Nordic equiseticolous Pyrenomycetes

Lennart Holm and Kerstin Holm

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The Pyrenomycete flora on *Equisetum* has been studied, mainly on Nordic material. With regard to frequency and host specificity these fungi can be divided into three groups, viz. 1) true *Equisetum* fungi; 2) common species but not restricted to *Equisetum*; 3) accidental species. An annotated list is given of the two first categories which comprise the following taxa. 1: *Didymosphaeria equiseti-hiemalis, Phaeosphaeria berlesei, P. equiseti, Mycosphaerella equiseti, M. equiseticola, Scirrhia castagnei, S. silvatica,* and probably *Didymella equisetina.* 2: *Phaeosphaeria eustoma, P. fuckelii, Mycosphaerella* cf. *aspidii.*
Two new taxa and one new combination are published, viz. *Phaeosphaeria equiseti* (Karst.) L. & K. Holm comb. nov., *P. equiseti* var. *lindii* L. & K. Holm var. nov., *Scirrhia silvatica* L. & K. Holm sp. nov.

L. Holm and K. Holm, Inst. of Systematic Botany, Univ. of Uppsala, P.O. Box 541, S-751 21 Uppsala, Sweden.

Introduction

Equisetum, the horsetails, is a taxonomically very isolated genus, comprising some 30 recent members of the archaic Sphenopsida. It is a priori likely that such a group will harbour a specialised and perhaps also primitive fungus flora, thus offering an interesting object to students of mycology. Certainly a large number of microfungi have been recorded from *Equisetum*, but most of them are poorly known and on the whole little attention has been paid to them. So much for the background of this article. As indicated by the title it deals with the subject from a Nordic angle of approach, which, however, in this case may be considered as fairly wide. Out of 11 European *Equisetum* species 10 occur in Scandinavia, most of them common and widely distributed. At any rate the material examined seems sufficient to warrant some general conclusions. With respect to their frequency and ecological importance these fungi can be grouped into three categories: 1) the true *Equisetum* fungi; 2) fairly common species but not bound to *Equisetum*; 3) accidental species.

1) The first group is of course the most interesting one. It comprises the majority of the species treated here, viz. *Didymosphaeria equiseti-hiemalis, Phaeosphaeria berlesei, P. equiseti, Mycosphaerella equiseti, M. equiseticola, Scirrhia castagnei* and *S. silvatica.* Probably *Didymella equisetina* belongs here, but this little known species is best left aside in this connection.

The members of this group are probably all more or less common, and generally they occur in abundance. The high degree of host-specificity is striking. *Didymosphaeria equiseti-hiemalis* and *Phaeosphaeria berlesei* are known from *Equisetum hiemale* only, while *P. equiseti* so far seems restricted to *E. variegatum* and *E. scirpoides.* Those three hosts are closely allied, members of the subgenus *Hippochaete.* Even if the fungi in question may have a wider host spectrum than now known it can probably be safely assumed that they are confined to *Hippochaete.*

The other species of group 1) are, with one exception, obviously restricted to the subgenus *Equisetum. Scirrhia silvatica* is so far found on *E. silvaticum* only. *Mycosphaerella equiseti* is common on *E. palustre* and moreover found on *E. fluviatile. M. equiseticola* is particularly abundant on that host, but is also met with on *E. arvense, E. maximum, E. silvaticum,* and *E. palustre.* The sole species common to the two subgenera is *Scirrhia castagnei,* growing on *E. arvense, E. hiemale,* and *E. variegatum.*

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2) The second group includes a few species, not restricted to *Equisetum* but fairly common on these species. We refer here to *Mycosphaerella* cf. *aspidii*, very frequent on various ferns, and *Phaeosphaeria eustoma* and *P. fuckelii*. The latter two species are mainly graminicolous and their occurrence on *Equisetum* is surely secondary.

3) The third group is a heterogeneous assembly of species, found occasionally. It includes inter alia *Nectria arenula*, *Nodulosphaeria modesta*, *Pleospora* sp., *Trichothyrina* sp., *Phaeosphaeria vagans*; (incidentally, *Leptosphaeria limosa* Fautrey is according to type material in UPS = *P. vagans*). These species will not be treated in the present study.

As is evident from this survey the majority of these fungi are biologically isolated, being restricted to *Equisetum*. Taxonomically, however, they do not stand very much apart, as they all have close affinities to species on Angiosperms, particularly grasses which perhaps may have some connection with the content of silica. It is also noteworthy that the Pyrenomycetes on *Equisetum*, with the possible exception of *Schirrhia*, are certainly not primitive. The present article is based mainly on our own collections (which will be transferred to UPS); in addition the material in S and UPS has been examined, a few samples have been obtained on loan from C and LE. Our thanks are due to the curators of these institutes.

Artificial key

1. Ascocarps with many loculi ..... *Scirrhia castagnei*
1. Ascocarps with 1 or 2 loculi 2
2. Spores generally 1-septate 3
2. Spores with 3 or more septa 9
3. Spores hyaline 4
3. Spores brown ..... *Didymosphaeria equiseti-hiemalis*
4. Interascal threads present, often early dissolving 5
4. No interascal threads 6
5. Spores 5–7 µm broad, on *E. fluviatile* ..... *Didymella equisetina*
5. Spores < 5 µm broad, on *E. silvaticum* ..... *Didymella* sp.
6. Ascocarps with flat top, on *E. silvaticum* ..... *Scirrhia silvatica*
6. Ascocarps subglobose 7
7. Ascocarps ≥ 0.2 mm diam., spores > 15 µm ..... *Mycosphaerella equiseti*
7. Ascocarps ≤ 0.1 mm diam., spores < 15 µm 8
8. Spores distinctly guttulate, asci ± pyriform ..... *Mycosphaerella equiseticola*
8. Spores eguttulate, asci oblong ..... *Mycosphaerella* cf. *aspidii*
9. Spores constantly with 3 septa ..... *Phaeosphaeria eustoma*
9. Spores generally with more septa 10
10. Spores with one distinctly inflated cell 11
10. Spores not so 12
11. Spores 3–5 µm broad ..... *Phaeosphaeria fuckelii*
11. Spores about 7 µm broad ..... *P. equiseti* var. *lindii*
12. Terminal spore cells equal ..... *Phaeosphaeria berlesei*
12. Spores obtuse at apex, basally attenuating ..... *P. equiseti* var. *equiseti*

Didymella equisetina (H. Syd.) Petr.

Petrak, Ann. Mycol. 29: 358 (1931) – *Mycosphaerella equisetina* H. Sydow, Ann. Mycol. 19: 139 (1921) – Type: Germany, Brandenburg, pr. Zossen, in dead stems of *E. fluviatile* (sic!), July 1917 (= Syd., Myc. germ. 1540, S, UPS!).

Exs.: Syd., Myc. germ. 1540 (S, UPS).

Fig. 1A.

Ascocarps widely and rather densely scattered, immersed, piercing the epidermis with a minute papilla, subglobose or slightly depressed, 0.15–0.3 mm diam., brownish. Peridium of ± uniform width, 20–25 µm, of 3–4 layers of cells, up to 15 µm. Interascal threads numerous, short-celled, dissolving at maturity. Asci ± oblong, 75–80 × 12–15 µm, sessile, 8-spored. Spores elliptico-fusiform, 18–23 × 5–7 µm, hyaline, bicellular, eguttulate, the upper cell broader and often somewhat shorter than the lower one.

Didymella equisetina seems to be fairly close to e.g. *D. exigua*, and is hardly separable on morphological

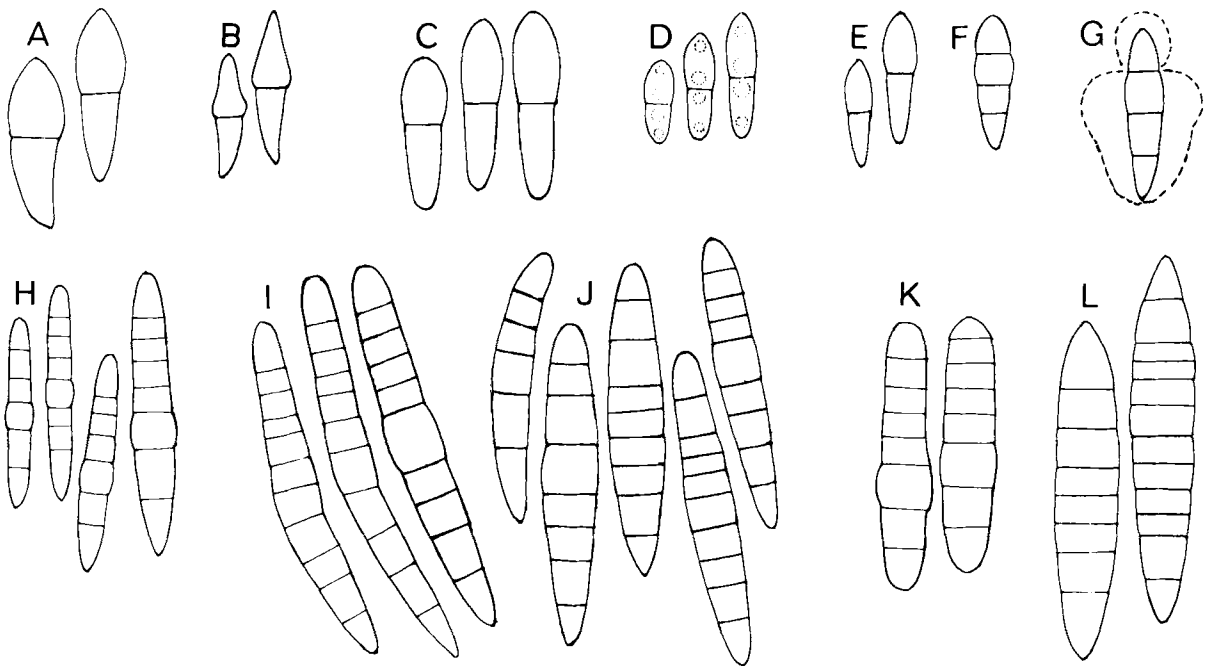

Fig. 1. Spores, all × ca. 1100. – A: *Didymella equisetina.* – B: *Didymella* sp. – C: *Mycosphaerella equiseti.* – D: *Mycosphaerella equiseticola.* – E: *Scirrhia silvatica,* normal spores. – F: *Scirrhia silvatica,* 3-septate spore (Romell 9 June 1895). – G: *Phaeosphaeria eustoma.* – H: *Phaeosphaeria fuckelii,* from the left of the types 3-1-2, 4-1-3, 4-1-2, and 5-1-2, respectively. – I-J: *Phaeosphaeria equiseti* var. *equiseti.* – I: Orig. coll., from the left of the types 5-2-4, 5-2-4, and 5-1-4, respectively. – J: (Holm 696a), from the left of the types 3-1-2, 3-1-4, 3-2-4, 4-2-4, and 4-1-4, respectively. – K: *Phaeosphaeria equiseti* var. *lindii* (type coll.). – L: *Phaeosphaeria berlesei.*

grounds only; its taxonomic value is somewhat uncertain but it may represent a form, specialized on *Equisetum fluviatile.* Sydow (1921) erroneously stated the host to be *E. hiemale.* He also fell a victim when saying that the fungus was "aparaphysate", which, however, was pardonable in view of its overripe condition. Petrak (1931) realized its true position and provided a detailed description. The species was so far known only from the type collection, and it was not mentioned by Corbaz (1956) in his study of the genus *Didymella.* We can mention a further find:

Sweden: Uppland. Skuttunge parish, 1 km NW of Kipplingeberg, *E. fluviatile.* 25 August 1941. J. A. Nannfeldt 5506 (UPS).

Didymella sp.

Figs 1B, 3A.

Ascocarps rather densely scattered and often aggregate in rows, subepidermal, brownish, ± globose, usually 150–200 µm diam. Peridium of uniform width, 12–15 µm, of 2–3 layers of cells forming a textura angularis. Interascal threads numerous, shortcelled. Asci almost cylindrical, 50–55 × 10–12 µm, 8-spored. Spores subfusiform, (12–)16–18 × 4–5 µm, hyaline, generally guttulate, distinctly inflated above the median septum.

In dead stems of *E. silvaticum.*

This form may represent a taxon of its own but our material is too limited to allow a definite treatment. It is probably related to *Didymella equisetina* but seems plainly different by the more fusiform spores, often with oil droplets. On the other hand it can easily be mistaken for *Scirrha silvatica,* occurring on the same host, but this *Didymella* should be recognized by the spores with their characteristic inflation above the septum. We have seen three collections, all from *Sweden*:

Uppland. Dalby, pr. "Jerusalem", 16 June 1976, Holm 871 and 19 June 1979, Holm 1778b. Dalarna. Sundborn, Mjölnarvallen, 5 July 1975, Holm 703b.

Didymosphaeria equiseti-hiemalis Larsen et Munk

Larsen and Munk, Dansk Bot. Arkiv 14(7): 17 (1952) – Type (not indicated): Denmark, *E. hiemale.*

Figs 2A, 3C.

Ascocarps rather thickly scattered, immersed, subglobose, usually 200–250 (–300) µm diam., almost epapillate, with brown hyphae and a distinct, subepi-

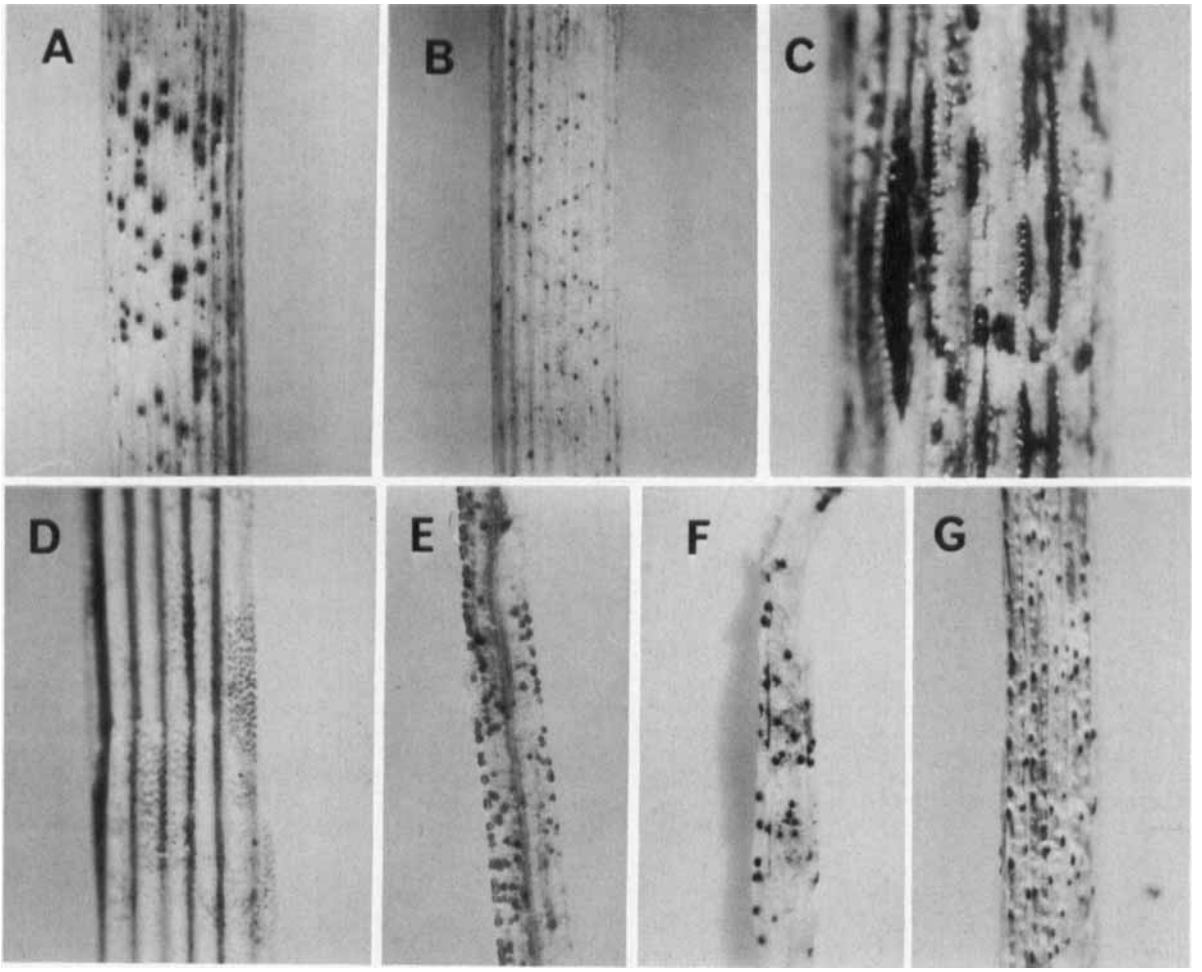

Fig. 2. Ascocarps in surface view. – A: *Didymosphaeria equiseti-hiemalis,* × ca. 3. – B: *Phaeosphaeria berlesei,* × ca. 3. – C: *Scirrhia castagnei,* × ca. 7. – D: *Mycosphaerella equiseticola,* on *E. fluviatile,* × ca. 7. – E: *Mycosphaerella equiseticola,* on *E. silvaticum* (type coll.), × ca. 13. – F: *Mycosphaerella equiseti,* × ca. 7. – G: *Scirrhia silvatica,* × ca. 7.

dermal pseudoclypeus, 0.2–0.5 mm diam. Asci almost cylindrical, 75–90 × 6–8 µm, briefly pedicellate, with a varying number of spores, mostly 8. Spores uniseriate, variable in form, broadly to narrowly ellipsoid, (8–) 10–16 × 4–6 µm, bicellular, brown, very finely punctate.

This species is generally easily recognizable by the pseudoclypeus, a diffuse spot, up to 0.5 mm diam., caused by profuse dark hyphae beneath the epidermis. The spore measurements of the original description are larger than ours, 13–21 × 6–8 µm. Munk (1957: Figs 177a, b) has depicted two spores with minutely roughened surface, but no reference is made to this detail in the text. It is, however, correctly reproduced, as is evident in oil immersion.

Didymosphaeria equiseti-hiemalis is hardly separable from *D. futilis* on morphological grounds, the latter having finely punctate spores, too, though this condition was not noticed by Holm (1957) or Scheinpflug (1958). Therefore, *D. equiseti-hiemalis* should perhaps be treated as a biological race of the polyphagous *D. futilis.* It seems anyway very probable that it is specialized on *E. hiemale,* as it is evidently rather common on this host but not known to occur on other members of the genus. We cannot concur in the statement by Larsen and Munk in Larsen (1952) that it "grows sparsely, chiefly near the nodi of the stems"; according to our experience it grows abundantly all over the dead stems. We have 7 collections from the Swedish provinces of Uppland and Gästrikland.

Phaeosphaeria eustoma (Fckl) L. Holm

Fig. 1G.

This species is well characterized by its spores, which are provided with an oddly shaped gelatinous coating, as was first demonstrated by Eriksson (1967). It is probably mainly a graminicolous fungus but is known to occur also on other monocotyledones. It seems to be rather common on dead stems of *Equisetum fluviatile,* too, but the ascocarps are thinly scattered and it is apparently of little importance for the decay of *Equisetum*. The occurrence on *E. fluviatile* (we have only found it on one other horsetail, viz. *E. pratense*) may indicate that *P. eustoma* has a preference for moist habitats.

Phaeosphaeria fuckelii (Niessl) L. Holm

Fig. 1H.

This mainly graminicolous species has been described and discussed at length by Holm (1957) and Eriksson (1967). It has turned out to be rather common on *Equisetum* spp., which confirms the observation by Eriksson that "the fungus seems to prefer more damp localities" (1967: 417).

Eriksson also reported a considerable variation in spore septation and suggested that the species may be heterogeneous. This variability is very striking in our material on *Equisetum,* and it is noteworthy that each collection seems to have a ± constant spore type. The normal *P. fuckelii* has the "spore pattern" 3-1-2, i.e. an apical 3-celled part above the inflated cell, and a 2-celled part below (cf. Holm 1957: 92, 123). This spore type is also found in the material on *Equisetum* (cf. the list of collections), but besides this there are gatherings predominantly with the spore patterns 4-1-2, 4-1-3, or 5-1-2 respectively. Probably we are here dealing with different biotypes. The spore size varies from 22 × 3 µm (no. 1340) to 35 × 5 µm (no. 331). We have 9 collections, all from *Sweden*:

E. arvense: Uppland, Åland, Rövarkulan, 15 August 1974, 332 (immature) *E. fluviatile:* Uppland, Dalby, pr. "Jerusalem", 11 June 1976, 860 c (3-1-2) and 16 August 1979, 1845 b (3-1-2). – Åland, Rövarkulan, 15 August 1974, 331 a (5-1-2). Dalarna, St. Kopparberg, pr. Östborn, 2 June 1979, 1719 b (3-1-2). *E. silvaticum:* Uppland, Alunda, pr. Hävermossen, 2 June 1975, 584 b (4-1-2). Ekeby, 16 July 1976, 905 a (4-1-3). – Dalarna, Garpenberg, Hundön, 29 August 1974, 347 d (5-1-2). – Sundborn, Mjölnarvallen, 11 July 1978, 1340 a (3-1-2).

Phaeosphaeria equiseti (Karst.) L. et K. Holm comb. nov.

Leptosphaeria equiseti Karsten, Öfvers. K. Sv. Vet.-Akad. Förhandl. 1872 No. 2: 101 – Type: Spitzbergen, Liefdebay, *E. variegatum,* 2 September 1868, Th. M. Fries (UPS!).

var. equiseti

Figs 1I, J, 4A, B.

Ascocarps scattered, immersed, subglobose, 0.2–0.3 mm diam., with a tomentum of short brown hyphae and a broad, hardly noticeable papilla. Asci cylindrico-clavate, 110–140 × 13–15 µm, mostly 8-spored. Spores very variable in size and septation, generally ± cylindrical, apically obtuse, basally more attenuating, (28–)36–48 × 6–7 µm, brownish at maturity, with (6–)8–11 cells. A characteristic trait of this taxon is the remarkable variation in spore septation, a condition prevailing in one and the same ascocarp. However, all the different spore types are obviously derived from the *fuckelii*-pattern, 3-1-2. Spores with a septation according to this basic formula are occasionally seen also in *P. equiseti* and there are numerous variations on the theme, e.g. 3-1-3, 3-1-4, 3-2-4, 4-1-2, 4-1-4, 4-2-2, 4-2-3, 4-2-4, 4-2-5, 5-2-4. The most frequent type, particularly in the type collection, is 4-2-4, which corresponds to a 3-1-2 spore where the cells no. 3, 4, 5, and 6 have each divided once.

The affinity to *P. fuckelii* is thus obvious and is moreover testified by the *fuckelii* forms with additional spore septa, described above. It is no problem to discriminate between those forms and *P. equiseti* var. *equiseti,* which has much darker, and more obese spores, with the central cell(s) generally not distinctly inflated. The hosts, too, are different.

Phaeosphaeria equiseti s. lat. is apparently a northern species and its principal host seems to be *E. variegatum.* It has been recorded also on *E. scirpoides* (Lind 1934: 19), which may be correct: it is remarkable that it is not known with certainty from *E. hiemale*; such finds have been reported but are surely referable to *P. berlesei.*

Besides the type we have seen the following material, also on *E. variegatum:*

Norway: Hedmark. Folldal, between Nergård and Moan, gravelly shore by the river Folla, 2 July 1975, 696a.
NW Greenland: Marshall Bay, 2 July 1921, Nygaard (C). Rensselaer Bay, 10 July 1921, Nygaard (C). Both collections determined by Lind as *L. equiseti* and published by him (Lind 1926: 174).

var. lindii L. et K. Holm var. nov.

A var. *equiseti* sporis brevioribus et crassioribus, plerumque septemcellulatis, cellula sexta distincte inflata differt. Typus: Islandia, Norður-Thingeyjarsýsla, pr. Dettifoss, in caulibus siccis *E. variegati,* 29 VII 1971, Holm 48 a-71 (UPS, holo).

Figs 1K, 4C.

The type collection is the only material seen by us and we would hardly have felt justified in recognizing the

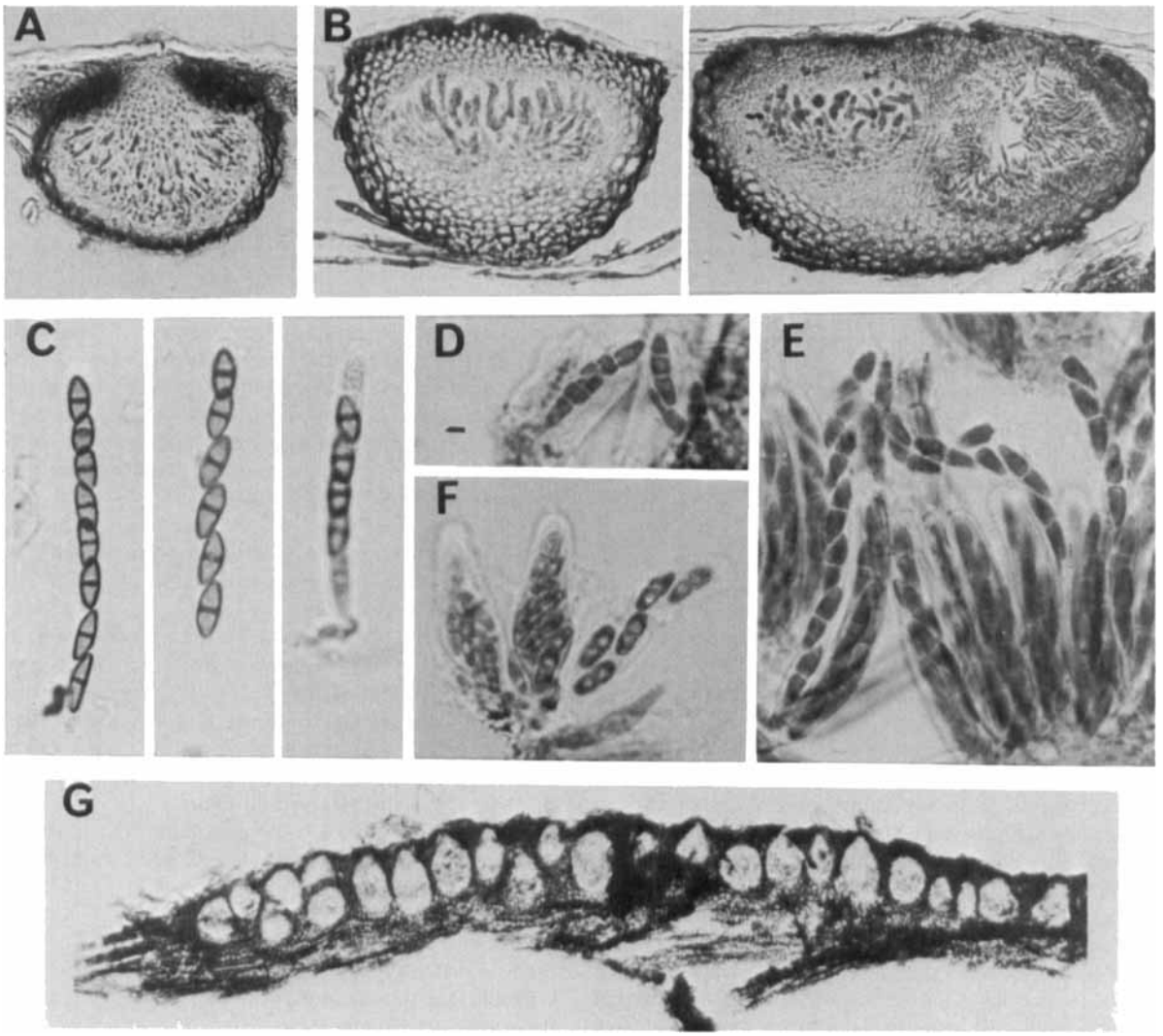

Fig. 3. A: *Didymella* sp., section of ascocarp with interascal filaments, × ca. 230. – B: *Scirrhia silvatica,* sections of ascocarps, the right one with a conidial loculus, × ca. 230. – C: *Didymosphaeria equiseti-hiemalis,* asci with 8, 6, and 4 spores, respectively, × ca. 585. – D–E: *Scirrhia silvatica.* – D: 2-septate spores (Romell 9.VI. 1895), × ca. 585. – E: Asci with normal spores, × ca. 585. – F–G: *Scirrhia castagnei.* – F: Asci and spores, × ca. 585. – G: Pluriloculate ascocarp in section, × ca. 90. – All, except C, in Lactic Blue.

taxon formally, had it not been for some unmistakeable earlier references to it: Lind (1928: Fig. 15a, b) depicted an ascus and spores which are a complete match of our fungus; his material was from Spitzbergen, Bell Sound, *E. scirpoides,* 18 July 1920. J. Lid. The same fungus has been reported from Iceland by Larsen (1931: 473). This author quoted Lind's illustration with the remark that it "agrees perfectly with the *Leptosphaeria,* found on *Equisetum variegatum* in Iceland". This variety is distinctive by the short, plump spores, 25–30 × 7 µm, with one large, inflated cell, generally the 6th one, which seems to correspond to the formula 4-2-2. The similarity with the *fuckelii*-pattern is obvious, and it is a bit surprising that it was not recognized by Larsen or Lind. It seems quite possible that it may merit specific rank.

This taxon is named after J. Lind, the well-known investigator of arctic fungi, who first depicted the spores and probably was the first one ever to see them.

Phaeosphaeria berlesei (Larsen et Munk) Hedjaroude

Hedjaroude, Sydowia 22: 87 (1969) – *Leptosphaeria berlesei* Larsen et Munk, Dansk Bot. Arkiv 14(7): 23 (1951) – Type not indicated (Denmark, *E. hiemale*).

Exs.: Syd., Myc. germ. 3109 ('*L. Equiseti*') (UPS, several ascocarps infested by a *Mycosphaerella* sp.).

Figs 1L, 2B, 4D.

Ascocarps widely and rather thickly scattered, immersed, almost globose, epapillate, 0.2–0.3 mm diam. Asci almost cylindrical, 120–160 × 13–18 µm, 8-spored. Spores cylindrico-fusiform, with a thin mucous sheath, 30–50 × 6–7 µm, yellowish, guttulate, with a varying number of cells, 4–14, mostly 8 or 12.

In dead stems of *E. hiemale,* generally in abundance.

This species has been confused with *P. equiseti,* mainly on account of the related substrates, but it seems doubtful whether they are closely related. Certainly they are rather similar but plainly distinct, inter alia by constant if not very conspicuous spore characters. In *P. berlesei* there is generally no morphological difference between the two spore ends, the terminal cells being equal, broadly paraboloid. The spores usually consist of two equal halves, and consequently it is in most cases not possible to see which end of the spores is up and which is down when they are seen outside the asci. As a matter of fact we have found no convincing evidence of the spores being derived from the *fuckelii*-type; rather, it seems likely that they have developed from some ancestral form like *P. vagans.*

The spores display a considerable variation in size and septation, but spores with 8 and 12 cells, respectively, are clearly the most frequent. It is interesting that these two spore types are rarely found together but one of the two will dominate in a certain sample. The 8-celled spores are shorter but also, it seems, darker. Possibly these two spore types represent two different genotypes.

P. berlesei may initially be a parasite; the ascocarps are often found in the dead tips of living stems, and the fungus is possibly the causal organism of this dying off.

The species is probably common on *E. hiemale* and coexistent with it, but nevertheless it has been largely neglected. The first finds to be reported were evidently Kirschstein's (1935: 219) from Germany and two years later it was collected by Sydow and distributed in his Mycotheca germanica. Both these authors identified the species with *L. equiseti* Karst. It was up to Larsen to discover that the *hiemale* fungus was different from *L. equiseti* which he knew from his studies of Icelandic fungi (Larsen 1931, Larsen and Munk in Larsen 1952). The differential characters given by the Danish authors are not very well taken, though. They also claim that the illustration of "*Leptosphaeria equiseti* Karst." given by Berlese (Ic. Fung. I, pl. 76 fig. 3) does in fact depict *P. berlesei* – this is obviously an erroneous assumption: Berlese's figure is based on type material of *L. equiseti,* sent by Karsten, and is fairly good, only the greenish spore colour is quite fallacious. The explanation of this mystery is probably that Larsen did not know the true *P. equiseti* but the aberrant var. *lindii.*

P. berlesei seems to be common in Sweden: we have seen 13 collections from the provinces of Västergötland, Sörmland, Uppland, Gästrikland and Dalarna.

Scirrhia castagnei (Mont.) Nitschke ex Fuckel

Fuckel, Symb. Mycol. 221 (1870) – *Dothidea castagnei* Montagne in Castagne, Suppl. Catal. Pl. Mars. 42 (1851) – Type: France, dead stems of *Equisetum arvense* (n.v.)

Exs.: Erbar. Critt. Ital. 343, *E. arvense* (UPS) – Fckl, F. rhen. 1017, *E. hiemale* (UPS) – Rbh., F. eur. 545, *E. arv.* (UPS) – (Roumeg., F. gall. 3753, UPS) – D. Sacc., Myc. ital. 1656, *E. arv., ('Sphaerella equiseti',S).*

Figs 2C, 3F, G.

Ascocarps dark, subepidermal, very variable in size, up to 2.5 mm long and 0.4 mm broad, with many loculi, 50–70 µm diam. Interascal threads sparse. Asci subpyriform, 45–50 × 12–15 µm, 8-spored. Spores obovate, 12–14 × 4–5 µm, hyaline, distinctly guttulate, with a median septum, upper cell broader than lower.

A quite characteristic species, easily recognized by its large elongated ascocarps often occupying extensive areas of the substrate. It is unique among the equiseticolous Pyrenomycetes by infesting members of both subgenera of *Equisetum.* It is not common, however, at least not in the Nordic countries, and we have seen only two Scandinavian collections:

Sweden: Uppland. Lena par., W. of Ångsjön, *E. hiemale,* 10 August 1970, N. Lundqvist 6746 (UPS).
Norway: Hedmark. Folldal, *E. variegatum,* 2 July 1975, 696 b.

Scirrhia silvatica L. et K. Holm sp. nov.

Exs.: Petr., Fl. Bohem. Mor. II: 1 no. 1238 ("*Mycosphaerella equiseti*", S),

Figs 1E, F, 2G, 3B, D, E.

Ascocarpia vulgo seriatim disposita, subepidermalia, nigra, generatim ± elongata, 0.15–0.3 mm longa, ad 150 µm alta et ca. 0.1 mm lata, uni-vel biloculata, discreta vel aggregata, applanata, late dehiscentia. Peridium plerumque forte evolutum, vulgo 15–35 µm latum, basi ad 50 µm, e textura angulari, seriebus cellularum plurimis compositum, cellulis exterioribus membrana valde incrustata. Filamenta interthecialia desunt. Asci numerosi, paralleli, ± cylindrici, vulgo 50–60 × 8–10 µm, substipitati, octospori. Sporae subfusiformes, plene maturae ad 20 × 5 µm et tum interdum pluriseptatae sed vulgo ± immaturae visae, 12–15 × 3–3.5 µm, bicellulares, eguttulatae.

Status anamorphosis: *Dothichiza* sp.
In caulibus emortuis *Equiseti silvatici.*
Typus: Suecia, Uplandia, paroecia Alunda, pr. Hävermossen, *E. silvaticum,* 2.VI. 1975, Holm 584 a (UPS, holotypus).

This species seems to be restricted to *E. silvaticum* (hence the specific epithet) and the dead stems of the host are often profusely dotted by the ascocarps. These are generally serially arranged and ± longitudinally elongated. The larger ascocarps are bilocular. Pycnidia of similar shape are intermixed, and no doubt connected with the *Scirrhia,* as is conclusively shown by fruiting bodies with one ascal loculus and one conidial one, cf. Fig. 3B. The anamorph is of the *Dothichiza* type.

Most of the material at hand is more or less immature, but an exception is a sample, collected by Romell, and listed below. It is very noteworthy that several spores with additional septa are found in that material (cf. Figs 1F, 3D). Possibly this condition is typical for the fully mature spores but it may be an anomalous phenomenon.

We are somewhat hesitant as to the generic assignment of the species. It seems best accomodated in *Scirrhia* according to the classification of Barr (1974) which we follow tentatively, but it is not a close relative of *Scirrhia castagnei.*

S. silvatica is probably common and widespread though it has been generally ignored: we have only found four collections in S and UPS, all under the name of *"Mycosphaerella equiseti"*. Besides the type and Petrak's exsiccata no. 1238 we have seen the following material:

Sweden: Uppland. Stockholm, 9 June 1895, L. Romell (S). Dalarna. Vika par., Lövhult, 22 April 1973, 106. Sundborn par., pr. L. Lofstjärn, 29 May 1977, 1075 a. Torne Lappmark. Jukkasjärvi par. Laimolahti, 8 July 1927, Nannfeldt 875 (UPS). Vassijaure, 12 July 1927, Nannfeldt 964 b (UPS).

Mycosphaerella cf. aspidii (v. Höhn.) L. et K. Holm

L. and K. Holm, Bot. Not. 132: 213 (1979).

Fig. 5A.

Ascocarps rather crowded, often i rows, immersed, ± globose, blackish, 60–100 µm diam., naked or with sparse hyphae. Asci numerous, fasciculate, cylindrico-clavate, ca. 40 × 7 µm, 8-spored. Spores ± cuneate, 8–10 × 3 µm, with a median septum, eguttulate.

This *Mycosphaerella* belongs to the *punctiformis* group and is a close match of *M. aspidii* on ferns and might well be conspecific. For a detailed description of *M. aspidii* we refer to Holm 1979. It is superficially similar to *M. equiseticola,* with which it may be associated, but they can usually be readily distinguished even under the binocular. *M. aspidii* has darker ascocarps, glabrous or almost so. It may be quite common on horsetails, but is

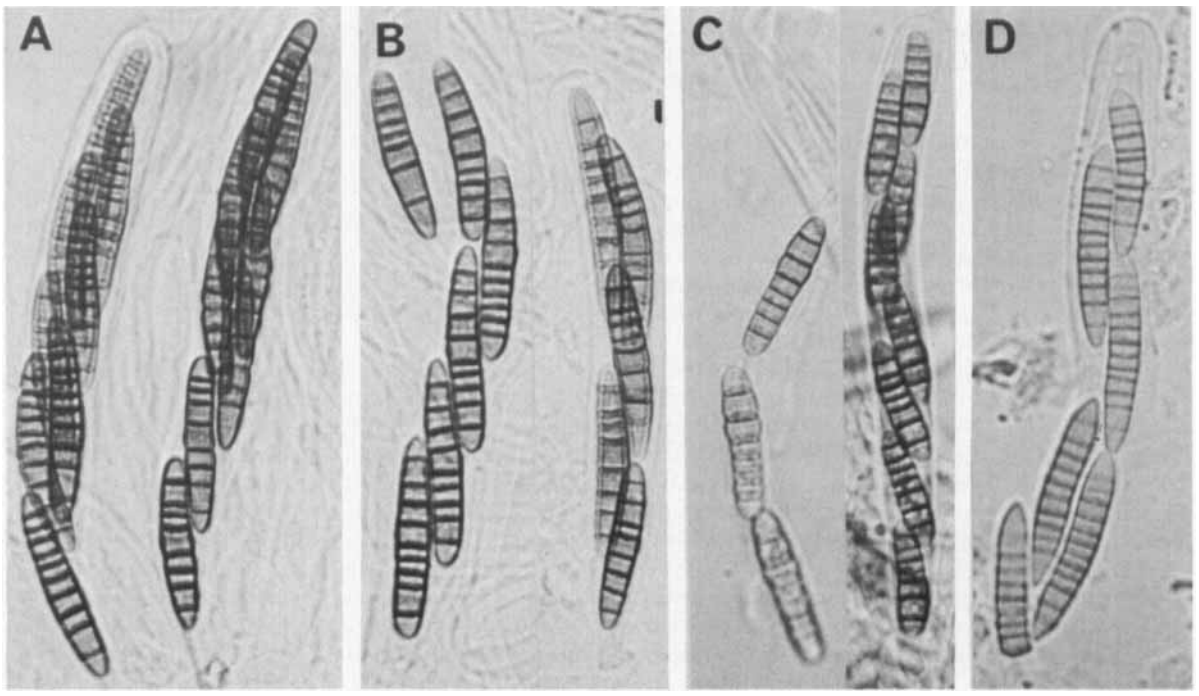

Fig. 4. Asci and spores, all × ca. 585. – A–B: *Phaeosphaeria equiseti* var. *equiseti.* – A: Type coll. – B: Holm 696a. – C: *Phaeosphaeria equiseti* var. *lindii,* type coll. – D: *Phaeosphaeria berlesei.*

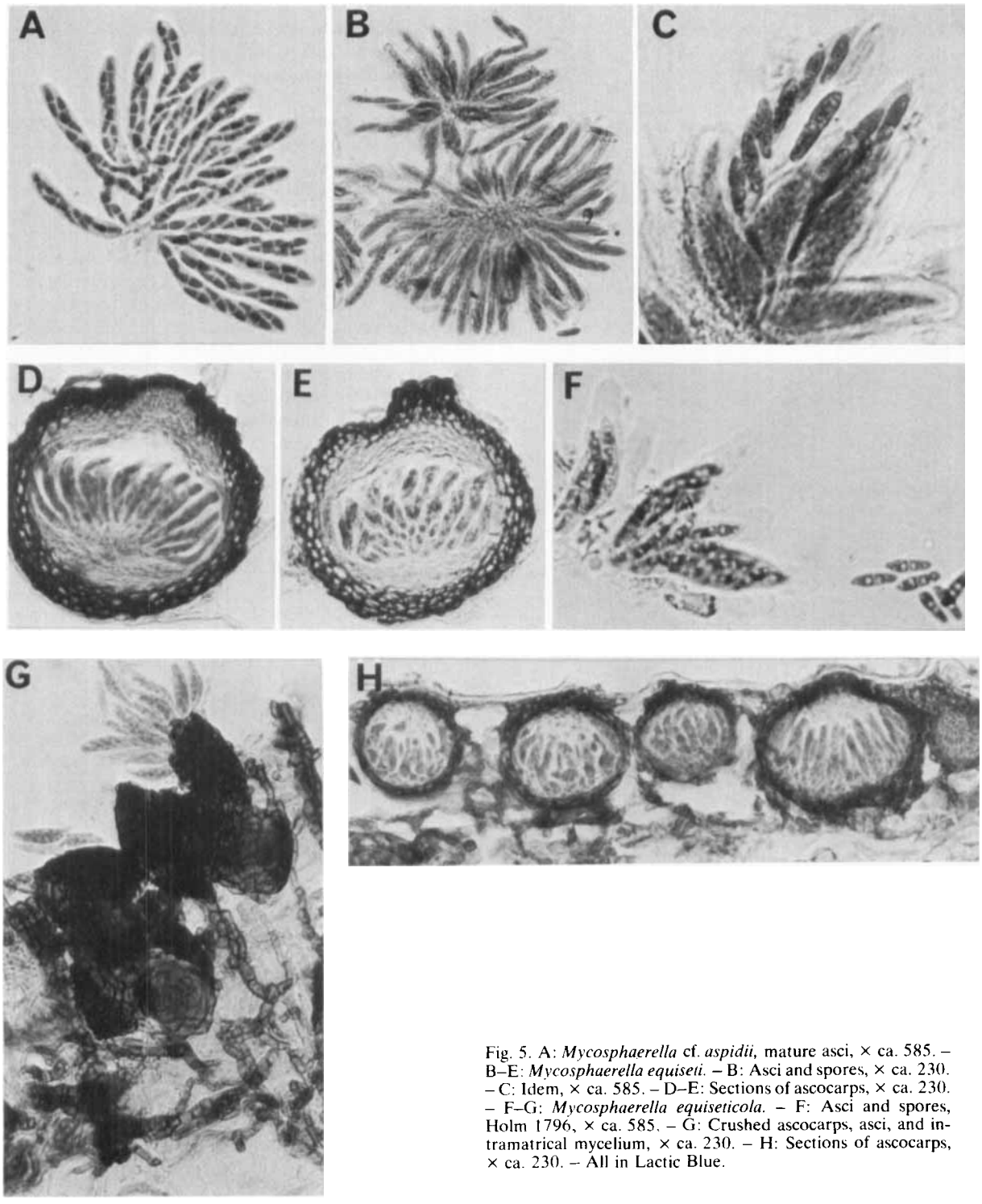

Fig. 5. A: *Mycosphaerella* cf. *aspidii*, mature asci, × ca. 585. – B–E: *Mycosphaerella equiseti*. – B: Asci and spores, × ca. 230. – C: Idem, × ca. 585. – D–E: Sections of ascocarps, × ca. 230. – F–G: *Mycosphaerella equiseticola*. – F: Asci and spores, Holm 1796, × ca. 585. – G: Crushed ascocarps, asci, and intramatrical mycelium, × ca. 230. – H: Sections of ascocarps, × ca. 230. – All in Lactic Blue.

apparently easily overlooked, and we have so far seen only four samples, all from Sweden:

E. palustre: Jämtland. Stugun, Borglunda, 11 June 1962, Nannfeldt 17157 b (UPS). *E. silvaticum:* Uppland, Dalby, Östbergstorpet, 16 June 1979, 1769. Dalarna. St. Kopparberg par., Backa, 11 July 1978, 1339. *E. arvense:* Uppland. Åland, pr. Rövarkulan, 7 June 1979, 1738 a.

Mycosphaerella equiseti (Fckl) Schröter

Schröter in Cohn, Krypt.-Fl. Schlesien 3(2): 341 (1894) – *Sphaerella equiseti* Fuckel, Symb. Mycol. 102 (1870) – Type: Germany, Budenheim, *E. palustre* (= F. rhen. 2241) (S, UPS, isotype!).

Exs.: Fckl, F. rhen. 2241 (S, UPS) – (Rbh., F. eur. 1730, S. UPS) – (D. Sacc., Myc. ital. 1656 "*Sphaerella equiseti*" = *Scirrhia castagnei,* S) – Syd., Myc. germ. 3106 (S, UPS) – Thüm., Myc. Univ. 263 (UPS) – Wien, Crypt. exs. 3426 (S, UPS).

Figs 1C, 2F, 5B–D.

Ascocarps generally rather densely scattered, immersed, ± globose, rather large, mostly 0.2–0.3 mm diam., sometimes with a rather coarse papilla, up to 0.1 mm broad and high. Asci numerous, fasciculate, oblong or finally somewhat saccate, 60–70 × 10–12 µm, almost sessile, 8-spored. Spores nearly oblong, (15–)18–22 × (4–)5–6 µm, with obtuse ends, septate at middle or slightly above, hyaline, generally with conspicuous oil-drops.

In dead stems of *Equisetum palustre* (principal host) and *E. fluviatile.*

This species seems to be a true companion of *E. palustre* and is easily identified already under the binocular because of the large ascocarps. It has been recorded on other species of *Equisetum* too, but such records should be treated with some scepticism as probably originating from a misidentification of either fungus or host. In fact, we have seen only one collection definitely not on *E. palustre,* viz. *Sweden,* Uppland, Tegelsmora, *E. fluviatile,* 21 April 1978, Holm 1307 b. *Mycosphaerella equiseti* is probably common and perhaps coextensive with *E. palustre.* We have seen several collections from subalpine sites in the Abisko area in Swedish Lapland.

Mycosphaerella equiseticola Bond.-Mont.

Bondarzewa-Monteverde, Not. Syst. Inst. Crypt. Horti Bot. Petropol. 2: 18 (1923) – Type: Latvia, *E. silvaticum,* in live and dead branches 15.VIII. 1922, J. Smarods (LE!).

Figs 1D, 2D, E, 5E–G.

Ascocarps grouped, subepidermal, globose, 60–80(–100) µm diam., rather light brown except for a dark area around the pore, on a profuse, richly branched mycelium of rather coarse hyphae, up to 7 µm diam. Asci pyriform at maturity, 25–40 × 10–12 µm, sessile, 8-spored. Spores ± obovate, (8–)10–12(–14) × 3–4 µm, septate at middle, hyaline, distinctly guttulate.

Parasitic and saprophytic on *Equisetum* spp.

This species seems well characterized by its minute, often densely grouped brownish ascocarps, by the small, guttulate spores and the well developed intramatrical mycelium. Though apparently common it has nevertheless been almost completely neglected; this may partly be due to the fact that the ascocarps are easily overlooked when dry – they will appear when the substrate is moist and transparent. It is interesting that the species is found even in live tissues; this was also noticed in the very good original description. Evidently is has a preference for the thin branches, except in *E. fluviatile* where it is abundant in the stems, too. The type material is very well developed. As *M. equiseticola* has been virtually unknown we think it is appropriate to list the collections seen, in addition to the type.

E. arvense (branches): *Sweden:* Torne Lappmark, Abisko, by the lagoon. 19 June 1953, L. Holm (UPS). *E. fluviatile: Sweden:* Uppland; Dalby par., ca. 250 m SE of "Jerusalem", 15 May 1979, 1645b; 21 May 1979, 1693a; 27 May 1979, 1709a. ca. 200 m W. of J., 11 June 1976, 860b; 19 June 1979, 1771a. Bondkyrko par. close to the "three parish cairn", 15 July 1979, 1796. Tegelsmora par., "Floran", 21 April 1978, 1307. Åland par., Rövarkulan 15 August 1974, 331b. Dalarna. St. Kopparberg par., pr. Östborn, 2 June 1979, 1719a. *E. palustre: Sweden:* Jämtland. Stugun par., Borglunda, 11 June 1962, Nannfeldt 17157b (UPS). *E. silvaticum* (branches): *Sweden:* Uppland: Uppsala-Näs par., close to the "three parish cairn", 15 July 1979, 1797. Dalarna. Garpenberg par., Hundön, 29 August 1974, 347b. *E. telmateja* (branchlets): Germany, Franconia, Hersbruck, 16 August 1946, K. Starcs (S, sub nom. *M. equiseti,* det. A. Ludwig).

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