

## Dryadicolous Ascomycetes from Svalbard

Kerstin Holm & Lennart Holm

University of Uppsala, Institute of Systematic Botany, S-751 21 Uppsala, Sweden

The ascomycete flora on *Dryas octopetala* of Svalbard has been investigated. Thirty-four species are recorded, many of them polyphagous but some probably true *Dryas* associated fungi. Twenty-one species are reported from Svalbard for the first time. *Anthostoma polaris*, *Melaspilea? hyarctica*, *Pleospora spetsbergensis*, and *Wentomyces dryadis* are described as new.

Additional keywords: Ascomycetes, *Dryas*, Svalbard.

During the ISAM III excursions on Svalbard, August 10-20, 1988, we collected several samples of *Dryas octopetala* aggr. *Dryas* harbours a rich and largely host-specific mycoflora, comparatively well investigated in Scandinavia and in the Alps (Holm, 1979; Holm & Holm, 1986; Nogrased, 1990). Reports on dryadicolous fungi have been published from Arctic North America by Barr (1959) but very little is known from Svalbard. Lind's comprehensive survey of the Svalbard micromycetes (1928) lists only two species on *Dryas* and very few have been added since. In addition to our own collections, the material collected by Dr. Geir Mathiassen in the Icefjord area from July 25 to August 3, 1986 has also been studied.

Our material is preserved in UPS, Mathiassen's in TROM.

### Collecting sites

(H=Holm, M=Mathiassen)

H1-H12: Ny-Ålesund and Longyearbyen (Spitzbergen) Area.

H1: Ny-Ålesund, slopes facing the sea, ca. 1 km WNW of the Polar Institute. H2: Bird cliff in front of the eastern Lovénbreen glacier, ca. 6.5 km ESE of Ny-Ålesund. H3: Rocky slope ca. 1.5 km SE of Ny-Ålesund. H4: Blomstrandhalvöya, "London", ca. 5 km NE of Ny-Ålesund. H5: Blomstrandhalvöya, by the small tarns ca. 1 km NE of "London". H6: Sassen, heaths by the bay Gipsvika. H7: Longyearbyen, slopes east of Nybyen. H8: Western slopes of the valley Endalen, ca. 5 km SE of Longyearbyen. H9: Eastern slopes of Endalen. H10: Bolterdalen, slopes of Mt. Breinosa, ca. 12 km SE of Longyearbyen. H11: The mouth of Bolterdalen into Adventdalen. H12: Longyearbyen, slopes near "Gruve 2".

M1-M15: Area of the Adventdalen valley.

M1: The plain at the mouth of the valley Endalen. M2: Northern slopes of Mt. Breinosa, 50-80 m. M3: Slopes between the river Foxelva and Janssonhaugen. M4: Vicinity of the hut Innerhytta. M5: Southern part of the valley Helvetiadalen, up to 200 m. M6: Slopes of Mt. Helvetiafjellet, north of Innerhytta. M7: Eastern side of Helvetiadalen, ca. 90 m. M8: Slopes NE of M7, up to 220 m. M15: Western side of the valley Endalen, between the bridge and mine 5.

M16-M20: Opening of the bay Sassenfjorden, south western side.

M16: Diabasodden, by the hut. M18: Mt. Grönsteinfjell. M19: Wimandalen valley, south of the hut. M20: Mouth of Carolinedalen valley.

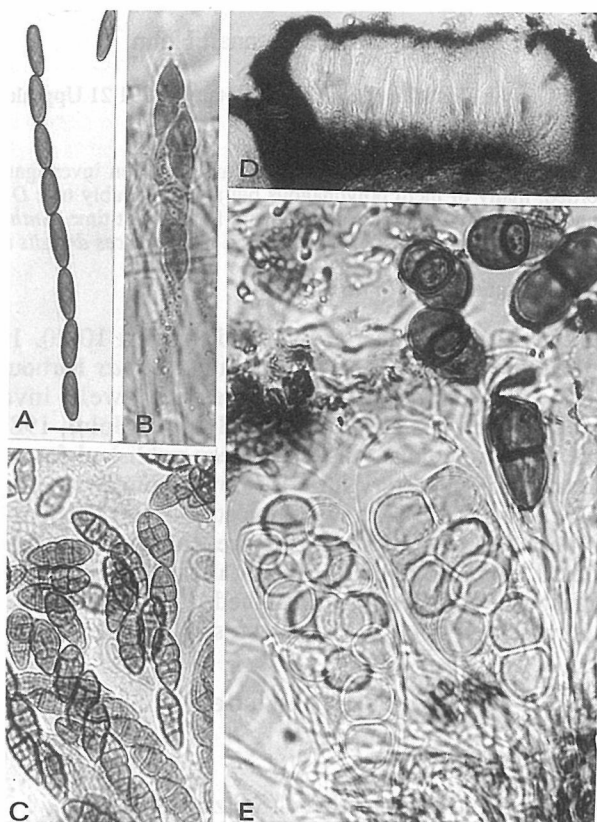


Fig. 1.— A, *Anthostoma polaris*, ascus with spores (4061c).— B, *Lophiostoma winteri*, anomalous (?) two-celled spores; fuchsin (5130b).— C, *Pleospora spetsbergensis*, spores (5050d).— D, E, *Melaspilea? hyparctica*. D, section of ascoma (5050c); E, asci with immature spores and free ripe spores (5050c).— Scale bars: A–C, E: 20  $\mu$ m; D: 60  $\mu$ m.

### List of species

Thirty-four species are recorded in this paper, but foliicolous species are underrepresented here, as we mainly collected wood samples. Several species are polyphagous but more than the half of them may be chiefly or entirely restricted to *Dryas*. Twenty-one species have so far not been recorded from Svalbard. Dr. Mathiassen's collections and ours, on the whole, host the same mycoflora, in general similar to that found in Scandinavia. *Pleospora spets-*

*bergensis* is apparently common on Svalbard but so far known only from two collections in Swedish Lapland, but not from the Alps. On the other hand, *Gnomonia dryadis* and *Massarina balnei-ursi* seem to be less common on Svalbard.

## UNITUNICATI

*Anthostoma polaris* K. & L. Holm, sp. nov.— Fig. 1A.

Species nova *Anthostomellae melanotetis* sat similis sed differt sporis rima germinationis destitutis.

Holotypus: SUECIA: Lapponia Tornensis, Abisko, in monte Nuolja, ca. 900 m, in ligno vultu *Dryadis octopetalae*, 3. Jul. 1986, K. Holm (4061) et Nogrask (UPS).

*Perithecia* scattered or more often densely grouped, immersed-erumpent, pyriform, 0.2-0.3 mm diam., piercing the blackened substrate with a short but distinct neck, ca. 0.1 mm high and broad.— *Peridial* wall ca. 20  $\mu$ m broad of ca. 5 layers of compressed cells, up to 12  $\mu$ m long.— *Asci* cylindrical, 120-130 x 8  $\mu$ m with a minute apical ring, I+, 8-spored.— *Spores* uniseriate, 12-18 x 5-7  $\mu$ m, rather strongly compressed, flat side narrowly elliptic, one-celled, dark brown without visible germ slit.

*Material examined.* — H2(5050e), H8(5195b). M3.

This new species seems close to *A. melanotes* but differs by the spores apparently lacking a germ slit and the amyloid reaction of the ascus tips. For this and other reasons, it cannot be identified with the foliicolous *Anthostomella dryadis* Vasil., described from the Magadan region in the Soviet Far East (Vasilyeva, 1979).

The species was found twice in the Abisko area in Swedish Lapland in 1986 by K. Holm. It has also been discovered in Spitzbergen.

*Cainiella johansonii* (Rehm) E. Müll.

H9.— In leaf veins. Probably common and earlier reported from Green Harbour (Holm, 1979).

*Gnomonia dryadis* Auersw.

H4.— In twigs and persisting leaf bases. Two other collections from H9 and M7 may represent this species but have straight, shorter spores, 14-16 x 4-6  $\mu$ m.

*Gnomoniella vagans* Johans.

H4, H9.— On peduncles. The material is rather scanty but well developed. The peculiar spore type has been variously interpreted. The spores finally become

septate, the minute basal cell apparently degenerating. It is only weakly stained by Congo Red or Cotton Blue, and appears to be an appendage rather than a functional cell.

*G. vagans* seems closely related to *G. hyparctica* found on *Cassiope tetragona*, and it may represent a transition between *Apiognomonina* and *Gnomoniella*.

*Isothea rhytismoides* (Bab. ex Berk.) Fr.

H4; M5, M6, M8.— Recorded by Lind (1928) and probably common.

*Naemacyclus lambertii* var. *dryadis* Holm & Holm

H1, H2, H3, H4, H6, H8; M2, M4, M16, M18.— All samples are rather scanty.

*Phyalospora* cf. *hyperborea* Baeuml.

H2.— A few perithecia on bark. The occurrence on *Dryas* of *Ph. hyperborea*, which is very common on *Cassiope tetragona*, is probably accidental.

*Stictis* sp.

H1.— On old wood. We have probably found the same species earlier in two collections from northern Norway. All samples are fairly rich but unfortunately immature, so we refrain from a specific determination. The material possibly represents a taxon of its own.

*Sydowiella dryadis* Vasil. var. *macrospora* Nograsedk

H1, H2, H4, H6; M4, M5, M16, M20.— The species was described from the Magadan district in the Far East and has since then been found in Scandinavia and in the Austrian Alps (Nograsedk, 1990). The Svalbard material agrees closely with European material, which Nograsedk has distinguished as a separate variety characterized mainly by larger spores.

#### BITUNICATI

*Capronia pilosella* (Karst.) E. Müll. & al.

M18.— A very similar and probably conspecific fungus devoid of setae was also found: H1, H6; M16, M18.

*Capronia* cfr *polyspora* (Barr) E. Müll. & al.

H7.— A peculiar fungus, with 16- and 32-spored asci, the former with larger spores, 18-22 x 5 µm, the latter with smaller spores, 12-14 x 5 µm. Setae are lacking in our material.

*Clathrospora pentamera* (Karst.) Berl.

M2, M4, M16.— All samples on old *Dryas* wood. The species is common on Svalbard on various herbs (cf. Eriksson, 1967) but it is surprising to find it on *Dryas* wood, because it has never been recorded on wood before. In M2, five-septate spores occur, which match the concept of *C. planispora*. Such spores were also described by Lind (1928).

*Didymosphaeria futilis* (Berk. et Br.) Rehm

H4; M18.— Sparse, on old *Dryas* wood. The material is well developed and agrees well with the description of the polyphagous *D. futilis*. What is apparently the same species is present on a *Dryas* sample from the Italian Alps (leg. Spegazzini; Holm & Holm, 1986: 142).

*D. striatispora* Nogrsek is a very similar species, so far known from two collections on *Dryas* wood, one from the Austrian Alps and the other from Swedish Lapland, respectively. The latter species is distinguished by its longitudinally striate spores.

*Epipolaeum absconditum* (Johans.) L. Holm

H3; M20.— On dead leaves, especially in the median furrow, but also found in lateral furrows. Very likely to be overlooked but sometimes rather abundant. According to Nogrsek (1990), this tiny fungus is quite common in Scandinavia and in the Alps.

*Gibbera latispora* (Barr) L. Holm

H3.— Only one ascoma on a dead leaf. This species prefers ericaceous hosts and is rather common on *Cassiope tetragona*, but it can also accidentally infect *Dryas* (Nogrsek, 1990).

*Lophiostoma* cf. *myriocarpum* Fuckel

M5.— On wood, immature. Holm & Holm (1988) reported the occurrence of a *Lophiostoma* on *Dryas* in the Scandinavian mountains, and noted that it was close to *L. myriocarpum*.

*Lophiostoma winteri* (Sacc.) Wint.— Fig. 1B.

Apparently a common fungus on Svalbard, collected on most samples of *Dryas* wood. The spores always lack appendages and are quite variable. We have come across several fruit bodies with mainly 2-celled spores with a deep median constriction (Fig. 2). The two-celled spores are probably anomalous. In two collections H6 (5130a) and M18, the spores are yellow-brown with lighter end cells, but otherwise suggestive of *L. winteri*.

*Massarina balnei-ursi* (Rehm) K. & L. Holm

H1, H6; M16, M20.— Sparse. Spores with a thin gelatinous sheath only.

*Melanomma dryadis* Johans.

H2, H4, H9, H12; M1, M7.— In previous year's flowers; on receptacles, fruits and sepals. A possible connected anamorph is a *Phoma* sp., also found in old flowers; 5114d(H4), 5259b(H12); M7.

*Melaspilea? hyparctica* K. & L. Holm, sp. nov.— Figs. 1D, 1E.

Ascomata superficialia, vulgo gregaria, desuper visa plerumque elliptica, ad 0.5 mm longa, 0.2 mm lata, distincte marginata, atra. Hamathecium valde gelatinosum e filamentis tenuibus, ca 1.5  $\mu\text{m}$  crassis, saepe anastomosantibus, apice incrustatis epithecium formantibus. Asci clavati, sat longe stipitati, apice valde incrassati, ad 120 x 40  $\mu\text{m}$ . Sporae ellipsoideae 35-40 x 16-20  $\mu\text{m}$ , uniseptatae, pariete primo hyalina denique fusca, crassa, biguttulatae, cellula superiore paulo latiore. "Hymenium" ope lodi non coloratum.

Habitat in ligno vetusto *Dryadis octopetalae*.

Holotypus: Spetsbergia, Sassen, prope sinum Isfjorden, Gipsvika, 15. Aug. 1988, K. & L. Holm No. 5130e (UPS).

Ascomata superficial, usually grouped, elliptic when seen from above, up to 0.5 mm long and 0.2 mm wide, with a distinct margin, black.— Hamathecium strongly gelatinised, of thin, often anastomosing filaments ca 1.5  $\mu\text{m}$  thick, apically encrusted, forming an epithecium.— Asci clavate with a rather long stipe and a strongly thickened apex, up to 120 x 40  $\mu\text{m}$ .— Ascospores ellipsoid, 35-40 x 16-20  $\mu\text{m}$ , 1-septate, upper cell somewhat broader, biguttulate; spore wall thick, first hyaline, finally dark brown.

Habitat.— On dead wood of *Dryas octopetala*.

Material examined.— H1(5022b), H2(5050c), H6 [5130e (type)], H9(5195j); M18.

For want of a better alternative, we refer this species to *Melaspilea*, particularly because of the deviating negative Iodine reaction. The general appearance is reminiscent of, e.g., *M. emergens*. The ascospores are remarkably large.

***Melaspilea lecideopsoidea*** (Rehm) K. & L. Holm

H1, H4, H12.— Scanty on old wood. Described from the Alps and also known from Scandinavia (Holm & Holm, 1986; Nograsedk, 1990).

***Microthyrium holmiae*** Nograsedk

H1.— On old persistent leaf bases. This species seems well characterized by the somewhat clavate spores. It was recently described from northern Scandinavia and the Alps (Nograsedk, 1990).

***Mycosphaerella* cf. *minor*** (Karst.) Johans.

Common on old naked wood. Apparently, the same species is also on old persisting leaf bases.

***Mycosphaerella octopetalae*** (Oud.) Lind

On old *Dryas* leaves, everywhere.

***Othia dryadis*** K. & L. Holm & Nograsedk

H2; M2, M5, M7, M18.— Scanty on old wood.

***Phaeosphaeria lindii*** (L. & K. Holm) Leuchtman

H9(5210d).— A few ascomata on previous year's fruits. This fungus was so far known solely on *Equisetum scirpoides* and *E. variegatum* (Leuchtman, 1984).

***Pleospora ascodedicata*** K. & L. Holm & Nograsedk

H2, H4.— Scanty on old wood. First found in the Alps (Holm & Holm, 1986, as "*Pleospora* cf. *gigaspora*") and more recently in Scandinavia. Two records were published by Nograsedk (1990).

***Pleospora helvetica*** Niessl

H2, H4, H5, H6; M16, M19.— On peduncles, probably rather common. A polyphagous species like the following one.

***Pleospora penicillus*** (Schm.:Fr.) Fuckel var. *penicillus*

H2, H12; M15.— On peduncles, H12 on woody stem.

*P. penicillus* var. *ambigua* (Berl. & Bres.) Crivelli

H12.— On woody stems. Spores strikingly variable, 16-28 x 10-16  $\mu$ m, 5-6 septate. Setae reduced.

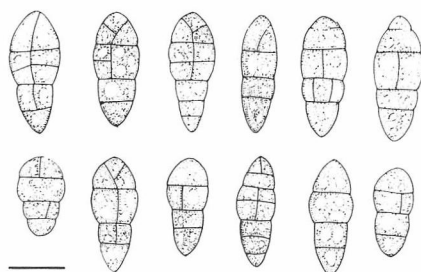


Fig. 2.— *Pleospora spetsbergensis*, ascospores.— Scale bar: 10  $\mu$ m.

*Pleospora spetsbergensis* K. & L. Holm, sp. nov.— Figs. 1C, 2.

Ascomata sparsa vel aliquot gregaria, postremo fere superficialia, pyriformia vel conoidea, 0.2–0.3 mm diam. Peridium c. 20  $\mu$ m crassum e textura angulari vel prismatica e ca. 5 seriebus cellularum ad 15  $\mu$ m compositum. Asci fere cylindrici, 90–120 x 12–14  $\mu$ m, brevissime stipitati, octospori. Sporae 16–22(–26) x 6–9(–11)  $\mu$ m, valde variabiles quoad formam earum et numerum et dispositionem septorum, usque 3–6 septis transversalibus, 1 septo longitudinali in uno vel pluribus segmentis, asymmetricae, guttulis numerosis, primo luteobrunnae, postremo sat fuscae.

Habitat in ligno *Dryadis octopetalae*.

Holotypus: Spetsbergia, prope sinum Isfjorden, Gipsvika, 15 Aug. 1988, K. & L. Holm no. 5130c (UPS).

Ascomata scattered or a few grouped together, eventually almost superficial, pyriform or conic, 0.2–0.3 mm diam. Peridium ca 20  $\mu$ m thick, of a *textura angularis–textura prismatica*, composed of ca five layers of cells up to 15  $\mu$ m.—Asci almost cylindrical, 90–120 x 12–14  $\mu$ m, very short–stipitate, 8–spored.—Ascospores 16–22(–26) x 6–9(–11)  $\mu$ m, very variable in shape and septation, usually with 3–6 transverse septa and one longitudinal septum in one or more segments, asymmetric, with numerous guttules, at first yellow brown, eventually deep brown.

Habitat.— On dead wood of *Dryas octopetala*.

Material examined.— H1(5022k), H2(5050d), H4(5091f), H6(5130c, type), H8(5195c); M16, M18, M20.

The species is distinguished by the rather small guttulate spores, which are very variable but mostly with 4 or 5 transverse septa, and generally strongly asymmetric with the distal "hemispore" shorter and narrower than the proxi-



mal one. The great variability in spore shape and septation is apparently a characteristic trait of this species. This taxon is rather common on Svalbard and does occur also in northern Scandinavia but is obviously less common as we have found it only in two scanty collections.

*Scleroplella hyperborea* (Fuckel) L. Holm

H9 (5210g).— A single fruit body on an old leaf, but probably not rare. The fungus is common on *Cassiope tetragona* but has also been recorded on other hosts; according to Nogrsek (1990), it is quite frequent on *Dryas* in Swedish Lappland.

*Stomiopeltis dryadis* (Rehm) L. Holm

H4, H6, H8, H10; M5, M18, M20.— On dead leaves, particularly on the persisting bases and probably widespread.

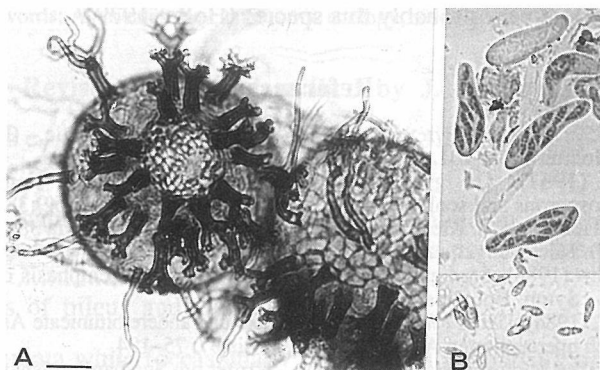


Fig. 3.— *Wentiomyces dryadis*.— A, ascoma (5220a).— B, asci and ascospores, fuchsin (5220a).— Scale bar: 20  $\mu$ m.

*Wentiomyces dryadis* K. & L. Holm, sp. nov.— Figs. 3A, 3B.

Ascomata sparsa, superficialia, subglobosa, 50–70  $\mu$ m diam., basin versus hyphis affigentibus sat numerosis crebris, brunneis 2–3  $\mu$ m crassis sparse septatis instructa; circa ostiolum setis aseptatis fuscobrunneis paucis ad 20  $\mu$ m longis, 4  $\mu$ m crassis, apice vulgo ter dichotome ramosis instructa. Asci pauci sessiles curvati, cylindrici vel paullo saccati, ca. 30 x 6  $\mu$ m, octospori. Sporae obovoideae, medio septatae, hyalinae, 8–10 x 2  $\mu$ m.

Holotypus: Spetsbergia, in valle Adventdalen, in declive boreo-occidentali montis "Breinosa", ad folias siccas *Dryadis octoptalae*, 18 Aug. 1988, Holm 5220a (UPS).

Ascomata scattered, superficial, subglobose, 50–70  $\mu$ m diam, towards the base with rather numerous, coarse, 2–3  $\mu$ m thick, brown, sparingly septate anchoring hyphae; around the pore a few dark brown, aseptate setae up to 20

x 4µm, apically usually three times dichotomously branched.— Ascii few, sessile, somewhat curved, cylindric or slightly saccate, ca. 30 x 6 µm.— Ascospores obovoid, hyaline, with a median septum, 8–10 x 2 µm.

Habitat.— On dead leaves of *Dryas octopetala*.

Material examined.— H10 (5220a, type), (H2, H4).

The only collection on *Dryas* is very rich; the tiny fruit bodies are particularly frequent on the persisting leaf bases and in the median leaf furrow. We have also found it infrequently on *Cassiope tetragona* (H2, H4). This genus was originally described from Java and its presence in the Arctic is astonishing. On the other hand, *Wentomyces alpivagus* was also found in Swedish Lapland and the Alps (Nograsek, 1990).

*Wettsteinina dryadis* (Rostr.) Petr.

H4, H5, H6, H9; M1, M2, M6, M7.— One of the most common fungi found on *Dryas*, on peduncles and leaves. The so-called *Didymosphaeria dryadis*, listed by Lind (1928), is very probably this species (Holm, 1979).

### References

- Barr, M. E. (1959). Northern Pyrenomycetes I.— Canadian Eastern Arctic.— Contr. Inst. Bot. Univ. Montréal 73:1-101.
- Eriksson, O. (1967). On graminicolous pyrenomycetes from Fennoscandia 2. Phragmosporous and scolecosporous species.— Ark. Bot. ser. 2. 6.9:381-440.
- Holm, K. & L. Holm (1986). Kleinpilze auf *Dryas*-Stämmchen.— Sydowia 38: 136-145.
- Holm, L. (1979). Microfungi on *Dryas*.— Bot. Not. 132:77-92.
- & K. Holm (1988). Studies in the Lophiostomataceae with emphasis on the Swedish species.— Symb. Bot. Ups. 28:2:1-50.
- Leuchtmann, A. (1984). Ueber *Phaeosphaeria* Miyake und andere bitunicate Ascomyceten mit mehrfach querseptierten Ascosporen.— Sydowia 37: 75-194.
- Lind, J. (1928). The Micromycetes of Svalbard.— Skrifter om Svalbard og Ishavet 13:1-61.
- Nograsek, A. (1990). Ascomyceten auf Gefäßpflanzen der Polsterseggenrasen in den Ostalpen.— Bibl. Mycol. 133: 1-271.
- Vasilyeva, L.N. (1979). Ecological approaches to the study of Pyrenomycetes in the southern part of Magadan region.— Mikol. Fitopatol. 13:273-281.

(Manuscript accepted 10th January 1993)