospore bundle. The caudae do not appear as adhesive as do the caudae of *Podospora* species and do not cause the ascospore bundle to adhere to other bundles or to the slide surface. Perhaps they have some role in flotation as was evidenced by the discharge viewed when water was added to the ascoma surface. The caudal wedges with their flame-like tips seemingly distinguish this species of *Sporormia* from all previously described collections of *Sporormia fimetaria* whose wedge-like caudae completely lack the flame-like wedge extensions. Whether this variation warrants the recognition of a new species remains to be seen. To date, most published records don't include photos or detailed descriptions of the caudae. Also characteristic of the ascospore sheaths and their wedge extensions is their persistent nature. They remain a feature of the spore in water, aniline blue lactic acid and Shear's mount fluid mounts. Furthermore, the sheath remains unstained so it is best viewed under phase contrast microscopy. When pressure is applied to the ascospore bundle (by pressing the cover slip), individual ascospores of the bundle separate from each other (with their sheaths visible along their lengths and at their caudal extremities). If further pressure is applied, cells of the ascospores readily disarticulate. No germ pores or germ slits were observed on any cells of the ascospores.

Comments: The above and preceding page represent our more detailed morphological description of Ann's original 2005 coverage of *S. fimetaria* in her book on Australian dung fungi (see that presentation on the next page). That presentation is followed on further pages by a look at what has been said about *Sporormia fimetaria* since Ahmed & Cain's 1972 publication.

Initially, Ann reported the Australian collection [AEB 721 (= PDD 73881)] on the PDD website as *Sporormia* sp. (rather than as the *S. fimetaria* in her book) because she felt it might be a new species. Her designation was based on careful observations of the unusual caudae on its ascospores. The 'new species' possibility still exists, although in other ascospore (and ascoma) features it matches *S. fimetaria*. For now we present it as a variant of that species.

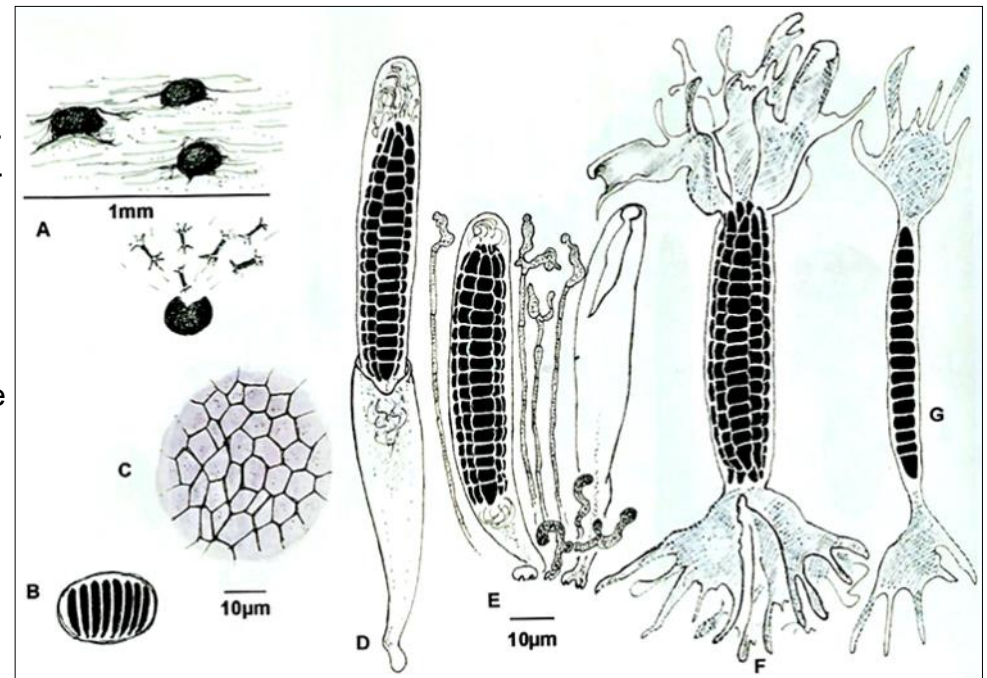
BELL, A. 2005. *An illustrated guide to the coprophilous Ascomycetes of Australia*. CBS Biodiversity Series No. 3, Centraalbureau voor Schimmelcultures, Utrecht, the Netherlands, 172 pages. Portions of pages 53, 54 & 160 are copied in below.

Key to *Sporormia* and *Sporormiella*

1. Ascomata ca 150 μm diam, not clearly ostiolate; ascospores clustered together centrally within ascus, ascospores 16-celled, $50\text{--}58 \times 5 \mu\text{m}$, each ascospore surrounded by a sheath which is extended to form prominent lobed hyaline appendages at the ends of the ascospores.....
Sporormia fimetaria (De Not.) De Not. (Fig. 106)

1. Ascomata larger, with clearly defined ostiole; ascospores uniseriate or biseriate in the ascus *Sporormiella* spp.

Richardson & Watling (1982) described the ascospores of *S. fimetaria* as $37.5\text{--}42 \times 3\text{--}3.8 \mu\text{m}$, while Ahmed & Cain (1972) describe them as larger, $50\text{--}57 \times 3\text{--}3.5 \mu\text{m}$. In 1983 I recorded *S. fimetaria* from New Zealand with ascospores of $37\text{--}40 \times 3.5\text{--}4 \mu\text{m}$ considering at that time that this could represent a new species since the measurements were smaller than those given by Ahmed & Cain. In a later paper Richardson (1998) clearly described the confusion that surrounds the specific epithets *Sporormia fimetaria* (De Not.) and *S. fimetaria* sensu Ahmed & Cain. He also indicated that the original description by De Notaris in 1849 gave neither ascospore measurements nor a scale with the illustration (the latter being at odds with the description). Dissing (1992) described and illustrated *S. fimetaria* (De Not.) De Not. from several collections made in Greenland giving ascospores as $40\text{--}55 \times 3\text{--}3.5 \mu\text{m}$, thus intermediate between the measurements given by Ahmed & Cain and those given by Richardson & Watling (1982). Dissing also illustrated the large single hyaline ascospore appendages described as "pointed". He assumed that the ascospores were most likely discharged as a whole bundle in the manner of *Saccobolus* species. Lundqvist (pers. comm.) described a collection in which the appendages were "spear like". However, one of the most outstanding features of the Australian material is the presence of huge lobed ascospore appendages extending from both ends of each ascospore (Fig. 106 F and G). The very pale purple-brown ascomata of the Australian collection are so small that I have been unable to ascertain whether or not they are cleistothecia or if in fact a tiny ostiole is present. In water the ascomata immediately burst flinging the asci out. Discharged ascospores readily separate from one another in water mounts and are held in the meniscus suspended by their enormous appendages.



As illustrated in Fig. 106 A–G (page 160) in Ann's book. A. Ascoma in situ, one discharging ascus in water. B. Sectional view through ascoma. C. Details of peridium. D. Ruptured mature ascus. E. Unruptured mature ascus, empty outer ascus wall & branched paraphyses. F. Bundle of 8 mature ascospores. G. Single mature ascospore.

Comments: *Sporormia fimetaria* has been widely collected but its descriptions vary in ascospore size and often lack details surrounding the caudae at the ascospore extremities. Below I have included comments provided by Ahmed & Cain 1972, Bell 1983 & 2005, Dissing 1992, Richardson 1998 (& his Excel publ. in Mycotaxon online), Doveri 2004, Kruys & Wedin 2009 and Index Fungorum.

AHMED, S.I. & R.F. CAIN. 1972. Revision of the genera *Sporormia* and *Sporormiella*. Can. J. Bot. 50: 419-477. (Pages 420 & 421 reproduced below)

KEY TO THE SPECIES OF *Sporormia*

- | | |
|--|------------------------|
| 1. Perithecia less than 150 μ in diameter; asci less than 100 μ long, ascospores 16- to 20-celled, 50–57 \times 3.5–4.5 μ (Figs. 1–3)..... | 1. <i>S. fimetaria</i> |
| 1. Perithecia more than 150 μ in diameter; asci over 100 μ long; ascospores 29- to 32-celled, 130–160 \times 4–6 μ (Figs. 4–7)..... | 2. <i>S. mirabilis</i> |
| 1. Perithecia more than 150 μ in diameter; asci over 100 μ long; ascospores 16-celled, 85–116 \times 5.0–6.5 μ | 3. <i>S. fimicola</i> |

1. *Sporormia fimetaria* De Not., Mem. Accad. Torino, 2, 10: 342. 1849. Figs. 1–3
 = *Sphaeria fimetaria* (De Not.) Rabenh., Herb. Mycol. (ed. 1), No. 1733. 1853.
 = *Brochospora fimetaria* (De Not.) Kirsch., Hedwigia, 81: 204. 1944.

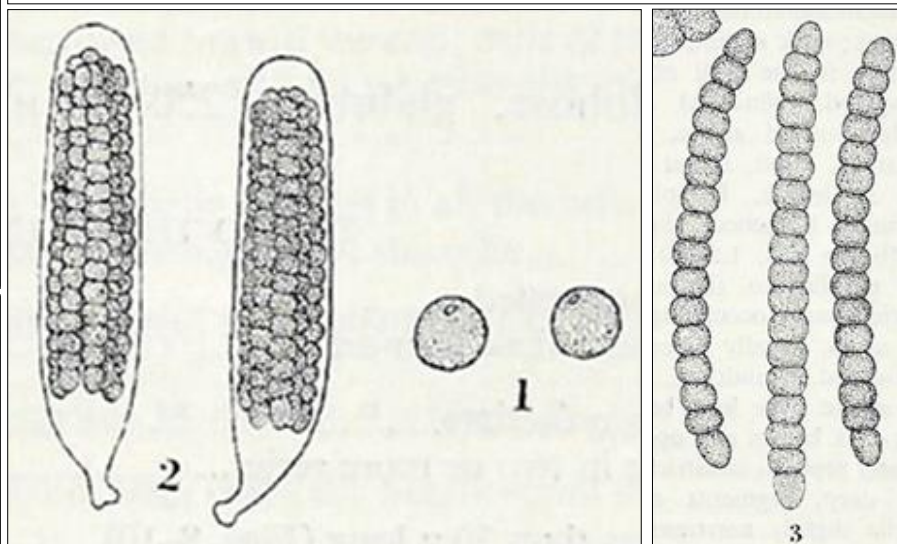
Perithecia scattered, immersed in the substrate, globose, 91–125 μ in diameter, thin, membranaceous, dark brown and opaque, without neck, the ostiole being simply an opening in the perithecial wall. Asci eight-spored, cylindrical, 70–80 \times 12–16 μ , broadly rounded

above, contracted below into a very short persistent stipe. Paraphyses filiform, septate, sparingly branched, longer than and mixed with the asci. Ascospores parallel, firmly united into a cylindrical, truncate mass in the center of the ascus, 16- to 20-celled, cylindrical, 50–57 \times 3.5–4.5 μ , broadly rounded at the ends, light brown when young, becoming dark brown

and opaque when mature, transversely septate; constrictions at septa broad and deep; segments easily separable; terminal cells nearly twice the length of the remaining cells; germ slit absent; a narrow hyaline gelatinous sheath surrounds the entire mass of ascospores.

HABITAT: On dung of cow, deer, goat, and rabbit.

Figs. 1–3. *Sporormia fimetaria* (TRTC 38898). Fig. 1. Perithecia, $\times 40$. Fig. 2. Asci with ascospores, $\times 430$. Fig. 3. Ascospores, $\times 920$.

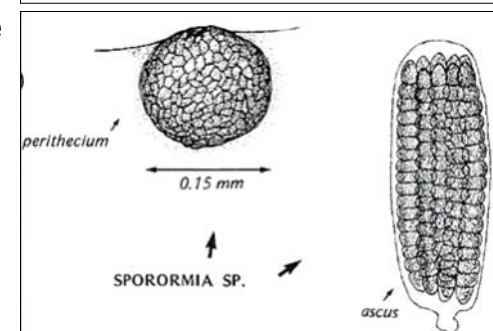


Bell, A. 1983. *Dung fungi: an illustrated guide to coprophilous fungi in New Zealand*. Victoria University Press, Wellington, New Zealand. 88 pp. **Her comments on p. 48 are quoted below.** Ann's specimen had "Ascospores aggregated into a single cylindrical truncated bundle in the centre of the ascus, ascospores 16-celled without germ slits, ascospores 37–40 \times 3.5–4 μ m (Fig. 43)". She noted that "this *Sporormia* sp., may be a new species. Its ascospores are approx. 10 μ m shorter than the measurements given for *S. fimetaria* de Not., in Ahmed & Cain (1972)."

BELL, A. 2005. *An illustrated guide to the coprophilous Ascomycetes of Australia*. CBS Biodiversity Series No. 3, Centraalbureau voor Schimmelcultures, Utrecht, the Netherlands.

Treated on the previous page.

Ann's Dung Fungi of NZ 1983, p. 78, Fig. 43, as *Sporormia* sp.



Dissing, H. 1992. Notes on the Coprophilous Pyrenomycete *Sporormia fimetaria*. Persoonia 14: 389-394.

***Sporormia fimetaria* (De Not.) De Not.**

“**Ascocarps** globose or subglobose, superficial or partly immersed in the dung, 130-185 μm broad, thin-walled, membranaceous, glabrous, first pale yellowish-brown, when mature dark brown; excipulum of one layer, individual cells rather large, 4-6 angular, 10-17 μm broad, 3-5 μm thick. No neck, nor opening seen. **Asci** 50-70 x 10-13 μm , cylindrical, rounded above, below with a short stalk; **paraphyses** not seen; **spores** firmly united like a corn cob, first hyaline all over, later dark brownish on the outside, remaining pale on the inside, 40-55 x 3-3.5 μm , 16-celled, with pointed, gelatinous, hyaline, 30-40 μm long appendages from both poles of each spore (Figs. 4 and 5). The spores mature nearly simultaneously. When enclosed in the ascus, the appendages are closely packed and hardly visible; when the spores are liberated, they remain united in the cob, but the appendages are seen to be suddenly stretched. Neither germ-slits, nor a common gelatinous covering are seen.

Habitat.— On dung of musk-ox, reindeer, roe-deer, and sheep.”

“The cohering spores of *S. fimetaria* with the very characteristic pointed, gelatinous appendages indicate a typical coprophilous spore dispersal, like *Saccobolus* in Pezizales. The gelatinous appendages have never before been mentioned, nor depicted in literature. Nils Lundqvist, Stockholm (in litt.) has kindly informed me that he has seen the same appendages on material of *S. fimetaria* from Scotland, Iceland, and Sweden. *Sporormia fimetaria* may have a worldwide distribution. The type, which has not been studied, was described from material from Italy. Ahmed & Cain (1972) examined material from Canada, Mexico, and United States. Bell (1983) mentioned it from New Zealand.”

Fig. 4. Ascospores in water (one bundle).
Leitz interference contrast light microscopy.
Gr. 81.201 (C), x 1000.

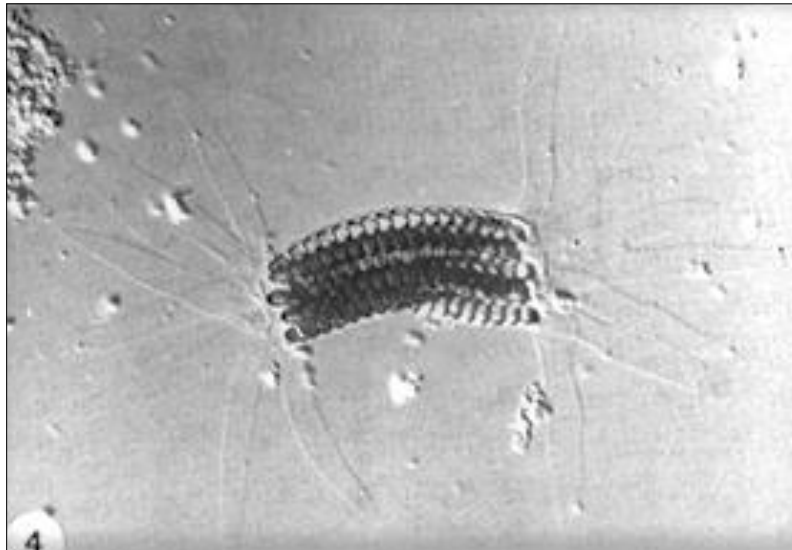
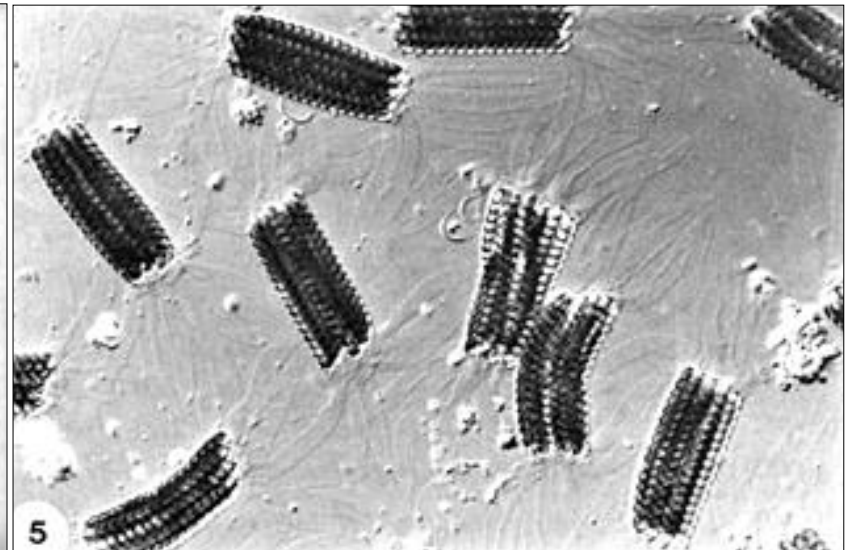


Fig. 5. Ascospores in water (many bundles).
Leitz interference contrast light microscopy.
Gr. 81.201 (C), x 600.



Richardson M.J. 1998. New and interesting records of coprophilous fungi. *Botanical Journal of Scotland* 50(2): 161-175.

Portions of pages 171 & 172 are reproduced below:

***Sporormia fimetaria* (De Not.) De Not.**

“These collections, two British and two French, had pseudothecia 70-110 µm diam. with cylindrical asci 55-65 × 11-12 µm, abruptly tapered below to a short stalk. Spores were consistently 16-celled, 37.5-42 × 3-3.8 µm diam., 8 to an ascus, tightly bundled together, the bundles 40-51 × 9.5-11.5 µm, with gelatinous appendages at each end of the bundle ca 20-25 µm long. There are few British records, although there are two collections in Kew from Surrey (K[M] 17184 & 17214)].

S. fimetaria sensu Ahmed & Cain (1972) has spores 50-57 µm long, with asci 70-80 × 12-16 µm, from five north and central American samples. I drew attention to the markedly smaller spores of the first Scottish collection (Richardson & Watling, 1982) and Bell (1983), commenting on a similar collection from New Zealand, noted that 'this may be a new species'. Dissing (1992) describes 11 arctic and north temperate collections with spores 40-55 µm long, which appears to bridge the gap between the shorter-spored Scottish, French and New Zealand specimens and the American material with longer spores and asci. Dissing does not comment on any variation in spore size among his collections; the one illustrated in detail (9 spore bundles) has spores 40-42 µm long. Apart from Ahmed & Cain's material all spores are consistently 16-celled. Although Ahmed & Cain (1972) described spores as 16-20 celled, all their illustrations (with the exception of one 18-celled spore) are of 16-celled spores. The original description (De Notaris, 1849), has no spore or ascus measurements, and no scale with the illustration. The spores are described as 16-18-celled, but only 18-, 19-, and 20-celled spores are illustrated. Saccardo (1879) reports the spores as 50-55 × 3-4 µm and, in a poor representation which may not be accurate, as being 13-19-celled, with asci 100-110 × 15 µm. Rabenhorst (1987) in the main text has asci 80 × 14-16 µm, with spores up to 20-celled, 50 × 4 µm, with the terminal cells 4 µm long, the others 2.5 µm; in a subtext, however, reference is made to constantly 16-celled spores 38 µm long, in asci 50-55 × 12-13 µm, which suggests an observation based on experience by one of the authors of material very similar to the recent European and New Zealand records, rather than the American material studied by Ahmed & Cain (1972). It is possible, therefore, that the European and New Zealand collections represent *S. fimetaria* sensu De Notaris, and that *S. fimetaria* sensu Ahmed & Cain, with markedly longer spores and asci, is a different species.”

For Mike Richardson's records of his coprophilous fungi collections see the following:

Richardson, Michael J. Records of coprophilous fungi – a Mycotaxon data set.

[2015-10: Introduction](#) — [Database](#) (excel format); [files](#); [link to summary list/abstract](#) (vol. 130-3) **Ctrl/Click on Database**

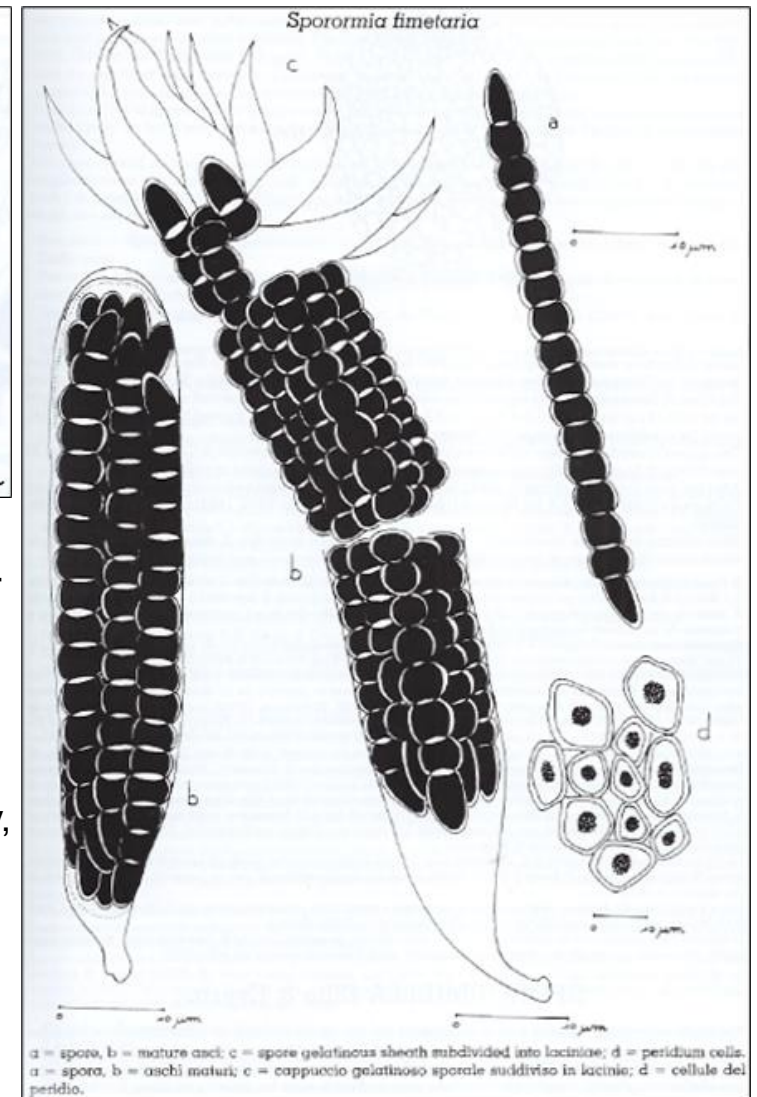
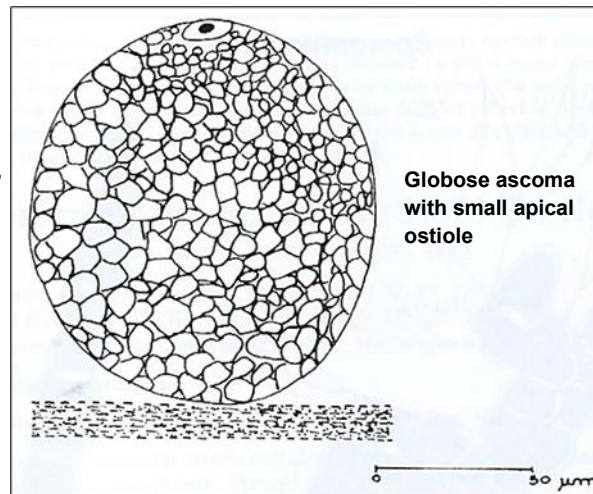
Once there, enable editing & then find & select *Sporormia fimetaria*. Your *Sporormia fimetaria* search will yield 16 records between 1961 and 2014 from the dung of rabbit, hare, sheep, goat, deer (roe?) and kangaroo (mostly between 1996 and 2007).

Doveri F. 2004. *Fungi Fimicoli Italici*. Associazione Micologica Bresadola, Trento. Selected text & illustrations from pages 610–612 are reproduced below:

“Description- (partly based on DOVERI et al., 1999) “Doveri F., Cacialli G. & Caroti V., 1999. Etude préliminaire des Loculoascomycetes fimicoles d'Italie. Contribution à l'étude des champignons fimicoles n° XXX. Doc. Mycol. 29 (113): 35-70.”

Pseudothecia 120-150 µm diam., globose or broadly ovoid, ostiolate, membranous, smooth, dark brown. **Peridium** very thin, pseudoparenchymatous, made up of polygonal, dark brown, thick-walled cells, 5-15 µm diam. **Pseudoparaphyses** filiform, ephemeral, hardly observable. **Asci** 63-78 x 11.5-13 µm, 8-spored, cylindric, roundish at the apex, strongly narrowed at the base, which ends with a short, lobate stalk. **Spores** 47.2-53.6 x 4.0-4.5 µm, surrounded by a common gelatinous sheath (with a separate cauda for each spore extending beyond each end), forming a cylindric bundle in the middle of the ascus, hyaline in the early stages, dark brown at maturity, cylindric, smooth, straight or slightly wavy, thick-walled, lacking germ slits, subdivided by transverse, rather deep septa into 16 (sometimes into 18) easily separable cells: end cells subconical, roundish or slightly pointed at the apex, longer and narrower than the middle ones; the latter cylindric, more or less equal in size and shape, always wider than long.”

Notes: Doveri then briefly discusses the variable ascus and spore sizes reported by various authors and concludes that “*S. fimetaria* could be regarded as a taxon with very variable ascus and spore sizes”.



Kruys, A. & M. Wedin. 2009. Phylogenetic relationships and an assessment of traditionally used taxonomic characters in the Sporormiaceae (Pleosporales, Dothideomycetes, Ascomycota), utilising multi-gene phylogenies. *Systematics and Biodiversity* 7(4): 465-478.

Two collections of *Sporormia fimetaria* are sequenced and placed among numerous species of *Sporormiella*, *Preussia* & *Westerdykella* in a phylogram of the family Sporormiaceae:

Species	GenBank accession no. & Source ^a	Origin	ITS nLSU	mtSSU	β-tubulin
<i>Sporormia fimetaria</i> De Not					
1.	Lundqvist 2302-c (UPS)	Sweden, cow dung	GQ203768	GQ203728	GQ203691
2.	Dissing Gr.81.194 (UPS)	Greenland, sheep dung	GQ203769	GQ203729	GQ203692

^a UPS = Uppsala University, Uppsala, Sweden (Uppsala's natural history museum - The Museum of Evolution)

Although little morphological detail is provided, the authors state the following on p. 469:

“The type, *Sporormia fimetaria* is sister to the *Westerdykella* clade in the 2-markers phylogeny (supported by pp). In the 4-markers phylogeny, it clusters with *S. pulchella*, which is an unusual member of *Sporormiella* with its uniseriate spores in the asci. Neither of these taxa is an obvious closest relative to *Sporormia*. As the sister-group relationship is ambiguous and the genus is morphologically unique with its typical spores, we suggest that *Sporormia* should continue to be circumscribed in the sense of Ahmed and Cain (1972).”

Under ‘Conclusions and suggestions for the future’ on p. 476 they state:

“Identifying homologous/synapomorphic character states is clearly difficult in Sporormiaceae, although we have found a number of features that may be useful for circumscribing smaller clades. We believe an extended search for useful morphological characters is needed, though, preferably in combination with molecular studies. It is most important to facilitate continuing studies in this exciting group of fungi, by arriving at a well-supported and highly resolved phylogenetic hypothesis of the Sporormiaceae, in the near future.”

Index Fungorum: (November 2021)

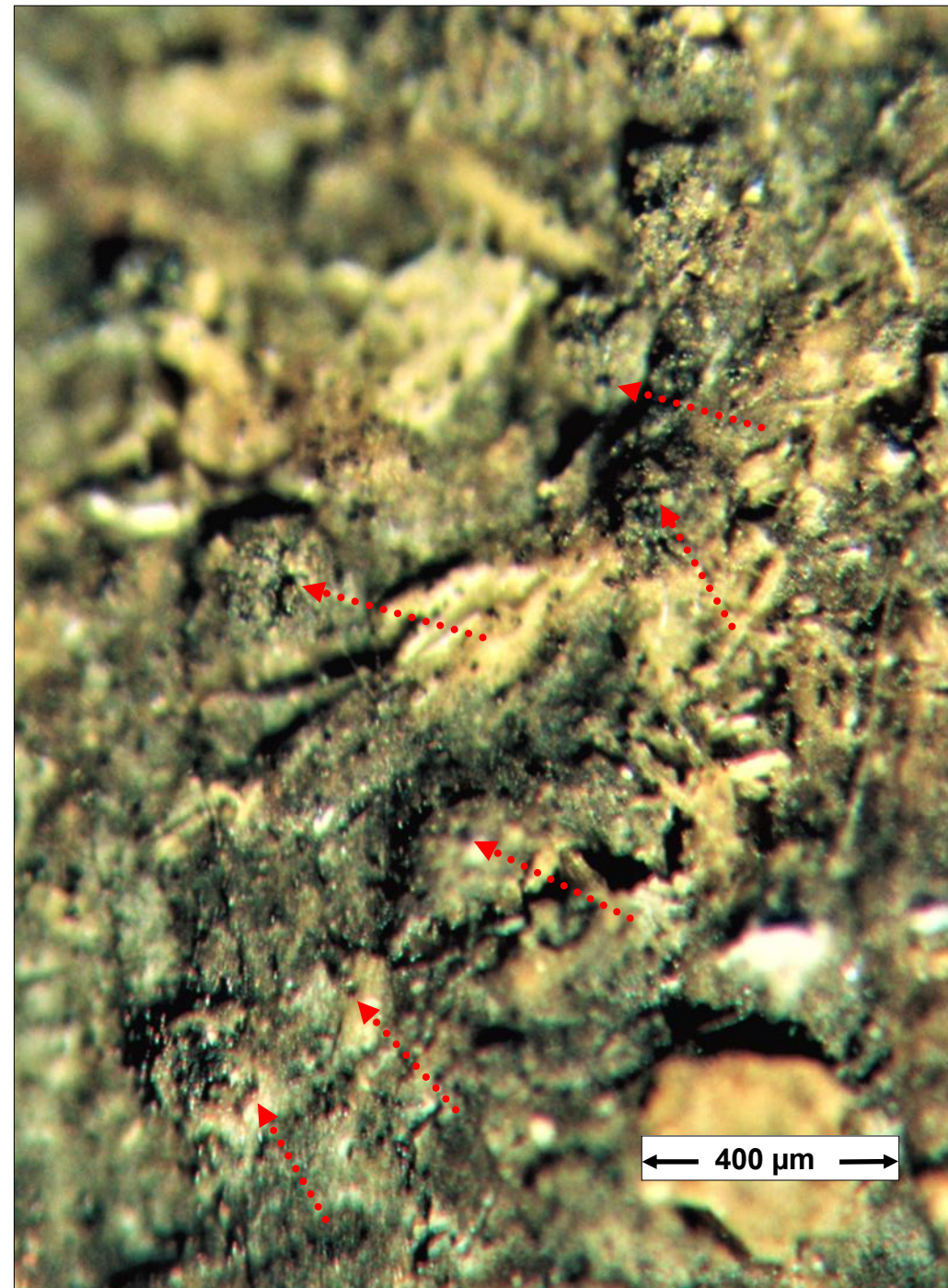
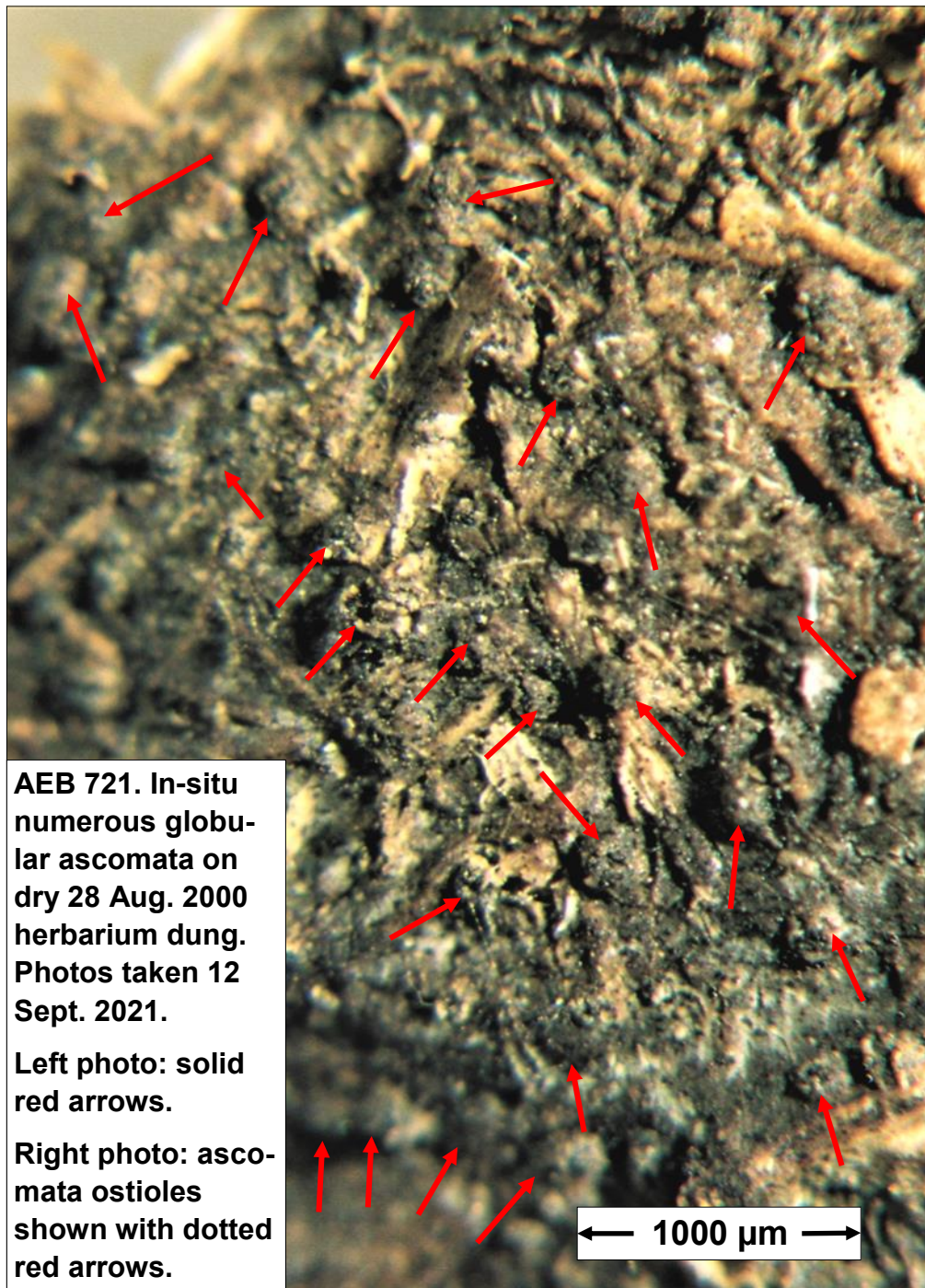
Current Name:

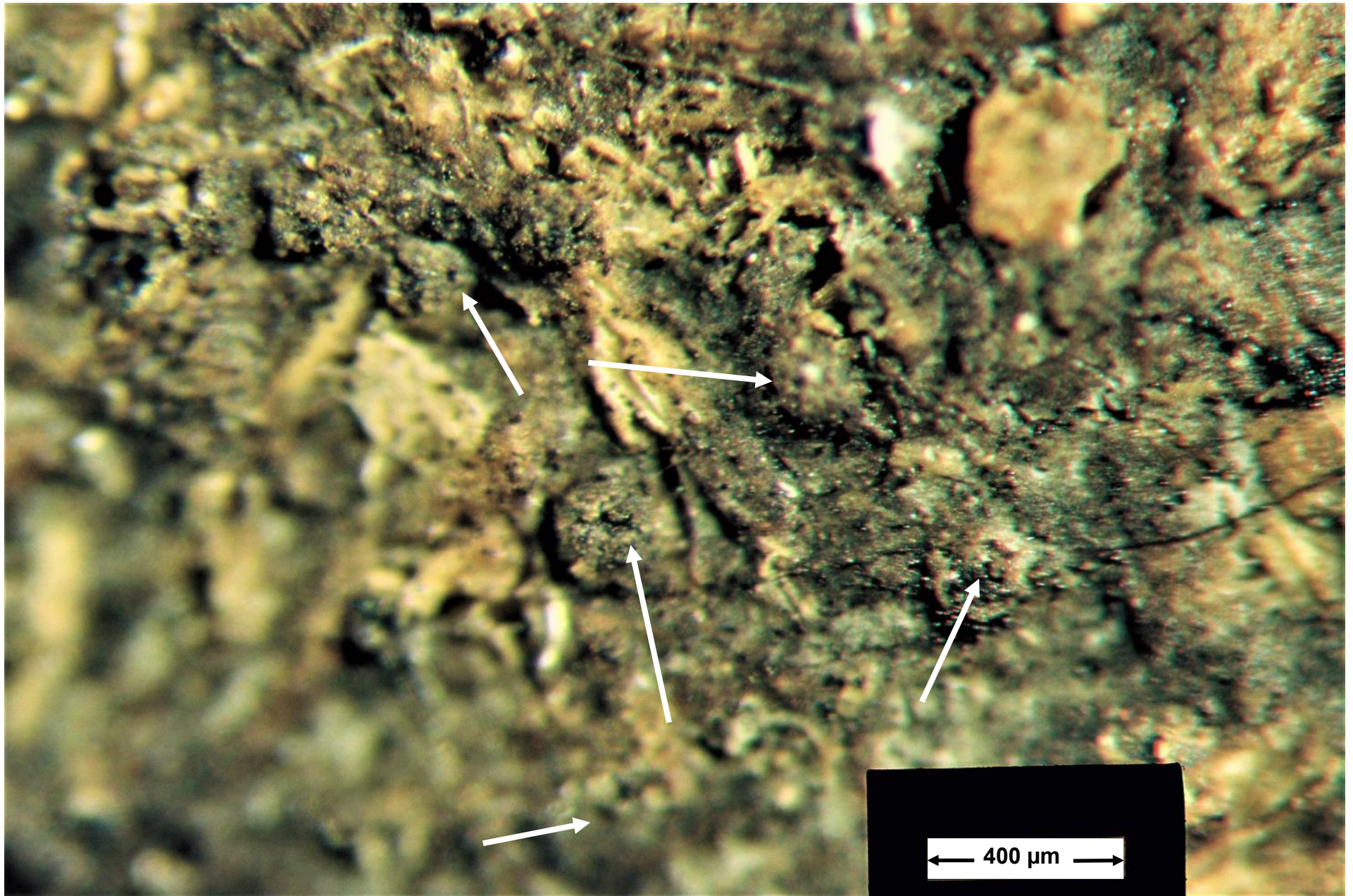
[**Sporormia fimetaria \(Rabenh.\) De Not.**](#), *Mém. R. Accad. Sci. Torino*, Ser. 2 **10**: 342 (1849)

Synonymy:

[**Sphaeria fimetaria Rabenh.**](#), *Klotzschii Herb. Viv. Mycol.*, Edn 1: no. 1733 (1845)

[**Brochospora fimetaria \(Rabenh.\) Kirschst.**](#), *Hedwigia* **81**: 204 (1944)





AEB 721. Numerous small, partially emergent ascomata and their centrally located ostioles (solid white arrows) on herbarium dung collected 28 Aug. 2000. Photos taken 12 Sept. 2021.



AEB 721. In-situ view of ascospore bundles (arrowed) on dried dung collected 28 Aug. 2000. Photo taken 12 Sept. 2021 under the X10 objective of an Olympus BX51 using reflected light from a Schott KL 1500 electronic.



Asci each containing an ascospore bundle with 8 ascospores, all 16-celled. Photo 10 September 2021 using the original 2001 SMF slide, X40 objective, brightfield microscopy. The 5 parallel asci $75\text{--}82.5 \times 15\text{--}17.5 \mu\text{m}$ (actually a bit longer due to their bent stipes). Note also the peridium fragment (upper left), exhibiting its *textura angularis* makeup.



Ascospore bundle – 8 ascospores, all 16-celled. Photo 5 April 2001, original SMF slide, X100 objective, phase microscopy. Note the caudae at the ends of each ascospore in the ascospore bundle. These consist of a broad hyaline extension, each tipped with several flame-like fingers.



Ascospore bundle – 8 ascospores, all 16-celled. Photo 5 April 2001, original SMF slide, X100 objective, brightfield microscopy. Same bundle as shown in phase above, but reoriented. Top in-focus ascospore $53 \times 5 \mu\text{m}$ with end cells $5.5 \times 4 \mu\text{m}$ and $6.5 \times 4 \mu\text{m}$; bottom in-focus ascospore $53 \times 5 \mu\text{m}$ with end cells $5.5 - 6 \times 3.5^+ - 4 \mu\text{m}$. Middle cells of both ascospores (wider than long) $5 - 5^+ \times 3 - 3.5 \mu\text{m}$.



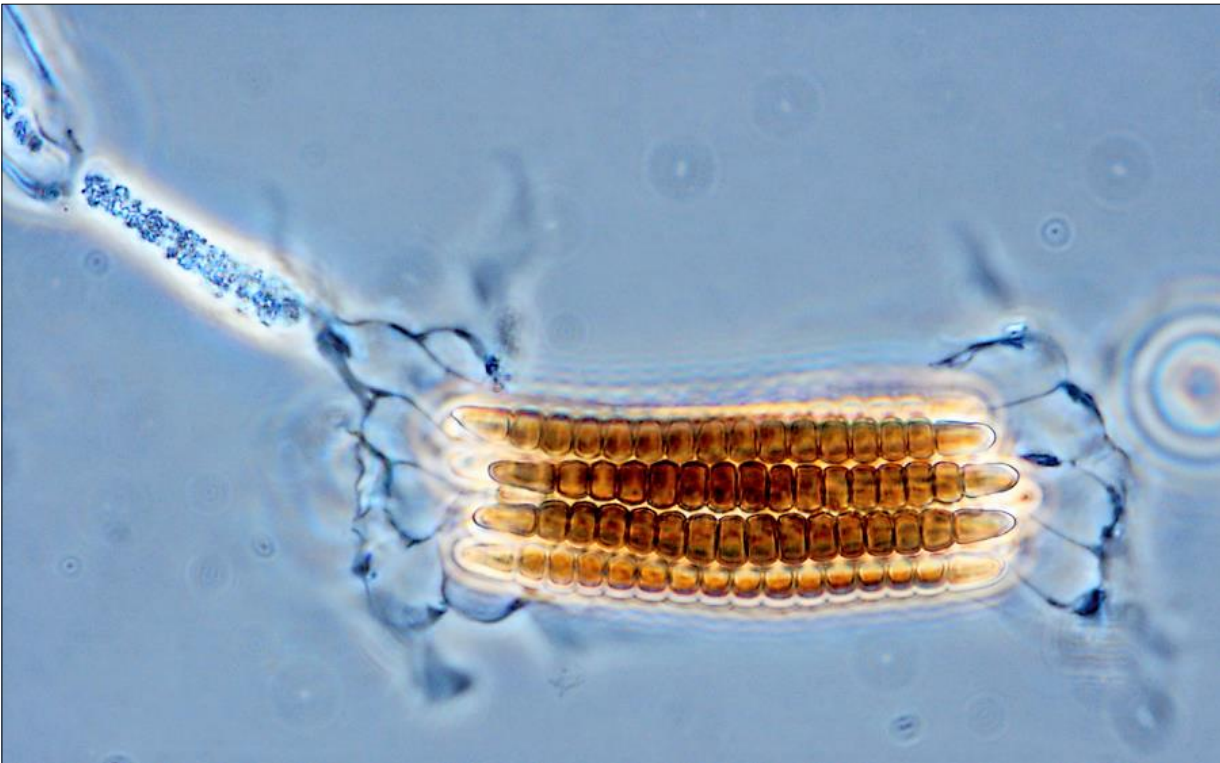
Ascospore bundle – 8 ascospores, all 16-celled. Photo 5 April 2001, original SMF slide, X100 objective, phase microscopy. Note the caudae at the ends of each ascospore in the ascospore bundle. These consist of a broad hyaline extension, each tipped with several flame-like fingers.



Ascospore bundle – 8 ascospores, all 16-celled. Photo 5 April 2001, original SMF slide, X100 objective, brightfield microscopy. Same bundle as shown in phase above, but slightly reoriented. Two dark in-focus ascospores $56\text{--}57 \times 5 \mu\text{m}$ with end cells $6 \times 4 \mu\text{m}$ and middle cells (wider than long) $5 \times 3\text{--}3.5 \mu\text{m}$.



Ascospore bundle – 8 ascospores, all 16-celled. Photo 10 September 2021 using original 2001 SMF slide, X100 objective, phase microscopy. The caudae seen here show only their broad hyaline extensions; their flame-like fingers are indistinct. Sizes of the 3 in-focus ascospores: top, $51 \times 5^+ \mu\text{m}$; middle, $50 \times 5 \mu\text{m}$; bottom, $52.5 \times 5 \mu\text{m}$.



Ascospore bundle – 8 ascospores, all 16-celled. Photo 10 September 2021 using original 2001 SMF slide, X100 objective, phase microscopy. The caudae seen here show only their broad hyaline extensions; their flame-like fingers are indistinct. No measurements recorded.



Flattened ascospore bundle – 8 ascospores, all 16-celled. Photo 10 September 2021 using original 2001 SMF slide, X100 objective, phase microscopy. Note the caudae at the ends of each ascospore in the ascospore bundle. These consist of a broad hyaline extension, each tipped with several flame-like fingers.



Two ascospore bundles with their 8, 16-celled, ascospores separating. Photo 6 April 2001, original SMF/aniline blue lactic acid slide, X100 objective, brightfield microscopy. Ascospores $55\text{--}56 \times 5 \mu\text{m}$ with end cells $6 \times 3.5 \mu\text{m}$ and middle cells (wider than long) $5 \times 3 \mu\text{m}$.