DRYADICOLOUS MICROFUNGI FROM GREENLAND. I. LIST OF SPECIES

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ABSTRACT

Seventeen taxa of microfungi growing on *Dryas* are recorded from Greenland based on 147 collections. Five of them are new to the archipelago, *Lophium igoschinae* Chlebicki sp. nov. is described as a new species, the other four being: *Crocicreas variabile, Gnomonia dryadis, Naemacyclus lambertii* var. *dryadis, Pseudomassaria islandica* and *Stomiopeltis dryadis*. Short descriptions and drawings of diagnostic microscopic features are presented. *Lophiostoma macrostomum, Phaeosphaeria vagans, Pleospora pentamera* and *Scleropleella hyperborea* were not previously reported on *Dryas* from Greenland. Specimens of *Stictis mollis* reported by Rostrup (1891) in fact belongs to *Naemacyclus lambertii* var. *dryadis*.

KEY WORDS: Arctic, Greenland, microfungi, *Dryas octopetala*, *Dryas integrifolia*, distribution.

INTRODUCTION

Greenland is the largest Arctic island extending from Cape Farewell 59° 46' N to Cape Morris Jesup 83° 39' N. Until the beginning of the twentieth century, Greenland specimens of *Dryas* were referred to *D. integrifolia* (Simons 1909). However Nathorst (1884) described *D. octopetala* f. *intermedia* and suggested that they might be hybrids between *D. octopetala* and *D. integrifolia*. Both species no doubt hybridize in this area (Elkington 1965). The hybrids occur in eastern and northern Greenland but the influence of *D. octopetala* is reduced westwards (Bay 1992). Elkington (1965) suggested that *D. integrifolia* immigrated to Greenland from Canada, whereas *D. octopetala* immigrated across the northern ridge from Svalbard as earlier suggested by Seidenfaden and Sørensen (1937).

Hultén (1937) suspected that so-called 'Beringia' as well the High Arctic remained unglaciated and were a major source for recolonization in the Arctic. Ives (1974) and Funder (1979) reported location of ice-age plant refugia in Greenland. Tremblay and Schoen (1999) analysed chloroplast DNA variation in *Dryas integrifolia* in relation to present-day geographical distribution of population, and to Pleistocene fossil records. The obtained results (Tremblay and Schoen 1999) are compatible with Hultén's hypothesis. Described haplotypes were restricted to a few locations in Greenland. Refugia along the east coast of Canada and the west coast of Greenland have been postulated on the basis of existence of the high level of genetic diversity along such coastal refugia as well on the basis of the fossil Pliocene records (Tremblay and Schoen 1999). Some examples of *Dryas* vegetation from northern part of Greenland are showed in Fig. 1 and Fig. 2.

At the turn of the nineteenth century some mycological papers were published by Rostrup (1888, 1891, 1894, 1904), and Lind (1910, 1924, 1926, 1928, 1934). Later appeared many articles devoted to Greenland fungi such as an annotated index of plant diseases (Conners 1967), graminicolous species (Petersen and Hermansen 1972), the work of Dennis (1981) which deals with microfungi of Jensen's Nunataks, Dissing (1982, 1987), Dissing and Sivertsen (1988), Korf (1982), Petersen and Korf (1982) and Olsen, Haines and Sivertsen (1993) elaborated the discomycetes, Lange (1948, 1955, 1980, 1987) investigated the basidiomycetes. Knudsen and Borgen (1982, 1987, 1992), Noordeloos (1984), Borgen (1998), Borgen and Hoiland (1988), Kobayashi et al. (1971) published a series of papers devoted to agarics and other macrofungi. Ma, Rogers and Catranis (2000) reported some ancient fungi entrapped in glacial ice.

Dryadicolous fungi were reported by Rostrup (1888, 1894, 1904), Lind (1910, 1924, 1926, 1934), Lange (1955), Holm (1979), Knudsen and Borgen (1992) and

Fig. 1. Windswept *Papaver-Dryas* area with naked clayey parts in between. NE-Greenland, Hvalrosodden, 76° 57' N, 20° 08' W. Photo: B. Fredskild.

Fig. 2. *Dryas integrifolia* vegetation NW-Greenland, near Thule Air Base, c. 76° 30' N, 68° 45' W. Photo: B. Fredskild.

Knudsen and Lamoure (1993). Cannon (1996) reported a single locality of the dryadicolous ascomycete *Isothea rhytismoides* from Greenland.

METHODS

We followed Rostrup's method and searched the collections of *Dryas* in the Greenland herbarium of the Botanical Museum in Copenhagen (C). The plants from 147 collections were screened with a Wild dissecting microscope and afterwards checked in a light microscope Labophot 2. Nikon. A full list of Greenland localities will be reported in the next paper (Chlebicki and Knudsen in prep.). All material mentioned is deposited in C unless otherwise stated. We followed Eriksson (2000) for Latin names of the orders of fungi.

LIST OF MICROFUNGI REPORTED IN THE LITERATURE FROM *DRYAS* IN GREENLAND

Didymosphaeria dryadis (Fuckel) Berl. and Voglino (*Pleospora dryadis* Fuckel) on *D. octopetala* and *D. integrifolia*. According to L. Holm (1979) and Aptroot (in

herb) the records by Lind in 1910 and 1924 are all *Wettsteinina dryadis*.

Hypoderma dryadis Nannf. ex L. Holm mentioned by Holm (1979) on *D. octopetala* from Kisengiartak, West Greenland.

Isothea rhytismoides (Berk.) Fr. (*Laestadia rhytismoides* (Berk.) Sacc.; *Hypospila rhytismoides* (Berk.) Niessl; *Carlia rhytismoides* (Berk.) Kuntze) reported by Rostrup (1888, 1904), Lind (1910) and Cannon (1996) on *Dryas integrifolia*. Lind (1934) recognized it as a common species in Greenland even up 82° 54' N.

Leptosphaeria dryadophila Huhndorf (= *Melanomma dryadis* Johanson) was noted on *D. integrifolia* from Grant Land 82° 30' by Lind (1910).

Melasmia dryadis Rostr. on *D. integrifolia* was reported by Rostrup (1888, 1904).

Mycosphaerella ootheca (Sacc.) Dearn. (*Sphaerella ootheca* Sacc.) on *D. integrifolia* was reported by Rostrup (1888, 1904).

Pleospora herbarum (Fr.) Rabenh. on *D. integrifolia* was noted by Lind (1928). According to L. Holm and K. Holm (1993) the forms with naked ascocarps should be included in *Pleospora helvetica* Niessl.

Pyrenophora cerastii (Oudem.) Lind (= *Pleospora cerastii* Oudem.) was noted on *D. integrifolia* by Lind (1928). According to L. Holm and K. Holm (1993) large-spored forms with setose ascocarps represent *Pleospora helvetica* Niessl.

Scleropleella hyperborea (Fuckel) L. Holm (*Leptosphaeria hyperborea* (Fuckel) Berl. and Voglino) was reported by Kobayasi et al. (1971) on *D. integrifolia*.

Stictis integrifolia Fr. was reported on *D. integrifolia* by Conners (1967) after Rostrup (1894). However Rostrup (1894) does not have a *Stictis integrifolia*, but he has a *S. mollis* Pers. The text goes like this, translated: twigs of *Salix glauca*: Røde Ø (Red Island); stems of *Dryas integrifolia*: Danmarks Ø (Denmarks Island). These three collections, gathered by N. Hartz are deposited in C herbarium. Also Sherwood (1977) not mentioned *Stictis integfrifolia* in her monograph.

Stictis mollis Pers. This widely distributed species (Sherwood 1977) was noted by Rostrup (1891) on *D. integrifolia*. Examined by us Rostrup's specimens in C herbarium in fact belongs to *Naemacyclus lambertii* var. *dryadis*.

Wettsteinina dryadis (Rostr.) Petr. (*Massarina dryadis* Rostr., *Pleospora dryadis* Petrak non Fuckel) was noted on *D. integrifolia* (Rostrup 1888) and on *Dryas*-hybrids (Lind 1924; Conners 1967).

LIST OF INVESTIGATED SPECIES

Crocicreas variabile Nograsek and Matzer, Nova Hedwigia 53: 453, 1991. *Helotiales*

Host and habitat: on *Dryas* spp., on the lower side of the leaves, rarely on the upper side.

Description: apothecia 280-360 µm in diam., hairs 10-27 × 3-4 µm, asci 50-54 × 9-10 µm, spores hyaline, 16-20 × 3-4 µm, paraphyses branched, up 50 µm long (Fig. 3A, B, C, D).

Material examined: Ruiz 171, Vatnahverfi, N facing, mossy rock, 10 m elev., 60° 50' N, 45° 24' W, on *D. integrifolia*, 13 July 1986, J. Feilberg, C 86-5088. Mellemlandet at Narssarssuaq, on *D. integrifolia*, 22 July 1982, V.B. Mikkelsen. Tunugdliarfik, Mâjüt, 300 m elev., 61° 04' N, 45° 35' W, on *D. integrifolia*, 30 August 1962, K. Hansen, C. Hansen and P.M. Petersen, C 2218. Julianehíb district, Lakseelv, head of Kangerdluarssuk, 60° 52' N, 45° 52' W, on *D. integrifolia*, 4 July 1978, V. Alstrup, C 78-099. Liverpool Land, Cape Hope, 70° 30' N, 22° 20' W, on *D. octopetala* (young apothecia), 30 June 1933, T. Sørensen, C 2166.

Comments: A new species to Greenland. Nograsek and Matzer (1991) reported it from Sweden and Austria (the Alps) on *Dryas octopetala*. Chlebicki (in press) reported it on *Dryas octopetala* from Poland (the Tatra Mts.), the Polar Urals and on *Dryas grandis* from the Chukotka Peninsula.

Gnomonia dryadis Auersw., Mycol. Europ. 5/6: 26, 1869. *Diaporthales*

Host and habitat: on twigs of *Dryas* spp.

Description: the typical *G. dryadis* has spores hyaline, 2-celled, 12-15 × 3-4.2 µm, with appendages 3-10 µm long (Fig. 3F). Another type has spores 16-20 × 4-5(6) µm, with filiform, hyaline appendages up 42 µm long (Fig. 3E).

Material examined: (typical) Julianehåb district, West of "Graenseelv", Kangerdluarssuk, 75 m elev., 60° 57' N, 45° 52' W, on *D. integrifolia*, 7 July 1978, V. Alstrup, C 78-121. The second type: Julianehíb district, Lakseelv, head of Kangerdluarssuk, 60° 52' N, 45° 52' W, on *D. integrifolia*, 4 July 1978, V. Alstrup, C 78-099.

Comments: Occurrence of typical *G. dryadis* was reported from Scandinavia, the Alps (L. Holm 1979; K. Holm and L. Holm 1985; Nograsek 1990), the Canadian Arctic (Barr 1959, 1978), Spitsbergen (K. Holm and L. Holm 1993; L. Holm and K. Holm 1994), Tatra Mts., Pyrenees, Yugoslavia (Chlebicki 1995). In some collections from Tatra Mts., Kola Peninsula, Sayan Mts. and Polar Urals (Chlebicki in press) spores with long appendages were present. It is possible that the specimen with bigger spores and long filiform appendages belongs to a separate taxon (Fig. 3E).

Hypoderma dryadis Nannf. ex L. Holm, Bot. Not. 132: 80, 1979. *Rhytismatales*

Host and habitat: on leaves of *D. integrifolia* and hybrids.

Material examined: Kangerdluarssuk, 250 m elev., 61° 06' N, 46° 12' W. on *D. integrifolia*, 7 July 1962, K. Hansen, C. Hansen and P. M. Petersen, C 741. "The land between glaciers", 500 m elev., 60° 57' N, 45° 00 W, on *D. integrifolia*, 18 July 1978, F. Arnklit (only in phanerogam herb.). Wolstenholme Land, Thule, on *D. octopetala* × *integrifolia*, 1919, J.N. Nygaard.

Comments: Reported from Kisengiartak in Greenland by L. Holm (1979). It seems to be rare in Europe and restricted to Scandinavia and the northern part of Russia. In Greenland it occurs only in the western and southern part. It indicates its late postglacial colonization of Greenland from west.

Isothea rhytismoides (Bab. ex Berk.) Fr., Sum. Veg. Scand. 421, 1849. *Phyllachorales*

Host and habitat: on living leaves of *Dryas* spp.

Description: Asci clavate, 64-70 × 14-20 µm, spores hyaline, one-celled, 13-14 × 4.6-6 µm (Fig. 4A, B).

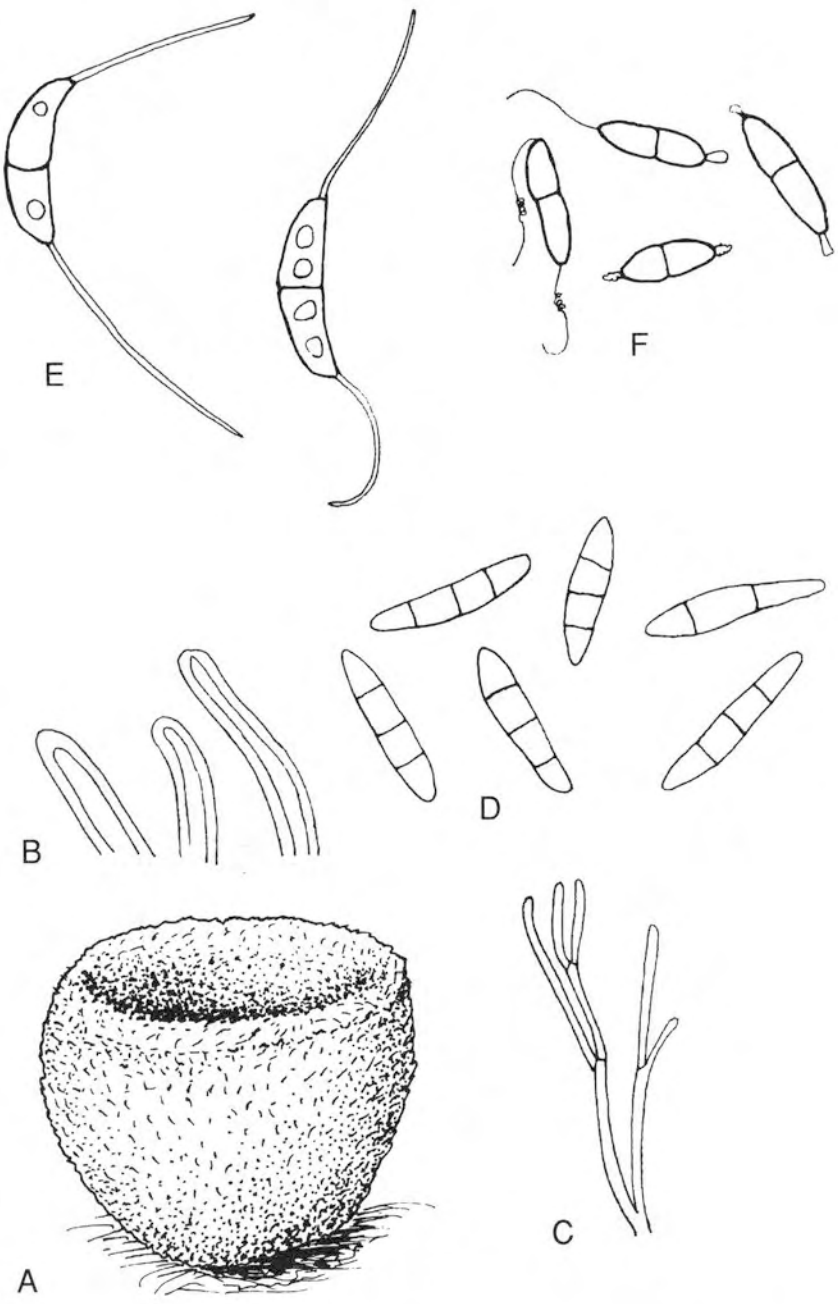

Fig. 3. *Crocicreas variabile*: A – apothecium, B – hairs, C – paraphyses, D – spores; *Gnomonia dryadis*: F – spores; *Gnomonia* sp. E – spores; bar – 10 µm.

Material examined: Kap Morris Jesup, 10 m elev., 83° 39' N, 33° 23' W, on *D. octopetala* × *integrifolia* (abundant!), 26 June 1979, S. Funder (only in phanerogam herb.). Igaliko Fjord, Iterdlag, 50 m elev., 60° 57' N, 45° 58' W, on *D. integrifolia*, 29 July 1962, K. Hansen, C. Hansen and P.M. Petersen (only in phanerogam herb.), C 1308. Ymer Isl., Botanikerbugten (Sophia Sound), near sea shore, 0-10 m elev., 73° 10' N, 24° 30' W, on *D. octopetala*, 18 August 1932, T. Sørensen, C 3175. Germania Land, Sedimentkløft, 100 m elev., 77° 35' N, 21° 30' W, on *D. octopetala* subsp. *punctata*, 26 June 1989, D. Boertmann, C. Bay (only in phanerogam herb.).

Comments: The monotypic genus *Isothea* is restricted to the genus *Dryas*. It occurs in the whole range of the host plants incl. *Dryas octopetala, D. drummondii, D. grandis* and *D. integrifolia*. It is a common and widespread species in Greenland on *Dryas octopetala* and *D. integrifolia*, noted by Rostrup (1888, 1904), Lind (1910) and Cannon (1996). The northernmost locality is situated in Greenland near Kap Morris Jesup, 83° 39' N, 33° 23' W (on leaves of *D. octopetala* × *integrifolia*). We have found 79 collections, among them 26 on *D. octopetala*, 10 on *D. octopetala* subsp. *punctata*, 19 on *D. integrifolia* and 24 on hybrids (*D. octopetala* × *integrifolia* = *D. chamissonis*).

Lophiostoma macrostomum (Tode: Fr.) Ces. and De Not., Comm. Soc. Critt. Ital 1: 219, 1863. *Dothideales*

Host and habitat: on stems of herbs and twigs and wood of scrubs. Recorded from *Rumex, Epilobium, Urtica* (Chesters and Bell 1970), *Salix reticulata* (Nograsek 1990), *Ribes*

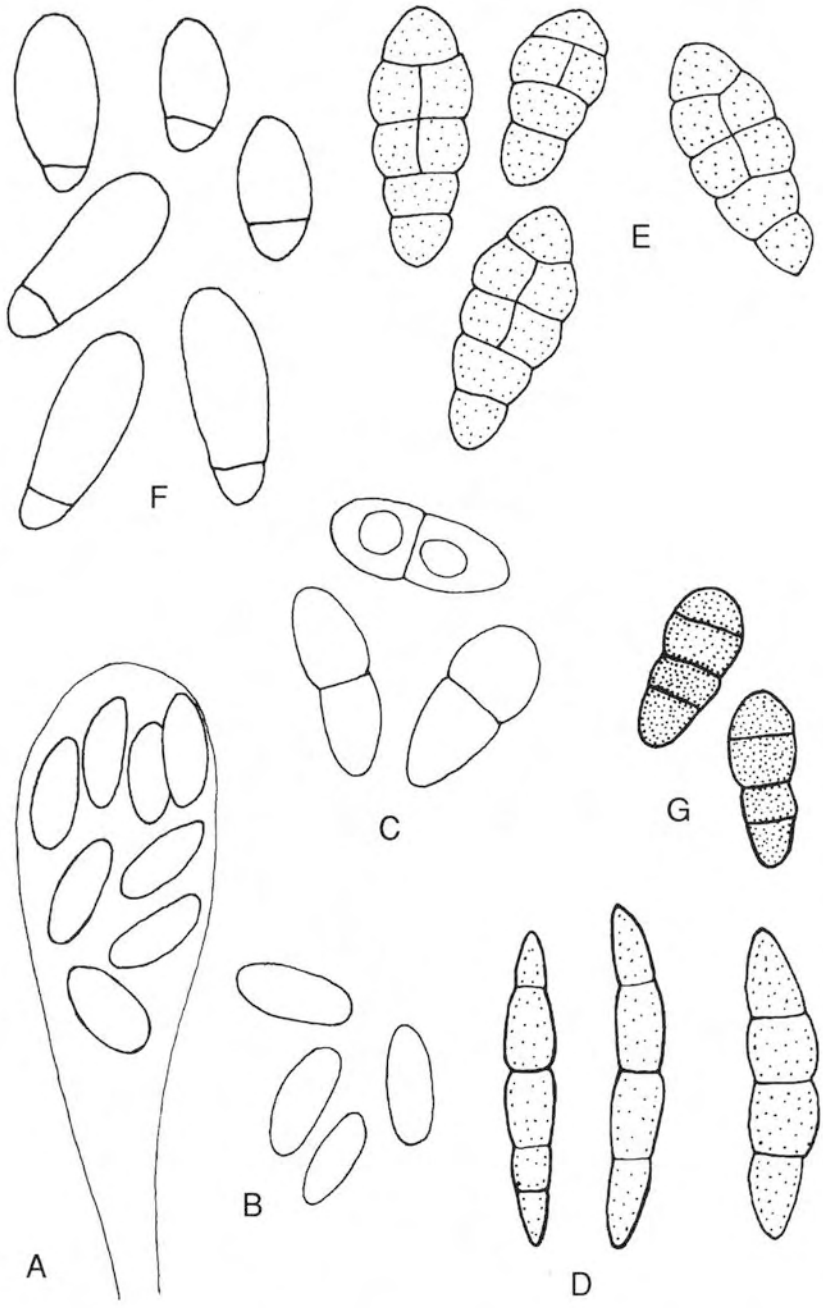

Fig. 4. *Isothea rhytismoides*: A – ascus, B – spores; *Lophiostoma macrostomum*: D – spores; *Pleospora pentamera*: E – spores; *Mycosphaerella octopetalae*: C – spores; *Pseudomassaria islandica*: F – spores; *Scleropleella hyperborea*: G – spores; bar – 10 µm.

alpinum (Schroeter 1908) and *Dryas octopetala* (Chlebicki in press). L. Holm and K. Holm (1988) stated that it is frequent on ligneous as well as on herbaceous substrata.

Description: Asci 100-120 × 18-30 µm, spores hyaline to pale brown, 3-4 septate, 32-37 × 6-7 µm (Fig. 4D).

Material examined: Expeditio Danico in Groenlandiam orientalem 1891-92, c. 74° N, on *D. octopetala* var. *minor* Hooker, 20 July 1891, N. Hartz. Jameson Land, Mikael Bjerg, 585 m elev., 71° 09' N, 23° 18' W, on *D. octopetala*, 20 July 1982, C. Bay and B. Fredskild (only one ascocarp on slide!), C 545.

Lophium igoschinae Chlebicki spec. nova, *Hysteriales*

Diagnosis: *Hysterotheciis conchiformibus, angustis, irregulariter undulatis vel pusticulatis, 180-210 µm longis, 140-240 µm altis, cristatis, longitudinali fissura anguste aperientibus, verruculosa, ascis cylindraceis 80-100 × 8-10 µm, ascosporis filiformis, olivaceis, transverse 12-15-septatis, in apicibus obtusis, 78-86 µm longis, 2,6-3 µm crassis. Holotypus in Herb. KRAM depositus. Differ a Lophium mayori hysterotheciis minoribus.*

Typus: Russia, the Polar Ural Mts., one km south of Polyarnyj Ural railway station, on veins of lower and upper surface of leaves of *Dryas octopetala*, 12 July 1995, A. Chlebicki, KRAM-holotype, 43 217.

Etymology: an homage towards the significant contributions of K.N. Igoshina to the investigations of the Polar Urals.

Host and habitat: on dead leaves of *Dryas* spp.

Description: Ascomata superficial (Fig. 6A, Fig. 7A), conchate, laterally compressed, surface black, irregularly

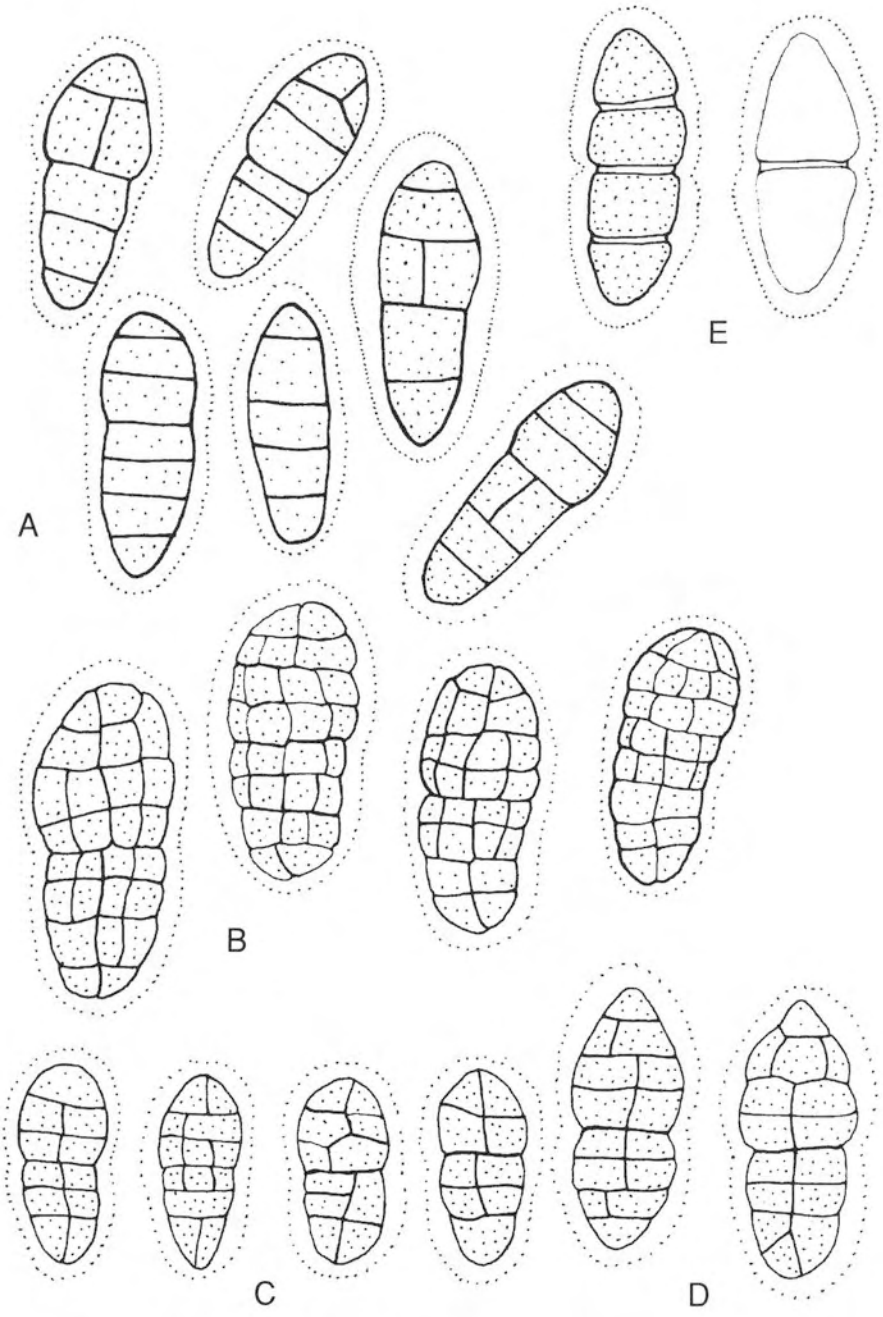

Fig. 5. *Phaeosphaeria vagans*: A – spores; *Pleospora helvetica*: B – spores; *Pleospora penicillus* var. *penicillus*: C – spores; *Pleospora penicillus* var. *ambigua*: D – spores; *Wettsteinina dryadis*: E – spores.

granular or undulate, apex cristate with longitudinal slit covered by very small papillae (Fig. 7B), asci cylindric 90-97 × 8-9 µm (Fig. 6B), spores filiform (Fig. 6C), with obtuse ends, 12-15-septate, pale yellow 78-86 × 2.6-3 µm, trabeculae sparse, filiform, simple or branched in lower part (Fig. 6D), with thickened ends, in gelatinous matrix.

Additional material examined: Greenland, Liverpool Land, Cape Hope, on leaves of *D. octopetala*, 4 August 1928, A. Peterson. Russia, the Tchukotka Peninsula, central part, valley of Tchantalveergyn River, on *D. crenulata* (= *D. incisa* × *integrifolia*), 13 July 1972, Y.P. Kozhevnikov (LE).

Comments: Because of the very scanty material from Greenland, the choice of other appropriate collections was necessary for a description. Thus, the collection from the Polar Ural Mts. was selected.

Only a few papers have dealt with *Mytilinidiaceae* (earlier *Lophiaceae*), e.g. Bisby and M.B. Ellis (1952), Zogg (1962), Darker (1963), Sutton (1970) and Barr (1990). So far *Lophium mytilinum* Pers. : Fr., *L. mayori* Zogg and *L. elegans* Zogg were described, all on conifers such as *Juniperus, Larix, Pinus* and *Abies* (Zogg 1962). Spores of the new species resemble those of *L. mayori*, but its apothecia are distinctly smaller. The genus *Lophium* has conchate ascomata, whereas species with dolabriform ascomata were transferred by Zogg (1962) to the genus *Glyphium*. *L. igoschinae* is the first species of this genus which has been found on non-coniferous substrata.

Size of spores according to Zogg (1962):

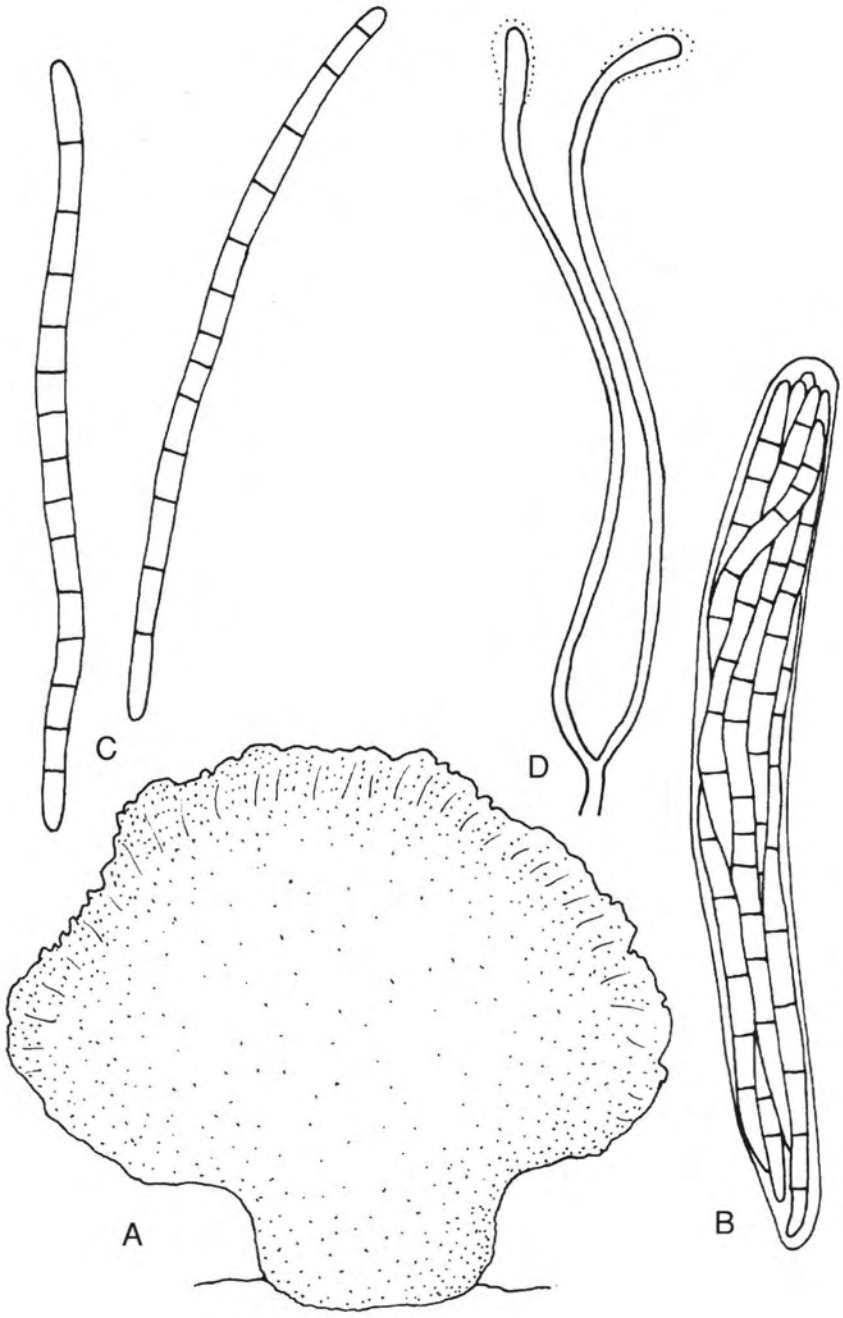

Fig. 6. *Lophium igoschinae*: A – hysterothecium, B – ascus, C – ascospore, D – trabeculae; bar – 10 µm.

L. mytilinum: (130)170-250(300) × 1-2(2.5) µm,
L. elegans: (200)260-280(300) × 2 µm,
L. mayori: (60)80-100(110) × 3-4(5) µm.

Mycosphaerella octopetalae (Oudem.) Lind, Rep. Sci. Res. Norw. Exp. Nov. Zemlya 19: 12, 1921. *Dothideales*

Host and habitat: on upper, rarely lower side of leaves of *Dryas* spp.

Description: Ascocarps densely covering the leaf, spores hyaline, 1-septate, 21-22 × 9-10 µm (Fig. 4C).

Material examined: Ruiz 171, Vatnahverfi, N facing, mossy rock, 10 m elev., 60° 50' N, 45° 24' W, on *D. integrifolia*, 13 July 1986, J. Feilberg, C 86-5088. Young Sund, Zackenberg, S-slope, 25 m elev., 74° 27' N, 20° 46' W, on *D. octopetala* subsp. *punctata*, 27 July 1991, B. Fredskild, C 91-229. Scoresbysund: Sydkarp-Øen., central part of the island, 150 m elev., 71° 20' N 25° 05' W, on *D. octopetala*, 28 August 1951, T. Sørensen, C 102.

Comments: Some species of the genus have been described or reported from *Dryas* leaves: *Mycosphaerella dryadicola* (Rostrup) Munk (L. Holm 1979), *Mycosphaerella biberwierensis* (Auerswald) Lindau (Tomilin 1979; Vasilyeva 1987), *M. octopetalae* (Oudemans) Lind (Lind 1934; L. Holm 1979), *M. ootheca* (Saccardo) Magnus (Lind 1934), *M. minor* (P. Karsten) Johanson (K. Holm and L. Holm 1993), and *M. punctiformis* (Pers. : Fr.) Starbäck (Nograsek 1990). Of them *Mycosphaerella ootheca* was reported from Ellesmere Island (Lind 1934). Tomilin (1979) synonymized it with *M. dryadis*, but the spores of *M. ootheca* as described by Saccardo (1882) are somewhat shorter than those of *M. dryadis* described by Auerswald (1869) and reported by Vasilyeva (1987) (Table 1). We

TABLE 1. Spores of species of *Mycosphaerella* reported from *Dryas*.

Species	Spore length × width (µm)	Author
M. biberwierensis	12-14 × (2)2.5-3	Tomilin (1979), Vasilyeva (1987)
M. dryadis	18 × 4 20-26 × 6-7	Auerswald (1869) Vasilyeva (1987)
M. octopetalae	21 × 7-9 20-25 × 8-10(11) 20-26 × 8-10	Oudemans (1885) Holm L. (1979) Vasilyeva (1987)
M. ootheca	15-16 × 6-7	Saccardo (1882)
M. minor	10-12 × 3-4	Vasilyeva (1987)
M. punctiformis	6-9 × 2-3	Vasilyeva (1987)

have found 11 collections, among them three on *D. integrifolia*, six on *D. octopetala* and two on *D. octopetala* subsp. *punctata*.

The spores of *M. octopetalae* from Greenland were similar to those from Novaya Zemlya.

Naemacyclus lambertii Rehm var. *dryadis* K. Holm and L. Holm, Sydowia 38: 137, 1985.

Rhytismatales

Host and habitat: on the lower side of twigs of *Dryas* spp.

Description: Apothecia white, circular, spores filiform, septate.

Material examined: The triennial Danish Expedition to East Greenland, Hold Wild Hope, South Coast, 100-200 m elev., 73° 30' N, 20° 40' W, on *D. octopetala*, 12 August 1924, T. Sørensen, (only in phanerogam herb.), C 5336. Scoresby Sund, on *D. octopetala*, September 1891, N. Hartz (only in phanerogam herb.).

Comments: The species was noted in the Alps (K. Holm and L. Holm 1985; Nograsek and Matzer 1991), Sweden (Nograsek and Matzer 1991), Spitsbergen (K. Holm and L. Holm 1993), the Polar Urals, Taimyr Peninsula and Chukotka Peninsula (Chlebicki in press).

Rostrup (1891) reported a similar species *Stictis mollis* Pers. from Greenland, but in fact it is *Naemacyclus lambertii* var. *dryadis*. However, true members of the genus *Stictis* have been noted on *D. octopetala*. *Stictis radiata* Pers. subsp. *radiata* was recorded by Nograsek and Matzer (1991) from the Alps. K. Holm and L. Holm (1993) reported the occurrence of *Stictis* sp. from Spitsbergen. There are some taxonomical problems related to the genus *Naemacyclus* Fuckel. According to DiCosmo et al. (1984) *Naemacyclus* and *Lasiostictis* (Sacc. and Berlese) Sacc. represent the same taxon.

Phaeosphaeria vagans (Niessl) O.E. Erikss., Ark. Bot. 6: 430, 1967. *Dothideales*

Host and habitat: on pedicels of various herbaceous plants (Farr et al. 1989).

Description: Ascocarps c. 240 µm in diam., spores pale brown, 27-30 × 9-11 µm, with a gelatinous coating up to 2 µm thick (Fig. 5A).

Material examined: Ella Ø: Solitaerbugt, c. 100 m elev., 72° 52' N, 25° 10' W, on *D. octopetala*, 24 August 1958, S. Laegaard, C 1319.

Comments: Widely distributed in Fennoscandia (O.E. Eriksson 1967), noted also on many host plants in temperate regions of the world (Farr et al. 1989).

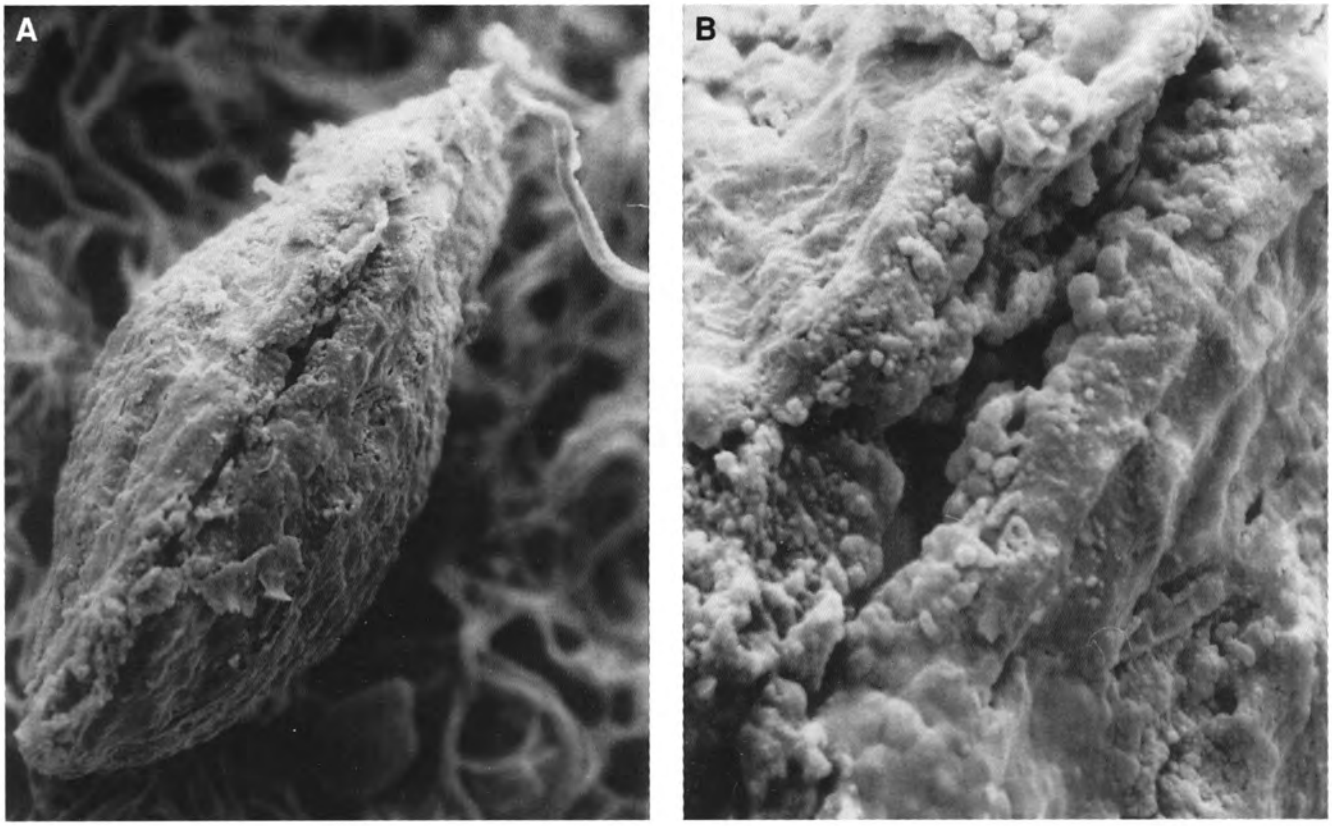

Fig. 7. *Lophium igoschinae*: A – hysterothecium, B – central part of slit. SEM microphotographs.

Pleospora helvetica Niessl, Verhandl. Naturf. Ver. Brünn 14: 191, 1876. *Dothideales*

Host and habitat: on leaves and hypanthium of various herbaceous plants.

Description: Ascocarps with hairs up to 100 µm long, but sometimes ascocarps were naked. Spores muriform, pale brown, 28-34 × 13-15 µm (Fig. 5B).

Material examined: Heilprin Land, Klaresø, 82° 10' N, 30° 30' W, on *D. octopetala* × *integrifolia*, 29 June 1963, B. Fredskild, C 2486.

Comments: We have found it in eight collections, among them two on *D. integrifolia*, one on *D. octopetala* subsp. *punctata* and five on hybrids. It is a plurivorous species (Farr et al. 1989), reported on *D. integrifolia* from Canada by Barr (1959). Chlebicki (in press) observed it on almost all species of *Dryas*. The northernmost locality of this fungus is situated in Heilprin Land, Klaresø, 82° 10' N.

Pleospora penicillus (J.C. Schmidt : Fr.) Fuckel var. *ambigua* (Berl. and Bres.) Crivelli, Diss. ETH. 7318: 75, 1983. *Dothideales*

Host and habitat: on leaves and hypanthium of various herbaceous plants.

Description: Spores pale brown, muriform, with distinctly paler upper cell, 24-29 × 11-11.5 µm (Fig. 5D).

Material examined: South coast of Independence Fjord, Neergård Elv, 82° 00' N, 26° W, on *D. octopetala* × *integrifolia*, 8 March 1949, Å. Sahlertz (only in phanerogam herb.), C 9500. Scoresbysund, Danmarks Ø, on *D. octopetala*, 5 August 1951, Behrndt Andersen.

Comments: L. Holm and K. Holm (1993) recognized a large-spored *Pleospora* with 7-septate spores and having a length/width ratio generally > 2 like *P. helvetica*. It occurs in temperate regions (Farr et al. 1989) as well as in the Arctic (L. Holm and K. Holm 1993). Chlebicki (in press) noted it on all species of *Dryas*.

Pleospora penicillus (J.C. Schmidt : Fr.) Fuckel var. *penicillus* Jahrb. Nassauischen Vereins Naturk. 27/28: 23, 1873. *Dothideales*

Host and habitat: on hypanthium of various herbaceous plants.

Description: Spores light brown (gold), muriform, 20-23 × 9-11 µm, with gelatinous coating (Fig. 5C).

Material examined: Strindberg Land, Lauge Kocks Rejsehus, 0-50 m elev., 73° 42' N, 24° 31' W, on *D. octopetala* subsp. *punctata*, 23-26 July 1988, T. I. Hauge Andersson.

Comments: It is a variety characterized by spores with constantly five transversal septa and one longitudinal septum (L. Holm and K. Holm 1993). *P. penicillus* var. *penicillus* was also noted in the Alps (Crivelli 1983; Nograsek 1990).

Pleospora pentamera P. Karst., Öfvers. K. Svenska Vet.-Akad. Förh. 2: 99, 1872. *Dothideales*

Syn.: *Clathrospora pentamera* (P. Karst.) Berl., *Graphylium pentamerum* (P. Karst.) Barr

Host and habitat: on pedicels of *Dryas octopetala* (see comments).

Description: Ascocarp 230 µm diam, papilla c. 30 µm high and 70 µm diam., spores pale yellowish brown, 4-septate, with one longitudinal septum in mid cells, 26-30 × 12-14 µm, devoid of mucous envelope (Fig. 4E).

Material examined: Scoresbysund, 10-00 m elev., 70° 29' N, 21° 58' W, on *D. octopetala*, 14 July 1983, B. Fredskild.

Comments: It occurs on various angiosperms. Barr (1959, 1990) reported it from Canada (on *D. integrifolia*) and USA. O.E. Eriksson (1967) cited localities in Sweden, Norway and Russia (but not on *Dryas*). K. Holm and L. Holm (1993) stated that it is a common species in Spitsbergen on various herbs and reported some findings on *Dryas* wood. Conners (1967) mentioned this species from Greenland, reported on *Cerastium*, *Gentiana* and *Carex* spp. by Rostrup (1894, 1888) and Lind (1924). It seems to be a common species in the Arctic. M. Barr (in litt.) wrote that: '*Clathrospora pentamera* (Karst.) Berlese was placed in *Graphylium* by Barr (1990) and *Comoclathris* by Shoemaker and Babcock (1992). I would be more cautious now about assigning collections to species of *Pleospora*'.

Pseudomassaria islandica (Johanson) Barr, Mycologia 56: 854, 1964. *Amphisphaeriales*

Host and habitat: on leaves of *Dryas* spp.

Description: Spores hyaline, 1-septate, 21-25 × 8-9 µm (Fig. 4F).

Material examined: Tugtutôq Island, eastern part, 60° 55' N, 46° 10' W, on *D. integrifolia*, 3 August 1963, K. Damsholt, C. Hansen and K. Jakobsen, C 1476. Scoresbysund, 10-100 m elev., 70° 29' N, 21° 58' W, on *D. octopetala*, 14 July 1983, B. Fredskild.

Comments: We have found it on two collections of *D. octopetala* and seven collections of *D. integrifolia*. Ascomata of investigated specimens were devoid of setae. *P. islandica* is a common species with an amphi-atlantic distribution.

Scleropleella hyperborea (Fuckel) L. Holm, Svensk Bot. Tidskr. 69: 155, 1975. *Dothideales*

Host and habitat: on leaves and hypanthium of *Dryas* spp. and *Cassiope tetragona* (Barr 1959; L. Holm 1975; Chlebicki in press).

Description: Spores brown, 3-septate, 19-20 × 7-8 µm (Fig. 4G).

Material examined: Lyell Land, Cape Hedlund, Chan[mae]ephyte-heath, 600 m elev., 72° 38' N, 26° 10' W, on *D. octopetala*, 17 July 1932, T. Sørensen. Jubilaeums Expeditionen Nord om Grønland 1920-1923, NW. Greenland, Cape Agassiz, 74° 10' N, on *D. octopetala* × *integrifolia*, 24 June 1921, J. N. Nygaard. Peary Land, Kap København, 100 m elev., 82° 30' N, 21° 35' W, on hypanthium of *D. integrifolia*, 10 July 1987, C. Bay.

Comments: We have noted it in four collections of *D. octopetala*, one collection of *D. integrifolia* and three collections of hybrids. It is a species with a distinct circumpolar type of distribution, becoming more common northwards. The dark coloured spores are probably an adaptation to colonization of the High Arctic with the strong influx of light *S. hyperborea* belongs to the ericaceous fungi. Chlebicki (1995) noted that the proportion of ericaceous microfungi on *Dryas* increases towards the North.

Stomiopeltis dryadis (Rehm) L. Holm, Bot. Not. 132: 88, 1979. *Dothideales*

Host and habitat: on petioles, twigs and leaves of *Dryas* spp.

Material examined: Ruiz 171, Vatnahverfi, N-facing, mossy rock, 10 m elev., 60° 50' N, 45° 24' W, on *D. integrifolia*, 13 July 1986, J. Feilberg, C 86-5088.

Comments: We have found it in three collections of *D. integrifolia*, one collection of *D. octopetala* subsp. *punctata* and one on a hybrid. It is another species with an ericaceous origin, reported from arctic as well as alpine areas of the Northern Hemisphere (Holm 1979; Barr 1959; Nograsek 1990; K. Holm and L. Holm 1993; Chlebicki 1995).

Wettsteinina dryadis (Rostr.) Petr., Sydowia 1: 322, 1947. *Dothideales*

Host and habitat: on leaves of *Dryas* spp.

Description: Ascomata scattered on upper side of leaf, spores at first hyaline, surrounded by a gelatinous coating, finally becoming 3-septate and pale brown (Fig. 5E).

Material examined: Figely Fjord, westside, 74° 49' N, 20° 45' W, 0-50 m elev., on *D. octopetala* subsp. *punctata*, 28 May 1939, E.S. Hansen. Kugssuatsiaq Valley, Søndre Sermilik Fjord, sandy boulder morraine, 660 m elev., 60° 41' N, 44° 50' W, on *D. integrifolia*, 30 July 1972, A. Barbier and P. Ellis. Ymer Isl., Botanikerbugten (Sophia Sound), near sea shore, 0-10 m elev., 73° 10' N, 24° 30' W, on *D. octopetala*, 18 August 1932, T. Sørensen, C 3175. Danish Peary Land Expedition, island in J.P. Kocks Fjord, wall of rock, 82° 38' N, 42° W, on *D. octopetala* × *integrifolia*, 31 March 1949, P. Johansen, C 7996.

Comments: We have noted it in 15 collections of *D. octopetala* subsp. *punctata*, 11 collections of *D. integrifolia*, 12 collections of *D. octopetala* and 19 collections of hybrids. It is a widespread species in arctic and alpine regions of the Northern Hemisphere.

CONCLUSION

Greenland is a very important place from the biogeographical point of view. No doubt the waves of migrational plants from the East as well from the West were stopped here. More detailed data will be available in a forthcoming paper.

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GRZYBY MIKROSKOPIJNE ZEBRANE NA DĘBIKACH W GRENLANDII. I. LISTA GATUNKÓW

STRESZCZENIE

Praca jest poświęcona grzybom mikroskopijnym występującym na dębikach *Dryas octopetala* i *Dryas integrifolia* w Grenlandii. W przeglądanych materiałach z Grenlandii, zdeponowanych w zielniku Muzeum Botanicznego w Kopenhadze (C) odnotowano występowanie 17 taksonów. Nowe dla Grenlandii okazały się następujące gatunki: *Crocicreas variabile, Gnomonia dryadis, Lophium igoschinae, Naemacyclus lambertii* var. *dryadis, Pseudomassaria islandica* i *Stomiopeltis dryadis*. Natomiast *Lophiostoma macrostomum, Phaeosphaeria vagans, Pleospora pentamera* i *Scleropleella hyperborea* nie były dotychczas podawane z Grenlandii na dębikach.

SŁOWA KLUCZOWE: Arktyka, Grenlandia, grzyby mikroskopijne, *Dryas octopetala*, *Dryas integrifolia*, rozmieszczenie.