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The lichenicolous fungi of Greenland

Vagn Alstrup and David L. Hawksworth

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Alstrup, V. & Hawksworth, D. L. 1990. The lichenicolous fungi of Greenland. – Meddr Grønland, Biosci. 31, 90 pp. Copenhagen 1990-2-9.

124 lichenicolous (lichen-inhabiting) fungi are reported from Greenland, 72 for the first time, based on a study of 350 mainly hitherto undetermined collections made in the period 1946–83. This number is substantially more than that known from the whole of North America. A key to the species is provided, as are illustrations of new and rare species, extensive references to the literature, and lists of species by the host lichens.

New taxa introduced comprise three new generic names: *Deichmannia* (Hyphomycetes, Dematiaceae), *Geltingia* (?Ostropales, Odontotremataceae) and *Kalaallia* (Dothideales, Dacampiaceae). In addition, 24 species are described as new to science: *Ascochyta santessonii, Dactylospora allantoidea, D. aspiciliicola, D. rinodinicola, Deichmannia verrucispora, Echinothecium glabrum, Geltingia groenlandiae, G. stereocaulorum, Graphium aphthosae, Kalaallia reactiva, Karschia alpicolae, Karsteniomyces tuberculosus, Lasiosphaeriopsis christiansenii, »Lecidea« diexcipula, L. hymeneliicola, Lecidella lecanoricola, Opegrapha stereocaulicola, Phaeosporobolus alpinus, Pyrenidium hyalosporum, Rhizocarpon destructans, R. narssaqensis, Scutula cladoniicola, Taeniolella christiansenii* and *T. pertusariicola*. Eight new combinations are also made: *Geltingia associata* (*Lecidea associata* Th.Fr.), *Rinodina egedeana* (*Lecidea egedeana* Lindsay), *Sagediopsis campsteriana* (*Verrucaria campsteriana* Lindsay), *Stigmidium frigidum* (*Epicymatica frigida* Sacc.), *Unguiculariopsis cribriformis* (*Lecanora cribriformis* Norman), *Weddellomyces geographicola* (*Phaeospora geographicola* Arnold), *W. peripherica* (*Verrucaria peripherica* Taylor) and *W. tartaricola* (*V. tartaricola* Lindsay). *Phoma epiphyscia* Vouaux and *Epicymatica frigida* Sacc. have been neotypified, and lectotypes have been selected for *Lecanora cribriformis* Norman and *Verrucaria campsteriana* Lindsay.

The genus *Nesolechia* Massal. is retained as distinct from *Phacopsis* Tul., the concept of *Weddellomyces* D. Hawksw. is extended to include species lacking distinctly cephalothecoid peridia, the citation and typification of *Sagediopsis* (Sacc.) Vainio is revised, and *Xenosphaeria* Trevisan is shown to be a synonym of *Dacampia* Massal.

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Introduction

This contribution provides the first comprehensive survey of the lichenicolous (lichen-inhabiting) fungi not only so far known to occur in Greenland, but the first major study of these fungi in any arctic region. Although they have received scant attention in previously published studies of the Greenland biota, the 124 species of lichenicolous fungi treated here show they are a significant element in the flora that clearly merited further investigation.

The results reported here are based mainly on research on 350 hitherto unstudied collections from Greenland made by several collectors of lichenicolous fungi during the last 40–50 years, including material from the first author who visited the the country seven times in 1974–80. In addition, we have endeavoured to compile and evaluate the few previously scattered literature reports of these fungi, tracing the relevant supporting specimens in critical cases. While the species list presented here is to be considered preliminary and by no means exhaustive, the key should facilitate the future identification of these fungi in Greenland and other arctic regions. Further, many of the 24 species newly described in this paper can be expected to be widespread in arctic to subboreal and even some temperate areas, especially as the host lichens of some of these fungi have wide distributions.

Lichenicolous fungi

Fungi can occur on lichens as parasites, saprophytes, or commensals ("parasymbionts"). In some cases the fungi can later develop independent lichen thalli, as in certain *Acarospora* (Poelt & Steiner 1972), *Caloplaca* (Steiner & Poelt 1987), *Diploschistes* (Friedl 1977) and *Rhizo-*

carpon (Holtan-Hartwig & Timdal 1987, Poelt & Hafellner 1982) species; these lichenicolous lichens, perhaps totalling over 200 species in the world, are little studied and not treated in this paper, except where algae are doubfully present, sometimes absent, or difficult to observe.

The species of fungi involved are almost entirely exclusively lichenicolous, not being known from other habitats or hosts, although in some cases they belong to genera which also include lichen-forming, saprophytic or other fungi (see Tab. 1). They are evidently polyphylletically derived from both non-lichenized or lichenized ancestors, depending on the groups to which they are referred.

A synopsis of the biology of lichenicolous fungi was provided by Hawksworth (1982c). Parasitic species can be: (1) pathogens able to kill entire lichen thalli, but these are relatively rare; (2) cause restricted necrotic patches, as seen in many species including *Everniicola flexispora, Nesolechia oxyspora* or *"Phragmonaevia" peltigerae;* (3) extensive discolourations as in *Deichmannia verrucispora;* or (4) form bullate galls as in *Polycoccum galligenum, P. trypethelioides* or *Refractohilum peltigerae.* Saprophytic species attacking already dead or dying lichen thalli are rather scarce, and in Greenland it is possible that species such as *Bacidia killiasii, Graphium aphthosae* and *Rinodina turfacea* act as opportunistic saprophytes. Of particular biological interest are the commensalistic species, formerly termed "parasymbiotic" (see Hawksworth, 1988: 11), which do not cause any apparent damage to the host and in effect form an additional third member of the symbiosis; examples amongst the Greenland flora include *Echinothecium glabrum, Endococcus propinquus, Muellerella pygmaea, Phaeosporobolus alpinus* and *Sclerococcum sphaerale.*

In many cases the precise biological relationships remain obscure as it is not clear whether the fungi involved colonize already compromised or aged thalli, or whether they are the causal agents of the observed symptoms. Many of the species treated in this contribution fall in this category, including *Bispora christiansenii, Taeniolella* species and *Trimmatostroma lichenicola.* On the other hand it is quite clear that some species are always found in infected, dying areas, often several together, e.g. on *Peltigera* species, which can have a flora of *Stigmidium peltideae, Wentiomyces peltigericola, Thelocarpon epibolum* and *Graphium aphthosae.*

The identification of lichenicolous fungi requires a knowledge of the literature of the whole of mycology and not only that devoted to these fungi. For key references see Hawksworth et al. (1983) and Sims et al. (1988: 211–270). The most important studies devoted to lichenicolous fungi are the compilations of Lindsay (1869a), Arnold (1874), Zopf (1896) and Vouaux (1912–14); Clauzade & Roux (1976) provide a key to the world's species based mainly on the literature. The known lichenicolous Hyphomycetes (Hawksworth 1979a) and Coelomycetes (Hawksworth 1981) have also been monographed.

Keissler's (1930) treatment of the central European species includes full descriptions of numerous species, and Hawksworth (1983a) provides a key to the 218 species reported for the British Isles (including spore illustrations of 141 species). Detailed illustrations of certain species are to be found in the works of Tulasne (1852), Lindsay (1869b), Hawksworth (1975a, 1978, 1980b, 1982a, 1986) and Vězda (1963, 1969, 1970).

History of Exploration in Greenland

The first reports of lichenicolous fungi from Greenland were made by Th. M. Fries (1860) in his "Lichenes arctoi", which included the species now known as *Dactylospora urceolata, Epilichen glauconigellus* and *E. scabrosus.* This was the last great period of exploration of unknown lands, and many expeditions brought back collections including lichens (and so lichenicolous fungi).

Dr. Robert Brown participated in an expedition to the Disko Bay area in 1867 and collected lichens which were examined by Lindsay (1871), a pioneer of the study of lichenicolous fungi. Lindsay (loc. cit.: 306) recorded that:

> "The main interest of the collections attaches, however, not to the character or number of the apparently novel forms it contributes to science, but to the illustrations which it offers of the following, among other, characteristics or peculiarities of extreme northern, arctic, or alpine lichens, viz. the frequency of occurrences of:
>
> 1. Paracitic Micro-Fungi or Micro-Lichens, or their separate pycnidias or spermagonia, affecting either the thallus or apothecia of the host, or both".

Lindsay reported the species now known as *Muellerella pygmaea* and *Polycoccum vermicularium,* on *Ophioparma lapponica* and *Thamnolia vermicularis,* respectively. In addition, he described as new four species treated in the present contribution as *Rinodina egedeana* (on *Parmelia saxatilis*), *Sagediopsis campsteriana* (on *Ochrolechia frigida*), *Unguiculariopsis cribriformis* (on *Pertusaria oculata*) and *Weddellomyces tartaricola* (on *O. frigida*). These collections were thought to be lost, but we succeeded in finding two of the holotypes in BM by locating material of the hosts collected by Brown in the localities given by Lindsay.

Th. M. Fries visited Greenland himself in 1871, but his collections were not published until Lynge (1937).

The English Polar Expedition 1875–76 explored the shores of the Nares Strait, which is now the border between northernmost Greenland and Canada (Baffin Island). This expedition collected lichens in many places, which were studied by Fries (1879). The follow-

ing localities cited in that paper are in Greenland: Cape York (75°56′N), Port Foulke (78°18′19″N), Hannah Island, Bessell Bay (81°07′N), Polaris Bay (81°30′35″N), Crossing Harbour (82°16′N), Floeberg Beach (82°26′30″N), The Dean Mountain (82°26′30″N), Black Cliffs Bay (82°31′N), Egerton Valley (82°40′N), Westward-Ho! Valley (82°41′N), and the Alert's winter quarter near the Dean Mountain.

Of the lichenicolous fungi included in the paper of Fries (loc. cit.), the following species were consequently records for Greenland: *Arthonia clemens, A. fusca, Didymella sphinctrinoides, Muellerella lichenicola, M. pygmaea, Phaeospora parasitica, Pyrenidium actinellum* and *Stigmidium frigidum.* The material from this expedition has unfortunately not been traced in BM, E, K or UPS, so the identity of some of these specimens remains uncertain. "On account of a deficient knowledge of Mycology, I [Fries] have thought proper not to give names to .... three species, though most probably all are new to science" (Fries, loc. cit.: 370); these were given names by Saccardo (1882), but he did not examine any material.

J. S. D. Branth reported on several species of lichenicolous fungi from Greenland. *Scutula stereocaulorum* was added to the known flora in Branth & Grønlund (1887), and Branth (1895) further reported the species now known as *Carbonea vitellinaria, Cercidospora ulothii, Dactylospora saxatilis, Illosporium carneum* and *Scutula tuberculosa. Lasiosphaeriopsis stereocaulicola* was identified by Branth and reported by d'Orleans (1909).

The succeeding lichenologists who studied lichens from Greenland did not fully share Lindsay's enthusiasm for lichenicolous microfungi and the reports of new species became rather scattered. Vainio (1905) added *Stigmidium dispersum,* Lynge (1937) *Adelococcus alpestris* and *Endococcus stigma,* and Lynge (1940) *Dacampia hookeri.* Lamb (1939) included reports of *Lichenodiplis lecanorae* and *Endococcus rugulosus,* Gelting (1956) added *Echinothecium reticulatum,* Fredskild (1961) *"Phragmonaevia" peltigerae,* and Henssen (1963) *Stigmidium ephebes. Trimmatostroma lichenicola* was discribed from Greenland in Hawksworth (1979a), and Alstrup (1981) added *Arthonia epiphyscia, A. fuscopurpurea, Cercidospora lichenicola, Polycoccum trypethelioides, Rhagadostoma lichenicola* and *Rosellinula frustulosae. Stigmidium conspurcans* was distributed in Vězda's "Lichenes selecti exsiccati" no. 1975 (1984). Poelt (1986) discovered *Cercidospora epipolytropa,* Hansen, Poelt & Søchting (1987) *Cercidospora caudata,* and *Clypeococcum grossum* and *Polycoccum squamarioides* were reported by Hawksworth & Diederich (1988). Triebel & Rambold (1988) discovered that *Lecidea umbonella,* so far thought to be a lichen, was a lichenicolous fungus, *Cecidonia umbonella,* which they listed from Greenland. Finally, Hafellner (1989) in introducing the new genus *Lichenochora,* recorded *L. constrictella* from the country.

The rather low activity in the study of lichenicolous fungi in Greenland, and also other arctic areas, is partly explained by the lack of modern treatments of these organisms. Our knowledge of lichenicolous fungi is now rapidly expanding, and it is our hope that the present account, particularly through the inclusion of a key, will stimulate the study of these organisms in the Arctic.

Discussion

The number of lichenicolous species reported here from Greenland is compared with that of the only other countries from which checklists have been produced in recent years in Table 1. The total number of genera and species was found to be about 100% higher than that listed for North America, although we wish to emphasize that the listing by Egan (1987) is not comprehensive. The total is also favourable with respect to the British Isles, considering that corticolous lichens are poorly represented in Greenland and the more detailed attention the lichenicolous species in that country have received. About 300 lichenicolous fungi are known in Sweden according to R. Santesson (pers. comm.), but a list of these has not yet been issued.

In all three regions analyzed in Table 1, it is of interest

Table 1. Comparison of the numbers of genera and species of lichenicolous fungi recorded from Greenland with those reported from the British Isles and North America.

Genera	Greenland[1]		British Isles[2]		North America[3]	
	Genera	Species	Genera	Species	Genera	Species
Including saprophytic or other fungi	15 (23%)	28 (23%)	23 (29%)	57 (26%)	4 (13%)	23 (40%)
Including lichen-forming fungi	12 (18%)	28 (23%)	16 (20%)	59 (27%)	6 (19%)	9 (15%)
Exclusively lichenicolous	38 (58%)	68 (55%)	40 (51%)	102 (47%)	21 (68%)	26 (45%)
Total	65	124	79	218	31	58

[1]Alstrup & Hawksworth (this paper), [2]Hawksworth (1983a), [3]Egan (1987)

Table 2. Position of the genera of lichenicolous fungi recorded from Greenland in the kingdom Fungi.

Fungal group[1]		Lichenicolous genera[2]	Numbers of species in Greenland		
Basidiomycotina		*Fayodia* (1)			1
Ascomycotina[3]					
Arthoniales	Arthoniaceae	*Arthonia* (11)		11	
Dothideales	Capnodiaceae	*Echinothecium* (2)	2		
	Dacampiaceae	*Dacampia* (1), *Kalaallia* (1), *Pyrenidium* (2), *Weddellomyces* (1)	5		
	Dimeriaceae	*Wentiomyces* (1)	1		
	Herpotrichiellaceae	*Capronia* (1)	1		
	Lichenotheliaceae	*Lichenostigma* (1)	1		
	Mycosphaerellaceae	*Stigmidium* (7)	7		
	Uncertain	*Cercidospora* (5), *Clypeococcum* (1), *Didymella* (1), *Endococcus* (3), *Homostegia* (1), *Karschia* (1), *Merismatium* (1), *Polycoccum* (7), *Rosellinula* (1), *Sagediopsis* (2)	23		
				40	
Hypocreales	Hypocreaceae	*Nectriella* (1)		1	
Lecanorales	Acarosporaceae	*Thelocarpon* (2)	2		
	Agyriaceae	*Scutula* (5)	5		
	Bacidiaceae	*Bacidia* (1)	1		
	Dactylosporaceae	*Dactylospora* (5)	5		
	Lecanoraceae	*Carbonea* (2), *Lecidella* (1)	3		
	Lecideaceae	*Lecidea* (2), *Steinia* (1)	3		
	Lichinaceae	*Phylliscum* (1)	1		
	Physciaceae	*Buellia* (3), *Rinodina* (2)	5		
	Rhizocarpaceae	*Epilichen* (2), *Rhizocarpon* (2)	4		
	Uncertain	*Cecidonia* (1), *Nesolechia* (1), "*Phragmonaevia*" (1)	3		
				32	
Leotiales	Hyaloscyphaceae	*Unguiculariopsis* (1)		1	
Opegraphales	Opegraphaceae	*Opegrapha* (1)		1	
Ostropales	Odontotremataceae	*Geltingia* (3)		3	
Phyllachorales	Phyllachoraceae	*Lichenochora* (1)		1	
Sordariales	Nitschkiaceae	*Lasiosphaeriopsis* (2), *Rhagadostoma* (1)		3	
Verrucariales	Verrucariaceae	*Muellerella* (2), *Phaeospora* (2)		4	
Uncertain order		*Abrothallus* (2), *Adelococcus* (1)		3	
					100
Deuteromycotina					
Coelomycetes		*Ascochyta* (1), *Everniicola* (1), *Karsteniomyces* (1), *Lichenoconium* (2), *Lichenodiplis* (1), *Phaeosporobolus* (2), *Phoma* (1), *Vouauxiomyces* (1)		10	
Hyphomycetes		*Bispora* (1), *Deichmannia* (1), *Graphium* (1), *Illosporium* (2), *Lichenopuccinia* (1), *Refractohilum* (1), *Sclerococcum* (2), *Taeniolella* (3), *Trimmatostroma* (1)		13	
					23

[1]Major categories follow Hawksworth, Sutton & Ainsworth (1983).
[2]The number of species in each genus is given in parenthesis.
[3]The placement of genera in the Ascomycotina mainly follows Eriksson & Hawksworth (1988).

that 51–68% of the genera are exclusively lichenicolous, not including species with other nutritional or host requirements. The number of genera which also include lichen-forming species, or saprophytic or other fungi, are also very similar in the three areas at 19–23% and 22–29%, respectively. However, while the number of species in genera assigned to these categories was broadly similar between the British Isles and Greenland, in the case of North America, representatives from genera including lichen-forming species were substantially lower; this in our view reflects a lack of study rather than any substantive difference.

The families, orders and higher categories to which the 65 genera including lichenicolous fungi recorded in Greenland are referred and summarized in Table 2. Representatives of the Dothideales and Lecanorales clearly predominate. The figure for the Lecanorales is especially high proportionately and it appears that Greenland is particularly rich in lichenicolous fungi derived from primarily lichenized genera. This hypothesis is also substantiated by the relatively large number of lichenicolous *Arthonia* species reported; 12 from Greenland compares to only nine in the better studied British Isles (Hawksworth 1983a) and in the discovery of lichenicolous species in genera which previously included only lichenized species. *Dactylospora* and *Scutula* species are also especially frequent. In contrast, some genera appear on the basis of current data to be rather poorly represented in Greenland, for example *Nectriella ornamentata* is the only member of the Hypocreales found, and only two species of both *Abrothallus* and *Lichenoconium* are recorded. It will be of interest to see whether these tendencies are borne out by subsequent collections from Greenland.

The description of 24 species as new to science in this work (19% of the total species listed), which may indicate the rich flora of these fungi in Greenland, should not be taken to indicate any high degree of endemism. Several are also noted here already from other countries and can be expected to occur in at least other arctic regions where appropriate hosts are present.

With respect to the host lichens, the degree of specificity varies substantially according to the fungus species involved, and our knowledge of the host ranges is currently advancing. Many new hosts are cited in this contribution for the first time. Some host lichen genera are especially rich in lichenicolous fungi in Greenland; lists of the species recorded from different host lichens are summarized in the Host Index (pp. 81–84), the most important being species of *Ochrolechia, Peltigera, Pertusaria, Rhizocarpon* and *Stereocaulon*. Attention has previously been drawn to the richness of *Pertusaria* and especially *Peltigera* and the co-evolutionary and phyllogenetic interest of this phenomenon (Hawksworth 1980a, 1982a). *Hymenelia lacustris* and *Placopsis gelida* also yielded some particularly remarkable lichenicolous species. Detailed attention to these hosts, including the study of already collected lichen host material in major herbaria, promises to be of major interest.

Materials and methods

The basis of this study was the 350 mainly undetermined collections from the following sources:

V. Alstrup: Collections made on seven visits in 1974 to 1980 (126 specimens).

M. Skytte Christiansen: Collections made in 1946 and generously made available for this study (83 specimens).

P. Gelting: Collections made over many years, sorted out, together with other lichenicolous fungi from Greenland in UPS, by R. Santesson for this study (35 specimens).

J. Poelt and H. Ullrich: Collections made in 1982 and 1983 and retained in GZU, sorted and sent on loan for inclusion in this study by J. Hafellner (71 specimens).

Collections in BM, including type specimens made by R. Brown in 1867 (10 specimens).

Collections from C, located by V. Alstrup during the study of lichens, and a collection found on *Placopsis gelida* sent on loan by E. S. Hansen (10 specimens).

F. E. Eckardt: One collection made in 1983 donated to V. Alstrup.

P. Jacobsen: Four specimens collected in 1987 sent on loan by the collector.

I. Johnsen & K. Bach Jensen: One collection from 1989 was added in the proof stage.

A few records have been added from the notes of both authors on material from outside Greenland and from R. Santesson's notes of Greenland material in O to add to the distribution of some species.

We have not checked the identifications of all species previously reported by other authors, but they have been included in the keys and species list for the sake of completeness.

Macroscopic features were examined with a Nikon stereomicroscope fitted with an eyepiece graticule and zoom lens (to x 60). Microscopic characters were studied in squash preparations and 12 µm microtome sections in water, 10% KOH (K), Lugol's iodine solution (I), lactophenol cotton blue and lactofuchsin, and a few also in 50% HNO_3 (N) or a chlorine solution (C), in an Olympus BH-2 microscope (to x 1562) fitted with Nomarski differential interference contrast. Drawings were made with a drawing tube, mostly at x 3300. Microphotographs were taken with Kodak TMAX p3200 and Ilford HP5 135 films. Macrophotographs were taken with a Tessovar, and SEM micrographs were taken using air-dried material on the Hitachi S-570 S scanning electron microscope at CMI.

Key to the species

The host species listed in this key are restricted to those from which the species are known in Greenland.

1	Spores produced in asci	2
	Spores not produced in asci or absent	108
2(1)	Hymenium not exposed at maturity (ascomata perithecioid)	3
	Hymenium exposed at maturity (ascomata apothecioid, arthonioid or lirelliform)	55
3(2)	Ascospores brown	4
	Ascospores hyaline	30

4(3) Ascospores non-septate 5
Ascospores septate 6

5(4) Asci 64–100-spored; pseudoparaphyses present; ascospores 5–6.5 × 4–5 µm; on *Lecanora argopholis*..... **Rosellinula frustulosae**
Asci 8-spored; pseudoparaphyses absent; ascospores 11.5–16 × 7.5–10 µm; on *Acarospora glaucocarpa*..... **Adelococcus alpestris**

6(4) Ascospores 1-septate 7
Ascospores 2 or more septate or muriform 19

7(6) Pseudoparaphyses present..... 8
Pseudoparaphyses absent..... 15

8(7) Ascoma wall pseudoparenchymatous, clypeus absent..... 9
Ascoma wall composed of interwoven hyphae, becoming clypeate, ascospores 14–17.5 × 7–10 µm; on *Umbilicaria* species..... **Clypeococcum grossum**

9(8) Ascospores mainly exceeding 14 µm in length, ± distichously arranged in the asci..... 10
Ascospores (10–)11–13(–15) × (4–)4.5–6 µm, ± monostichously arranged in the asci; on *Caloplaca stillicidiorum* **Polycoccum bryonthae**

10(9) Ascospores mainly less than 10 µm broad 11
Ascospores 18–21 × 10.5–14 µm, often also with muriform spores; on *Placopsis gelida* ..... **Polycoccum gelidarium**

11(10) Ascomata 0.15–0.3 mm diam. 12
Ascomata mainly less than 0.15 mm diam. 13

12(11) Ascospore cells ± equal in size; ascospores 14–18(–21) × 7–9 µm; forming galls on *Physcia caesia*..... **Polycoccum galligenum**
Ascospore cells unequal in size, the lower 1/3 the length of the ascospore; ascospores 14–22 × 8–10 µm; forming galls on *Stereocaulon* species..... **Polycoccum trypethelioides**

13(11) Ascospores 14–18 × 7–9 µm..... 14
Ascospores (18–) 19–26 × (5.5–)6–7(–8) µm; on *Placopsis gelida* ..... **Polycoccum squamarioides**

14(13) Ascomata (50–)100–150 µm diam.; asci 4–8-spored, subcylindrical; on *Hymenelia lacustris*..... **Polycoccum microsticticum**
Ascomata (60–)75–95(–100) µm diam.; asci 8-spored, elongate-clavate; on *Thamnolia vermicularis*..... **Polycoccum vermicularium**

15(7) Asci 8-spored..... 16
Asci 64 or more spored 18

16(15) Ascospores 12–20 µm in length 17
Ascospores (7–)9–10(–12) × 4–6(–7) µm; on various crustose lichens..... **Endococcus propinquus**

17(16) Ascospore ends broadly rounded, 12–16(–18) × (5–)7(–9) µm; on various crustose lichens ..... **Endococcus rugulosus**
Ascospore ends often attenuated, (12–)14–16 (–20) × 4–6(–8) µm; mainly on *Rhizocarpon* species..... **Endococcus stigma**

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118(117) Conidia 12–16(–19.5) × 3–4(–4.5) µm; conidiomata ± superficial; on *Peltigera* species..... **Karsteniomyces tuberculosus**
Conidia 12–12.5 × 6–6.5 µm; conidiomata immersed; on *Phaeophyscia sciastra*..... **Ascochyta santessonii**

119(109) Conidia hyaline..... 120
Conidia pale to dark brown..... 123

120(119) Conidia ± globose; forming from pale pink to rose sporodochia..... 121
Conidia elongated; forming from dark brown sporodochia or sporodochia absent..... 122

121(120) Sporodochia irregular, ± farinose, pale pink; conidia (4–)6–7 µm diam., indistinctly verruculose, readily separating; on *Peltigera* species..... **Illosporium carneum**
Sporodochia strongly convex, pink to rose; conidia 6–10 µm diam., smooth-walled, separating only with difficulty; on *Cetraria hepatizon, Pannaria* species and *Parmelia saxatilis*..... **Illosporium corallinum**

122(120) Conidiogenous cells arising from discrete conidiophores; conidia non-septate, (15–)18–20(–25) × 6–7.5(–9) µm, thin-walled; on *Peltigera* species. **Refractohilum peltigerae**
Conidiogenous cells arising from dark brown convex sporodochia; conidia 2–3-septate, thick-walled, (17-)23–29 × (4–)6–8(–8.5) µm; on *Parmelia saxatilis*..... **Lichenopuccinia poeltii**

123(119) Conidiophores arising singly, not in synnemata, in small groups or forming sporodochia..... 124
Conidiophores aggregated into stalked synnemata to 175 µm tall; conidia 7.4 × 3.5–4 µm; on *Peltigera aphthosa*..... **Graphium aphthosae**

124(123) Conidiophores arising singly or in small groups..... 125
Conidiophores arising in discrete sporodochia..... 129

125(124) Conidiophores developing on the surface of the host..... 126
Conidiophores immersed in the tissues of the host..... 128

126(125) Conidia smooth or finely verrucose, mainly less than 5.5 µm wide..... 127
Conidia coarsely verrucose, (11–)13–16 × (5–)5.5(–7) µm; on *Ophioparma lapponica* (?) and *Pertusaria carneopallida*..... **Taeniolella pertusariicola**

127(126) Conidia smooth-walled, 1-septate conidia predominating, 7–11 × 3.5–5(–6) µm; on *Icmadophila ericetorum*. **Taeniolella delicata**
Conidia with delicate longitudinal fissures; non-septate conidia predominating, 8–10 × 3.5–5 µm; 1-septate conidia 10–12(–13) × 4.5–5.5 µm; on *Arthonia nephromiaria* and *Stereocaulon alpinum*..... **Taeniolella christiansenii**

128(125) Conidia pale brown, 0–1-septate, 5–8(–9) × 4–6 µm; on a wide range of crustose and some foliose lichens **Bispora christiansenii**
Conidia dark brown, multicellular, 18–25 × 6–12 µm; on *Candelariella vitellina*..... **Trimmatostroma lichenicola**

129(124) Conidia smooth-walled, subglobose or multicellular..... 130
Conidia coarsely verrucose, elongate-ellipsoid, 1–3-septate, 1-septate conidia 9–11(–12.5) × 6.5–8(–9) µm; on *Diploschistes* species..... **Deichmannia verrucispora**

130(129) Conidia 1–2 celled, (3.5–)4–7(–8) µm diam.; on *Melanelia substygia*..... **Sclerococcum simplex**
Conidia 2–6(–9) celled, (8–)10–15(–17) µm

diam.; on *Pertusaria* species..... ..... **Sclerococcum sphaerale**

131(108) Basidiomycete, forming agaricoid basidioma; on *Peltigera* species..... **Fayodia striatula**
Not basidiomycete, forming purplish peltate scales on *Ocholechia frigida*..... ..... **Phylliscum demangeonii**

The species

The species are arranged alphabetically by genus for ease of reference. For systematic placement in families and higher categories see Table 2 (p. 6). Synonyms are restricted to basionyms and those used in literature on Greenland lichenicolous fungi.

Generic names placed in quotes (" ") are ones where the position is certainly incorrect and in need of further study.

Names of host lichens mainly follow Cannon et al. (1985), Egan (1987) and Santesson (1984). Herbarium abbreviations follow "Index Herbariorum" (Holmgren et al. 1981). Other abbreviations are alt. = altitude and d. = district.

Abrothallus de Not. (1849: 351)

Type species: *Abrothallus bertianus* de Not.
Number of species: 11, all lichenicolous fungi.
Description: Bellemère, Malherbe, Chacun & Hafellner (1986: 47–85), Kotte (1909).

Note: The generic name is sometimes indicated as published in a 1845 preprint of de Notaris' 1849 work (Farr et al. 1979: 3), but we have not located such a copy. The 1849 paper states that it was "Exhib. 15 iunii 1845", and de Notaris (1846: 195) assumed that it was validly published before then, but the work was apparently then still in press.

1. **Abrothallus bertianus** de Not. (1849: 351)
Descriptions: Kotte (1909: 74–93), Santesson (1960: 513–514) and Hawksworth & Minter (1980: 567).
Distribution: Western Europe.
Hosts: *Parmelia* spp., *Nephroma parile* (Ach.) Ach. and *Pseudephebe pubescens* (L.) M. Choisy.

Note: *Pseudephebe* is a new host genus for this fungus. The ascospores were dark brown and in the range of the species, the vegetative hyphae reacted I+ blue, and all the hymenial tissues were greenish in K.

Specimens: Holsteinsborg d., head of Søndre Strømfjord, in the scree at the foot of Mt. Hassel, on *Parmelia fraudans* (Nyl.) Nyl., 18 Aug. 1946, Skytte Christiansen 5455 (UPS, Santesson: Fungi Lichenicoli Exsiccati, Fasc. 6, no. 126).
Julianehåb d., Narssarssuaq, on *Nephroma parile* at the base of a trunk of *Betula*, 21 Sept. 1953, Gelting (UPS).
Narssaq d., Kangerdluarssuk, south shore, 60°52'N, 45°53'W, alt. 90 m, on *Pseudephebe pubescens*, 31 July 1978, Alstrup 243961e (C).

2. **Abrothallus parmeliarum** (Sommerf.) Arnold (1874: 102)
Lecidea parmeliarum Sommerf. (1826: 176)
Description: Schaechtelin & Werner (1926).
Anamorph: *Vouauxiomyces santessonii* D. Hawksw.
Distribution: Widespread.
Hosts: *Parmelia saxatilis* (L.) Ach., *P. omphalodes* (L.) Ach. and *P. sulcata* Taylor. The host thallus is deformed by numerous black apothecia.

Note: The nomenclature of this species is currently under investigation; the correct name may prove to be *A. parasiticus* (Ach.) Nyl. ex Sacc. (syn. *Endocarpon parasiticus* Ach., *Lichen parasiticus* Sm., non Hoffm.).

Specimens: Narssaq d., south slope of Narssaq Fjeld, 60°57'N, 46°03'W, alt. 120 m, on *P. saxatilis*, 22 July 1978, Alstrup 243927x (C). Kangerdluarssuk, mountain S of Laksedalen, 60°53'N, 45°46'W, alt. 332 m, on *P. saxatilis*, 16 July 1978, Alstrup 243-892h (C). Narssarssuaq, at the head of Tunugdliarfik Fjord, 61°11'N, on *P. saxatilis*, 13 July 1946, Skytte Christiansen 5518 (herb. Christiansen).
Julianehåb d., Akia, 60°42'N, 46°00'W, alt. 20 m, 31 July 1980, on *P. saxatilis*, Alstrup 80653 (C).
Sukkertoppen d. Qivâqe, 65°29'N, 52°31'W, alt. 50 m, on *P. saxatilis*, 6 Aug. 1977, Alstrup 77996a (C). Unnamed island, 65°25'N, 52°37'W, alt. 30 m, on *P. saxatilis*, 14 Aug. 1977, Alstrup 771555 (C).
Ivigtut d., on boulder W of Ivigtut town, 61°12'N, alt. 50 m, on *Parmelia omphalodes*, 11 July 1946, Skytte Christiansen 5517 (herb. Christiansen). On rock E of Ivigtut town, alt. 20 m, on *P. saxatilis*, 15 July 1946, Skytte Christiansen 5531 (herb. Christiansen).

Adelococcus Theissen & Sydow (1918: 31)

Type species: *Adelococcus alpestris* (Zopf) Theissen & Sydow.
Number of species: Three to five, all lichenicolous fungi.

Note: The genus is in need of a critical reassessment.

1. **Adelococcus alpestris** (Zopf) Theissen & Sydow (1918: 31)
Rosellinia alpestris Zopf (1896: 314)
Description: Keissler (1930: 309–311).
Distribution: The Alps and the British Isles.
Report from Greenland: Lynge (1937).
Host: *Acarospora glaucocarpa* (Wahlenb.) Körber.

Arthonia Ach. (1806: 3)

Type species: *Arthonia radiata* (Pers.) Ach.
Number of species: About 100, of which 42 are lichenicolous fungi, the others being lichenized.

Notes: The genus is in need of a modern revision, the latest monograph being that from Scandinavia by Almquist (1880). At present it includes taxa with two different ascus types, one is broadly clavate to saccate, the other pear-shaped, broad at the top. An important character for identification is the iodine reaction of the

hymenium. It is generally recommended to pretreat the test material with 10% KOH in order to have a "good" iodine reaction. In several cases, however, we noted that specimens which first became wine-red with Lugol's solution gave an immediate blue reaction if they were pretreated with KOH, a phenomenon discussed by Baral (1987). Some of the specimens reported below from new hosts may later prove to represent other species.

1. **Arthonia clemens** (Tul.) Th. Fr. (1867: 46)
Phacopsis clemens Tul. (1852: 124)
Conida clemens (Tul.) Massal. (1856: 46)
Description: Keissler (1930: 72–76).
Distribution: Europe, N. Africa, China and Greenland.
Report from Greenland: Fries (1871) on *Rhizoplaca peltata* (DC.) Leuck. & V. Wirth and Fries (1879) on *Lecanora hageni* (Ach.) Ach.
Hosts: On the apothecia of many different crustose lichens, the host apothecia becoming deformed and covered by the parasite's aggregated black apothecia.

Specimens: Disko, Godhavn, N–NE of the Arctic Station, alt. 20 m, on *Protoparmelia badia* (Hoffm.) Hafellner and on *Psoroma hypnorum* (Vahl) Gray, 27 July 1982, Poelt & Ullrich (GZU).

2. **Arthonia destruens** Rehm (1890: 816)
Distribution: Europe.
Hosts: The species has so far been reported on species of *Xanthoria, Physcia* and *Phaeophyscia*. On *Lecanora leptacina* Sommerf. it is found on the thallus and apothecia, and turns the host white, evidently pathogenic.

Specimen: Disko, Godhavn, N–NE of the Arctic Station, alt. 20 m, on *L. leptacina*, 1982, Poelt & Ullrich (GZU).

3. **Arthonia epimela** Norman (in Almquist 1880: 56)
Distribution: Europe and possibly N. Africa.
Hosts: Given as crustose lichens. The type collection from northern Norway and Danish collections are on *Buellia punctata* (Hoffm.) Massal. The specimen from Greenland is on *Biatora vernalis* (L.) Fr.

Specimen: Godthåb d., Sârdloq, 64°23'N, 51°42'W, alt. 30 m, 14 Aug. 1976, Alstrup 769431 (C).

4. **Arthonia epiphyscia** Nyl. (1875: 361)
Descriptions: Santesson (1960: 500–501), Vězda (1970: 221), Hawksworth (1975a: 186) and Alstrup (1981: 121–122).
Distribution: Widespread in temperate to arctic areas: Europe, S. Africa, Bouvetøya, S. America and Greenland.
Reports from Greenland: Alstrup (1981: 121) and Hansen, Poelt & Søchting (1987: 9).
Hosts: *Physcia ssp.*, *Phaeophyscia* spp., *Caloplaca saxicola* (Hoffm.) Nordin and *Xanthoria parietina* (L.) Th. Fr. *Phaeorrhiza nimbosa* (Fr.) Mayrh. & Poelt is a new host for the species. It is found as numerous, crowded, black apothecia on the thallus.

Specimens: Disko, Godhavn, 30 m N of the Arctic Station, on *Physcia caesia* (Hoffm.) Fürnr., 14 Aug. 1949, Gelting (UPS).
Holsteinsborg d., Angujârtorfiup nunâ, Arnangarngup kûa, 66°31'N, 51°13'W, alt. 125 m, on *Phaeorrhiza nimbosa*, 26 June 1979, Alstrup 79318a (C).
Narssaq d., Kangerdluarssuk, mountain N of Sørensen's Ø, 60°53'N, 45°47'W, alt. 125 m, July 15 1978, Alstrup 243885s (C). 1 km S of Qagssiarssuk, 61°08'N, 45°32'W, alt. 140 m, 4 Aug. 1980, Alstrup 801205 (C).
Umanak d., Mârmorilik, alt. 50–300 m, on *Physcia caesia*, Aug. 1983, Poelt & Ullrich (GZU).

5. **Arthonia excentrica** Th. Fr. (1867: 46)
Fig. 1.
Distribution: European mountains.
Hosts: *Leprocaulon subalbicans* (Lamb) Lamb & Ward. The European host is a sterile, white, unidentified, crustose species. On *Leprocaulon* numerous brown immersed ascomata break through the cottony tissue of the host, apparently suppressing the formation of host "podetia".

Specimens: Disko, Godhavn, Lyngmarken, alt. 30 m, 3 July 1950, Gelting (UPS).
Holsteinsborg d., head of Søndre Strømfjord, foot of Mt. Hassel, 67°N, alt. 50–100 m, 24. Aug. 1946, Skytte Christiansen 5444 (herb. Christiansen).
Sukkertoppen d., head of Sønder Isortoq, N of Averlerqup taserssua, S of lake, 65°31'N, 51°42'W, alt. 525 m, 15 July 1977, Alstrup 77343 (C-with *Echinothecium glabrum*).
Godthåb d., Ilulialik, Igdlorssuit, July 1976, Alstrup 76198 (C). Head of Ilulialik, 64°54'N, 50°43'W, alt. 30 m, 22 July 1976, Alstrup 763302 (IMI 331028).
Ivigtut d., boulder W of Ivigtut town, 61°12'N, alt. 25 m, 11 July 1946, Skytte Christiansen 5516 (herb. Christiansen).
Narssaq d., south slope of Narssaq Fjeld, 60°57'N, 46°04'W, alt. 150 m, 14 July 1980, Alstrup 80253 (C).

6. **Arthonia fusca** (Massal.) Hepp (1860: 534)
Catillaria fusca Massal. (1852: 80)
Conida fusca (Massal.) Th. Fr. (1879: 369)
Distribution: Europe.
Report from Greenland: Fries (1879).
Hosts: "Several other more or less developed lichens" (Fries, loc.cit.).

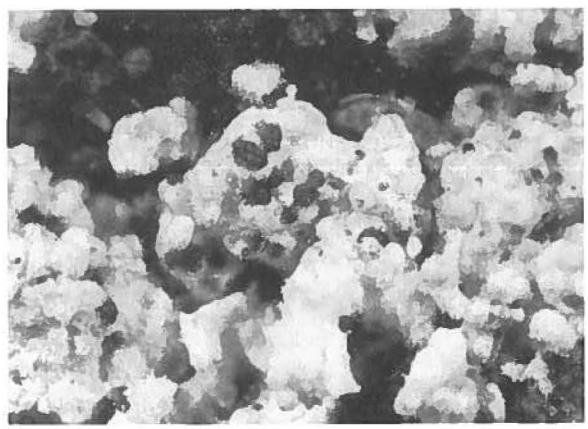


Fig. 1. *Arthonia excentrica* (Christiansen 5444); ascomata on *Leprocaulon subalbicans* (x 25).

Note: Reported by Fries (loc. cit.) from Floeberg Beach, but the status of this taxon merits further study. We have not seen the material examined by Fries.

7. **Arthonia fuscopurpurea** (Tul.) R. Sant. (1960: 501)
Celidium fuscopurpureum Tul. (1852: 121)
Distribution: Europe and Greenland.
Report from Greenland: Alstrup (1981: 121).
Hosts: *Peltigera* spp., *Solorina* spp. and *Psoroma hypnorum* (Vahl) Gray, which is a new host species. In Greenland it has only been found on *Solorina* and *Psoroma* where it forms pale brownish maculae up to 2 mm diam.

Specimens: Sukkertoppen d., Sønder Isortoq, Kangerdluk, 65°34′N, 51°57′W, alt. 60 m, on *Solorina bispora* Nyl., 20 July 1977, Alstrup 77572 (C).
Narssaq d., Bredefjord, Naimiat, 60°59′N, 46°12′W, alt. 40 m, on *Psoroma hypnorum*, 11 July 1980, Alstrup 801085 (C).

8. **Arthonia glaucomaria** (Nyl.) Nyl. (1856: 98)
Lecidea glaucomaria Nyl. (1852: 177)
Description: Hertel (1969: 213–214, as *A. intexta* Almq.).
Distribution: Europe, N. Africa and N. America.
Hosts: On the apothecia of *Lecanora rupicola* (L.) Zahlbr., which becomes covered by the black apothecia of the parasite, and on *L. bicincta* Ramond (Leuckert & Poelt 1989: 128). It has also been reported from other species of Lecideaceae and Lecanoraceae, but these reports need confirmation.

Specimen: Disko, Diskofjord, Kangerdluarssuk, alt. 0–30 m, on *L. rupicola* f. *sorediata* (Flotow) Zahlbr., 4 Aug. 1982, Poelt & Ullrich (GZU).

9. **Arthonia molendoi** (Frauenfeld) R. Sant. (1986b: 2)
Tichothecium molendoi Frauenfeld (in Arnold 1864: 462)
Distribution: The Alps and Scandinavia.
Hosts: *Xanthoria* and *Phaeophyscia* spp., and *Caloplaca saxicola* (Hoffm.) Nordin which is a new host species. It is found on the host's thalli which become white.

Note: A specimen found on the basal podetium of *Cladonia rangiferina* (L.) Wigg. has ascospores of the same size and the same iodine reactions of the hymenium (I+ red-brown without pretreatment with K, KI+ blue); it may belong to the same species (Disko, Godhavn, NE of the Arctic Station, alt. 20–100 m, July 1983, Poelt & Ullrich, GZU).

Specimens: Disko, Godhavn, N–NE of the Arctic Station, alt. 2 m, on *Caloplaca saxicola*, 27 July 1982, Poelt & Ullrich (GZU). Godhavn, 1–2 km E of the town, alt. 20 m, on *Phaeophyscia* sp., 31 July 1982, Poelt & Ullrich (GZU).
Holsteinsborg d., Søndre Strømfjord, N of the airport, alt. 20–50 m, on *Xanthoria elegans* (Link) Th. Fr., 12 Aug. 1983, Poelt & Ullrich (GZU).

10. **Arthonia nephromiaria** Nyl. (1866b: 187)
Distribution: Europe and Greenland.
Hosts: *Nephroma* and *Stereocaulon* spp. It is also, somewhat hesitatingly, here reported from *Dactylina ramulosa* (Hook.) Tuck. and *Leprocaulon subalbicans* (Lamb) Lamb & Ward. It does not seem to cause much damage to the host, except on the *Leprocaulon* where the formation of "podetia" is suppressed.

Notes: Ohlert (1870: 49) described var. *stereocaulina* to accomodate the specimens found on *Stereocaulon;* they may represent a distinct species. We did not find any specimens on *Nephroma*. The hymenium turns blue in Lugol's solution after pretreatment in KOH.

Specimens: Holsteinsborg d., midway in Søndre Strømfjord, Itivdlinguaq, 66°30′N, alt. 50–100 m, on *Stereocaulon alpinum* Laurer, 24 July 1946, Skytte Christiansen 5562 (herb. Christiansen). Head of Søndre Strømfjord, south coast of Nakajanga along Umîvît, alt. 25 m, on *Leprocaulon subalbicans*, 21 Aug. 1946, Skytte Christiansen 5475 (herb. Christiansen).
Disko, Knud Rasmussens nunatak, lower part, on *Dactylina ramulosa*, July 1968, Brolin & Ehrenroth L6 (UPS) and top plateau of the nunatak, on *D. ramulosa*, Brolin & Ehrenroth L6 (UPS).

11. **Arthonia peltigerina** (Almq.) H. Olivier (1917: 213)
Arthonia vagans var. *peltigerina* Almq. (1880: 54)
?A. peltigerae Th. Fr. (1866: 15)
Distribution: Greenland and Sweden.
Hosts: *Peltigera* spp., forming scattered to aggregated black apothecia on both sides of the host thallus which becomes dark-coloured and eventually necral white after the infection.

Specimen: Disko, surroundings of Godhavn, on *Peltigera* sp. (apparently *P. aphthosa*), Brolin & Ehrenroth, July 1968 (UPS).

12. **Arthonia pelveti** (Hepp) Almq. (1880: 57)
Celidium pelveti Hepp (1857: Pl. 67)
Fig. 2.
Distribution: Widespread.
Hosts: *Peltigera, Solorina* and *Pseudocyphellaria* spp. *Cladonia carneola* (Fr.) Fr. and *Pannaria pezizoides* (Weber) Trevisan are new host species.

Specimens: Disko, Blæsedalen 4 km N Qeqertarssuaq, alt. c. 150 m, on *Peltigera didactyla*, Aug. 1987, Jacobsen 6303 (KIEL).
Sukkertoppen d., unnamed island E of Imartorngup timâ, 65°27′N, 52°37′W, alt. 10 m, on *Pannaria pezizoides*, 10 Aug. 1977, Alstrup 771504 (C).
Godthåb d., Godthåb town, 64°10′N, alt. 0–50 m, on *Peltigera* sp., 18 July 1946, Skytte Christiansen 5532 (herb. Christiansen; IMI 331029) and 5540 (herb. Christiansen).
Narssaq d., Narssarssauq, 61°11′N, alt. 0–50 m, on *Cladonia carneola*, podetia, 13 July 1946, Skytte Christiansen 5528 (herb. Christiansen).

Ascochyta Libert (1830 Pl. Crypt. Ard. fasc. 1: 8)
Type species: *Ascochyta pisi* Libert.
Number of species: Over 350 described, on a wide range of mainly angiosperm hosts.
Description: Punithalingam (1988: 4).
Distribution: Cosmopolitan.

Note: Only one lichenicolous species, *A. lichenoides*

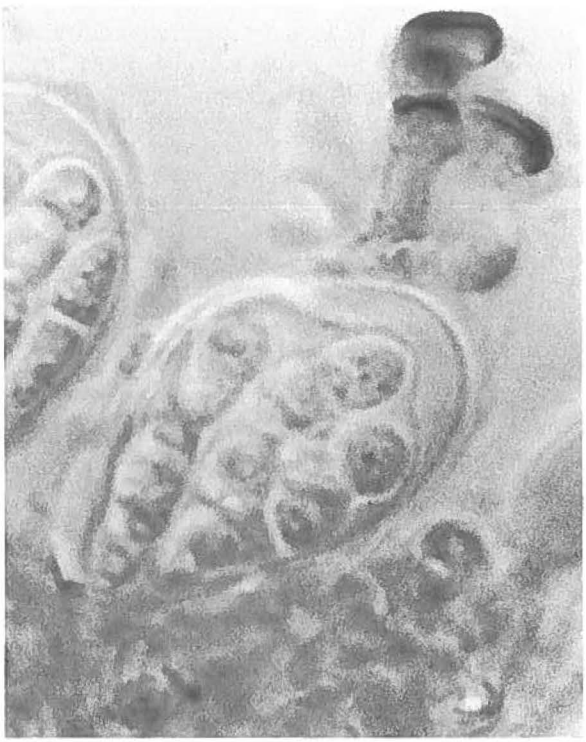


Fig. 2. *Arthonia pelveti* (Christiansen 5574) on *Cladonia carneola*; asci and paraphyses tips (x 2200).

(A.L. Sm.) D. Hawksw. has previously been assigned to the genus, but the conidia of that fungus have recently been shown to have gelatinous appendages and a new genus, *Crustodiplodina* Punith. has been described to accomodate this species; that species may in any case be a bark-saprophyte and not a true lichenicolous fungus (Punithalingam 1988: 200).

1. **Ascochyta santessonii** Alstrup & D. Hawksw. *sp. nov.*

Figs 3, 4.

Conidiomata pycnidia, singularia, immersa, nigra, 30–50 µm diam., cum muris textura angularis, usque 18–25 µm latis, e cellulis 8–10(–11) µm diam. Cellulae conidiogenae enteroblasticae, acrogenae, subglobosae vel doliiformes, non prolifericae, hyalinae, (6–)7–8 × 6–6.5 µm. Conidia ellipsoidea, 1-septata, hyalina ad pallide straminea, laevia ad leviter verruculosa, 12–12.5 × 6–6.5 µm.

Typus: Groenlandia, Narssaq d., 1 km S of Qagssiarssuk, 61°08′N, 45°32′W, on *Phaeophyscia sciastra* (Ach.) Moberg, alt. 140 m, 4 Aug. 1980, Alstrup 801422 p.p. (C-holotypus, with *Phoma epiphyscia* Vouaux).

Conidiomata pycnidial, arising singly in bleached areas of the thallus, immersed, black, 30–50 µm diam. when viewed from above, ostiolate, in vertical section strongly compressed, conical, laterally expanded below to 120 µm wide, sometimes becoming confluent with other pycnidia, the ostiole 60–80 µm tall extending up to the thallus surface; pycnidial walls brown, dark brown to black near the tips of the ostiole, 18–25 µm thick, composed of 1–2 layers of subglobose to ± polyhedral pseudoparenchymatous cells 8–10(–11) µm diam., textura angularis, cells in the ostiolar region elongated to 12 µm and thick-walled. Conidiogenous cells lining the lower part of the pycnidial cavity, enteroblastic, acrogenous, subglobose to doliiform, hyaline, not proliferating, (6–)7–8 × 6–6.5 µm. Conidia arising singly, ellipsoid, rounded at the apex and tending to be somewhat truncated at the base, hyaline to pale straw-coloured, 1-septate, smooth to very weakly verruculose with age, 12–12.5 × 6–6.5 µm.

Host: *Phaeophyscia sciastra*, thallus. In the type collection the pycnidia occur in bleached areas of the thallus in mixed infections with *Phoma epiphyscia* (see below); it is unclear which the primary pathogen is, but it may

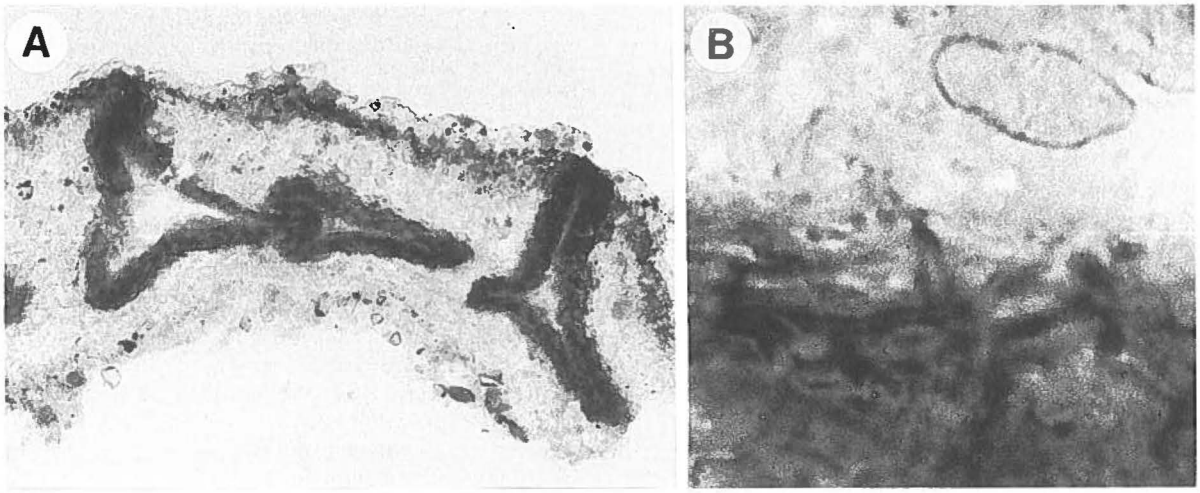


Fig. 3. *Ascochyta santessonii* (Alstrup 801422, holotype) on *Phaeophyscia sciastra*. A: Vertical section with immersed conidiomata (x 200). B: Vertical section of conidiomata wall (x 2200).

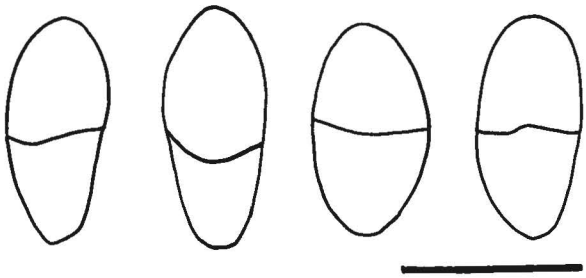


Fig. 4. *Ascochyta santessonii* (Alstrup 801422, holotype); conidia. Scale = 10 µm.

well be this species in view of the depths at which the pycnidia develop.
Distribution: Greenland, known only from the type collection.

Notes: This new species belongs to sect. *Ascochytella* (Tassi) Sprague & Johnson as the conidia become slightly straw-coloured. The only currently accepted species in this group with similarly broad conidia is *Ascochyta allii-cepae* Punith. et al. on *Allium cepa,* which has much longer conidia, (15–)16–19 × (4–)5–6 µm.

The species epithet is chosen in honour of Professor Dr. Rolf Santesson in recognition of his unique knowledge of lichenicolous fungi and in appreciation of his assistance in connection with the present investigation.

Bacidia de Not. (1846: 189)
Type species: *Bacidia rosella* (Pers.) de. Not.
Number of species: About 400 are currently referred to the genus, of which two are lichenicolous.

1. **Bacidia killiasii** (Hepp) D. Hawksw. (1983a: 22)
Biatora killiasii Hepp (in Killias 1861: 246)
Distribution: European mountains.
Hosts: *Peltigera* spp. forming green-grey maculae on the cortex.

Notes: The specimen cited seems to be rather young, the apothecia are plane and the ascospores are up to 20 µm long and 3-septate.

Specimen: Holsteinsborg d., midway in Søndre Strømfjord, Itivdlinguaq, 66°30'N, alt. 50–150 m, on *Peltigera* cfr. *rufescens* (Weis) Humb., 24 July 1946, Skytte Christiansen 5563 (herb. Christiansen).

Bispora Corda (1837: 9)
Type species: *B. molinioides* Corda.
Number of species: 14, mostly saprophytic on deciduous trees, one is lichenicolous.
Description: Ellis (1971: 90).

1. **Bispora christiansenii** D. Hawksw. (1979a: 207)
Fig. 5.
Distribution: Europe.
Hosts: Species of *Buellia, Caloplaca, Candelariella, Le-*

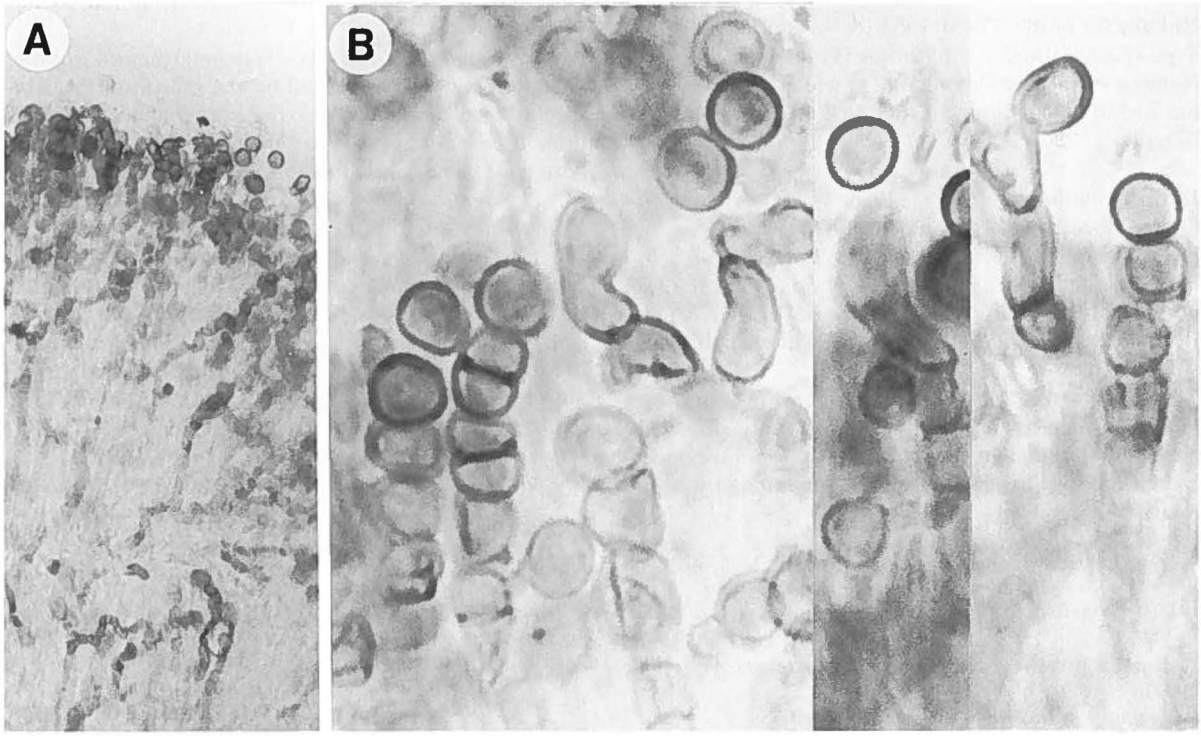


Fig. 5. *Bispora christiansenii* (Alstrup 76483a) on *Candelariella vitellina*. A: Vertical section of infected hymenium (x 800). B: Conidiophores bearing chains of 1-septate and mainly simple conidia (x 2200).

cania, Lecanora, Phaeophyscia, Rhizocarpon and *Usnea. Arthonia excentrica* Th. Fr., *Coriscium viride* (Ach.) Vainio, *Phacopsis vulpina* Tul., *Rinodina turfacea* (Wahlenb.) Körber and *Stereocaulon condensatum* Hoffm. are new hosts for the species; it is normally found in the hymenia of the host apothecia, but occurs also on the thallus. It was found on grey to black dead squamules of the *Coriscium,* but it may also occur on the living thallus, as it does on other host species. On *Stereocaulon condensatum* it caused the cortex to disintegrate, giving the impression of brownish soralia, which, however, did not contain algae.

Note: The specimen on *Candelariella* is unusual in having mostly non-septate conidia, although a few are 1-septate (see Fig. 5), but otherwise agrees well with this species.

Specimens: Holsteinsborg d., head of Søndre Strømfjord, foot of Mt. Hassel, 67°N, alt. 50–100 m, on *Arthonia excentrica,* 22 Aug. 1946, Skytte Christiansen 5444 (herb. Christiansen).
Midway in Søndre Strømfjord, Itivdlinguaq 66°30′N, alt. 50–100 m, on *Rinodina turfacea* with *Peltigera* sp., July 1946, Skytte Christiansen 5564 (herb. Christiansen).
Godthåb d., Godthåb town, 64°10′N, alt. 0–50 m, on the ground near the harbour, on *Coriscium viride,* 18 July 1946, Skytte Christiansen 5542 (herb. Christiansen). Godthåbsfjord, Qornoq, 64°32′N, 51°06′W, alt. 5–25 m, on *Stereocaulon condensatum,* 10 Aug. 1976, Alstrup 767830 (C). Ilulialik, 64°48′N, 50°39′W, alt. 30 m, on *Candelariella hudsonica* Hakul., July 1976, Alstrup 76483a (C).
France: Hautes-Alpes, Monetier-les Bains, alt. 1600 m, on *Phacopsis vulpina,* 24 Aug. 1975, Rondon (IMI 198491).

Buellia de Not. (1846: 195)

Type species: *Buellia disciformis* (Fr.) Mudd.
Number of species: About 100, of which most are lichenized, but 14 are obligate or facultative lichenicolous fungi.

1. **Buellia adjuncta** Th. Fr. (1866: 14)
Description: Hafellner & Poelt (1976).
Distribution: Northern Norway.
Hosts: *Lecanora straminea* Wahlenb. ex Ach., here reported from *Rinodina olivaceobrunnea* Dodge & Baker. Both host species are found in nitrophilous habitats.

Note: The collection was compared with Santesson's "Fungi Lichenicoli" Exs. no. 7. The only difference observed was that in our collection the apothecia became slightly convex with age, but the margin was still clearly visible.

Specimen: Sukkertoppen d., Sønder Isortoq, Nûk, 65°30′N, 52°09′W, alt. c. 100 m, on *Rinodina olivaceobrunnea,* 24 July 1977, Alstrup 77673a (C).

2. **Buellia nivalis** (Bagl. & Car.) Hertel ex Hafellner (1979b: 62)
Leciographa nivalis Bagl. & Car. (1864: 84)
Polyschistes nivalis (Bagl. & Car.) Keissler (1925b: 198)
Description: Hafellner (1979b: 62–64) and Hertel (1971: 253–256).
Distribution: Europe, Greenland, Alaska and Venezuela.
Hosts: Species of *Caloplaca* and *Xanthoria,* here also reported on *Lecanora subradiosa* Nyl. In young infections black apothecia break through the cortex of the host thallus which becomes white; at later stages *B. nivalis* establishes its own lichenized thallus.

Notes: The specimen on *Lecanora subradiosa* destroys the host thallus in the same way as the thallus of *Xanthoria elegans* is destroyed, and the parasite then forms its own lichen thallus. The paraphyses are c. 2 µm thick, branched only in the upper part, with end cells c. 3.5 µm with a dark cap, the asci have a strong I+ blue tholus and I− wall, and the ascospores are 3-septate to submuriform, 16–18 × 9–10 µm.

Specimens: Narssaq d., south slope of Narssaq Fjeld, 60°58′N, 46°02′W, alt. 220 m, on *Xanthoria elegans* (Link) Th. Fr., 21 July 1978, Alstrup 243925aj (C).
Disko, Godhavn, Arktisk Station, alt. 20 m, on *X. elegans,* 27 July 1982, Poelt & Ullrich (GZU, with *Caloplaca trachyphylla* (Tuck.) Zahlbr.). Godhavn, Fortunebay, alt. 5 m, on *Lecanora subradiosa,* 3 Aug. 1982, Poelt & Ullrich (GZU).

3. **Buellia pulverulenta** (Anzi) Jatta (1900: 400)
Abrothallus pulverulentus Anzi (1860: 116)
Description: Hafellner (1979b: 64–67) and Hafellner & Poelt (1980: 129–133).
Distribution: Widespread in northern temperate to arctic regions.
Hosts: *Anaptychia, Physcia, Phaeophyscia* and *Physconia* species, which are killed by the infection, the apothecia being dispersed over the host thallus. A collection on *Lecanora polytropa* (Hoffm.) Rabenh. is placed here with some reservation.

Notes: Hafellner & Poelt (1980) demonstrated that *Buellia pulverulenta* is in fact a lichenized species establishing its own thallus within the dead thallus of the host. This character is not always easily seen and we include the species in this work. The collection on *Lecanora polytropa* is rather small; a lichenized thallus was not observed, but the apothecial characters are as in *B. pulverulenta.*

Specimens: Nûgssuaq d., Atâ, on *Physconia muscigena* (Ach.) Poelt, Gelting 13160a (C).
Disko, SW of Godhavn, on *Phaeophyscia sciastra* (Ach.) Moberg, 1. Aug. 1982, Poelt & Ullrich (GZU).
Holsteinsborg d., midway in Søndre Strømfjord, Itivdlinguaq, 66°30′N, alt. 50–150 m, on *Physconia muscigena,* 24 July 1946, Skytte Christiansen 5560 (herb. Christiansen). Head of Søndre Strømfjord, near the airport, on *Phaeophyscia* sp, July 1974, Alstrup (C). Near Store Saltsø, alt. 100 m, on *Physcia* sp., 11 Aug. 1983, Poelt & Ullrich (GZU).
Narssaq d., Kangerdluarssuk, mountain ridge in Laksedalen, 64°54′N, 41°47′W, alt. 185 m, on *Lecanora polytropa,* 4 July 1978, Alstrup 243841m (C).

Capronia Sacc. (1883: 288)
Type species: *Capronia sexdecemspora* (Cooke) Sacc.
Number of species: 26, only one is so far described as a lichenicolous fungus, but another is known to D.L.H.
Description: Müller et al. (1987: 63).

1. **Capronia peltigerae** (Fuckel) D. Hawksw. (in Eriksson & Hawksworth 1987: 120)
Trichosphaeria peltigerae Fuckel (1874: 25)
Herpotrichiella peltigerae (Fuckel) D. Hawksw. (1980a: 371)
Description: Hawksworth (1980a: 371–372).
Distribution: Switzerland and Greenland.
Hosts: *Peltigera canina* (L.) Willd. and *P. malacea* (Ach.) Funck.

Notes: This species was previously known only from the type collection. The specimen from Greenland could not be identified with absolute certainty as the only perithecium found was empty. However, the superficial appearence was in full accordance with the illustration in Hawksworth (loc. cit.), although the spines were longer than previously noted, reaching 90 µm in length. In *Wentiomyces peltigericola* D. Hawksw., another spiny lichenicolous fungus found on *Peltigera* species, the spines are are much shorter and broader.

Specimen: Godthåb d., Ilulialik, Ivnajuagtoq, 64°46′N, 50°41′W, alt. 75 m, on *Peltigera malacea*, 20 July 1976, Alstrup 762936 (C).

Carbonea (Hertel) Hertel (1983: 441)
Lecidea subgen. *Carbonea* Hertel (1967: 101)
Type species: *Carbonea atronivea* (Arnold) Hertel.
Number of species: Four of which two are lichenicolous fungi.

1. **Carbonea supersparsa** (Nyl.) Hertel (1983: 442)
Lecidea supersparsa Nyl. (1865a: 7)
Description: Vouaux (1913: 408).
Distribution: Europe.
Hosts: *Lecanora* spp.

Specimen: Disko, Godhavn, Arktisk Station, on crustose lichen on a block, 29 March 1952, Gelting 17332b (UPS).

2. **Carbonea vitellinaria** (Nyl.) Hertel (1983: 442)
Lecidea vitellinaria Nyl. (1852: 177)
Nesolechia vitellinaria (Nyl.) Rehm (1890: 132)
Description: Vouaux (1913: 409).
Distribution: Europe, N. America and Greenland.
Reports from Greenland: Branth (1895) and Lynge (1937).
Hosts: Common on *Candelariella vitellina* (Hoffm.) Müll. Arg. rarer on species of *Lecidea, Rhizocarpon* and *Toninia*. Here also reported on *Candelariella coralliza* (Nyl.) Magnusson, *C. placodizans* (Nyl.) Magnusson, *C. hudsonica* Hakul. and *Pyrenopsis* sp.

Note: *Pyrenopsis* is a new host genus for the species. On the cited specimen the *Candelariella* and the *Pyrenopsis* were found intermixed, and the parasite was rather evenly distributed on both hosts.

Specimens (selected): Umanak d., SE of Mârmorilik, Sydsø, alt. 480–550 m, on *Lecidea* sp., Aug. 1983, Poelt & Ullrich (GZU). "Waygattet" (The strait between Disko and Nugssuaq, on *Candelariella* sp., Vahl (UPS).
Disko, Alákariaq, on *C. vitellina*, July 1975, Alstrup (C). Godhavn, Lyngmarksfjeld 100–400 m, on *C. placodizans* and on *Pyrenopsis* cfr. *pulvinata*, 31 July 1983, Poelt & Ullrich (GZU).
Sukkertoppen d., Sønder Isortoq, Averlerqup taserssua, 65°30′N, 51°40′W, alt. 600 m, on *C. husonica*, 15 July 1977, Alstrup 77296 (C), and alt. 525 m Alstrup 77334 (C).
Godthåb d., Sârdloq, Kanásut, on *C. placodizans*, Aug. 1976, Alstrup 761266 (C). Ilulialik, 64°51′N, 50°39′W, on *C. vitellina*, Aug. 1976, Alstrup 76685 (C).
Narssaq d., Kangerdluarssuk, Nunasarnaussaq, 60°52′N, 45°54′W, alt. 80 m, on *C. coralliza*, 21 July 1980, Alstrup 80948 (C).

Cecidonia Triebel & Rambold (1988: 280)
Type species: *Cecidonia umbonella* (Nyl.) Triebel & Rambold.
Number of species: Two, both gall-forming lichenicolous fungi.

1. **Cecidonia umbonella** (Nyt.) Triebel & Rambold 1988: 284)
Lecidea umbonella Nyl. (1866a: 372)
Distribution: Arctic-alpine in Europe, Caucasus, Spitsbergen, Greenland and USA.
Report from Greenland: Triebel & Rambold (loc. cit.).
Hosts: *Lecidea* spp., forming galls.

Note: This species was formally considered a lichenicolous lichen, but Triebel & Rambold interpreted the supposed lichen thallus as galls formed by the host.

Cercidospora Körber (1865: 465)
Type species: *Cercidospora ulothii* Körber.
Number of species: Six, all obligately lichenicolous.
Description: Hafellner (1987: 354–355).

1. **Cercidospora caudata** Kernst. (1895: 212)
Distribution: The Alps and Greenland.
Report from Greenland: Hansen, Poelt & Søchting (1987: 9).
Hosts: Species of *Caloplaca*. In Greenland also on *Xanthoria elegans* (Link) Th. Fr. (*Caloplaca elegans* (Link) Th. Fr.), which is a new host. It was found both on the apothecia and the thallus of *X. elegans;* the infected parts turn white.

Specimens: Holsteinsborg d., head of Søndre Strømfjord, N of the airport, south slope of Mt. Hassel, alt. 30 m, on *X. elegans*, 30 July 1946, Skytte Christiansen 5575 (herb. Christiansen). Same locality and host, 12 Aug. 1983, Poelt & Ullrich (GZU, with *Arthonia molendoi*).

2. **Cercidospora epipolytropa** (Mudd) Arnold (1874: 154)
Thelidium epipolytropum Mudd (1861: 298)
Distribution: Europe, N. Africa, Asia and Greenland.
Report from Greenland: Poelt (1986)
Hosts: Species of the *Lecanora polytropa* group. In Greenland on *L. polytropa* (Hoffm.) Rabenh. and *Rhizoplaca melanophthalma* (DC.) Leuckert & Poelt, a new host species. Numerous small perithecia break through the hymenium to the surface of the apothecia.

Specimens: Disko, Diskofjord, Eqalúnguit, alt. 15 m, 15 Aug. 1947, Gelting 11167 (UPS). NE of Diskofjord settlement, alt. 50 m, 4 Aug. 1982, Poelt & Ullrich (GZU). Godhavn, Lyngmarksfjeld, alt. 50–320 m, on *Rhizoplaca melanophthalma*, July 1983, Poelt & Ullrich (GZU). Mudderbugten, Alákariaq, alt. 40 m, July 1975, Alstrup 75–39 (C).
Holsteinsborg d., head of Søndre Strømfjord, south slope of Mt. Hassel, 67°N, alt. 50–100 m, on *R. melanophthalma*, 31 July 1946, Skytte Christiansen 5579 (herb. Christiansen).
Sukkertoppen d., Kangerdluarssuk, Qivâqe, 65°29′N, 52°31′W, alt. 75 m, 6 Aug. 1977, Alstrup 771601 (C).
Narssaq d., Kangerdluarssuk, south shore, 60°52′N, 45°53′W, alt. 90 m, 31 July 1978, Alstrup 243961a (C). Kangerdluarssuk, "Ref. III" 60°52′N, 46°02′W, alt. 170 m, 11 July 1978, Alstrup 2438811 (C).
Julianehåb d., Karrarmiut, at abandoned copper mine, 60°43′N, 45°56′W, 31 July 1980, Alstrup 80600 (C).

3. **Cercidospora lichenicola** (Zopf) Hafellner (1987: 360)
Leptosphaeria lichenicola Zopf (1896: 358)
Metasphaeria lichenicola (Zopf) Vouaux (1913: 202)
Description: Zopf (1897: 160).
Distribution: Europe and Greenland.
Previous reports from Greenland: Lindsay (1871: 326, Tab. 49, Figs 3a–b and Alstrup (1981: 122).
Host: *Solorina crocea* (L.) Ach.

Specimen: Ivigtut d., mountain SW of Ivigtut town, alt. 350 m, in late snow patch, 10 July 1946, Skytte Christiansen 5511 (herb. Christiansen).

4. **Cercidospora stereocaulorum** (Arnold) Hafellner (1987: 362)
Leptosphaeria stereocaulorum Arnold (1874: 153)
Metasphaeria stereocaulorum (Arnold) Saccardo (1883: 183)
Description: Hawksworth (1982a: 386).
Distribution: Europe.
Hosts: *Stereocaulon* spp., found as dispersed, minute, black perithecia, eventually colouring the host cortex brownish grey.

Specimens: Disko, surroundings of Godhavn, on *Stereocaulon* sp., July 1968, Brodin & Ehrenroth (UPS). NE of the Arctic Station, alt. 20 m, on *S. vesuvianum* Pers., 1982, Poelt & Ullrich (GZU).
Holsteinsborg d., Dragefjeldene, 66°17′N, 53°13′W, on *S. depressum* (Frey) Lamb, 13 July 1958, Hansen 496 (C).
Ivigtut d., mountains SW of Ivigtut town, alt. 350 m, on the ground in late snow patch on *S. depressum*, 10 July 1946, Skytte Christiansen 5512 (herb. Christiansen). Alt. 125 m, on *S. arenarium* (Sav.) M. Lamb, Skytte Christiansen 5520 (herb. Christiansen). Grønnedal, 61°14′N, alt. 100 m, boulders in scree, on *S. vesuvianum* Pers., 9 July 1946, Skytte Christiansen 5506 (herb. Christiansen).

5. **Cercidospora ulothii** Körber (1865: 466)
Description: Hafellner (1987: 362–363).
Distribution: Europe, N. America and Greenland.
Report from Greenland: Branth (1895: 90).
Hosts: *Lecanora muralis* (Schreber) Rabenh. group, the report from Greenland is on *Rhizoplaca chrysoleuca* (Sm.) Zopf.

Note: The species is closely related to *C. epipolytropa*, differing in spore shape (Hafellner loc. cit.). As *C. epipolytropa* is here reported on *Rhizoplaca melanophthalma* (identified by J. Hafellner), and *C. ulothii* after his opinion only occurs on the *Lecanora muralis* group, Branth's identification may be erroneous.

Clypeococcum D. Hawksw. (1977a: 196)
Type species: *Clypeococcum cladonema* (Weddell) D. Hawksw.
Number of species: Four, all lichenicolous fungi (see Øvstedal & Hawksworth 1986: 58).

1. **Clypeococcum grossum** (Körber) D. Hawksw. (1982a: 379)
Tichothecium grossum Körber (1865: 469)
Distribution: Norway, Canada (British Columbia), Greenland and New Zealand.
Hosts: *Umbilicaria vellea* (L.) Ach., *U. cylindrica* (L.) Delise ex Duby and *U. polyphylla* (L.) Baumg., forming black galls up to one mm diam. on both sides of the host thallus.

Specimens: Ivigtut d., along the path to Grønnedal, alt. 0–100 m, rock facing south, on *U. vellea*, 24 Sept. 1946, Skytte Christiansen 5324 (herb. Christiansen).
Narssaq d., Kvanefjeld, 60°59′N, 46°00′W, alt. 555 m, on *U. cylindrica*, July 24 1978, Alstrup 243936b (C).

Dacampia Massal. (1853: 7)
Type species: *Dacampia hookeri* (Borrer) Massal.
Number of species: Three, all lichenicolous fungi.
Description: Crivelli (1983: 192–196).

1. **Dacampia hookeri** (Borrer) Massal. (1853: 7)
Pleospora hookeri (Borrer) Keissler (1930: 503)
Verrucaria hookeri Borrer (in Smith & Sowerby 1831: Tab. 2622)
Description: Hawksworth (1975a: 196–197).
Distribution: Europe and Greenland.
Reports from Greenland: Lynge (1940) and Alstrup (1979, 1981).
Hosts: *Solorina saccata* (L.) Ach and *S. octospora* (Arnold) Arnold, transforming the thallus into a thick soft tissue not recognizable as a *Solorina* thallus.

Dactylospora Körber (1855: 271)
Type species: *Dactylospora floerkei* Körber (*D. parasitica* (Flörke) Zopf).
Number of species: About 30, including the three described here, most are lichenicolous or saprophytic on wood.
Descriptions: Bellemère & Hafellner (1982) and Hafellner (1979b: 90–93).

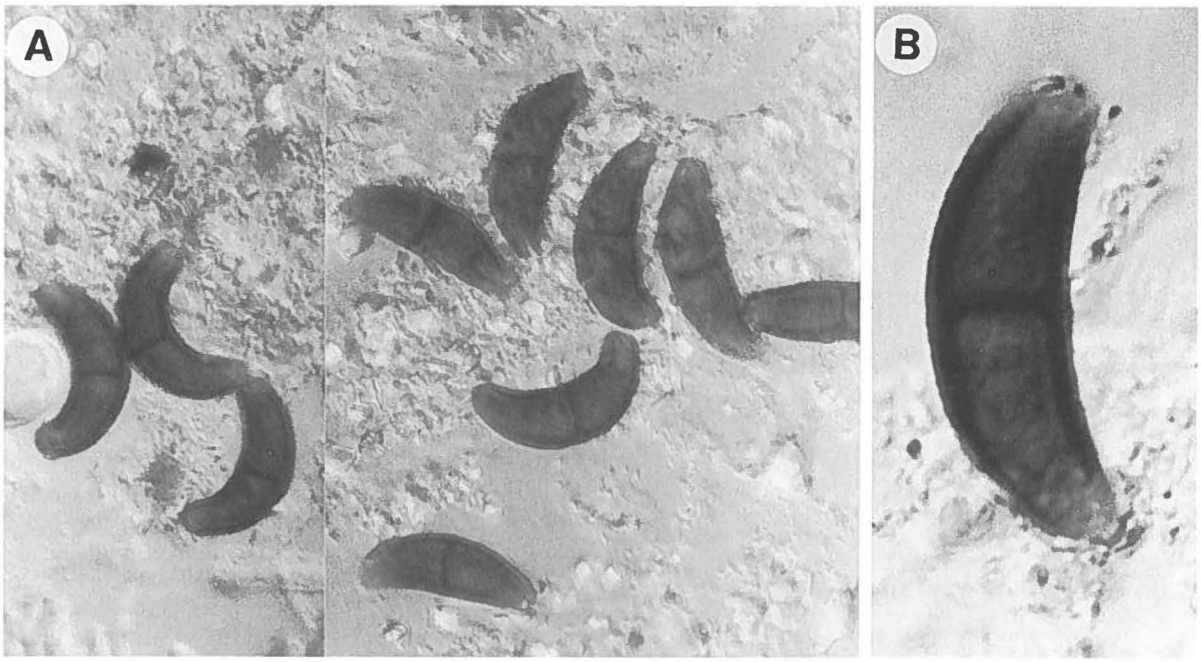


Fig. 6. *Dactylospora allantoidea* (Christiansen 5573, holotype) on *Parmelia pulla*. A: Ascospores (x 800). B: Ascospore (x 2200).

1. **Dactylospora allantoidea** Alstrup & D. Hawksw. *sp. nov.*
Fig. 6.

Ascomata apothecia, superficialia, ad basim constricta, nigra, 0.3–0.4(–0.5) mm diam., convexa; excipulum exclusescens, e cellulis pseudoparenchymaticis atrobrunneis compositum; epithecium atrobrunneum; hymenium 75–95 µm altum; hypothecium atrobrunneum, valde evolutum, fere stipitatum, 90–170 µm altum. Paraphyses (2–)2.5–3.5 µm latae, plerumque simplices, superne ramosae, apicibus capitatis, atrobrunneis, 5–6 µm latis. Asci elongato-clavati, interne I–, 50–75 × 12.5–17.5 µm, 8-spori. Ascosporae late allantoideae, 1-septatae, brunneae, leviter verruculosae, (24.5–)26–28 × 8–9(–10) µm.
Typus: Groenlandia, Holsteinsborg d., head of the northern branch of Søndre Strømfjord (Kangerdlugssuaq), south slope of Mt. Hassel, N of the airport, 67°N, alt. 50–100 m, on *Parmelia pulla* Ach. on a boulder, 28 July 1946, Skytte Christiansen 5573 (herb. Christiansen-holotypus).

Ascomata apothecia, superficial, constricted below, arising singly or aggregated in groups of 3–4 on the host thallus, black, 0.3–0.4(–0.5) mm diam., convex; exciple dark brown to black, becoming excluded as the apothecia mature, composed of radially orientated chains of dark brown rounded pseudoparenchymatous cells, elongated internally and 8–10 µm diam. at the margins; epithecium dark brown, 10–15 µm tall; hymenium 75–95 µm tall; hypothecium massively developed, dark brown, composed of compacted rounded pseudoparenchymatous cells similar to those of the exciple, becoming hyphal-like and penetrating into the algal layer of the host thallus, forming a layer 90–170 µm tall. Hamathecium of paraphyses, septate, branched mainly below the tips, (2–)2.5–3.5 µm wide, the end cells swollen, dark brown, capitate, 5–6 µm wide; hymenium and occasionally capitate cells I+ blue. Asci elongate-clavate, lecanoralean, strongly thickened at the apex, with a distinct internal truncated apical beak when young, discharge not seen, outer gelatinous coat I+ blue, internal wall layers and apical tissues I–, 50–75 × 12.5–17.5 µm, 8-spored. Ascospores irregularly distichously arranged in the asci, broadly allantoid, apices ± rounded, 1-septate, cells ± equal in size, not constricted at the septum, brown, finely verruculose, (24.5–)26–28 × 8–9 (–10) µm.

Distribution: Greenland, known only from the type collection.
Host: *Parmelia pulla* Ach., thallus. Infected portions of the thallus become bleached and are easily fragmented, indicating that the fungus is pathogenic to this host.

Notes: The distinctive shape and the size of the ascospores easily separate this species from all other members of the genus currently recognized. The ascospores are larger than reported in any other 1-septate spored species of the genus (Hafellner 1979b). Verruculose ascospores are a further unusual feature for this fungus. However, the structure of the asci, their reaction in iodine, the structure of the exciple, and the paraphyses suggest that it is congeneric with the type species of *Dactylospora*, *D. parasitica* (Flörke) Zopf.

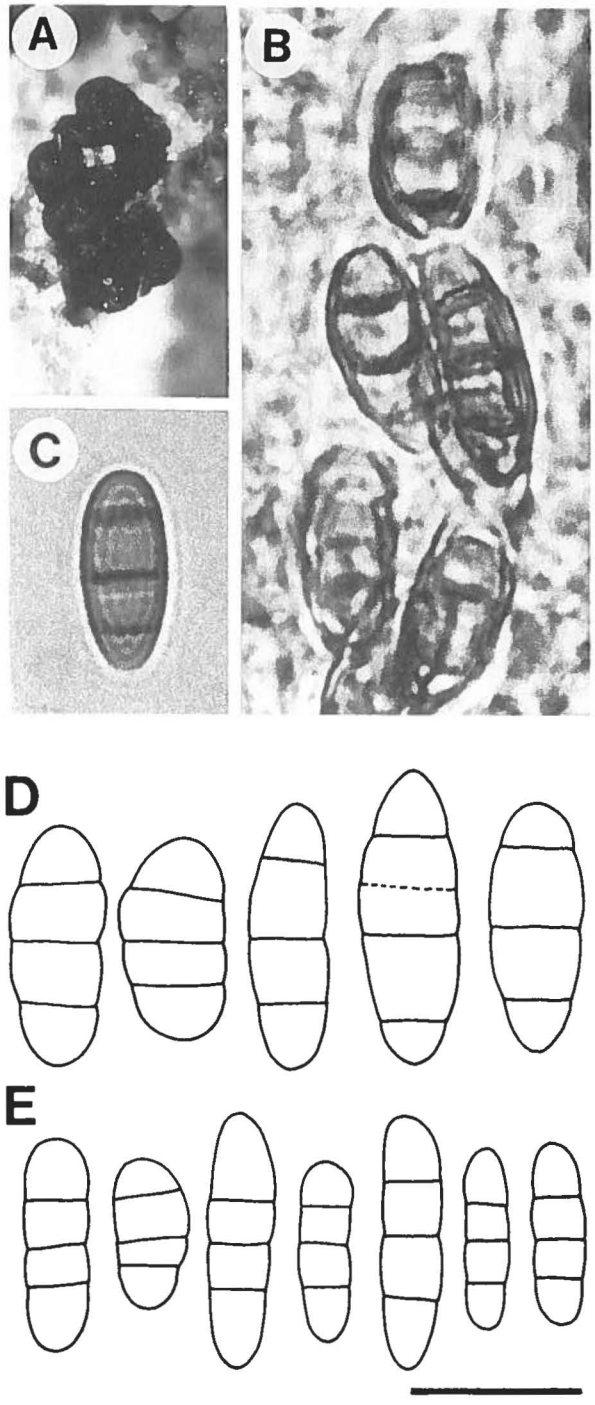


Fig. 7. A-D: *Dactylospora aspiciliicola* (Alstrup 801381, holotype) on *Aspicilia leucophyma*. A: Group of ascomata (x 50). B: Ascus with maturing ascospores (x 2200). C: Ascospore (x 2200). D: Ascospore outlines. E: *D. parasitica* (the British Isles, Carmarthenshire, Whiteland Abbey, on *Pertusaria albescens* (Huds.) Choisy & Werner, 20 Sept. 1972. (Rose, IMI 240223); ascospore outlines. Scale D-E = 10 µm.

2. **Dactylospora aspiciliicola** Alstrup & D. Hawksw. *sp. nov.*

Fig. 7 A–D.

Ascomata apothecia, superficialia, ad basim constricta, aggregata, nigra, 0.2–0.3 mm diam.; excipulum exclusescens, ex hyphis ad cellulis plusminusve pseudoparenchymaticas compositum, atrobrunneum; epithecium atrobrunneum; hymenium 45–55 µm altum; hypothecium atrobrunneum, continuum cum excipulis. Paraphyses 1.5–2.5 µm latae, ramosae et interdum anastomosantes, apicibus capitatis, brunneis, 2.5–4 µm latis. Asci elongato-clavati, interne I−, 35–45 × 10–12 µm, 8-spori. Ascosporae ellipsoideae, (2–)3(–4)-septatae, brunneae, laeves, (10.5–)12.5–14.5(–15.5) × 5–5.5(–6) µm.

Typus: Groenlandia, Narssaq d., W of Agpat, 60°56′N, 45°49′W, alt. 100 m, on *Aspicilia leucophyma* (Leighton) Hue on a seepage, 7 Aug. 1980, Alstrup 801381 (C-holotypus).

Ascomata apothecia, superficial, constricted below, arising in densely aggregated groups of 4–8, often arising from a common subiculum, black, 0.2–0.3 mm diam., plane to slightly convex, often angular by compression; exciple black, at first distinct, but becoming almost excluded with age, composed of radially arranged compacted dark brown thick-walled short-celled hyphae, ± pseudoparenchymatous in parts, becoming black at the margin, 35–50 µm wide in vertical section and continuing down into a stipe-like base, cells mainly 2–3 µm wide; epithecium dark brown, 10–15 µm tall; hymenium 45–55 µm tall, I+ blue, hypothecium dark brown, well-developed, similar in nature to the exciple with which it is ± continous. Hamathecium of paraphyses, branched and also sometimes anastomosed, 1.5–2.5 µm thick, the apical cells ± swollen, brown, capitate, 2.5–4 µm wide. Asci elongate-clavate, lecanoralean, thick-walled, especially at the apex, outer sheath I+ blue, internally all tissues I−, 35–45 × 10–12 µm, 8-spored. Ascospores distichously arranged in the asci, ellipsoid, apices rounded, (2–)3(–4)-septate, not or slightly contricted at the septa, brown, smooth-walled, (10.5–)12.5–14.5(–15.5) × 5–5.5(–6) µm.

Host: On *Aspicilia leucophyma*, thallus. The infected areas become blackened due to the development of the aggregated groups of ascomata.

Distribution: Greenland, known only from the type collection.

Notes: This species is close to *D. parasitica* (Flörke) Zopf (Fig. 7 E), which it resembles in the dark brown hypothecium and predominantly 3-septate ascospores which are similar in length, but differ in their generally broader shape. In *D. aspiciliicola* the length:breadth ratio of the ascospores is 2.1–2.4(–2.8), whereas in *D. parasitica* the ratio is (2.1–)3.5–4.7. *D. parasitica* is only known as a commensal of corticolous *Ochrolechia* and *Pertusaria* species. *D. parellaria* (Nyl.) Arnold, on thalli of *O. parella* (L.) Massal. differs from *D. aspiciliicola* in having a paler greyish brown epithecium and hypothecium, and ascospores which are extremely variable in septation, 1-septate ascospores tending to predominate in the collections we have seen.

3. **Dactylospora rinodinicola** Alstrup & D. Hawksw. *sp. nov.*

Fig. 8.

Ascomata apothecia, superficialia, ad basim constricta, aggregata, nigra, (0.1–)0.15–0.2 mm diam.; excipulum persistens, elevatum, e cellulis pseudoparenchymaticis angularibus et atrobrunneis compositum; epithecium brunneum, ruidimentum; hymenium 40–50 µm altum; hypothecium atrobrunneum. Paraphyses 1.5–2 µm latae, ramosae et anastomosantes, apicibus non valde capitatis. Asci late clavati, interne I−, 35–40(–50) × 10–12 µm, 8-spori. Ascosporae anguste ellipsoideae, (1–)3–4(–6) septatae, rubro-brunneae, laeves, (15.5–)17–20(–24.5) × (4.5–)5–6.5 µm.

Typus: Groenlandia, Ivigtut d., Ivigtut town, 61°12'N, alt. 350 m, on apothecia and thalli of *Rinodina turfacea* (Wahlenb.) Körber growing on dead plant remains, 10 July 1946, Skytte Christiansen 5523 (herb. Christiansen-holotypus).

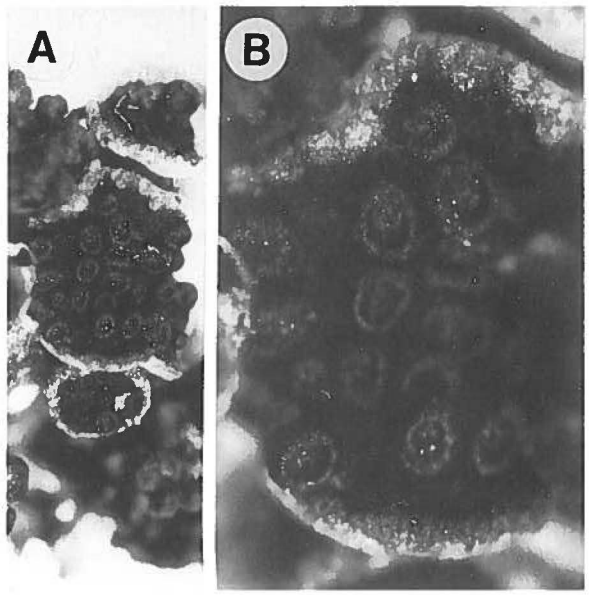
Ascomata apothecia, superficial, constricted below, densely crowded together with up to 25 in a single apothecial disc of the host, more rarely on the thallus and then dispersed, concave, black, (0.1–)0.15–0.2 mm diam.; exciple persistent, swollen and raised above the surface of the disc, 20–25 µm thick in surface view, composed of compacted dark brown angular pseudoparenchymatous cells mainly 3.5–6 µm diam.; epithecium brown, poorly developed; hymenium 40–50 µm tall; hypothecium dark brown, 15–25 µm thick, similar in structure to the exciple. Hamathecium of densely branched and anastomosed paraphyses, 1.5–2.5 µm thick, the apical cells scarcely thickened and pale brown; centrum I+ blue. Asci broadly clavate, lecanoralean, thick-walled, the apex strongly thickened, especially when young, discharge by an extrusion of the inner wall layers, outermost gelatinous layer I+ blue, internal tissues all I−, 35–45(–50) × 10–12 µm, 8-spored. Ascospores distichously arranged in the asci, narrowly ellipsoid, rounded at the ends, the lower cell sometimes attenuated, (1–)3–4(–6)-septate, not or scarcely constricted at the septa, red-brown, smooth-walled, (15.5–)17–20(–24.5) × (4.5–)5–6.5 µm.

Distribution: Greenland, known only from the type collection.

Host: *Rinodina turfacea*, as densely crowded apothecia on the apothecia of the host, but also scattered on the thallus surface.

Notes: This species is closest to *D. urceolata* (Th.Fr.) Arnold (see below). However, in that species the ascospores are mainly 5(–7)-septate, the apothecia reach 0.5 mm diam., and the exciple is much thinner and can become excluded.

The narrow and richly brached and anastomosed paraphyses are distinctive for the type species of the genus, which we suspect may be too broadly circumscribed at the present time.



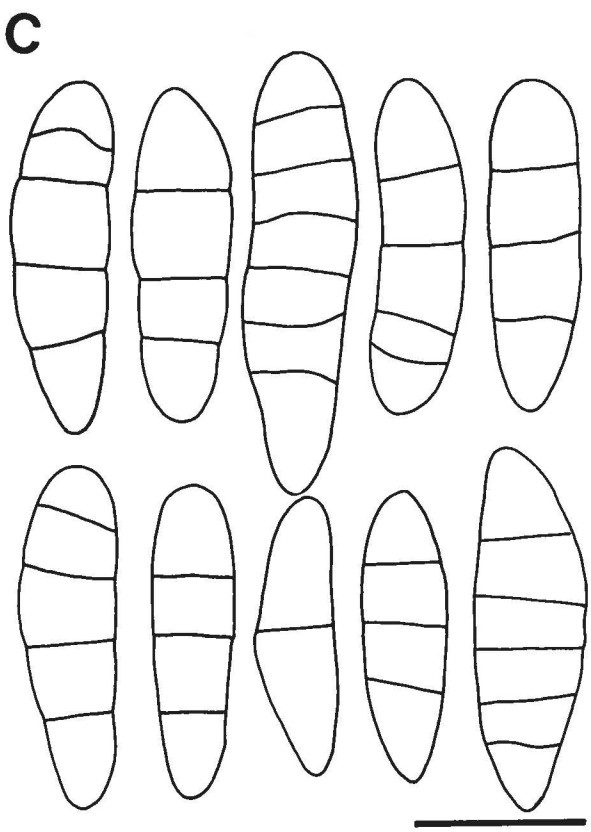


Fig. 8. *Dactylospora rinodinicola* (Christiansen 5523, holotype) on *Rinodina turfacea*. A: Ascomata on the host apothecium (x 20). B: As A (x 50). C: Ascospore outlines. Scale C = 10 µm.

4. **Dactylospora saxatilis** (Schaerer) Hafellner (1979b: 129)
Calicium saxatile Schaerer (1821: 35)
Buellia saxatilis (Schaerer) Körber (1855: 228)
Description: Hafellner (1979b: 129–135).
Distribution: Europe, N. Africa, Alaska and Greenland.
Reports from Greenland: Branth (1895) and Lynge (1937).
Hosts: *Pertusaria* spp.

Note: We have not seen any material of this species amongst the collections we have examined and the identity of these early reports merits verification.

5. **Dactylospora urceolata** (Th. Fr.) Arnold (1874: 173)
Buellia urceolata Th. Fr. (1860: 233)
Leciographa urceolata (Th. Fr.) Körber (1865: 464)
Description: Keissler (1930: 233–235).
Distribution: Europe, Greenland and N. America.
Reports from Greenland: Branth (1892), Branth & Grønlund (1887) and Fries (1860).
Hosts: Reported on various species of *Biatora, Caloplaca, Gyalecta, Lopadium, Ochrolechia, Protothelenella, Psoroma* and *Rinodina;* found as dispersed black apothecia in the host thallus.

Note: According to R. Santesson (in litt. 1988) the var. *majuscula* Th. Fr. on *Lopadium* probably represents a separate species. That may also be the case for var. *dimidiata* (Th. Fr.) Th. Fr. with 3-septate spores found on *Lecidea cuprea* Sommerf.

Specimens: Disko, Nordre Laksebugt, 69°38'N, 54°49'W, alt. 10 m, on *Psoroma hypnorum* (Vahl) Gray, 12 Aug. 1951, Gelting 14395a (C, UPS). Nordfjord, W of Kugssinerssuaq, 69°58'N, 54°24'W, alt. 30–70 m, on *Lopadium coralloideum* (Nyl.) Lynge, 13 Aug. 1975, Alstrup 75–97 (C).
Sukkertoppen d., head of Sønder Isortoq, 65°33'N, 51°44'W, alt. 75 m, on *Biatora vernalis* (L.) Fr. (thallus), 12 July 1977, Alstrup 77232a (C).

Deichmannia Alstrup & D. Hawksw. *gen. nov.*
Coloniae sporodochiae, nigrae; mycelium immersum, plusminusve hyalinum. Conidiophora macronemata, aggregata, parce ramosa, subcylindrica, brunnea. Cellulae conidiogenae probaliter monoblasticae, integratae, terminales, subcylindricae, brunneae ad pallide brunneae, interdum verrucosae. Conidia singularia, sicca, non catenata, late ellipsoidea ad globosa, 1(–2)-septata, brunnea, grosse verrucosa.
Type species: *Deichmannia verrucispora* Alstrup & D. Hawksw. (holotypus).

Colonies sporodochial, black; mycelium immersed, ± hyaline. Conidiophores macronematous, aggregated, sparsely branched, subcylindrical, brown. Conidiogenous cells probably monoblastic, integrated, terminal, subcylindrical, brown to pale brown, conidia perhaps produced from an irregular broad apical pore, but not observed in detail. Conidia arising singly, dry, not catenate, broadly ellipsoid 1(–2)-septate, brown, coarsely verrucose.

Number of species: Monotypic.
Distribution: Greenland.

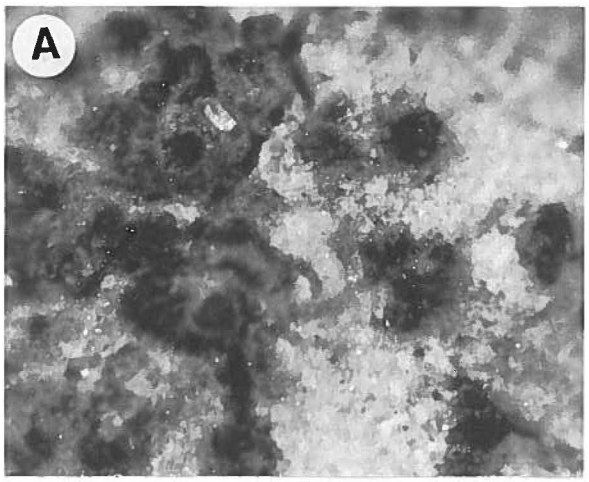
Notes: This distinctive new genus of lichenicolous Hyphomycetes is readily separated from other sporodochial genera by the elongate, discrete conidiogenous cells, apparent method of conidiogenesis and the rough-walled, generally 1-septate conidia.

In *Milospium* D. Hawksw. the conidia are lobate and unevenly thickened, and in *Sclerococcum* Fr. the conidia are formed from vertical chains of aggregated subglobose to polyhedral cells and not elongate, discrete conidiophores. The conidia recall *Nigropuncta* D. Hawksw. to some extent, but in that genus the conidia are produced in an acervulus, not a sporodochium. In *Monodictys* S. Hughes, which includes a few lichenicolous species, the conidia arise monoblastically from short, pale often hyphal-like conidiogenous cells. Among other hyphomycete genera, *Pseudoepicoccum* M. B. Ellis has polyblastic conidiogenous cells and only simple conidia, and *Spilodochium* H. Sydow has rounded conidiogenous cells with the conidia arising in branched chains. The primarily corticolous and lignicolous genera *Coniosporium* Link and *Trimmatostroma* Corda were also considered, but in both these cases the conidia arise in long chains from meristematic conidiophores and not from discrete conidiogenous cells as appears to be the case in *Deichmannia.* Even though the precise nature of the conidiogenesis could not be determined, there seems no doubt, on the basis of other characters, that this fungus merits recognition as a distinct genus.

The new generic name is introduced in honour of Jakob Severin Deichmann Branth (b. 1831–d. 1917) who published lichen floras with references to lichenicolous fungi of Greenland, the Faroe Islands and Denmark.

1. **Deichmannia verrucispora** Alstrup & D. Hawksw. *sp. nov.*
Fig. 9.
Coloniae sporodochiae, superficiales, nigrae, tuberculatae, 0.1–0.2(–0.25) mm diam.; mycelium immersum, plusminusve hyalinum, e hyphis 2–3 µm latis compositum. Conidiophora macronemata, aggregata, parce ramosa, subcylindrica ad elongato-ampulliformia, brunnea, 10–15 × 4–7 µm. Cellulae conidiogenae probaliter monoblasticae, integratae, terminales, subcylindricae, brunneae vel pallide brunneae vel subhyalinae, laeves vel verrucosae, 10–25 × 3.5–5 µm. Conidia singularia, sicca, plerumque late ellipsoidea et 1-septata, brunnea, grosse verrucosa, 9–11(–12.5) × 6.5–8(–9) µm, vel 2-septata et 12–15 × 10–11 µm, vel globosa et 6.5–8 µm diam.
Typus: Groenlandia, Gem. Umanak, Hänge über Mârmorilik, on *Diploschistes muscorum* (Scop.) R. Sant., Aug. 1983, Poelt & Ullrich (GZU-holotypus; IMI 331023, slides-isotypus).

Colonies forming discrete sporodochia on the surface of the host thallus, black, irregularly circular, tuberculate, arising singly or sometimes loosely aggregated or confluent, 0.1–0.2(–0.25) mm diam.; mycelium immersed in the host tissues, penetrating through to the algal



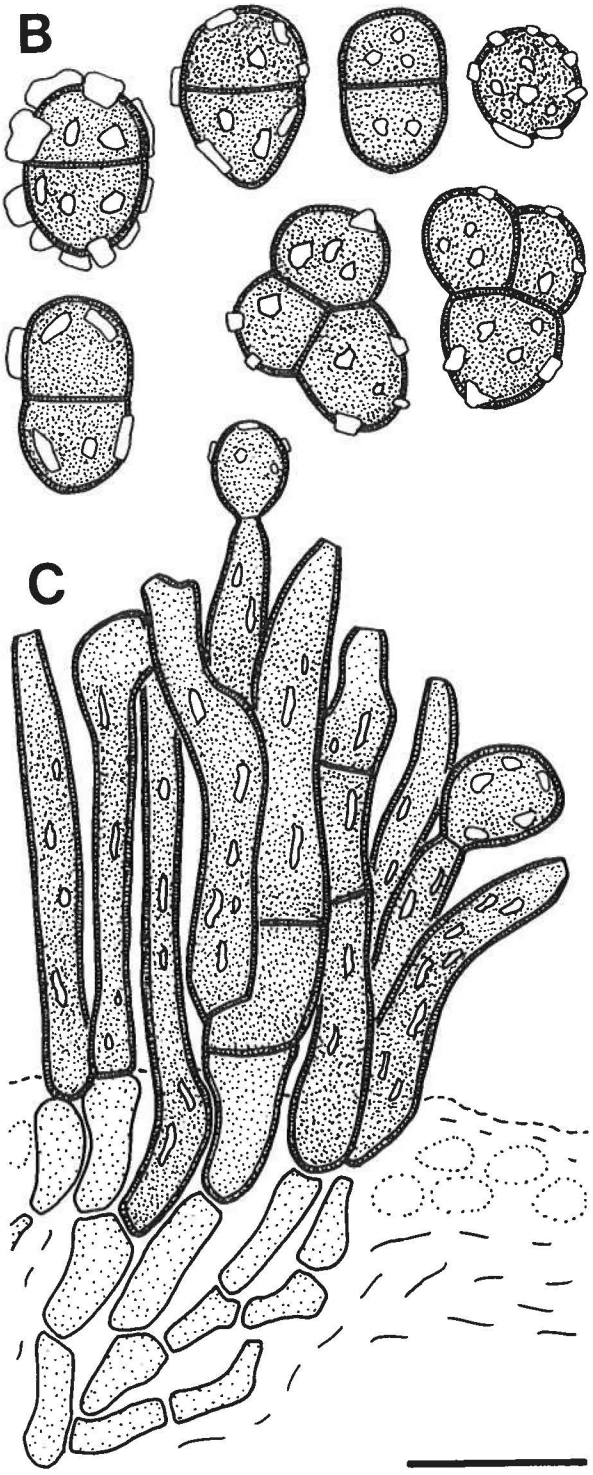


Fig. 9. *Deichmannia verrucispora* (Poelt & Ullrich, holotype) on *Diploschistes muscorum*. A: Habit (x 50). B: Conidia. C: Conidiophores and conidiogenous cells. Scale B-C = 10 µm.

layer, composed of ± hyaline hyphae 2–3 µm wide. Conidiophores macronematous aggregated into compact sporodochia, sparsely branched, brown, subcylindrical to somewhat ampulliform below, 10–15 × 4–7 µm. Conidiogenous cells apparently monoblastic, integrated, terminal, subcylindrical, brown to pale brown or sometimes almost subhyaline, smooth or unevenly verrucose, the conidia perhaps produced from an irregular broad apical pore, but not observed in detail, 10–25 × 3.5–5 µm. Conidia arising singly, dry, mainly ellipsoid and 1-septate, sometimes constricted at the septum or with the cells unequal in size, brown, irregularly coarsely verrucose, 9–11(–12.5) × 6.5–8(–9) µm, also forming 2-septate conidia 12–15 × 10–11 µm and globose conidia 6.5–8 µm diam.
Host: *Diploschistes muscorum* thallus, forming extensive black-flecked areas, but perhaps commensalistic rather than pathogenic.
Distribution: Greenland, known only from the type collection.

Notes: The precise method of conidiogenesis could not be elucidated conclusively as the conidia were readily detached from the conidiogenous cells during sectioning and mounting; this merits more critical examination to verify the interpretation given above.

Didymella Sacc. ex Sacc. (1880b 57)
Type species: *Didymella exigua* (Niessl.) Sacc.
Number of species: About 75, mostly on vascular plant stems, but reputedly including 12 lichenicolous fungi.
Description: Sivanesan (1984: 406).

1. **Didymella sphinctrinoides** (Zwackh) Berl. & Vogl. (in Saccardo 1886: 89)
Endococcus sphinctrinoides Zwackh (1864: 88)
?Epicymatica borealis Sacc. (1882: 572)
?Didymella sphinctrinoides var. *borealis* (Sacc.) Vouaux (1913: 92)
Description: Vězda (1963).
Distribution: Greenland, Europe and China.

Fig. 10. *Echinothecium glabrum* (A-D, Alstrup 75–88, holotype; E-F, Alstrup 761080). A: Mycelium forming a superficial ▶ network on *Ocholechia upsaliensis*, note also the ascomata (x 35). B: Superficial mycelium (x 400). C: Vertical section of ascoma (x 400). D: Vertical section of ascoma wall and ascus (x 800). E: Ascoma surface view (SEM, x 1600). F: Ornamented peridial cells of ascoma (SEM, x 13.300).

Reports from Greenland: ?Fries (1879), ?Saccardo (1882) and Alstrup (1981).
Hosts: Species of *Collema* and *Leptogium, Clauzadeana metzleri, Lecanora dispersa, L. epibryon, Caloplaca stillicidiorum, Protoblastenia rupestris, Xanthoria parietina* and *Physcia magnussonii. Physcia* is a new host genus, in which the aggregated black perithecia are found especially along the thallus margin.

Notes: The generic position of this species merits a critical reassessment. Saccardo's epithet was based on the description of an unnamed *Sphaeria* no. 9 by Fries (1879: 370) on an unidentified sterile crustose lichen from Westward Ho!. The type material could not be located in BM, K or UPS and is presumed lost. The placement here must be regarded as tentative, especially as the ascospores were given as 15–17 × 7–9 µm only.

Specimens: Narssaq d., 1 km S of Qagssiarssuk, 61°08'N, 45°32'W, alt. 140 m, on *Physcia magnussonii* Frey, 5 Aug. 1980, Alstrup 801314 (C).

Echinothecium Zopf (1898: 250)

Type species: *E. reticulatum* Zopf.
Description: Keissler (1930: 327–329).
Number of species: Three, all exclusively lichenicolous, including the new species described below.

Note: The genus is generally referred to the family Capnodiaceae Theissen & Sydow, albeit tentatively (Eriksson & Hawksworth 1988: 136), and distinguished primarily by the lichenicolous habit. Arx & Müller (1975: 113) separate it from *Archaeobotrys* Batista & Ciferri by the presence of setae on the ascomata and due to the hyaline rather than brown ascospores. The discovery of a non-setose obviously congeneric lichenicolous species *E. glabrum* brings this into question. It merits a critical consideration in future treatments of generic concepts in the capnodiaceous fungi.

1. **Echinothecium glabrum** M. S. Christ., Alstrup & D. Hawksw. *sp. nov.*
Figs 10, 11.
Coloniae superficiales; mycelium atrobrunneum, parce ramosum, reticulis compositum. Ascomata superficialia, nigra, plusminusve globosa, ostiolata, nuda, (25–)30–50(–60) µm diam., muris 8–12 µm latis, e cellulis pseudoparenchymaticis et polyedricis rubrobrunneis compositis. Hamathecium desunt. Asci late saccati, bitunicati, 20–25×10–15 µm, 8-spori. Ascosporae ellipsoideae, hyalinae, 1-septatae, laeves, (7.5–)9–12(–14.5) × (4–)4.5–5(–5.5) µm.
Typus: Groenlandia, Disko, Nordfjord, W of Perdlertut kûat, 69°58'N, 54°27'W, alt. 200 m, on *Ochrolechia upsaliensis* (L.) Massal., 11 Aug. 1975, Alstrup 75–88 (C-holotypus).

Colonies spreading over the surface of the host; mycelium superficial, dark brown, sparsely branched, approximately at right angles and forming a reticulum, hyphae torulose, cells subglobose to quadrangular, dark reddish brown, thick-walled, walls irregularly verrucose through splitting of the outer wall layers, 5–7.5 µm thick. Ascomata entirely superficial, arising directly from the mycelium, black, ± spherical, ostiolate, (25–)30–50(–60) µm diam., ascomatal walls lacking sterile hair-like protrusions, 8–12 µm thick, of 1–2 layers of reddish brown thick-walled polyhedral pseudoparenchymatous cells 8–10 µm diam. Hamathecium absent. Asci broadly saccate, only 3–4 developing at one time in each ascoma, thick-walled throughout, lacking any special apical apparatus, bitunicate in structure, discharge not seen, 20–25 × 10–15 µm, 8-spored. Ascospores irregularly distichously arranged in the asci, ellipsoid, apices rounded, hyaline, 1-septate, not or slightly constricted at the septum, the lower cell often somewhat narrow, smooth, (7.5–)9–12(–14.5) × (4–)4.5–5(–5.5) µm.

Hosts: *Ochrolechia frigida* (Swartz) Lynge, *O. grimmiae* Lynge, *O. lapuensis* (Räsänen) Räsänen, *O. tartarea* (L.) Massal., *O. upsaliensis* (L.) Massal., *Cladonia pocillum* (Ach.) O.-J. Rich., *Sphaerophorus fragilis* (L.) Pers. and *Arctoparmelia separata* (Th. Fr.) Hale, forming a black reticulate net over the thallus surface and thalline exciple of the apothecia.
Distribution: Greenland.

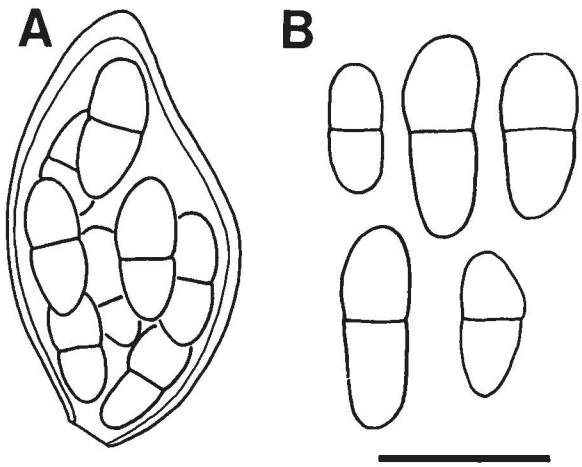
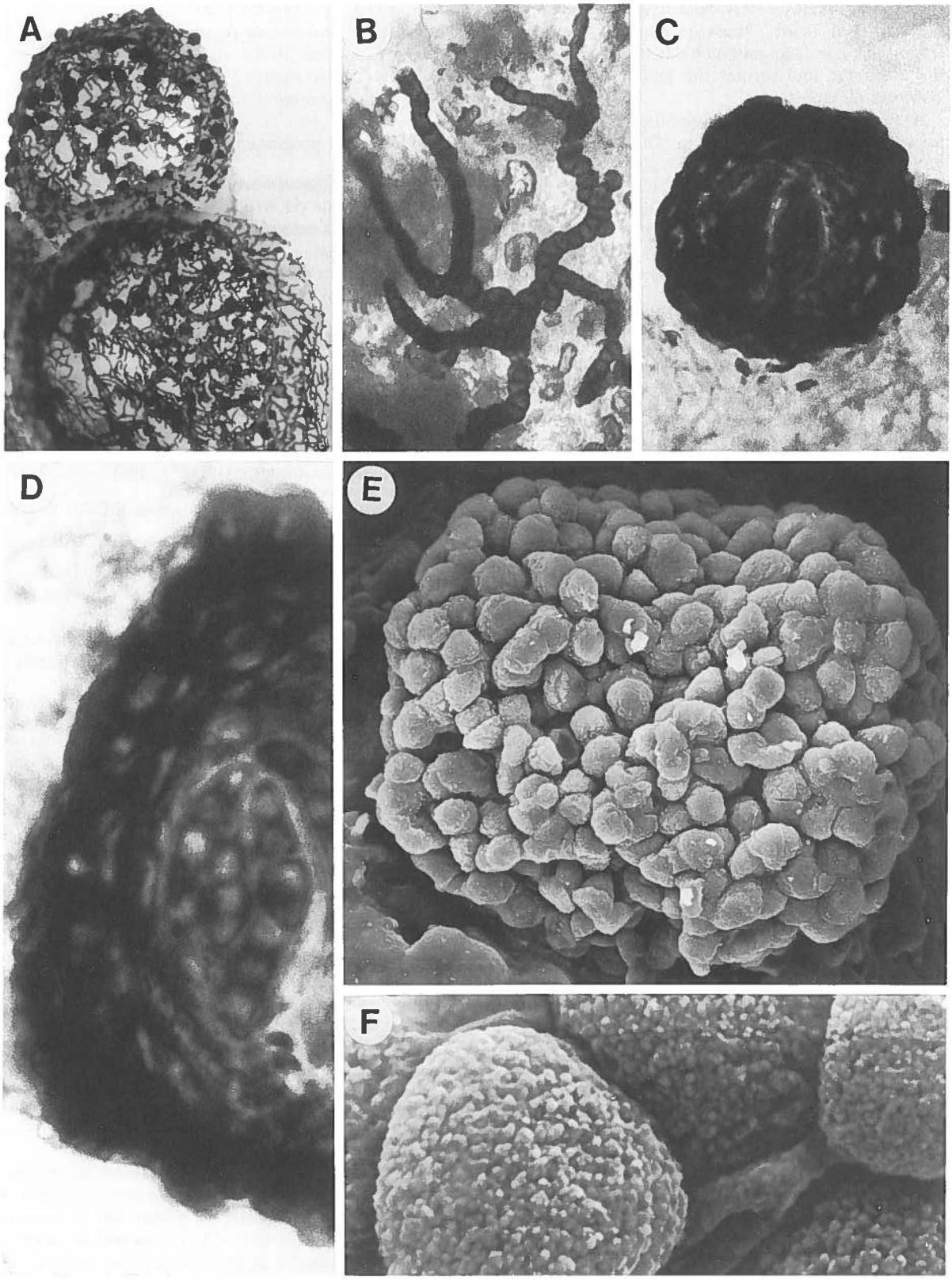


Fig. 11. *Echinothecium glabrum* (Alstrup 75–88, holotype). A: Ascus. B: Ascospores. Scale = 10 µm.


A
B
C
D
E
F

Notes: This species is very close to *Echinothecium reticulatum* Zopf, which occurs on *Parmelia* species, and from which it is distinguished by the absence of setae on the ascomata, and further the tendency of the ascospores to be larger.

A fungus superficially resembling *E. glabrum* was found on *Tephromela armeniaca* (DC.) Hertel & Rambold (Narssaq d., south slope of Narssaq Fjeld, alt. 160 m, 21 July 1978, Alstrup 243924b, C); unfortunately no ascospores could be found, so it cannot be definitely referred here.

Additional specimens: Narssaq d., Kangerdluarssuk, mountain S of Laksedalen, 60°53′N, 45°46′W, alt. 335 m, on *O. tartarea,* 16 July 1978, Alstrup 243891q (IMI 331032); same loc., alt. 300 m, on *O. frigida,* Alstrup 243896p (C); same loc., alt. 310 m, on *O. tartarea,* Alstrup 243895n (C); same loc., alt. 332 m, *O. frigida,* Alstrup 243892o (C); same loc., alt. 340 m, on *O. frigida,* Alstrup 243893p,q (C); same loc., alt. 300 m, on *Sphaerophorus fragilis,* Alstrup 243894a (C). Kangerdluarssuk, south shore of fiord, alt. 90 m, on *O. frigida,* 31 July 1978, Alstrup 243961a (C).
Sukkertoppen d., head of Sønder Isortoq, S of river Isuitsup kûa, alt. c. 50 m, on *O. lapuensis,* 9 July 1977, Alstrup 77095 (C). N of Averlerqup taserssua, S of lake, 65°31′N, 51°41′W, alt. 525 m, on *O. frigida,* 15. July 1977, Alstrup 77343 (C).
Holsteinsborg d., the cove Pâ at the mouth of Søndre Strømfjord, 66°0′N, alt. 50–100 m, on *O. frigida,* 23 July 1946, Skytte Christiansen 5549, 5550 and 5552 (herb. Christiansen). Head of Søndre Strømfjord, south coast of Nakajanga along Umîvît, alt. 25 m, on *Arctoparmelia separata,* 21 Aug. 1946, Skytte Christiansen 5477 (herb. Christiansen). Head of Søndre Strømfjord, N of the airport, scree at foot of Mt. Hassel, 50–100 m, on *A. separata,* 1946, Skytte Christiansen 5576, 5443 and 5448 (herb. Christiansen).
Godthåb d., Sârdloq, 64°23′N, 51°42′W, on *O. frigida,* Aug. 1976, Alstrup 761080 (C).
Egedesminde d., Egedesminde town, 68°42′N, 52°43′W, on *O. frigida,* Brown, June 1867 (BM).
Umanak d., SE of Mârmorilik, Sydsø, 480–550 m, on *Cladonia pocillum,* Aug. 1983, Poelt & Ullrich (GZU).
West Greenland, without locality, on *O. grimmiae,* Brown 1867 (BM, filed under *O. frigida*).

2. **Echinothecium reticulatum** Zopf (1897: 243)
Description: Keissler (1930: 329).
Distribution: Europe, Greenland and British Columbia.
Report from Greenland: Gelting (1956: 244).
Hosts: *Parmelia saxatilis* (L.) Ach., more rarely on *P. omphalodes* (L.) Ach. and *P. fraudans* (Nyl.) Nyl., forming a black reticulate net over the host thallus.

Specimens: Sukkertoppen d., Qivâqe, 65°27′N, 52°33′W, alt. 40 m, on *P. saxatilis,* 7 Aug. 1977, Alstrup 771065 (C).
Holsteinsborg d., Itivdlinguaq, midway in Søndre Strømfjord north shore, alt. 50–150 m, on *P. omphalodes,* 24.vii.1946, Skytte Christiansen 5571 and 5559 (herb. Christiansen). Head of Søndre Strømfjord, Mt. Hassel, 67°N, alt. 50–100 m, on *P. fraudans,* 31 July 1946, Skytte Christiansen 5580; 30 July 1946 Skytte Christiansen 5582 and 18 Aug. 1946, Skytte Christiansen 5470 (herb. Christiansen).
Disko, Godhavn, Arktisk Station, west facing rock, alt. 25 m, on *P. saxatilis,* 20 March 1952, Gelting 17288a (UPS).
Nûgssuaq, Aternikerdluk, alt. 15–20 m, on *P. saxatilis* on sandstone, 28 July 1950, Gelting (UPS).

Endococcus Nyl. (1855: 193)
Type species: *Endococcus rugulosus* Nyl.
Number of species: 10–12, all lichenicolous fungi.
Description: Hawksworth (1979b: 285).
Distribution: Cosmopolitan.

1. **Endococcus propinquus** (Körber) D. Hawksw. (1979b: 287)
Microthelia propinqua Körber (1855: 374)
Distribution: Europe, Greenland and N. America.
Hosts: On a wide range of crustose, saxicolous lichens, seen as dispersed, ± immersed, black perithecia. The host thallus turns grey, and eventually the formation of host apothecia may be suppressed.

Specimens: Narssaq d., Laksedalen, 60°54′N, 45°47′W, alt. 230 m, on *Rhizocarpon* sp., 4 July 1978, Alstrup 243846c (C). Same locality alt. 305 m, on *Porpidia pseudomelinodes* Schwab, 16 July 1978, Alstrup 243888 e (C). Narssaq town, Vandsøen, on *Lecanora intricata* (Ach.) Ach., Alstrup 243908f (C).

2. **Endococcus rugulosus** Nyl. (1855: 193)
Endococcus perpusillus Nyl. (1857: 439)
Discothecium gemmiferum var. *calcaricola* (Mudd) Keissler (1930: 389)
Description: Hawksworth (1979b: 287–288).
Distribution: Widespread. Common in Greenland.
Previous reports from Greenland: Fries (1879), Lamb (1939) and Alstrup (1984).
Hosts: On a wide range of saxicolous, crustose species, occurring as dispersed, ± immersed, black perithecia.

Specimens (selected): Narssaq d., Nunasarnaq, 60°58′N, 45°48′W, alt. 140 m, on *Aspicilia leucophyma* (Leighton) Hue, 10 July 1980, Alstrup 80228 (C). Kangerdluarssuk, Nunasarnaussaq, 60°52′N, 45°54′W, alt. 80 m, on *Acarospora* sp., 21 July 1980, Alstrup 80965 (C). Kvanefjeld, NE of Kvanesø, alt. 535 m, on indet. host, 6 July 1980, Alstrup 80166 (C).
Sukkertoppen d., Sønder Isortoq, Qaersutsiaup qulâ, 60°35′N, 51°44′W, alt. 30 m, on a grey species of *Aspicilia,* 7 July 1977, Alstrup 77106 (C).
Disko, Godhavn, Blæsedalen, alt. 50–100 m, on *Aspicilia* sp., 29 July 1982, Poelt & Ullrich (GZU). Same loc., alt. 150 m, on *Protapamelia badia* (Hoffm.) Hafellner Aug. 1987, Jacobsen 5614 pp (KIEL).
Umanak d., Hänge über Mârmorilik, 50–300 m, on *Aspicilia* sp., Aug. 1983, Poelt & Ulrich (GZU).

3. **Endococcus stigma** (Körber) Stizenb. (1882: 516)
Tichothecium stigma Körber (1865: 468)
Discothecium stigma (Körber) Zopf (1897: 127)
Descriptions: Santesson (1960: 508) and Hawksworth (1979b: 288–289).
Distribution: Europe, the Canary Islands and Greenland.
Report from Greenland: Lynge (1937).
Hosts: On a wide range of crustose saxicolous species. In Greenland found on *Rhizocarpon geographicum* (L.) DC., *R. superficiale* (Schaerer) Vainio and *R. badioatrum* (Flörke ex Sprengel) Th. Fr. as one to several small black perithecia in the host areoles, and on the apothecia of *Tephromela armeniaca* Hertel & Rambold.

Specimens: Narssaq d.: Eight collections have been seen, only one will be cited: Kvanefjeld, 60°59'N, 46°00'W, alt. 660 m, in areoles of *Rhizocarpon geographicum*, 25 July 1978, Alstrup 243951k (C). Disko, Qutdligssat, alt. 30 m, on *Tephromela armeniaca*, 2 Aug. 1950, Gelting (C).

Epilichen Clements (1909: 174)
Type species: *Epilichen scabrosus* (Ach.) Clem.
Number of species: Two, both lichenicolous.
Descriptions: Hafellner (1979a: 677–695, 1979b: 73).

Notes: Hafellner (1979a) attributed this generic name to "Clements ex Hafellner", but the generic name was already validly published by Clements (loc. cit.) as the phrase "Karschia lichenicola" included the diagnostic features recognized by Clements, i.e. the lichenicolous habit, so satisfying Art. 32.3.

1. **Epilichen glauconigellus** (Nyl.) Hafellner (1979a: 678, as "*glaucinigellus*")
Lecidea glauco-nigella Nyl. (1861: 238)
Buellia scabrosa var. *cinerascens* Th. Fr. (1874: 586)
Descriptions: Hafellner (1979a: 689, 1979b: 79–80).
Distribution: Europe and Greenland.
Reports from Greenland: Fries (1860).
Hosts: *Baeomyces rufus* (Huds.) Rebent. and *B. placophyllus* Ach.

Note: Hafellner (1979a) used the spelling *"glaucinigellus"*. However, under Art. 73.9 (Greuter et al. 1988: 73) in deleting the hyphen from Nylander's name the original spelling must be retained and the correct spelling of the species epithet is therefore *"glauconigellus"*.

Specimen: Disko, Godhavn, N-NE of the Arctic Station, alt. 20 m, on *B. rufus*, 9. Aug. 1982, Poelt & Ullrich (GZU).

2. **Epilichen scabrosus** (Ach.) Clem. (1909: 174)
Lecidea scabrosa Ach. (1803: 48)
Buellia scabrosa (Ach.) Massal. (1854: 20)
Descriptions: Hafellner (1979a: 686–688, 1979b: 74–78) and Bellemère & Hafellner (1983: 10–13).
Distribution: Boreal-arctic-alpine in Europe and N. America. Common in Greenland.
Reports from Greenland: Fries (1860), Branth & Grønlund (1887) and Alstrup (1979: 158).
Hosts: *Baeomyces rufus* (Huds.) Rebent. and *B. placophyllus* Ach. In young infections no lichenized thallus is found, but later this fungus forms an independent yellow-green thallus on the host.

Specimens (selected): Disko, Nordfjord, Perdlertut kûat, 69°59'N, 54°25'W, on *B. rufus*, Aug. 1975, Alstrup 75–104 (C). Sukkertoppen d., head of Sønder Isortoq, Qaersiatsup qulâ, 65°35'N, 51°45'W, on *B. placophyllus*, 13 July 1977, Alstrup 77270 (C).
Godthåb d., Ilulialik, 64°51'N, 50°39'W, on *B. rufus*, July 1976, Alstrup 76272 (C). Sârdloq, 64°23'N, 51°42'W, alt. 30 m, on *B. rufus*, Aug. 1976, Alstrup 768610 (C).
Narssaq d., Kangerdluarssuk, mountain N of Laksedalen, 60°53'N, 45°50'W, alt. 270 m, on *B. rufus*, 10 July 1978, Alstrup 78131 (C).

Everniicola D. Hawksw. (1982a: 383)
Type species: *E. flexispora* D. Hawksw.
Number of species: Monotypic.

1. **Everniicola flexispora** D. Hawksw. (1982a: 384)
Fig. 12.
Conidiomata pycnidial, arising in decolorized generally circular necrotic greyish patches 0.5–1.5(–2) mm diam., the patches sometimes delimited by a pale brown zone 0.1–0.15 mm wide, but more often by a pale yellowish zone of host tissue not yet fully decolorized; pycnidia numerous, 50–100 regularly present in single infection spots and often more, occuring throughout the spots, but sometimes arranged in concentric rings, immersed, arising singly, loosely aggregated, or sometimes almost coalescing, black, 25–40 µm diam. in surface view, mainly 25–30 µm tall in vertical section and ± globose at first and originating just below the upper cotex, later sometimes extending down into the algal layer and there expanded laterally to form irregularly flask or lens-shaped locules to 140 µm wide; pycnidia ostiolate, opening irregularly, the walls poorly developed, 3–5 µm thick, composed of 1–2 layers of interwoven hyphae, usually lining fractured cells of the host cortex, hyphae c. 1.5 µm thick, hyaline except in the immediate vicinity of the ostiole where they are slightly olivaceous. Conidiogenous cells lining the pycnidial cavity, often arising almost directly from inside the walls of ruptured cortical cells, enteroblastic, acrogenous, shortly subcylindrical to ampulliform, hyaline, 4–5 × 1.5–2 µm. Conidia arising singly, subcylindrical but strongly arcuate to falcate, the apex rounded and the base tending to be truncated, 1-septate, strongly constricted at the septum, hyaline, smooth 7–8 × 1.5–2 µm.
Distribution: The British Isles, here reported from Alaska, Canada, Finland, Greenland, Norway and Sweden.
Hosts: *Evernia prunastri* (L.) Ach., here reported from *Nephroma arcticum* (L.) Torss., forming conspicuous circular necrotic spots with numerous black dot-like pycnidia. Following the death of the cortical cells, the pycnidia expand laterally below and the cortical layers in the central part of the infection spot break away. The fungus is clearly pathogenic.

Notes: We were much in doubt whether the collections on *Nephroma arcticum* represented a different species, as the conidia seemed to be a little bigger and more curved, and the geographical and host diversity seemed to be too big. However, the sparse holotype was restudied and found to have a bigger variation in conidia shape and size than first observed. There still seem to be some small differences in the number and distribution of pycnidia in the infection spots, but this hardly merits distinction at species level. A final settlement must await the study of more collections on *Evernia prunastri*. In the light of this uncertainty we have given a full description of the species based on material occur-

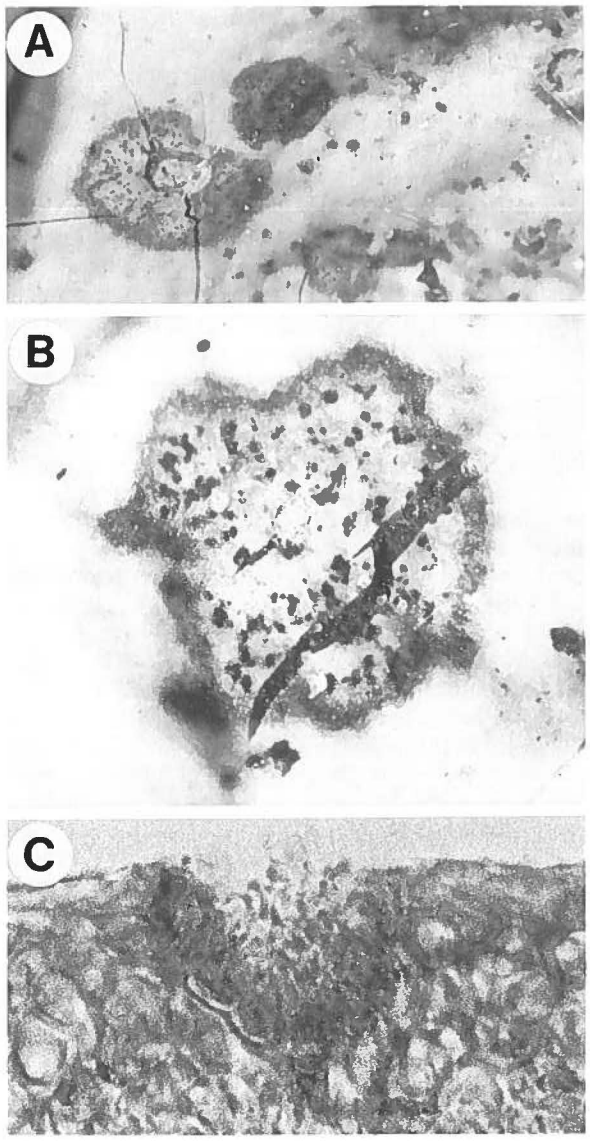


Fig. 12. A-C and E, *Everniicola flexispora* (A-B, Andersen & Hansen 151; C and E, Gelting 16400) on *Nephroma arcticum*. A: Infection spots, note the central eroded area from which the cortex has been lost (x 13). B: Infection spot with numerous conidiomata (x 30). C: Vertical section of conidioma (x 800). E: Conidia. D: On *Evernia prunastri* (the British Isles, Pembrokeshire, near Orielton, 25 June 1970, Harold, E, holotype). Scale D-E = 10 µm.

ring on *Nephroma arcticum* (Santesson 11231, UPS, IMI 329375; see below).

Specimens: Groenlandia occidentalis, Langesund, "Sarqarelleq-søen", 14 Aug. 1932, Grøntved (O).
Disko, Diskofjord, Kangerdluarssuk, 0–30 m, 4 Aug. 1982, Poelt & Ullrich (GZU).
Julianehåb d., Narssarssuaq, 61°09′N, 45°25′W, 11 July 1969, Andersen & Hansen, Lich. Groenl. exs. no. 151 (UPS).
Egedesminde d., Arfersiorfik Fjord, Kuánit, 68°05′N, 52°12′W, alt. 15 m, 29 Sept. 1951, Gelting 16400 (UPS).
Canada: South Labrador, Cartwright, 1934, Polunin (O).
Gaspé, Mt. Jaques Cartier, 26 Aug. 1953, Scholander & Dahl (O). Interior Quebec-Labrador, vicinity of Gerin Mountain, 55°4′N, 67°14′W, alt. 2800 ft, 1 Aug. 1955, Viereck (O).
Finland: Lapponia inarensis, two localities (UPS and O).
Norway: Five localities from the provinces Vestfold, Oppland, Sør-Trøndelag, Nordland and Finmark (four specimens in UPS, one specimen in O).
Sweden: Värmland, Dalby Parish, near the waterfall of Digerfallet in the stream of Tasan, 14 June 1956, Sant. 11231 (UPS, IMI 329375, R. Santesson: Fungi lich. Exs. forc. 7). 19 localities from the provinces Småland, Härjedalen, Jämtland, Lule Lappmark and Torne Lappmark (18 specimens in UPS, one specimen in O).
USA: Alaska, along Kaolak River, S of Wainright, 69°56′N, 159°57′W, 9–18 July 1958, Shushan & Maher 5352 (UPS).

Fayodia Kühner (1930: 68)
Type species: *Fayodia gracilipes* (Britz.) Bresinsky & Stangl.
Number of species: 11, of which two are lichenicolous.
Description: Singer (1986: 428–430).

1. **Fayodia striatula** (Kühner) Singer (1969: 146)
Rhodocybe striatula Kühner (1928: 139)
Clitocybe leucophylla (Fr.) M. Lange (1955: 30)
Description: Singer (1969: 146).
Distribution: Arctic-alpine in Europe, N. and S. America and Greenland.
Reports from Greenland: Lange (loc. cit.) and Lamoure, Lange & Petersen (1982: 88).
Hosts: *Peltigera* spp., the hyphae penetrating the host thallus and apparently killing the algae, evidently pathogenic.

Specimens: Disko, Godhavn, Lyngmarksfjeld, alt. below 300 m, on *P. aphthosa* (L.) Willd. in deep moss, 8 Aug. 1970, Petersen 70139 (C). Plateau S of Skarvefjeld, 69°16′N, 53°28′W, alt. 150–200 m, on *P.* sp., 23 July 1986, Elborne 86,26 (C). Skarvefjeld, on *P.* sp., 13 Aug. 1967, Lange 67–160 (C). Blæsedalen, on *P.* sp., 26 July 1970, Petersen 7070 (C). Lyngmarsbugten, on *P. praetextata* (Flörke ex Sommerf.) Zopf, 24 July 1970, Petersen 7067 (C). Lyngmarken, on *P. didactyla* (With.) Laundon, 3 Aug. 1970, Petersen 70.109 (C). Signifik, on *P.* sp., 21 Aug. 1967, Lange 67–521 (C).
Holsteinsborg d., head of Søndre Strømfjord, Mt. Hassel, on *P.* cfr. *elizabethae* Gyelnik, 9 Aug. 1973, Petersen 73.5 (C).

Holsteinsborg, Præstefjeldet, on *P. aphthosa* with *Thelocarpon epibolum* and *Wentiomyces peltigericola*, 28 Aug. 1972, Petersen 37 (C).

Geltingia Alstrup & D. Hawksw. *gen. nov.*

Ascomata singularia vel laxe aggregata, primum immersa et peritheciiformia, ubi maturitata erumpescentia et apotheciiformia, nigra; excipulum persistens, purpureo-brunneum ad atrobrunneum, e cellulis pseudoparenchymatis elongatis ad subglobosis compositum; epithecium non distinctum; hymenium hyalinum; hypothecium pallide brunneum ad atrobrunneum, cum excipulo conjunctum et cum cellulis similibus compositum. Hamathecium e paraphysibus, praecipue simplicibus, angustis, apicibus non inflatis; centrum I−. Asci elongato-clavati ad anguste cylindrici, stipitati, unitunicati, I−, 8-spori. Ascosporae monostichae ad distichae vel aliquantum helicae in asco, subglobosae ad ellipsoideae vel cylindricae ad subfusiformes, simplices, guttulatae, hyalinae, laeves.

Type species: *Geltingia associata* (Th. Fr.) Alstrup & D. Hawksw. *(Lecidea associata* Th. Fr., holotypus.)

Ascomata arising singly or loosely aggregated, at first immersed and ±perithecioid, but becoming erumpent and often ± superficial and apothecioid when mature, black; exciple persistent, purple-brown to dark brown, composed of elongated to almost subglobose ± parallel rows of pseudoparenchymatous cells; epithecium not differentiated; hymenium colourless; hypothecium pale to dark brown, similar in structure to the exciple with which it can be continuous. Hamathecium of paraphyses, mainly simple, narrow, hyaline, not swollen at the apices; centrum I−. Asci elongate-clavate to narrowly cylindrical, stalked, with a single functional wall layer, not or slightly thickened at the apex, I−, discharge by rupture of the ascus tip, 8-spored. Ascospores monostichously to distichously or somewhat helicoidally arranged in the asci, subglobose to ellipsoid or cylindrical to almost fusiform, simple, guttulate, hyaline, smooth.

Number of species: Three, all lichenicolous.

Notes: This previously unrecognized genus appears to be related to the Ostropales, particularly to the family Odontotremataceae, on the basis of the method of development of the ascomata, but the extremely thin-walled asci which are not thickened apically are somewhat uncharacteristic of that order. The method of development of the ascomata, together with the lack of any I+ blue annular ring in the ascus tips mitigates against a placement in the Leotiales (Helotiales) s.str.

Amongst other lichenicolous fungi with initially almost perithecioid ascomata, it differs from *Skyttea* Sherw. et al. in the absence of excipular hairs, from *Lethariicola* Grumm. in the ascospore shape and septation and also the nature of the exciple, and from *Pleospilis* Clem. in lacking the distinctive 1-septate arcuate to acicular ascospores characteristic of that genus.

We have not made an exhaustive study of other lichenicolous species described in *Lecidea* and *Nesolechia* with punctiform apothecia, and it is therefore possible that other already described species will later prove to belong to this new genus.

This new genus is named in honour of Paul Gelting (b. 1905–d. 1964) who spent seven years in Greenland as leader of the Arctic Station in Godhavn and made important collections of many Greenland plants, including lichens. He reported *Echinothecium reticulatum* from Greenland and more lichenicolous fungi collected by him are treated here.

1. **Geltingia associata** (Th. Fr.) Alstrup & D. Hawksw. *comb. nov.*

Lecidea associata Th. Fr. (1867: 42)

Nesolechia associata (Th. Fr.) Sacc. & D. Sacc. (in Saccardo 1906: 171)

Distribution: The British Isles, Sweden and Spitsbergen.

Hosts: *Ochrolechia* and *Pertusaria* spp., forming erumpent black apothecia which break down the cortical structure of the host thallus, so that the surface becomes irregular and soft. Also reported from *Thamnolia vermicularis* (Sw.) Schaerer (Walker 1970: 59–60).

Note: The type material of *Lecidea associata* Th. Fr. (Spitsbergen, Danskøn, 1861, A. J. Malmgren, UPS-lectotype) was not available to us for study, but has been checked by Mr G. Rambold and Miss D. Triebel.

Specimen: Disko, Mellemfjord, Enokshavn, alt. 6 m, on *Pertusaria dactylina* (Ach.) Nyl., 22 Aug. 1950, Gelting 13651b (UPS).

2. **Geltingia groenlandiae** Alstrup & D. Hawksw. *sp. nov.*

Figs 13, 14.

Ascomata laxe aggregata, primum immersa et peritheciiformia, ubi maturitata erumpescentia et apotheciiformia, nigra, 0.2–0.3 mm diam.; excipulum persistens, involutum, purpureo-brunneum, e cellulis pseudoparenchymatis subglobosis et elongatis, 6–10 µm latis compositum, non setosum; epithecium non distinctum; hymenium 60–90 µm altum; hypothecium cum excipulo conjunctum. Paraphyses simplices vel parce ramosae, 1.5–2 µm latae, apicibus non crassis. Asci anguste cylindrices, unitunicati, I−, (35–)45–55(–60) × 6.5–8 µm, 8-spori. Ascosporae anguste ellipsoideae, aliquando asymmetricae, hyalinae, laeves, 8.5–10(–11) × 2.5–3(–3.5) µm.

Typus: Groenlandia, Narssaq d., 1 km S of Qagssiarssuk, 61°08′N, 45°32′W, alt. 140 m, on (*Caloplaca citrina* (Hoffm.) Th. Fr., 4 Aug. 1980, Alstrup 801120 (C-holotypus; IMI 331030-slides).

Ascomata loosely aggregated in groups of 3–6, arising in the areoles of the host, immersed to finally erumpent, black, shining, at first perithecioid and 0.1–0.15 mm diam., gradually opening at the apex and becoming apothecioid, disc irregular circular to cerebriform, finally expanded to 0.2–0.3 mm diam.; exciple persistent, inrolled, purplish to brown, continuous with the hypothecium, 15–30 µm thick, composed of subglobose to elongated, irregularly shaped, reddish brown, thick-walled pseudoparenchymatous cells 6–10 µm diam., lacking excipular hairs; no distinct epithecium deve-

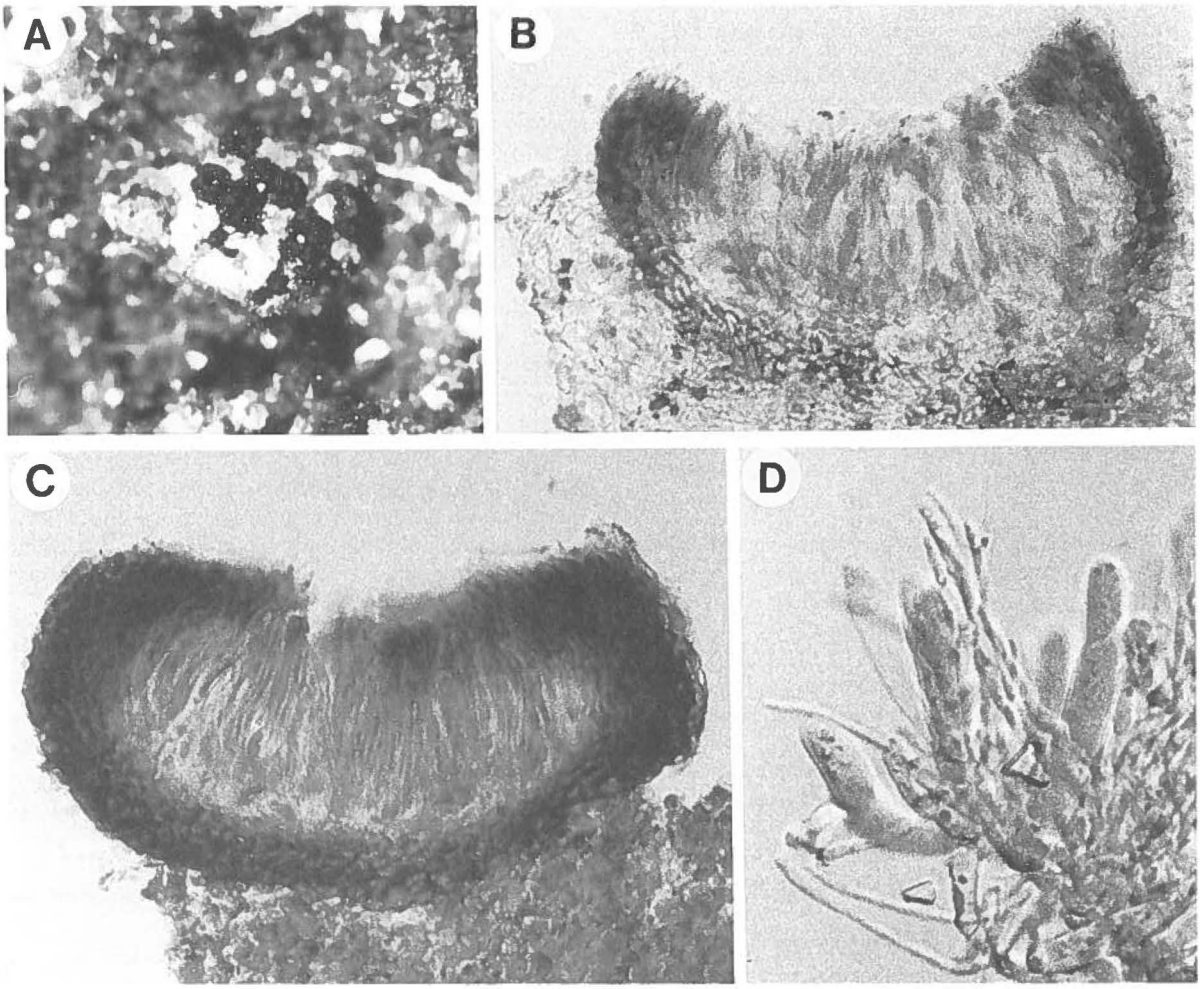


Fig. 13. *Geltingia groenlandiae* (Alstrup 801120, holotype) on *Caloplaca citrina*. A: Ascomata (x 50). B: Vertical section of erumpent young opening ascoma (x 400). C: Vertical section of mature superficial ascoma (x 400). D: Asci and paraphyses (x 800).

loped; hymenium 60–90 µm tall, I−. Paraphyses not or sparsely branched, filamentous, easily separating, not or remotely septate, not swollen at the apices, hyaline, 1.5–2 µm thick. Asci narrowly cylindrical, somewhat constricted at the base, (35–)45–55(–60) × 6.5–8 µm, thin-walled, not thickened at the apex, I−, walls c. 0.5 µm thick, with a single functional layer, discharge non-fissitunicate, apex rupturing to release the ascospores, 8-spored. Ascospores irregularly distichously arranged in the asci, narrowly ellipsoid, sometimes asymmetrical or attenuated towards the base, hyaline, smooth-walled, consistently 2-guttulate, 8.5–10(–11) × 2.5–3(–3.5) µm.

Distribution: Greenland.
Hosts: *Caloplaca citrina* and *Lepraria neglecta* (Nyl.) Lettau, found as dispersed black ascomata, apparently a mild pathogen.

Note: This lichenicolous fungus does not seem to have been described previously. It is close to *G. associata*, which occurs primarily on thalli of *Ochrolechia* species, but is easily distinguished from that fungus by the narrowly ellipsoid ascospores; those in *G. associata* are broadly ellipsoid to subglobose and measure (6.5–)7–9 (–9.5) × (5–)5.5–6(–7) µm.

Additional specimen: Holsteinsborg d., the cove Pâ at the mouth of Søndre Strømfjord, 60°0'N, alt. 50–100 m, on *Lepraria neglecta*, 23 July 1946, Skytte Christiansen 5553 (herb. Christiansen, IMI 331030).

3. **Geltingia stereocaulorum** Alstrup & D. Hawksw. *sp. nov.*
Figs 15, 16.
Ascomata aggregata, primum plusminusve peritheciiformia, mox plusminusve superficialia at apotheciiformia, ad 0.25 mm diam., nigra, concava; excipulum persistens, atrobrunneum, e cellulis pseudoparenchymatis rotundatis, 6–8 µm diam., com-

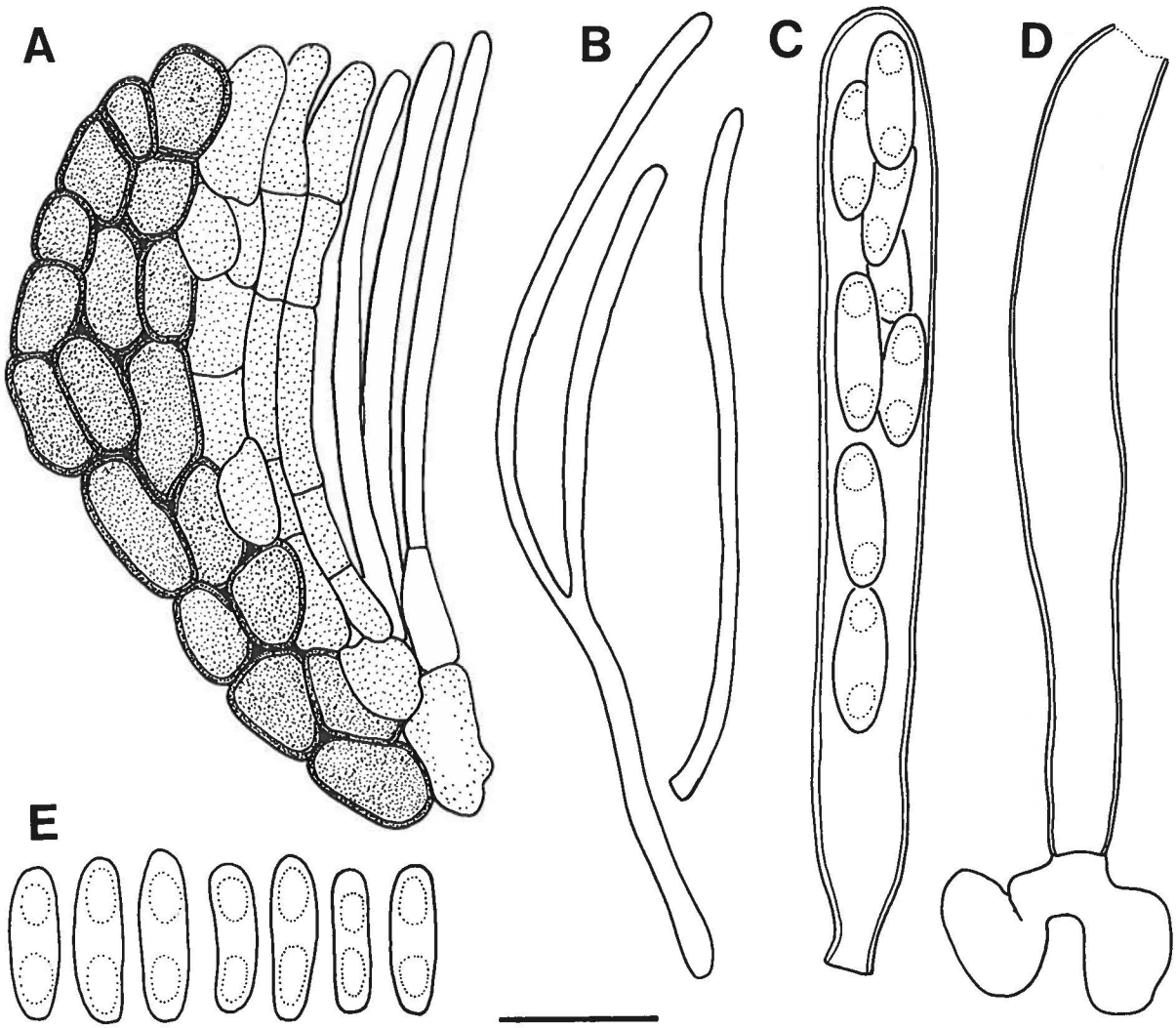


Fig. 14. *Geltingia groenlandiae* (Alstrup 801120, holotype). A: Exciple structure. B: Paraphyses. C: Mature ascus. D: Discharged ascus. E: Ascospores. Scale = 10 µm.

positum, non setosum; epithecium non distinctum; hymenium 25–40 µm tall; hypothecium excipulo simile sed stipitiformium et pallidius. Paraphyses simplices vel ramosae proxime basim, 1.5–2 µm latae, apices non distincte crassae; centrum I−. Asci elongato-clavati, unitunicati, I−, 35–40(–50) × (6.5–)8–9 µm, 8-spori. Ascosporae anguste-cylindrices ad subfusiformes, hyalinae, laeves, 15–17 × 3 µm.
Typus: Groenlandia, Godthåb (Nuuk), 64°10′N, alt. 25–50 m, on *Stereocaulon* sp. in snow-patch vegetation, 21 July 1946, Skytte Christiansen 5547 (herb. Christiansen-holotypus; IMI 331031-slides).

Ascomata aggregated in groups, ± superficial from an early stage, black, at first ± perithecioid and 0.05–0.15 mm diam, becoming expanded and to 0.25 mm with age, disc concave, circular, not strongly constricted but tapering below; exciple persistent, convex, dark brown, composed of rounded pseudoparenchymatous cells 6–8 µm diam. below, becoming more elongated adjacent to the hymenium, lacking excipular hairs; no distinct epithecium developed; hymenium 25–40 µm tall, I−; hypothecium similar in structure to the exciple, stipe-like, 30–40 µm tall, cells pale brown to subhyaline. Paraphyses simple or branched near the base, not anastomosed, not or remotely septate, 1.5–2 µm thick, not or only slightly thickened at the tips which are immersed in mucilage at maturity. Asci elongate-clavate, somewhat constricted at the base, 35–40(–50) × (6.5–)8–9 µm, thin-walled, not thickened at the apex when mature, I−, walls c. 0.5 µm thick, discharge non-fissitunicate, discharge not seen, 8-spored. Ascospores ± distichously to almost helicoidally arranged in the asci, narrowly cylindrical to almost fusiform, somewhat attenuated at the apices, hyaline, smooth-walled, often guttulate, 15–17 × 3 µm.

Host: *Stereocaulon* sp., thallus. The infected tissues become decolorized, deformed beyond recognition, and

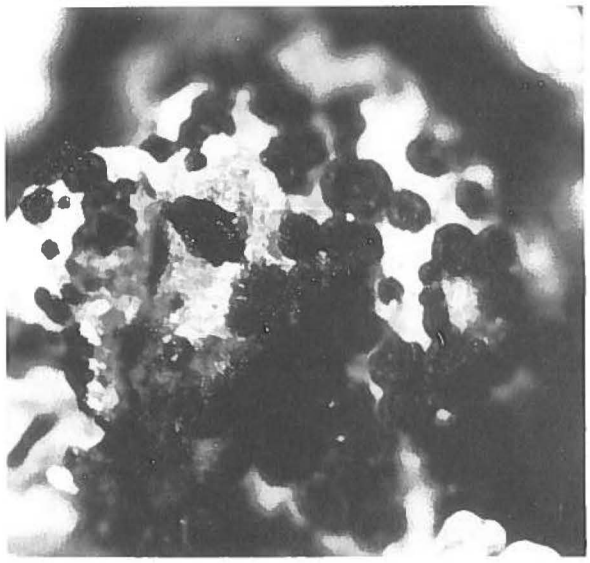


Fig. 15. *Geltingia stereocaulorum* (Christiansen 5547, holotype) on *Stereocaulon* sp. (x 45).

covered with the conspicuous black ascomata; evidently pathogenic.
Distribution: Greenland. Known only from the type collection.

Notes: This species is included in *Geltingia* with some hesitation as the ascomata are ± superficial from an early stage and the exciple is less strongly pigmented. However, on the basis of the ascus structure and the mature exciple, and as the ascospores recall those of *G. groenlandiae* to some extent in shape, it seems prudent to include the species here for the moment.

Graphium Corda (1837: 18)
Description: Ellis (1971: 333).
Types species: *Graphium penicilloides* Corda.
Number of species: About five, mainly saprophytic on

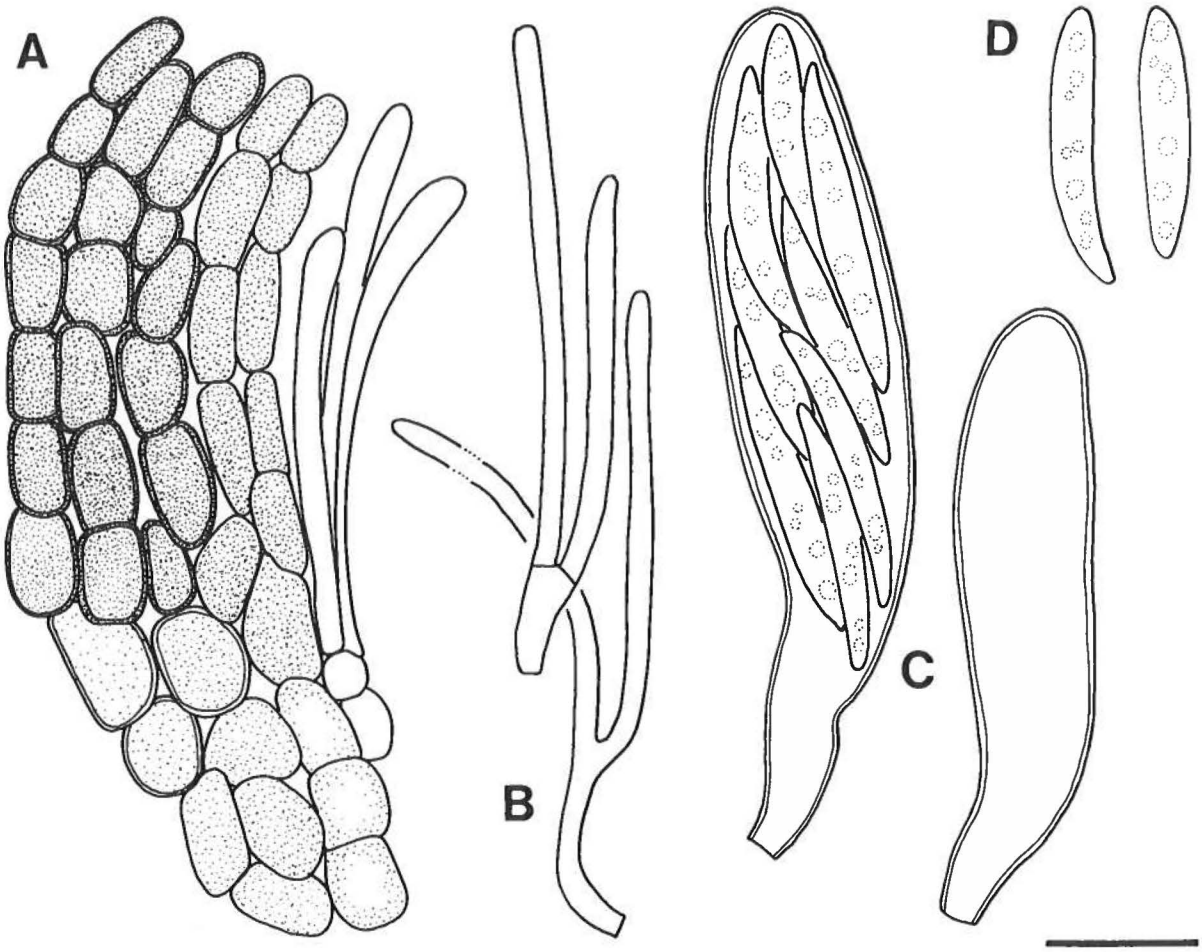


Fig. 16. *Geltingia stereocaulorum* (Christiansen 5547, holotype) on *Stereocaulon* sp. A: Exciple structure. B: Paraphyses. C: Asci. D: Ascospores. Scale = 10 µm.

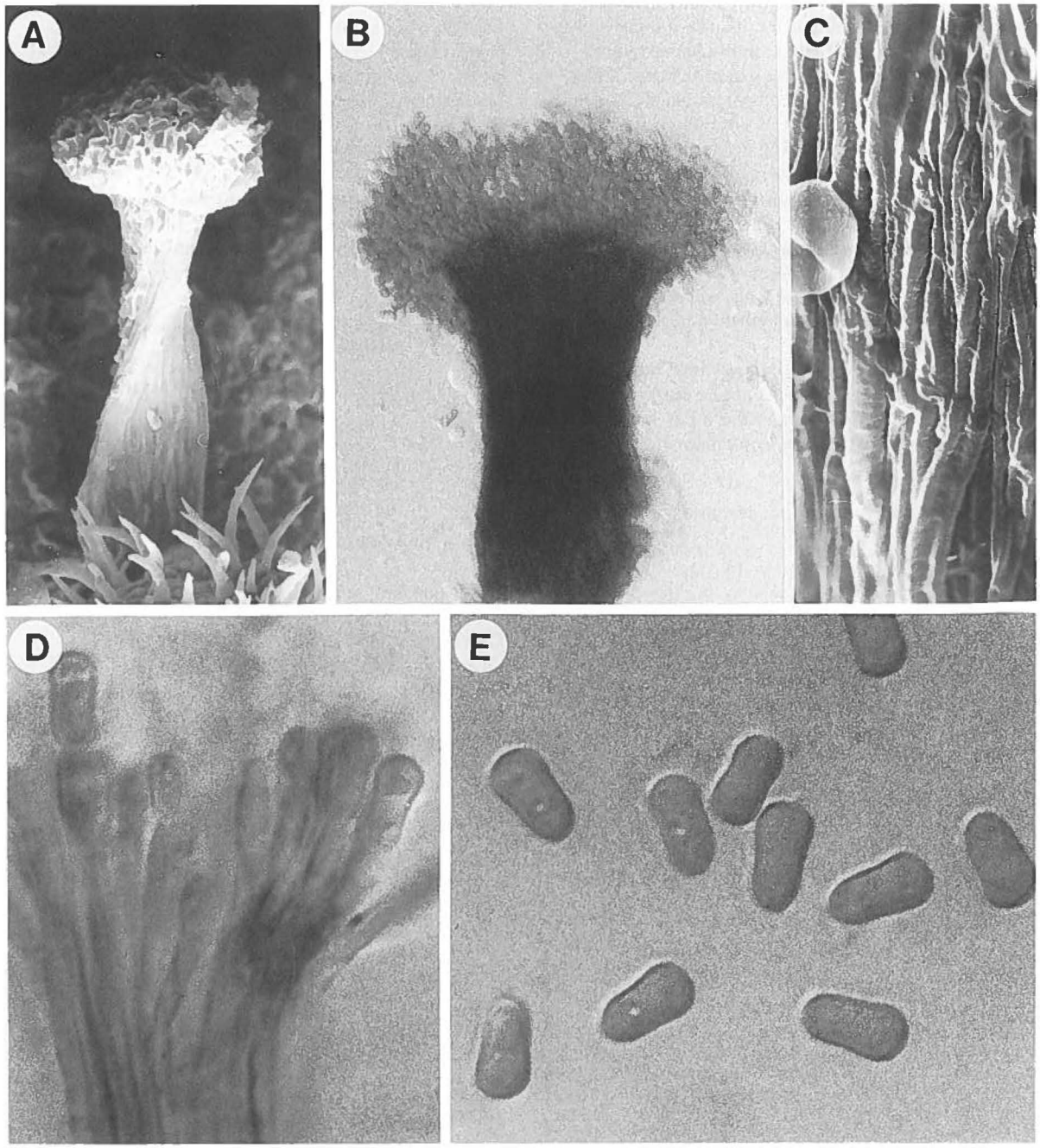


Fig. 17. *Graphium aphthosae* (Alstrup 75–76, holotype) on *Peltigera aphthosa*. A: Synnema (SEM, x 550). B: Apex of synnema (x 400). C: Arrangement of hyphae in the synnematal stipe (SEM, x 4000). D: Conidiophores and conidiogenous cells (x 2200). E: Conidia (x 2200).

dead herbaceous stems and wood. No lichenicolous species have previously been described.

1. **Graphium aphthosae** Alstrup & D. Hawksw. *sp. nov.*
Fig. 17.
Coloniae dispersa. Conidiophora macronemata, synnemata, ad 175 µm alta et ad 50 µm lata, nigra, nitida, e hyphis parallelibus composita, hyphis c. 2 µm latis, expanse proxime apicibus. Cellulae conidiogenae monoblasticae, non proliferatae, integratae, cylindricae, c. 2.5 µm latae. Conidia in muco producta, catenata, acrogena, simplicia, cuneiformia, pallide brunnea, laevia, 7.5 × 3.5–4 µm.
Typus: Groenlandia, Disko Island, Mudderbugten, Pingo 69°46′N, 52°02′W, alt. 300 m, on *Peltigera aphthosa* (L.)Willd., 26 July 1975, Alstrup 75–56 (C-holotypus).

Colonies dispersed. Conidiophores macronematous, to 175 µm tall and to 50 µm thick, black, shining, consisting of parallel, agglutinated, unbranched hyphae c. 2 µm thick, diverging at the top where the conidiogenous cells form. Conidiogenous cells monoblastic, not proliferating, annellations not seen, integrated, terminal, c. 2.5 µm wide. Conidia adhering in extended false chains, acrogenous, simple, cuneiform, broader at the upper end, smooth, 7.5 × 3.5–4 µm.

Distribution: Greenland and Norway.
Hosts: Saprophytic on *Peltigera aphthosa* (L.) Willd., where it may be associated with *Wentiomyces peltigericola* D. Hawksw. and *Thelocarpon epibolum* Nyl.

Notes: This species clearly belongs in *Graphium* s.str. even though no annellations could be seen on the conidiogenous cells. It differs from the other species recognized in the genus with short synnemata in the relatively broad conidia.

Additional specimens: Disko, Mudderbugten, Pingo, alt. 650 m, on *Peltigera aphthosa*, 26 July 1975, Alstrup 75–64 (C.). Mudderbugten, Alákariaq, 69°44′N, 52°01′W, alt. 40 m, on *P. aphthosa*, 18 July 1975, Alstrup 75–10 (IMI 331033).
Norway: Vågå, Veomoan, alt. 860 m, in *Pinus* forest, on *P. aphthosa* together with *Thelocarpon epibolum* and *Wentiomyces peltigericola*, 7 August 1985, Alstrup s.n. (C).

Homostegia Fuckel (1870: 223)

Type species: *Homostegia piggotii* (Berk. & Broome) P. Karsten.
Number of species: Three, all lichenicolous.

1. **Homostegia piggotii** (Berk. & Broome) P. Karsten (1873: 222)
Dothidea piggotii Berk. & Broome (1852: 385)
Description: Keissler (1930: 298–302).
Distribution: Europe.
Hosts: *Parmelia saxatilis* (L.) Ach. and *P. sulcata* Taylor, found on the thallus as irregular, sharply delimited, black spots, thickening to a superficial stroma up to about 5 mm across.

Specimens: Disko, Godhavn, Engelskmandens Havn, alt. 10 m, on *P. saxatilis*, 2 July 1950, Gelting (UPS). Godhavn, the Arktisk Station alt. 25 m, on *P. saxatilis*, 26 March 1950, Gelting (UPS). Godhavn, Vestre Lyngmarksbugt, alt. 10 m, 11 July 1950, Gelting (UPS).
Narssaq d., south slope of Narssaq Fjeld, 60°57′N, 46°03′W, alt. 90 m, on *P. saxatilis*, 21 July 1978. Alstrup 243923v (C).

Illosporium Martius (1817: 325)

Type species: *Illosporium roseum* Martius (i.e. *Illosporium carneum* Fr.).
Number of species: Two, both lichenicolous. Many other non-lichenicolous species referred here are certainly not congeneric with the type species.
Description: Hawksworth (1979a: 231–232).

1. **Illosporium carneum** Fr. (1832: 259)
Description: Hawksworth (1979a: 232–235).
Distribution: Europe and N. America.
Report from Greenland: Branth (1895).
Hosts: Very common on *Peltigera didactyla* (With.) Laundon in Greenland, occurring as pink aggregated granules on the thallus and soralia, but also on other species of *Peltigera*.

Note: *Nectriella robergei* (Mont. & Desm.) Weese has often been considered to be the teleomorph of this species (Killian & Werner 1924), but this now seems to be extremely dubious (R. Lowen, pers. comm.).

Specimens (selected): Disko, Godhavn, near the Arctic Station, on *P. didactyla*, July 1974, Alstrup s.n. (C).
Sukkertoppen d., head of Sønder Isortoq, N of river Isuitsup kûa, 65°35′N, 51°45′W, alt. 10 m, on *P. didactyla*, 12 July 1977, Alstrup 77254 (C).
Godthåb d., Godthåb town, near the harbour, 64°10′N, alt. 0–50 m, on *P. didactyla*, 18 July 1946, Skytte Christiansen 5535 (herb. Christiansen).
Narssaq d., Nákâlâq, 60°59′N, 45°42′W, alt. 1400 m, on *Peltigera* sp., 16 July 1980, Alstrup 80366 (C).
Thule d., Siorapaluk, Søkongeskrænt, on *P. canina* (L.) Willd., 22 Aug. 1989, Johnsen & Bach Jensen (C).

2. **Illosporium corallinum** Roberge (in Desmazières 1847: 1551)
Description: Hawksworth (1979a: 236–238).
Distribution: Europe and N. America.
Hosts: *Parmelia* and *Physcia* spp., *Lecanora conizaeoides* Nyl. ex Crombie, *Anaptychia ciliaris* (L.) Korber, *Hypogymnia physodes* (L.) Nyl., *Xanthoria parietina* (L.) Th. Fr., here also reported from *Cetraria hepatizon* (Ach.) Vainio, and a species of *Pannaria*.

Note: This species may be a synanamorph with *Hobsonia christiansenii* Lowen & D. Hawksw. (see Lowen et al. 1986: 842–844).

Specimens: Sukkertoppen d., Qivâqe, 65°29′N, 52°31′W, alt. c. 75 m, 6 Aug. 1977, Alstrup 771623 (C).
Godthåb d., Godthåbsfjord, Karra, 64°46′N, 50°35′W, alt. 100 m, on *Pannaria* sp., 4. Aug. 1976, Alstrup 766218 (C). Same locality, on *Cetraria hepatizon*, Alstrup 766223 (C).
Nordlandet, Kangigdleq, 64°23′N, 51°38′W, alt. 20 m, on *Parmelia saxatilis* (L.) Ach., 17 Aug. 1976, Alstrup 769320 (C.).

Kalaallia Alstrup & D. Hawksw. *gen. nov.*

Ascomata perithecia, nigra, ostiolata, cum muris atrobrunneis e hyphis vel fere pseudoparenchymatis. Hamathecium e pseudoparaphyses compositum, cellularibus, plerumque ramosis et anastomosis; centrum I+ caerulescens. Asci elongato-clavati, bitunicati, apicibus crassis et cum annulo cylindrico et minuto I+ caerulescenti. Ascosporae elongato-ellipsoideae, hyalinae, laeves, transseptatae.
Type species: *Kalaallia reactiva* Alstrup & D. Hawksw. (holotypus).

Ascomata perithecia, black, ostiolate, walls dark brown, composed of hyphae or almost pseudoparenchymatous. Hamathecium of pseudoparaphyses, cellular, frequently branched and anastomosed; centrum I+

blue. Asci elongate-clavate, bitunicate in structure, the apices thickened with an internal apical beak and a minute cylindrical annulus which is I+ blue. Ascospores elongate-ellipsoid, hyaline, smooth, transseptate.

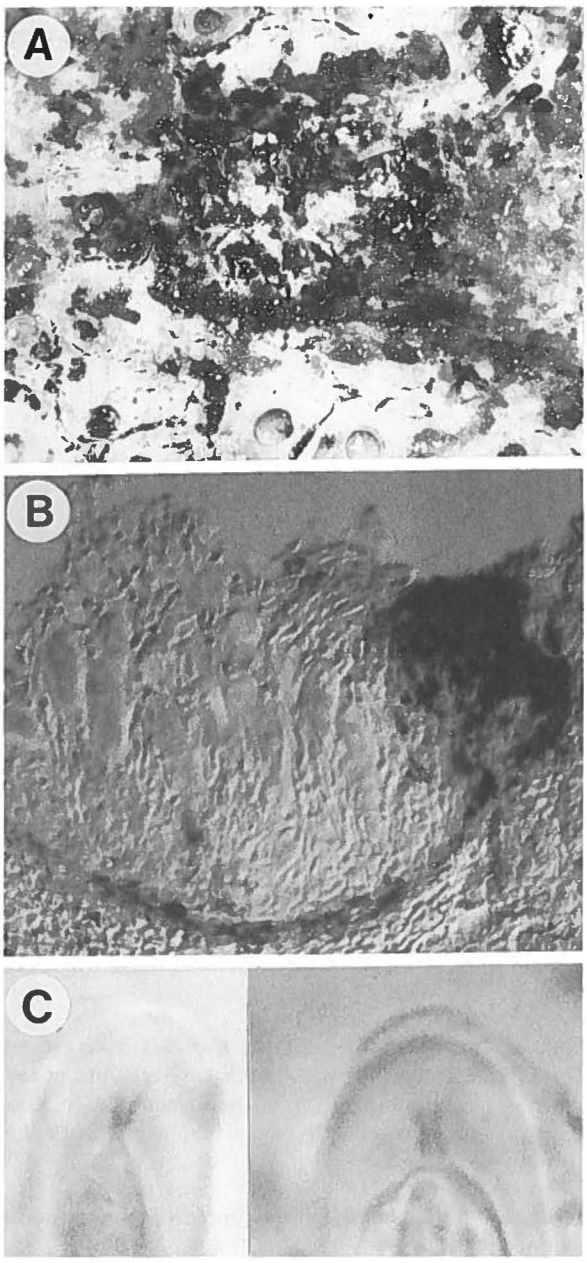
Number of species: Monotypic.
Distribution: Greenland.

Notes: This remarkable pyrenocarpous fungus clearly belongs to the Dothideales, but is unusual in the presence of the I+ blue cylindrical annulus above the tip of the internal apical beak.
Discharging asci were not seen, but their structure and the cellular nature of the pseudoparaphyses suggest that a tentative placement in the Dacampiaceae is not inappropriate pending more critical ontogenetic investigations.

The genus is named after the eskimo word for Greenland, Kalaallit nunaat.

1. **Kalaallia reactiva** Alstrup & D. Hawksw. *sp. nov.* Fig. 18.
Ascomata perithecia, laxe aggregata, erumpescentia, nigra, ostiolata, (50–)60–100 µm diam., cum muris atrobrunneis, 6–10 µm latis sed proxime ostiolum ad 40 µm latis, e hyphis vel fere pseudoparenchymatis pro parte. Hamathecium e pseudoparaphysibus, cellularibus, plerumque ramosis et anastomosis compositum, 1.5–2.5 µm latum; centrum I+ pallide caerulescens. Asci elongato-clavati, bitunicati, apicibus crassis et cum annulo cylindrico et minuto I+ caerulescenti, 55–65 × 10–12 µm, 8-spori. Ascosporae elongato-ellipsoideae, hyalinae, laeves, 3-septatae, (17.5–)20–24 × 5–7 µm.
Typus: Groenlandia, Narssaq d., Alángorssuaq, 60°51'N, 46°65'W, alt. 70 m, on *Hymenelia lacustris* (With.) Choisy, 3 Aug. 1980, Alstrup 801182 (C-holotypus; IMI 331017-slides).

Ascomata perithecioid, arising in loose groups, forming patches to 0.25 mm diam., erumpent, black, (50–)60–100 µm diam., ostiole discrete to gaping, walls dark brown, somewhat olivaceous in K, 6–10 µm thick except near the ostiole where they can reach 40 µm, composed of unevenly thickened hyphae, mainly 3–4 µm thick, swollen and almost pseudoparenchymatous in parts. Hamathecium of cellular pseudoparaphyses, densely branched and anastomosed, 1.5–2.5 µm wide; centrum I+ pale blue. Asci elongate-clavate, bitunicate in structure, short-stalked, strongly thickened especially at the apex, apex with an internal apical beak and a small I+ blue internal cylinder near the tip of the beak, discharge not seen, 55–65 × 10–12 µm, 8-spored. Ascospores elongate-ellipsoid, ± symmetrical, not tapered below,



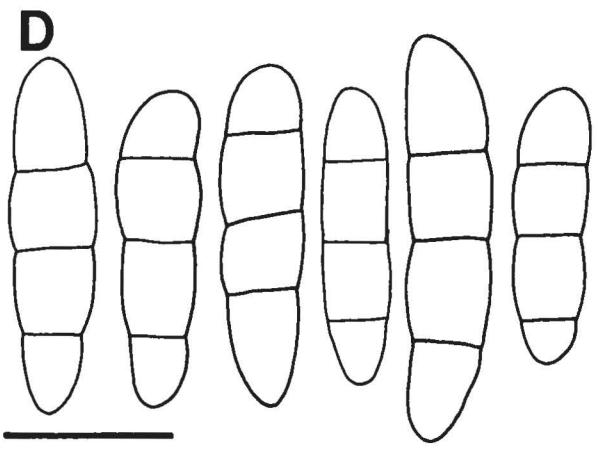


Fig. 18. *Kalaallia reactiva* (Alstrup 801182, holotype) on *Hymenelia lacustris*. A: Infection spot (x 15). B: Vertical section of lower portion of ascoma showing asci and paraphyses (x 400). C: Ascus tip in Lugol's iodine (after pre-treatment with 10% KOH) showing apical I+ blue annulus (x 2200). D: Ascospores. Scale D = 10 µm.

rounded at the apices, hyaline, 3-septate, slightly constricted at the septa, (17.5–)20–24 × 5–7 µm.

Distribution: Greenland, known only from the type collection.
Host: *Hymenelia lacustris,* the infected parts of the thallus becoming paler.

Note: A distinctive species separable from other lichenicolous fungi with large 3-septate ascospores in the nature of the pseudoparaphyses and the distinctive iodine reaction in the ascus tips.

Karschia Körber (1865: 459)
Type species: *Karschia talcophila* (Ach.) Körber.
Number of species: Three, including that described below; all are lichenicolous.
Descriptions: Hafellner (1979b: 178) and Hafellner & Poelt (1976).

1. **Karschia alpicolae** D. Hawksw. & Alstrup *sp. nov.*
Fig. 19.
Ascomata apothecia, ad 0.5 mm diam., nigra, primum clausa; excipulum bistratum, externe e cellulis pseudoparenchymatis 6.5–8 µm diam., interne e cellulis pseudosclerenchymatis 2.5 µm latis, ad 150 µm altum; excipulum brunneum, K+ aeruginosum; hymenium c. 80 µm altum. Paraphyses ramosae et anasomosae, 1.5 µm latae, apicibus ad 3.5 µm latis, cum vaginis gelatinosis I+ caerulescens. Asci late clavati, interne I−, 32–40 × 11–15 µm, 8-spori. Ascosporae ellipsoidea, leaves, hyalinae vel ultimo griseo-brunneae, 11–13(–16) × 4.5–5(–6) µm.
Typus: Groenlandia, Sukkertoppen d., eastern shore of Kangerdluarssuk, Tasiussaq, 65°28'N, 52°27'W, alt. 50 m, on *Allantoparmelia alpicola* (Th. Fr.) Essl., 8 Aug. 1977, Alstrup 771709 (C-holotypus; IMI 331027-isotypus).

Ascomata apothecia to 0.5 mm diam., black, closed until about 0.25 mm diam., then opening to expose a dark brown to black, flat disc, residues of the upper wall remaining on top of the hymenium; exciple distinct and a little raised above the disc when fully developed, 2-layered, the outer layer 30–40 µm thick, composed of pseudoparenchymatic cells 6.5–8 µm diam., outermost cells dark brown, inner cells paler brown, the inner layer varying in thickness, to 150 µm tall, depending on the surface of the host, orientating the disc towards the host surface, composed of pseudosclerenchymatous cells about 2.5 µm thick, radially arranged around the hymenium, irregularly arranged in the supporting tissue; hymenium c. 80 µm tall, hyaline; epithecium brown, K+ blue-green forming a soluble substance; all parts of the ascomata N+ red-brown, the strongest reaction in the exciple, the colour partly soluble. Paraphyses 1.5 µm thick, branched and anastomosed , end cell up to 3.5 µm, I−, covered in a gelatinous sheath I+ blue. Asci broadly clavate, 32–40 × 12–15 µm, I−, covered by a gelatinous sheath I+ blue, 8-spored. Ascospores ellipsoid, 1-septate, not constricted at the septum, smooth, long remaining hyaline, finally grey-brown, 11–13(–16) × 4.5–5(–6.5) µm.

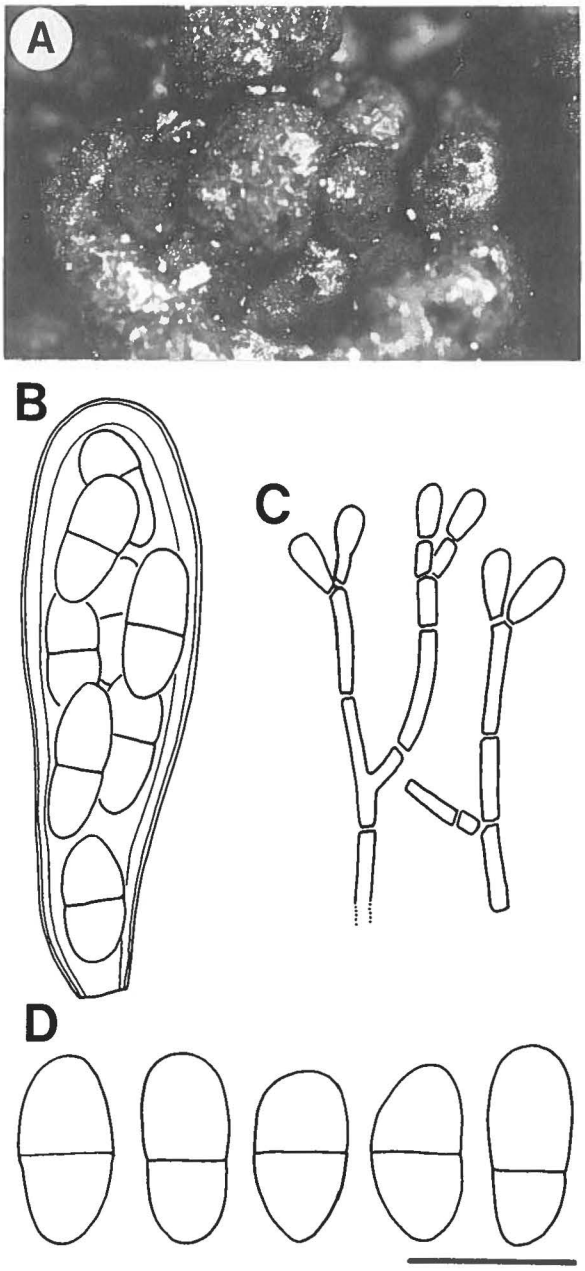


Fig. 19. *Karschia alpicolae* (Alstrup 771709, holotype) on *Allantoparmelia alpicola*. A: Ascomata (x 32). B: Ascus in Lugol's iodine. C: Paraphyses. D: Ascospores. Scale B-D = 10 µm.

Notes: Both *Buelliella* Fink and *Karschia* have closed fruits in the young stages and both have residues of the upper wall persisting on top of the hymenium. In *Karschia* the gelatinous sheaths are I+ blue, while *Buelliella* is totally I−.

Distribution: Greenland, known only from the type collection.

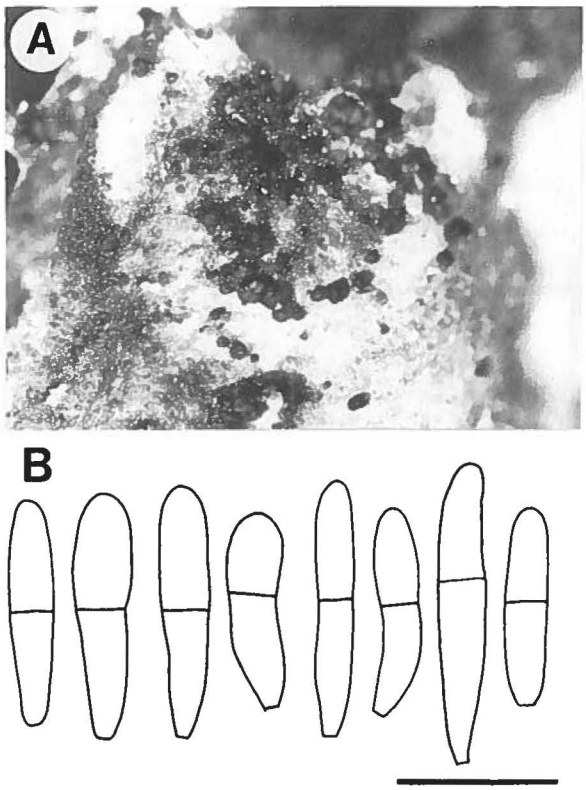


Fig. 20. *Karsteniomyces tuberculosus* (Alstrup 75–83, holotype) on *Peltigera leucophlebia*. A: Conidiomata in infection spot with the teleomorph *Scutula tuberculosa* (x 20). B: Conidia. Scale B = 10 µm.

Hosts: *Allantoparmelia alpicola,* apothecia arising from folds on the thallus which is not much affected, apparently commensalistic.

Karsteniomyces D. Hawksw. (1980a: 371)
Description: Hawksworth (1981: 22–25).
Teleomorph: *Scutula* Tul.
Type species: *K. peltigerae* (P. Karsten) D. Hawksw.
Number of species: Previously monotypic, on *Peltigera* thalli.
Distribution: Finland, Greenland, Norway and Sweden.

1. **Karsteniomyces tuberculosus** Alstrup & D. Hawksw. *sp. nov.*
Fig. 20.
Similis *Karsteniomyces peltigerae* sed differt in pycnidiis aggregatis, non dispersis, ubique minioribus, (60–)75–100 µm, et conidia 12–16(–19.5) × 3–4(–4.5) µm.
Typus: Groenlandia, Disko Island, Perdlertut, 69°58′N, 54°24′W, alt. 50 m, on *Peltigera leucophlebia* (Nyl.) Gyelnik, 11 August 1975, Alstrup 75–83 (C-holotype).
Teleomorph: *Scutula tuberculosa* (Th. Fr.) Rehm.
Distribution: Greenland, known only from the type collection.
Host: *Peltigera leucophlebia,* arising in patches similar to those caused by *Scutula tuberculosa* on the thallus, alone or mixed with apothecia of the teleomorph.

Notes: This species is distinguished from *K. peltigerae,* the anamorph of *Scutula miliaris* (Wallr.) Trevisan (*S. epiblastemica* auct.) by the generally smaller pycnidia which arise in discrete groups, and the predominantly shorter conidia. It is possible that *Diplodina peltigerae* Vouaux, which Hawksworth (1981: 76) suggested recalled the anamorph of *S. epiblastemica,* is an earlier name for the species, but as no material of that fungus is extant, and the pycnidia were said to be immersed, some doubt must remain. The epithet "peltigerae" is in any case preoccupied in *Karsteniomyces.*

Lasiosphaeriopsis D. Hawksw. & Sivan. (in Hawksworth 1980a: 371)
Type species: *Lasiosphaeriopsis salisburyi* D. Hawksw. & Sivan.
Number of species: Three, including that described here, all obligately lichenicolous.
Distribution: Widespread.

1. **Lasiosphaeriopsis christiansenii** Alstrup & D. Hawksw. *sp. nov.*
Fig. 21
Ascomata perithecia, singularia vel laxe aggregata, superficialia, nigra, rugosa, 0.15–0.25(–0.3) mm diam., cum muris plerumque 20–35 µm crassis, e multistratis cellularibus rubrobrunneis et pseudoparenchymaticis compositum, cellulis cum "Munk pores" instructis. Hamathecium e periphysibus 20–40 × 2.5–4 µm; centrum I−. Asci anguste-cylindrici, unitunicati, 80–100 × 11–15 µm, 4-spori. Ascosporae ellipsoideae, 3-septatae, cellulis cum uno poris instructis, rubro-brunneae ubi maturitatae, concoloribus, laeves, (24–)26–35(–37) × 9.5–11 µm. Typus: Groenlandia, Ivigtut d., Grønnedal, 61°14′N, alt. 100 m, on *Porpidia tuberculosa* (Sm.) Hertel & Knoph, 9 July 1946, Skytte Christiansen 5514 (herb. Christiansen-holotypus; IMI 331019-slides).

Mycelium immersed in the host, composed of branched, pale to red-brown torulose hyphae, strongly constricted at the septa, forming chains of irregular swollen cells, 6–10 µm thick, with "Munk pores" to 1–2 µm diam., in places forming a common stroma between several ascomata. Ascomata perithecioid, arranged in patches 0.75–1.75 mm diam., 5–8 in each group, arising singly or loosely aggregated to almost adpressed on the swollen areoles of the host, superficial, black, rough-walled, 0.15–0.25(–0.3) mm diam.; ostiole broad, somewhat papillate, 50–70 µm broad; ascomatal walls uneven in thickness, mainly 20–35 µm thick but more strongly thickened in the vicinity of the ostiole, composed of many layers of dark red-brown pseudoparenchymatous cells, irregularly rounded to somewhat polyhedral and 5–8 µm diam. in surface view, the inner cells often radially compressed and to 12 µm in length in vertical section, each wall cell with a distinct pale "Munk pore" 1–1.5 µm diam. Hamathecium of periphyses lining the ostiolar canal, hyaline, thin-walled, septate, 20–40 × 2.5–4 µm, tapered towards the tips; centrum tissues I−. Asci narrowly cylindrical, with a single thin functional wall layer, ± even in thickness, dehiscense by a rupturing of the apex, 80–100 × 11–15 µm, 4-spored. Asco-

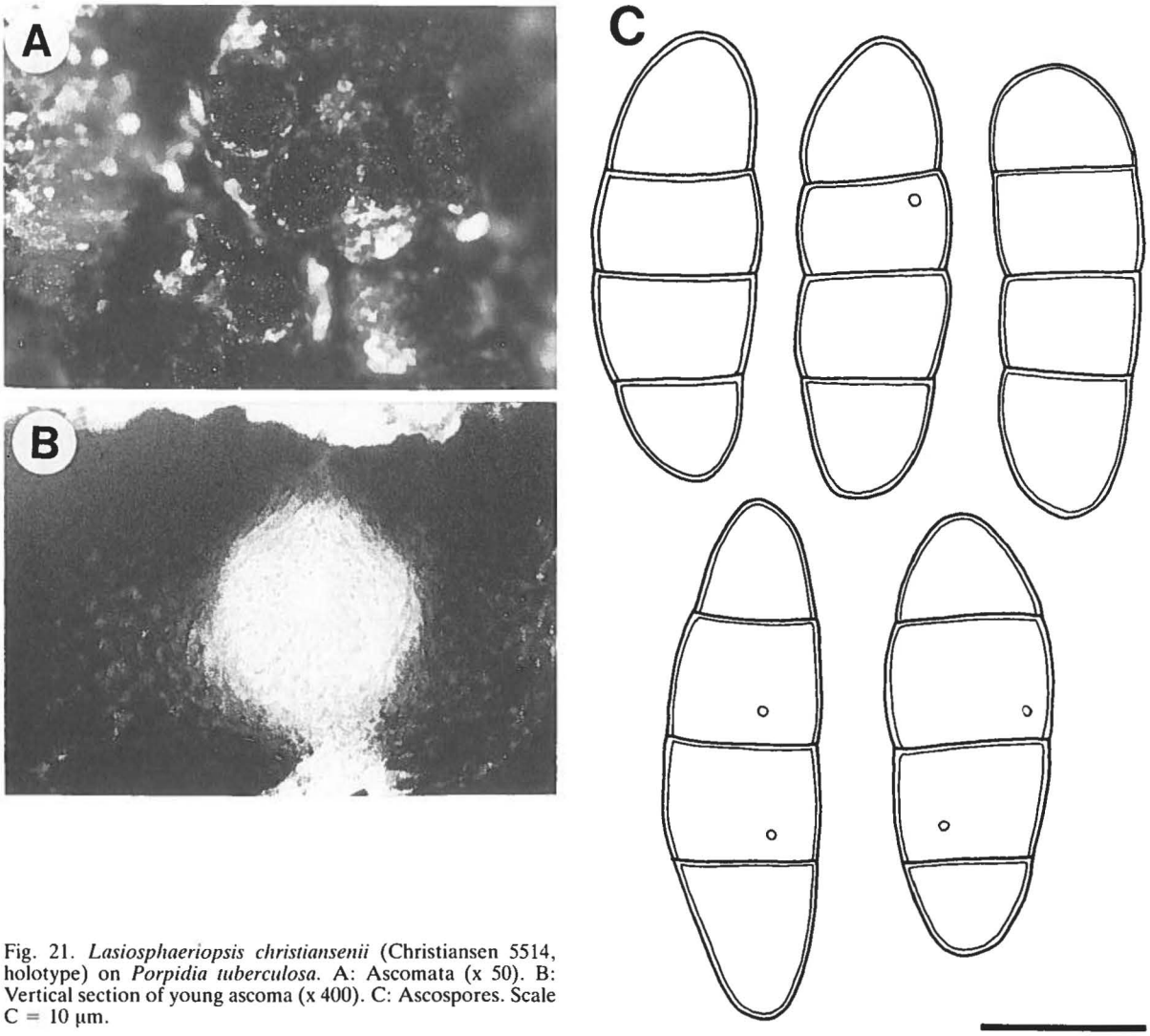


Fig. 21. *Lasiosphaeriopsis christiansenii* (Christiansen 5514, holotype) on *Porpidia tuberculosa*. A: Ascomata (x 50). B: Vertical section of young ascoma (x 400). C: Ascospores. Scale C = 10 µm.

spores ± monostichously arranged, ellipsoid, rounded to slightly attenuated at the apices, 3-septate, not or scarcely constricted at the septa, each cell with an individual pore c. 0.5 µm diam., guttulate, thick-walled and hyaline when young, becoming deep red-brown and thin-walled before discharge, end cells concolorous with the median cells, smooth, lacking a gelatinous sheath, (24–)26–35(–37) × 9.5–11 µm.

Distribution: Greenland, known only from the type collection.
Host: *Porpidia tuberculosa*, forming dark grey patches of somewhat swollen areoles, evidently a mild pathogen.

Notes: This species is named after Dr. M. Skytte Christiansen who collected the type specimen, and also drew our attention to the specially formed elongate hyphopodium-like cells in *L. stereocaulorum* (see below).

L. salisburyi D. Hawksw. & Sivan., which occurs on *Peltigera* thalli, differs in having much larger ascomata (0.5–0.7 × 0.25–0.4 mm), 2 and 4-spored asci, asci 100–135 µm in length, and generally slightly larger ascospores with constantly paler end cells. The only other species known in the genus is *L. stereocaulicola* (see below), on diverse *Stereocaulon* species, in which the ascomata develop in botryose clusters, the ascomatal wall is 50–70 µm thick, and more important, the generally larger ascospores are consistently 5-septate from an early stage and also develop oblique and helicoid septa.

2. **Lasiosphaeriopsis stereocaulicola** (Lindsay) O. Eriksson & R. Sant. (1986: 570)
Sphaeria stereocaulicola Lindsay (1869b: 528, 538)
Xenosphaeria apocalypta Rehm ex Arnold (1877: 302)

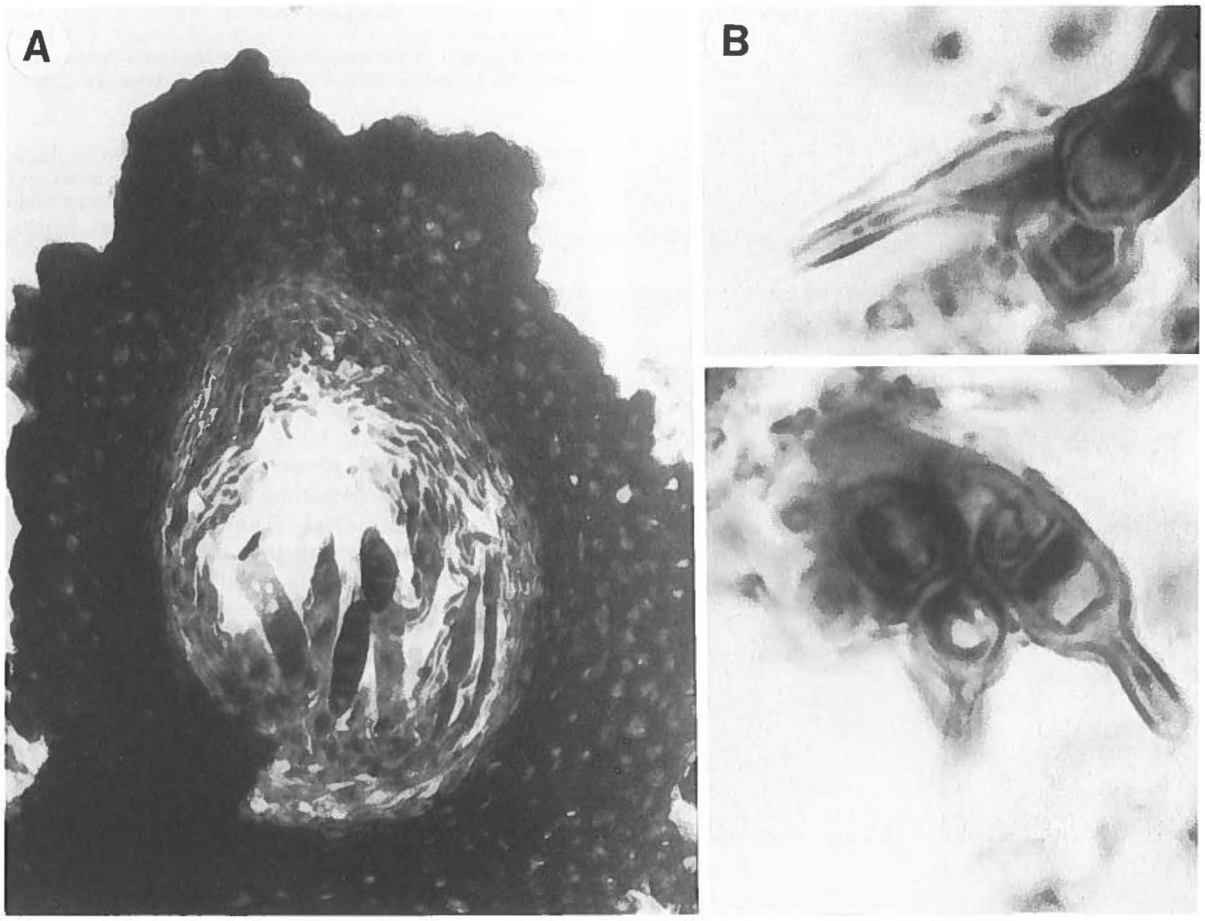


Fig. 22. *Lasiosphaeriopsis stereocaulicola* (Christiansen 5569) on *Stereocaulon alpinum*. A: Vertical section of ascoma (x 400). B: Hyphopodium-like cells on the mycelium (x 2200).

Fig. 22.
Description: Eriksson & Santesson (1986).
Distribution: Arctic-alpine in Argentina, Austria, Sweden, Spitsbergen, Greenland and Uganda. Not previously reported from the Bering Sea area.
Report from Greenland: d'Orleans (1909).
Hosts: Species of *Stereocaulon*, not previously reported from *S. vesuvianum* Pers. and *S. intermedium* (Savicz) Magnusson, forming black, rugose, erumpent stroma up to 2–3 mm diam. on the host's stem and cephalodia.

Note: Elongate hyphopodium-like cells were noted especially in Christiansen 5569, developing from the mycelium and which penetrated the host tissues (Fig. 22). The role of these previously unreported structures is obscure.

Specimens: Narssaq d., Kvanefjeld, 60°59'N, 46°00'W, alt. 585 m, on *S. vesuvianum*, 24 July 1978, Alstrup 243937d (C; IMI 331020).
Sukkertoppen d., Dragefjeldene, 66°17'N, 53°13'W, on *S. rivulorum* Magnusson, 13 July 1958, Hansen 385 (C).
Holsteinsborg d., at Søndre Strømfjord airport, south slope of Mt. Hassel, alt. 150 m, on *S. alpinum* Laurer, 30 July 1946, Skytte Christiansen 5577 (herb. Christiansen). Midway in Søndre Strømfjord, northern shore, Itivdlinguaq, 66°30'N, alt. 50–150 m, on *S. alpinum*, 24 July 1946, Skytte Christiansen 5569 (herb. Christiansen).
Disko, Godhavn, Lyngmarksfjeld, slope towards Blæsedalen, 10 Aug. 1982, Poelt & Ullrich (GZU).
Bering Sea, St. Paul Island, on *S. intermedium*, 1897, Macoun (C).

Lecidea Ach. (1803: 30)

Type species: *Lecidea fuscoatra* (L.) Ach.
Number of species: About 40 (400+ names) in the genus sensu stricto. 14 lichenicolous fungi are currently still referred to *Lecidea*, but none may belong to *Lecidea* s.str.
Description: Hertel (1977: 226).

1. **"Lecidea" diexcipula** D. Hawksw. & Alstrup *sp. nov.*

Fig. 23.
Ascomata apothecia, 0.2–0.25 mm diam., sessilia, ad basim adiquanto constricta, nigra, plana vel leviter convexa; excipulum bistratum, e cellulis pseudosclerenchymatis, interne atrobrunneum ad carbonaceum, externe hyalinum; epithecium

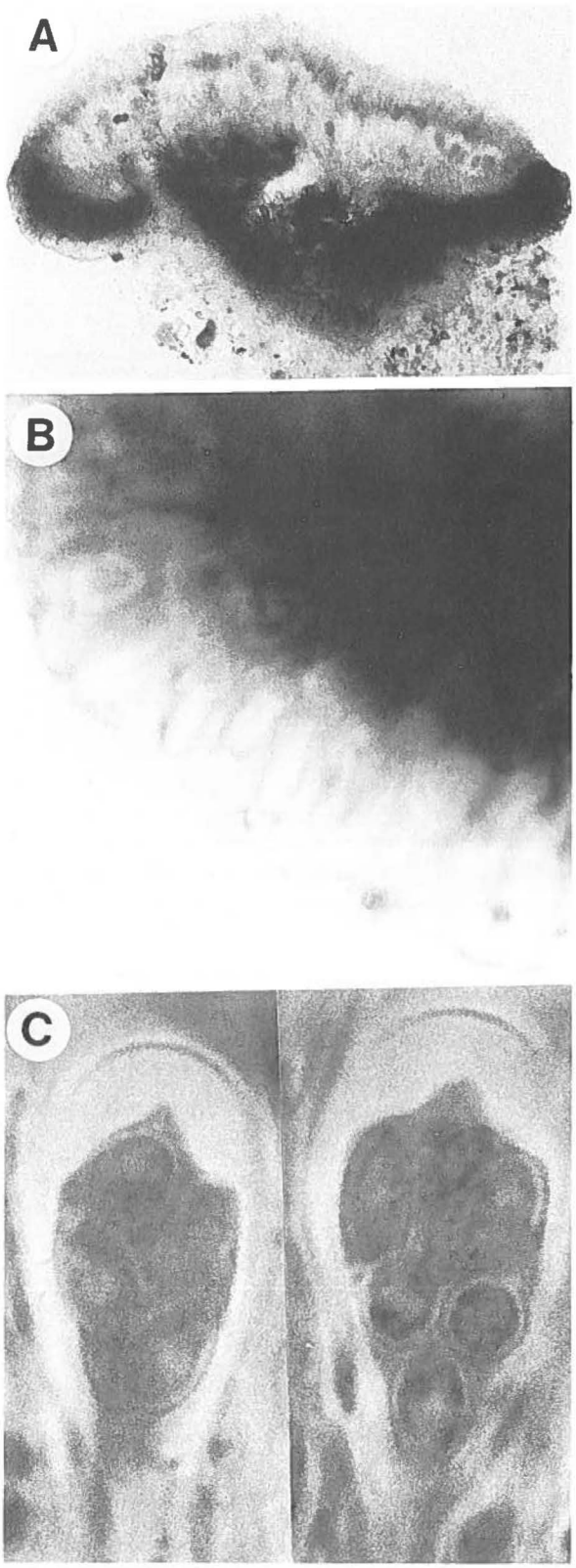


Fig. 23. *»Lecidea« diexcipula* (Alstrup 243848, holotype) on *Lecanora polytropa*. A: Vertical section of ascoma (x 200). B: Vertical section of the exciple showing the outer hyaline and inner dark layers (x 2200). C: Asci and ascospores (x 2200).

hyalinum; hymenium 45–55 µm altum; hypothecium atrobrunneum. Paraphyses simplices vel proximis apicibus ramosis, c. 2 µm latis, non capitatae. Asci clavati ad late-clavati, cum tholo et vagina I+ caerulescentibus, 26–31 × 11.5–15 µm, 8-spori. Ascosporae late-ellipsoideae, hyalinae, simplices, laeves, 9–9.5 × 5–5.5 µm.
Typus: Groenlandia, Narssaq d., south shore of Kangerdluarssuk, 60°52′N, 45°52′W, alt. 35 m, on *Lecanora polytropa* (Hoffm.) Rabenh., 6 July 1978, Alstrup 243848h (C-holotypus, with *Rhizocarpon destructans*).

Ascomata apothecia, 0.2–0.25 mm diam., sessile, somewhat constricted below, black, not shining, disc flat or slightly convex; exciple persistent, of two layers of radiating pseudosclerenchymatous cells, inner layer dark brown to carbonaceous, 14–20 µm thick in vertical section, outer layer colourless, 10–15 µm thick, continuous under the hypothecium, cells mostly without cytoplasm in the free part of the exciple, mostly with cytoplasm in the lower parts in contact with the host; epithecium 10–15 µm tall, colourless, of gelatinous material with only a few paraphyses penetrating, I+ blue-black, hymenium 45–55 µm tall from top hypothecium to top of asci, strongly I+ blue; hypothecium dark brown, paler than the inner exciple, about 35 µm tall. Paraphyses septate, mostly branched once near the top, about 2 µm thick with lumen 1–1.5 µm, anastomoses not seen, not enlarged at the apices. Asci clavate to broadly clavate, lecanoralean, with a tholus and a small apical beak, wall and tholus I+ blue, apical rings or canal not seen, contents and spores I+ greenish, 26–31 × 11.5–15 µm, 8-spored. Ascospores regularly broadly ellipsoid, hyaline, simple, smooth, lacking any epispore, 9–9.5 × 5–5.5 µm.

Distribution: Greenland, known only from the type collection.
Host: *Lecanora polytropa,* occurring on the thallus which turns white, but not as vigorous a pathogen as *Rhizocarpon destructans,* with which it occurs.

Notes: This species is easily recognized by the inner layer of the exciple being dark brown to carbonaceous and the outer layer being colourless, and the tall gelatinous epithecium. It is clearly not a true *Lecidea,* but we do not know any closely related species or a genus suitable for this fungus. It may be closest to *Carbonea,* but the major differences in the exciple seem too great to assign it there and a new generic name may be unavoidable.

2. **Lecidea hymeneliicola** Alstrup & D. Hawksw. *sp. nov.*
Fig. 24.
Ascomata apothecia, 0.15–0.25(–0.35) mm diam., sessilia, nigra, ad basim constricta, concava ad plane; excipulum persist-

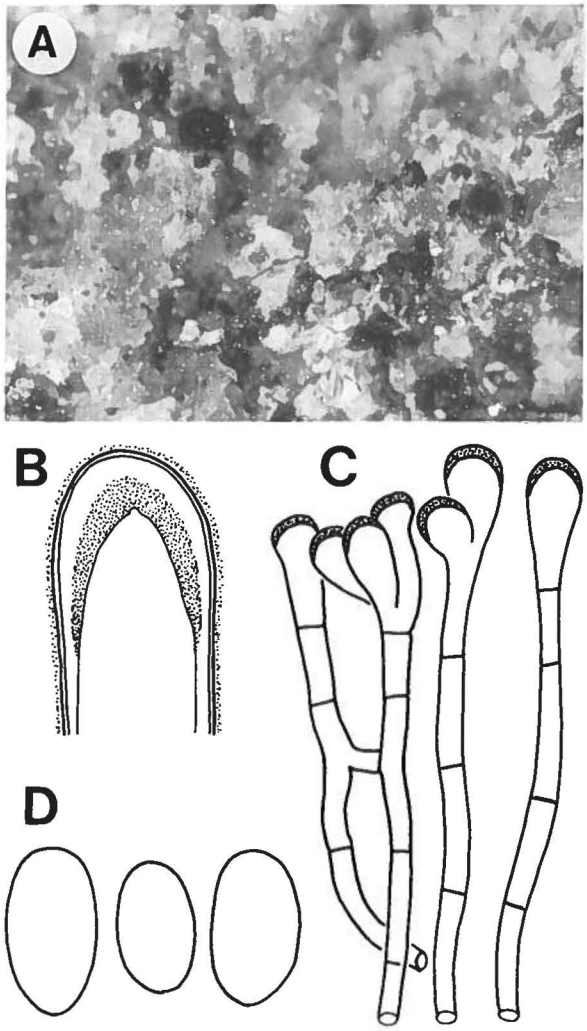


Fig. 24. *Lecidea hymeneliicola* (Alstrup 767408 p.p., holotype) on *Hymenelia lacustris*. A: Ascomata on the host thallus (x 32). B: Ascus tip in Lugol's iodine. C: Paraphyses. D: Ascospores. Scale B-D = 10 µm.

ens, elevatum, atrobrunneum, e cellulis pseudoparenchymatis 4–6 µm diam. compositum; epithecium atrobrunneum; hymenium 40–55 µm altum, N+ rubrobrunneum; hypothecium atrobrunneum. Paraphyses simpliciae vel parce ramosae, aliquanda anastomosantes, 1.5–2 µm latae, apicibus capitatis, brunneis ad 3–4 µm latis. Asci elongato-clavati, cum tholo I+ caerulescenti, 35–40 × 10–12 µm, 8-spori. Ascosporae late ellipsoideae ad subglobosae, hyalinae, simplices, laeves, (7.5–)8–10(–11) × 5–6(–7) µm.
Typus: Groenlandia, Godthåbsfjord, E of Ilulialik, at 120 m lake, 64°51'N, 50°28'W, on *Hymenelia lacustris* (With.) Poelt & Vězda, 8 Aug. 1976, Alstrup 767408 p.p. (C-holotypus; IMI 331018-slides, with *Polycoccum microsticticum* (Leighton ex Mudd) Arnold).

Ascomata apothecioid, black, 0.15–0.25(–0.35) mm diam., sessile, constricted at the base, disc concave to plane; exciple persistent, raised, well-developed, to 50 µm wide in surface view, 30–40 µm thick in section, dark brown to black, composed of radially arranged compacted thick-walled pseudoparenchymatous cells, individual cells 4–6 µm diam.; epithecium dark brown, granular; hymenium 40–55 µm tall, N+ reddish brown, C–, ± unchanged in K, hyaline, I+ blue; hypothecium dark brown, to 45 µm thick. Paraphyses conglutinated, filamentous, not or sparsely branched, especially near the tips, occasionally anastomosed, septate, 1.5–2 µm thick, apices abruptly swollen, 3–4 µm thick, brown-capitate. Asci lecanoralean, elongate-clavate, apex strongly thickened, lacking an internal apical beak, outermost layer and tholus I+ blue, tholus lacking any central I– area or I+ blue cylinder, 35–40 × 10–12 µm, 8-spored. Ascospores irregularly distichously arranged, broadly ellipsoid to almost subglobose, hyaline, simple, lacking an epispore, (7.5–)8–10(–11) × 5–6(–7) µm.

Distribution: Greenland, known only from the type collection.
Hosts: *Hymenelia lacustris*, thallus. The apothecia are aggregated in colonies up to 5 mm diam., pathogenic. The infected areas become white when the host is dead.

Notes: This fungus differs from other lichenicolous lecidioid species which also lack an independent thallus and have ascospores of a similar length as follows: *L. inquinans* Tul. (on *Baeomyces*) has apothecia which are convex at an early stage, and *L. puncta* (Massal.) Jatta (on *Cladonia* and other lichens) has ascospores only 2–4 µm wide. *L. hymeneliicola* has some similarities with the lichenized *L. auriculata* Th. Fr. group, in *Lecidea* s. str., but differs from them in the ascospore size and the reactions of the excipular tissues. *L. hymeneliicola* is certainly closer to *Lecidea* s. str. than *L. diexcipula*.

Lecidella Körber (1855: 233)

Type species: *Lecidella viridans* (Flotow) Körber.
Number of species: About 30, all lichenized and occurring on stone, bark or wood; the new species described below is the first lichenicolous fungus assigned to the genus.
Description: Hertel (1977: 317–318).
Distribution: Cosmopolitan.

1. **Lecidella lecanoricola** Alstrup, D. Hawksw. & R. Sant. *sp. nov.*
Fig. 25
Ascomata apothecia, (0.2–)0.3–0.5 mm diam., sessilia, atroviridonigra, ad basim valde constricta, pruinosa; excipulum exclusens, e hyphis elongatis compositum et 3–4 µm latis, hyalinum, cellulis externe crassis 5–6(–8) µm latis et N+ coccineis; hymenium 50–55 µm altum; hypothecium hyalinum. Paraphyses simples vel parce ramosae, 2–3 µm latae, apicibus crassis, elongatis et 3.5–4 µm latis. Asci elongato-clavati, *Lecanora*-typo, 40–45 × (11–)12–15 µm, 8-spori. Ascosporae late ellipsoideae ad subglobosae, hyalinae, simplices, 8–10(–11) × 5–6 µm.
Typus: Groenlandia, Narssaq d., Narssarssuak, on *Lecanora*

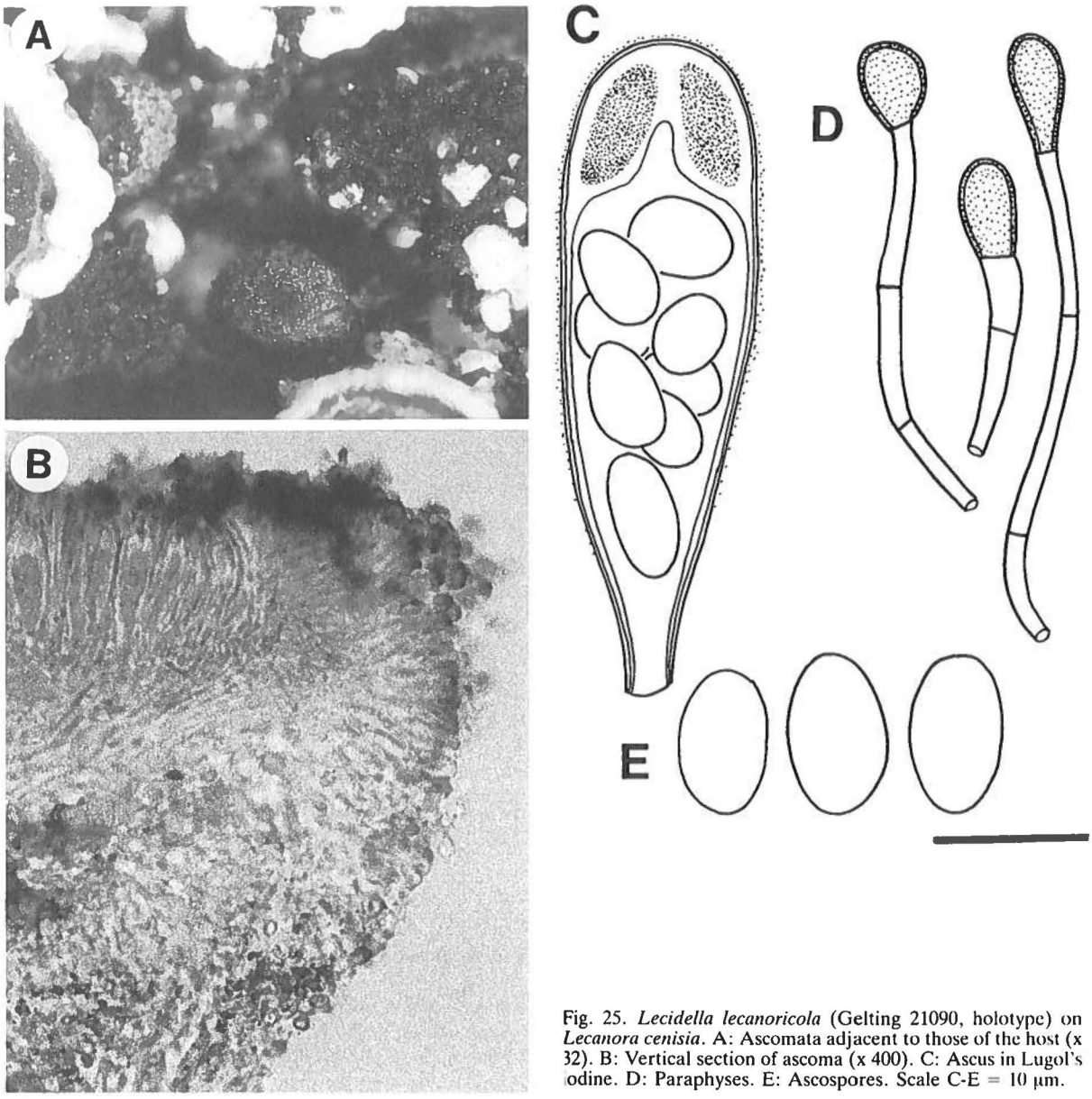


Fig. 25. *Lecidella lecanoricola* (Gelting 21090, holotype) on *Lecanora cenisia*. A: Ascomata adjacent to those of the host (x 32). B: Vertical section of ascoma (x 400). C: Ascus in Lugol's iodine. D: Paraphyses. E: Ascospores. Scale C-E = 10 µm.

cenisia Ach., thallus, 19 Sept. 1953, Gelting 21090 (UPS-holotypus).

Ascomata apothecia, sessile, strongly constricted at the base, (0.2–)0.3–0.5 mm diam., strongly convex, dark greenish black, disc densely greenish grey pruinose; exciple soon becoming excluded, scarcely apparent at maturity, composed of elongated branched radiating hyphae, mainly 3–4 µm wide and hyaline, the apical cells strongly swollen, 5–6(–8) µm wide, with dark green pigmented outer walls, K−, C−, N+ crimson red; epithecium green, 7–10 µm tall, K−, C−, N+ crimson red; hymenium colourless, 50–55 µm tall; hypothecium colourless. Paraphyses simple or sparsely branched, frequently septate, mainly 2–3 µm thick, the end cell swollen, elongate-ellipsoid, 3.5–4 µm thick; centrum I+ blue. Asci elongate-clavate, *Lecanora*-type, the upper part of the ascus thick-walled, with a distinct internal apical beak, tholus I+ blue with an I− axial mass and an unstained layer around the internal beak, outer wall layer I+ persistently blue (not changing to red-brown on standing), 40–45 × (11–)12–15 µm, 8-spored. Ascospores distichously arranged in the asci, broadly ellipsoid to subglobose, hyaline, simple, lacking an epispore, 8–10(–11) × 5–6 µm.

Distribution: Greenland, known only from the type collection.
Host: *Lecanora cenisia*, thallus. The apothecia occur on the host's areoles which retain their original pale yellow-green colour; the fungus is probably commensalistic.

Notes: No lichenicolous species of *Lecidella* has previously been recognized. The ascus structure and reactions in iodine, the exciple of radiating hyphae pigmented only at the outer surface, separating mainly unbranched paraphyses, and the pruina on the apothecial disc, all place this species very close to the lichenized mediterranean *L. viridans* (Flotow) Korber, the lectotype species of *Lecidella*. The primarily lichenicolous *Carbonea* (Hertel) Hertel is rather close to *Lecidella* in the ascus structure, although the outer wall of the ascus is said to change from blue to red-brown on standing in *Lecidella* (Hertel 1984: 449), something not seen in *L. lecanoricola*. However, the massive carbonaceous exciple and dark hypothecium of *Carbonea* is clearly distinct from the type species of *Lecidella*, and the present fungus is consequently described in *Lecidella* rather than *Carbonea*. The generic separation between these two genera, and perhaps also from *Tephromela* M. Choisy clearly merits a more critical asessment than has hitherto been carried out.

Lichenochora Hafellner (1989: 358)
Type species: *Lichenochora thallina* (Cooke) Hafellner.
Number of species: Six, all lichenicolous fungi.

1. **Lichenochora constrictella** (Müll. Arg.) Hafellner (1989: 359)
Sagedia constrictella Müll. Arg. (1874: 350)
Distribution: Switzerland, Austria, Spain, Norway and Greenland.
Report from Greenland: Hafellner (1989).
Hosts: *Fulgensia* spp.

Lichenoconium Petrak & Sydow (1927: 432)
Type species: *Lichenoconium lichenicola* (P. Karsten) Petrak & Sydow.
Number of species: Nine, all lichenicolous fungi.
Descriptions: Hawksworth (1977b: 170) and Sutton (1980: 118).

1. **Lichenoconium lecanorae** (Jaap) D. Hawksw. (1979a: 270)
Coniosporium lecanorae Jaap (in Lindau 1906: 71)
Lichenoconium parasiticum D. Hawksw. (1977b: 178–182)
Distribution: Europe and N. America.
Hosts: Many genera of the Lecanorales, especially *Lecanora* and *Parmelia* species, also on *Rhizoplaca* species and *Squamarina lentigera*.
Description: Hawksworth (1977b: 178–182).

Specimen: Holsteinsborg d., midway in Søndre Strømfjord, Itivdlinguaq, alt. 10 m, on *Rhizoplaca melanophthalma* (DC.) Leuck. & Poelt, 24 July 1946, Skytte Christiansen 5556 (herb. Christiansen).

2. **Lichenoconium usneae** (Anzi) D. Hawksw. (1977b: 185)
Epicoccum usneae Anzi (1868: 177)
Description: Hawksworth (1977b: 185–190).
Distribution: Europe, N. America and the Canary Islands.
Hosts: Various crustose, foliose and fruticose genera of the Lecanorales. In Greenland only known on the thallus of *Parmelia saxatilis* (L.) Ach. where it occurs in association with (and sometimes on the ascomata of) *Abrothallus parmeliarum* (Sommerf.) Arnold. Pycnidia are scattered on the lobes which are only slightly discoloured; no necrotic patches with dark margins were found.

Notes: This species was previously known from the apothecia of *P. saxatilis*, but not from the thallus, and the symptoms are quite different from infections caused by *L. erodens* M. S. Christ. & D. Hawksw. and *L. lecanorae* (Jaap) D. Hawksw. on the same host (Hawksworth loc. cit.: 168). The tendency of the species to be associated with infections by other lichenicolous fungi was already noted by Hawksworth (loc. cit.: 188). The conidiogenous cells in the Greenland specimen are 7–10 µm tall and the conidia (3–)3.5–4(–4.5) µm diam.

Specimen: Ivigtut d., Ivigtut town, 61°12'N, alt. 20 m, 15. July 1946, Skytte Christiansen 5531 p.p. (herb. Christiansen).

Lichenodiplis Dyko & D. Hawksw. (in Hawksworth & Dyko 1979: 51)
Type species: *Lichenodiplis lecanorae* (Vouaux) Dyko & D. Hawksw.
Number of species: Two, both lichenicolous fungi.

1. **Lichenodiplis lecanorae** (Vouaux) Dyko & D. Hawksw. (in Hawksworth & Dyko 1979: 52)
Diplodina lecanorae Vouaux (1912: 69)
Description: Hawksworth & Dyko (1979: 52).
Distribution: Europe and Greenland.
Reports from Greenland: Lamb (1939: 285) and Hansen, Poelt & Søchting (1987: 9).
Hosts: On a wide range of mainly crustose lichen species. In Greenland it has been found on *Caloplaca alcarum* Poelt, *Rhizoplaca chrysoleuca* (Sm.) Zopf, *R. melanophthalma* (DC.) Leuck. & Poelt, *Pertusaria* sp. and *Xanthoria elegans* (Link) Th. Fr. It is seen as aggregated black spots of sunken conidiomata on the thallus and apothecia of the hosts.

Specimens: Sukkertoppen d., Kangerdluarssuk, unnamed island, 65°25'N, 52°37'W, alt. 20 m, on *Xanthoria elegans*, 17 Aug. 1977, Alstrup 771750 (C).
Disko, Godhavn, Basaltplateau kurz NE der Arktischen Station Godhavn, 500–100 m, auf *Pertusaria* über Pflanzenresten, 28 Juli 1982, Poelt & Ullrich (herb. Hafellner). Godhavn,

gneiss area, rocks near the coast, 0–30 m, on *Caloplaca alcarum* Poelt, 28 July 1983, Poelt & Ullrich (herb. Hafellner).

Lichenopuccinia D. Hawksw. & Hafellner (in Hawksworth 1984: 373)

Type species: *Lichenopuccinia poeltii* D. Hawksw. & Hafellner.
Number of species: Monotypic.

1. **Lichenopuccinia poeltii** D. Hawksw. & Hafellner (in Hawksworth 1984: 374)
Distribution: Austria, the British Isles and Greenland.
Hosts: *Parmelia sulcata* Taylor (Austria) and *P. saxatilis* (L.) Ach., found as black sporodochia up to 0.25 mm diam. breaking through the cortex of both sides of the host thallus, not merely the upper cortex as in the original collection.

Specimens: Narssaq d., Narssarssuaq, 61°09'N, 45°25'W, on *P. saxatilis*, 14 July 1969, Hansen, Lichenes Groenlandici Exsiccati 19 (UPS).
British Isles, Isle of Skye, S Kyle of Lochalsh, S of loch na Beiste, on *P. saxatilis* on *Quercus*, 31 May 1987, Diederich 8830 (herb. Diederich, IMI 328885).

Lichenostigma Hafellner (1982: 259)

Type species: *Lichenostigma maureri* Hafellner.
Number of species: Two, both lichenicolous fungi.

1. **Lichenostigma rugosa** Thor (1985: 269)
Distribution: Libya, Saudi Arabia, Europe, Greenland and USA.
Hosts: *Diploschistes* spp., occurring as minute red-brown dispersed thalli on the host cortex, commensalistic.

Specimen: Holsteinsborg d., head of Søndre Strømfjord, foot of Mt. Hassel, 67 N, alt. 50–100 m, on *Diploschistes muscorum*, 22 Aug. 1946, Skytte Christiansen 5445 (herb. Christiansen).

Merismatium Zopf (1898: 259)

Type species: *Merismatium lopadii* (Anzi) Zopf.
Number of species: Three, all lichenicolous fungi.

1. **Merismatium lopadii** (Anzi) Zopf (1898: 260)
Celidium lopadii Anzi (1868: 177)
Description: Keissler (1930: 441–443).
Distribution: Europe.
Hosts: *Lopadium pezizoideum* (Ach.) Körber, *Catapyrenium lachneum* (Ach) R. Sant., *Lecanora conizaeoides* Nyl. ex Crombie, and a species of *Protoblastenia*. *Pyrenopsis macrocarpa* Dahl and *Lepraria neglecta* are apparently new host species; no obvious symptoms of infection were observed in these species.

Notes: The ascospores in Alstrup 77416 are up to 11 × 8 µm, and those in Skytte Christiansen 5525 up to 16 × 8 µm.

Specimens: Sukkertoppen d., head of Sønder Isortoq, Nûgssûp qârssua, at unnamed lake, 65°32'N 51°43'W, alt. 325 m, on *Pyrenopsis macrocarpa* and *Lepraria* sp. 16 July 1977, Alstrup 77416 (C).
Narsasq d., Narssarssuaq, 61°11'N, alt. 0–50 m, on *Lepraria neglecta* in a copse of *Betula pubescens*, 13 July 1946, Skytte Christiansen 5525 (herb. Christiansen).

Muellerella Hepp (in Müll. Arg. 1862: 419)

Type species: *Muellerella polyspora* Hepp.
Number of species: 11, all lichenicolous or bryophilous fungi.

1. **Muellerella lichenicola** (Sommerf.) D. Hawksw. (1979b: 289)
Sphaeria lichenicola Sommerf. (1826: 218)
Tichothecium lichenicola (Sommerf.) R. Sant. (1960: 507)
Endococcus erraticus Massal. (1855: 94)
Description: Santesson (1960: 507–508).
Distribution: Europe, N. America and Greenland.
Reports from Greenland: Branth (1895) and Hansen, Poelt & Søchting (1987: 9).
Hosts: Species of *Lecanora* and *Caloplaca*, and *Aspicilia calcarea*, here also reported on *Xanthoria elegans* (Link) Th. Fr., occurring as dispersed, black perithecia ± immersed in the thallus and apothecia of the host, which turn white.

Note: This epithet has often been cited as "Sommerf. ex Fr." (Fries 1828: 103), but was merely sanctioned by Fries and can be attributed to Sommerfelt alone.

Specimens: Narssaq d., Nákâlâq, 60°59'N, 45°44'W, alt. 1100 m, on *Lecanora polytropa* (Hoffm.) Rabenh., July 1980, Alstrup 80401 (C).
Disko, Godhavn, E of the Arctic Station, 20–100 m, July 1983, on *X. elegans*, Poelt & Ullrich (GZU).
Umanak d., Sydsø SE of Mârmorilik, alt. 480–550 m, on *Lecanora polytropa* and *Caloplaca paulii* Poelt, Aug. 1983, Poelt & Ullrich (GZU).

2. **Muellerella pygmaea** (Körber) D. Hawksw. (1979b: 289)
Tichothecium pygmaeum Körber (1853: 236)
Endococcus pygmaeus (Körber) Th. Fr. (1861: 375)
Sphaeria ventosaria Lindsay (1866: 439)
Description: Keissler (1930: 411–417).
Distribution: Widely distributed.
Reports from Greenland: Fries (1879), Branth (1895), Branth & Grønlund (1887), Lindsay (1871: 346), Lynge (1940) and Magnusson (1950: 378).
Hosts: On a wide range of lichens. In Greenland it has been found on *Amygdalaria panaeola* (Ach.) Hertel & Brodo, *Aspicilia cinerea* (L.) Körber, *Caloplaca saxicola* (Hoffm.) Nordin, *Caloplaca groenlandica* Lynge, *C. trachophylla* (Tuck) Zahlbr., *C. paulii* Poelt, *Carbonea vorticosa* (Flörke) Hertel, *Lecanora argopholis* (Ach.) Ach., *L. polytropa* (Hoffm.) Rabenh., *L. intricata* (Ach.) Ach., *Lecidea atrobrunnea* (Ramond) Schaerer, *L. lactea* Flörke ex Schaerer, *L. lapicida* (Ach.) Ach., *L. tesselata* Flörke, *Ophioparma lappo-*

nica (Räsänen) Hafellner & R. W. Rogers, *Porpidia flavocaerulescens* (Hornem.) Hertel & Schwab, *Polyblastia cruenta* (Körber) P. James & Swinscow, *Rhizocarpon geographicum* (L.) DC. and *R. superficiale* (Schaerer) Vainio. It occurs as 1–2 (rarely more) black perithecia ± immersed in the areoles of the host thallus.

Specimens (selected): Umanak d., slope above Mârmorilik, NE-exposed, alt. 50–300 m, on *Carbonea vorticosa* and *Caloplaca paulii*, Aug. 1983, Poelt & Ullrich (GZU).
Disko, Godhavn, Blæsedalen, alt. 150 m on *Aspicilia cinerea*, Aug. 1987, Jacobsen 5614 p.p. (KIEL). Godhavn, Lange Kær, 69°15′N, 53°32′W, alt. 26 m, on *Lecidea tesselata*, 21 May 1952, Gelting (UPS). Godhavn, N and NE of the Arctic Station, alt. 20 m, on *Caloplaca trachyphylla*, 27 July 1982, Poelt & Ullrich (GZU). Lyngmarksfjeld, alt. 350 m on *Lecidea atrobrunnea*, Aug. 1987, Jacobsen 4156 (KIEL).
Sukkertoppen d., head of Sønder Isortoq, Qaersutsiaup qulâ, 65°33′N, 51°44′W, alt. 20 m, on *Lecanora argopholis*, 14 July 1977, Alstrup 77161 (C).
Holsteinsborg d., Angujârtorfiup nunâ, Arnangarngup kûa, 66°31′N, 51°13′W, alt. 580 m, on *Rhizocarpon superficiale*, 8 July 1979, Alstrup 79733 (C).
Ivigtut d., rock E of Ivigtut town, 61°12′N, alt. 20 m, on *Ophioparma lapponica*, 15 July 1946, Skytte Christiansen 5529, (herb. Christiansen).
Narssaq d., at outlet from Taseq, 60°57′N, 45°48′W, alt. 460 m, on indet. crustose lichen, 1 Aug. 1980, Alstrup 80666 (C).

Nectriella Nitschke ex Fuckel (1870: 175)
Type species: *N. fuckelii* Nitschke ex Fuckel.
Number of species: Ten species are lichenicolous, about 30 others occur on other substrata, but may not be congeneric.
Descriptions: Hawksworth (1982b) and Lowen (1989).

Note: Most lichenicolous species may require transfer to *Pronectria* Clem.

1. **Nectriella ornamentata** D. Hawksw. (1982b: 756)
Distribution: Until now only reported from the type collection on Iceland.
Hosts: *Peltigera praetextata* (Flörke ex Sommerf.) Zopf and *P. didactyla* (With.) Laundon, found as dispersed to aggregated orange-brown to red-brown perithecia breaking through the upper cortex of the host leading to its destruction.

Specimen: Disko, Godhavn, Skarvefjeld, alt. 500 m, on *P. didactyla*, 7 Aug. 1982, Poelt & Ullrich (GZU).

Nesolechia Massal. (1856: 43)
Type species: *Nesolechia oxyspora* Massal.
Number of species: Six, all lichenicolous fungi.

1. **Nesolechia oxyspora** (Tul.) Massal. (1856: 43)
Abrothallus oxysporus Tul. (1852: 116)
Phacopsis oxyspora (Tul.) Triebel & Rambold (1988: 300)
Description: Triebel & Rambold (loc. cit.).
Distribution: Widely distributed.
Hosts: A wide range of genera in the Parmeliaceae, often forming galls on the thallus. In Greenland known from *Parmelia saxatilis* (L.) Ach. and *P. fraudans* (Nyl.) Nyl.

Notes: Triebel & Rambold (loc. cit.) transferred the type species of *Nesolechia* to *Phacopsis* Tul., pointing out the similarities in ascus and paraphyses types. However, we consider that the well-developed exciple, the pigmentation of the ascomata, the ascospore shape, the even, unthickened spore-walls, and the development of the infections are sufficient characters to separate this fungus at the generic level.

Specimens: Holsteinsborg d., head of Søndre Strømfjord, south slope of Mt. Hassel, 67 N, alt. 150 m, on *Parmelia fraudans*, 30 July 1946, Skytte Christiansen 5582 (herb. Christiansen).
Narssaq d., head of Kangerdluarssuk, 60°53′N, 45°51′W, alt. 10 m, on *Parmelia saxatilis*, 3 July 1978, Alstrup 78030 (C).

Opegrapha Acharius (1809: 97)
Type species: *Opegrapha vulgata* auct., non (Ach.) Ach.
Number of species: About 300, mostly lichenized, 18 are lichenicolous fungi.

Note: The conserved type species is a nomenclatoral synonym of the species now known as *Ascodichaena rugosa* Butin (Hawksworth 1983c: 215); this needs to be addressed by a new conservation proposal.

1. **Opegrapha stereocaulicola** Alstrup & D. Hawksw. *sp. nov.*
Figs 26, 27.
Ascomata lirelliformia, ramosa vel non-ramosa, ad 2 × 0.6 mm, primum plana sed mox convexa, sessilia, emarginata; excipulum debile et cum hypothecio continuuo; hymenium 100–120 µm altum; hypothecium brunneo-nigrum, e cellulis pseudoparenchymaticum compositum, ad 50 µm altum. Paraphyses ramosae et anastomosae, 2.5–3 µm latae, apicibus brunneis et ad 4 µm latis. Asci anguste clavati, bitunicati, 50–65 × 15–17.5 µm, 8-spori. Ascosporae anguste ellipsoideae ad cylindricae, 3(–5)-septatae, primum laeves et hyalinae, posteam brunneae et irregulariter verruculosae, 19–21(–27.5) × 5–6(–6.5) µm.
Typus: Groenlandia, Disko, Godhavn, at Røde Elv, on *Stereocaulon alpinum* Laurer, August 1983, Eckardt (C-holotypus).

Ascomata elongated, lirelliform, branched or unbranched, up to 2 mm long and 0.6 mm broad, flat when young, soon becoming strongly convex and emarginate, sessile, not constricted at the base; epithecium 15–20 µm tall, composed of end-cells of the paraphyses which are of markedly different height; hypothecium up to 50 µm thick, brown-black to carbonaceus, of rounded to subangular, thick-walled pseudoparenchymatous cells 6–7.5 µm diam., walls 1.5–2 µm thick, brown to black; exciple not separated from the hypothecium, of the same structure and continuous with that and of the same orientation, with the outer part embedded in host tissue; hymenium 100–120 µm tall, hyaline, I−. Paraphyses branched, septate and anastomosing, 2.5–3 µm thick, end-cell up to 4 µm and brownish, I+ pale blue. Asci narrowly clavate, thick-walled with an internal apical beak, wall 1–2 µm thick in the lower parts and 5

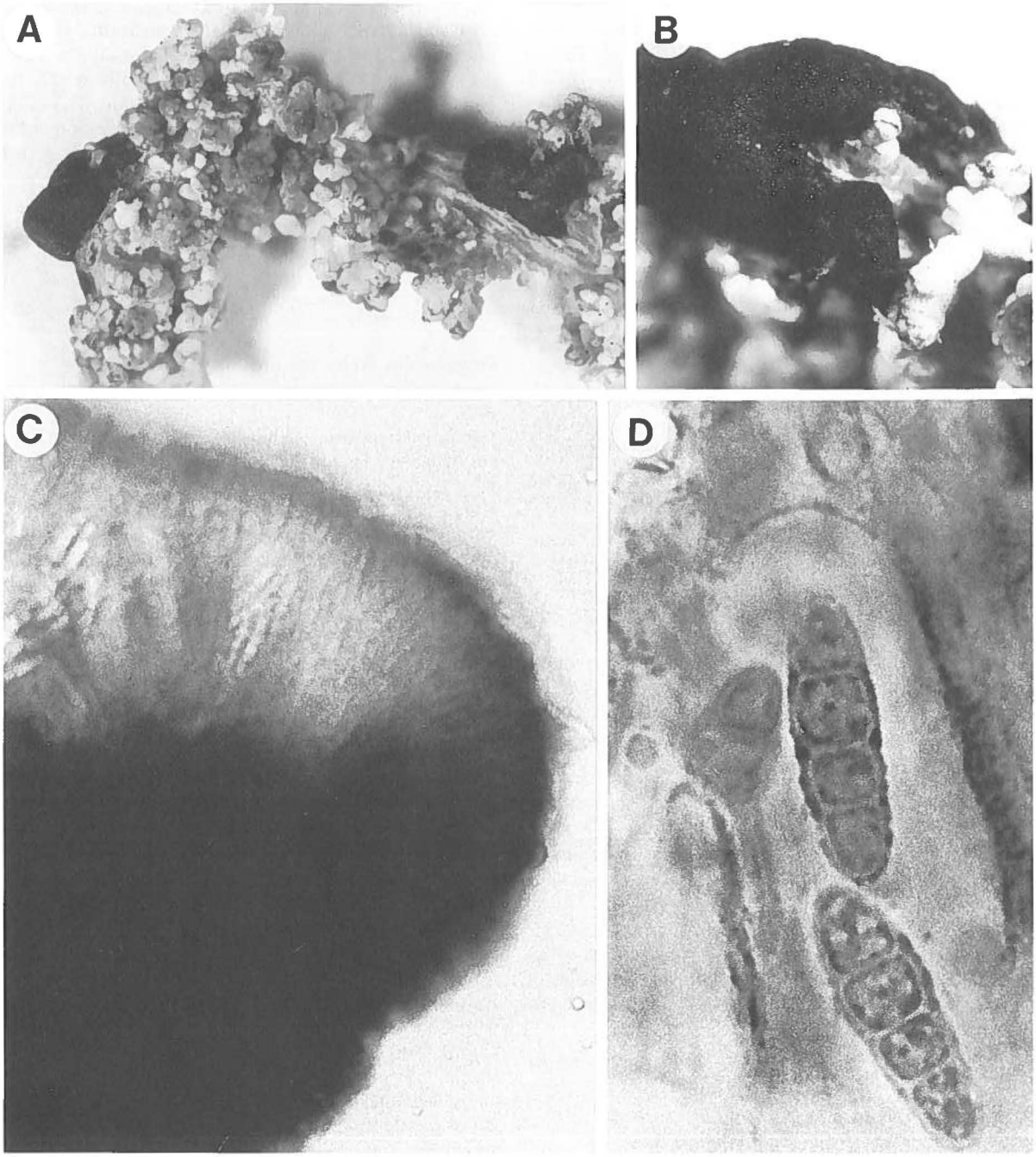


Fig. 26. *Opegrapha stereocaulicola* (Eckardt 1983, holotype) on *Stereocaulon alpinum*. A: Ascomata on host (x 13). B: Ascoma showing lirelliform habit (x 32). C: Vertical section of ascoma (x 400). D: Ascus apex and ascospores (x 2200).

µm thick in the upper parts, I−, 50–65 × 15–17.5 µm, dehiscence not seen, 8-spored. Ascospores narrowly ellipsoid to cylindrical, with rounded ends, mostly 3-septate but 4 and 5-septate quite frequently, not or slightly constricted at the septa, smooth, hyaline, finally brownish due to a dark substance being unevenly deposited on the outer spore-wall, 19–21 × 5–6 µm, 5-septate spores up to 27.5 × 6.5 µm, wall 0.5–1 µm thick.

Distribution: Greenland.
Hosts: *Stereocaulon alpinum* and *Stereocaulon* sp., forming black unbranched or branched ascomata on the

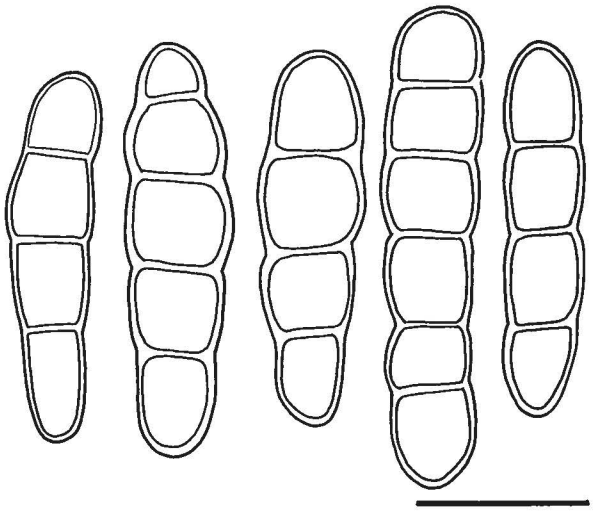


Fig. 27. *Opegrapha stereocaulicola* (Eckardt 1983, holotype) ascospore outlines. Scale = 10 µm.

stem, and phyllocladia near the stem, up to 2 × 0.6 mm; pathogenic, one of the collections could not be identified to species level due to the stunted growth which is probably caused by the parasite.

Notes: This species is placed in *Opegrapha* with some hesitation, because the exciple is continuous with the hypothecium, whereas other species in the genus have a differentiated exciple of upright orientation. The apothecial structure might be interpreted as arthonioid developed on a strongly developed hypothecium. However, the branched and anastomosing paraphyses, the ascus type with the thick upper wall, the ascospore shape and septation and the deposition of a dark substance on the old spore walls are features shared by at least some species of *Opegrapha* and not of *Arthonia*. Of the lichenicolous species currently referred to the genus, only *O. pertusariicola* Coppins & P. James on *Pertusaria leioplaca* DC. in Scotland has ascospores with more than 3 septa, but it has 4-spored asci and a brown K+ greenish exciple.

Additional specimen: Disko, Søndre Laksebugt, 69°18′N, 53°56′W, on *Stereocaulon* sp., 5 Sept. 1951, Gelting 15528b (C).

Phaeospora Hepp ex B. Stein (in Cohn 1879: 350)
Type species: *P. rimosicola* (Mudd) Hepp ex B. Stein.
Number of species: 20, mostly lichenicolous, but one is algicolous.
Description: Keissler (1930: 418–420).

1. **Phaeospora parasitica** (Lönnr.) Arnold (1874: 151)
Thelidium parasiticum Lönnr. (1858: 632)
?Endococcus triphractus Nyl. (1872: 364)
Distribution: Widespread.
Report from Greenland: ?Fries (1879).
Hosts: Various crustose lichens.

Note: Fries' report of *E. triphractus* on a sterile crustose lichen would belong to this species if the synonymy proposed by Keissler (1930: 422) is correct.

2. **Phaeospora rimosicola** (Mudd) Hepp ex B. Stein (in Cohn 1879: 350)
Microthelia rimosicola Mudd (1861: 308)
Description: Hawksworth (1985: 164).
Distribution: Widespread in Europe and N. America.
Hosts: Various crustose lichens, particularly frequent on *Rhizocarpon concentricum* (Davies) Beltr.; not previously reported on any macrolichen but reported here on *Arctoparmelia centrifuga* (L.) Hale.

Notes: The ascospores in the Greenland collection measure 16–19(–21) × 7–8(–9) µm, conforming to the dimensions given by Hawksworth (loc. cit.). The ascospores become clearly brown and do not remain pale as in the type specimen of *P. rimosicola*, but as the perithecia are also of a comparable size, we see no reason not to include the species here. The centrum reacts I+ blue in the collection on *Arctoparmelia*, and the variability of this reaction in the genus clearly merits further study.

Specimen: Ivigtut d., on boulder W of Ivigtut town, 61°12′N, alt. 50 m, on *Arctoparmelia centrifuga*, Skytte Christiansen 5450 (herb. Christiansen, IMI 331021).

Phaeosporobolus D. Hawksw. & Hafellner (1986: 525)
Type species: *P. usneae* D. Hawksw. & Hafellner.
Number of species: Previously monotypic.
Description: Hawksworth & Hafellner (1986: 525–526).

1. **Phaeosporobolus alpinus** R. Sant., Alstrup & D. Hawksw. *sp. nov.*
Fig. 28.
Conidiomata stromatica, superficialia, irregulariter convexa ad subglobosa, ad basim constricta, (20–)30–75 µm diam., nigra, cum cellulis globosis, 5–7(–8) µm diam. composita, pelliculae desunt. Conidiophora micronematosa. Cellulae conidiogenae monoblasticae in conidiophora incorporatae, terminales. Conidia irregulariter subglobosa, (9–)10–15(–17) µm diam., e 10–15 (–20) cellulis globosis composita, atrobrunnea, plusminusve laevia, 3–4 µm diam.
Typus: Groenlandia, Disko, Qutdligssat, 1 km SW of churchyard, on *Ochrolechia frigida* (Sw.) Lynge, 70°05′N, 53°01′W, alt. 100 m, 27 July 1950, Gelting 13333 (UPS-holotypus).

Conidiomata stromatic, superficial, irregularly convex to subglobose, strongly constricted below, (20–)30–75 µm diam., dispersed, black, composed of compacted subglobose brown cells, 5–7(–8) µm diam., the outermost layers somewhat darker brown and the cell walls more strongly thickened where they are exposed, often irregularly verruculose, not enveloped by a pellicle-like layer of hyphae, the stroma not supported by a distinct tissue. Conidiophores micronematous, not clearly distinguished from the stromal cells. Conidiogenous cells arising from the conidiophores in the cental to upper part of the stromata, monoblastic, integrated, terminal.

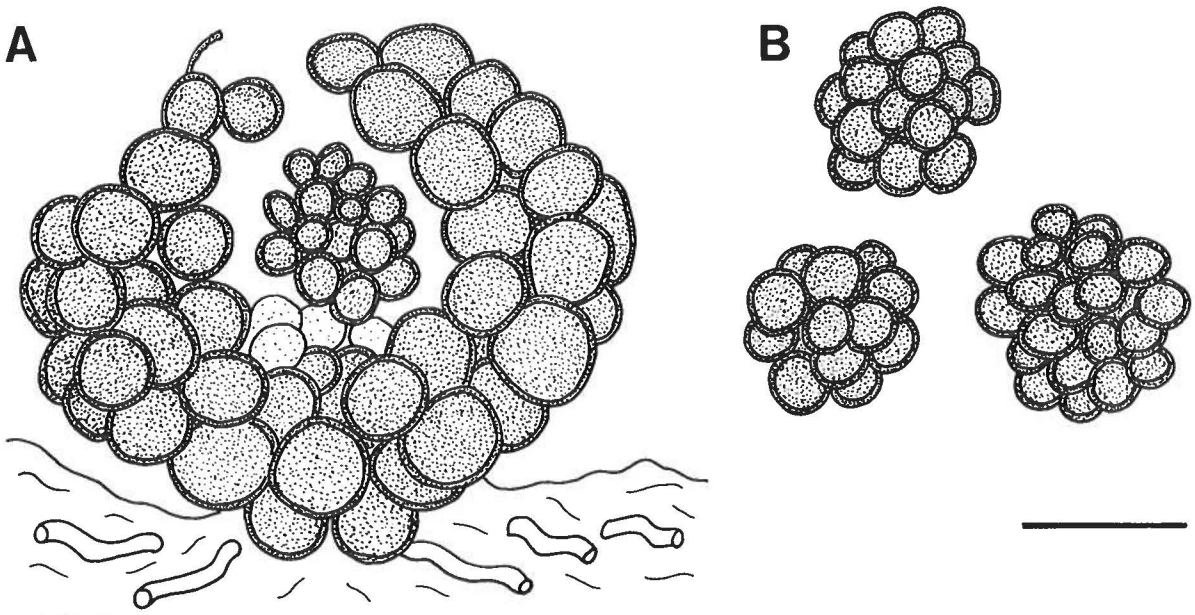


Fig. 28. *Phaeosphaerobolus alpinus* (Christiansen 5507, holotype) on *Ochrolechia frigida*. A: Vertical section of conidioma. B: Conidia. Scale = 10 µm.

Conidia irregularly subglobose, (9–)10–15(–17) µm diam. overall, composed of 10–15(–20) compacted subglobose cells, individual cells 3–4 µm diam., brown to dark brown, ± smooth, released through irregular breaks in the stromatal surface layers.

Hosts: *Ochrolechia frigida, Pertusaria dactylina* (Ach.) Nyl. and *P. glomerata* (Ach.) Schaerer, occurring as minute black dots on the thallus, commensalistic.
Distribution: Greenland, Scandinavia, Svalbard, Novaja Zemlja, N. America and Chile.

Notes: *P. alpinus* differs from the type species of the genus in several important respects, notably the absence of a pellicle-like outer hyphal layer over the stoma, the more pigmented cells in the central parts of the stroma, the conidia being 15–25 µm diam. overall and ellipsoid rather than subglobose, adhering in chains, and in that the individual cells within the conidia are 4–6 µm diam. In addition, *P. usneae* is primarily restricted to fruticose macrolichens, and is not known from *Ochrolechia* and *Pertusaria* species. What may be a third member of the genus occurs on *Ramalina* species, but needs more critical study; that species has more ellipsoid conidia overall 12.5–14.5 × 8–9.5 µm and with individual cells similar in size to those of *P. alpinus* (Austria, Oberösterreich, E-Umgebung von Vorderstuder, on *R. farinacea* (L.) Ach., 14 August 1986, S. Wagner 8251/3, SZU-L10030) – this could be the anamorph of a *Lichenostigma* (see Hawksworth & Diederich (1988: 309).

Small locules 20–30 µm diam. lined with pseudosclerenchymatous cells were seen in some of the sections made of the stromata in "Lich. Groenl. Exs." no. 24 (UPS) which appeared to contain either young asci or in one case perhaps hyaline spores (Fig. 29). It seems possible therefore, that a teleomorph will be found, which would be expected to belong to *Lichenostigma*.

This species often occurs on the same thalli as *Echinothecium glabrum*, but lacks the distinctive network of superficial hyphae characteristic of that genus.

Specimens: South Greenland: Akia, 60°41′N 46°04′W, on *Ochrolechia frigida*, 25 July 1969, Hansen, Lich. Groenl. exs. 24 (UPS).
Ivigtut d., Grønnedal, 61°14′N, alt. 0–50 m, on *Ochrolechia frigida*, 9 July 1946, Skytte Christiansen 5507 (herb. Christiansenn).
Disko, Nordfjord, Kuanerssuit, on *Pertusaria dactylina*, 22 June 1871, Th. Fries (UPS). Mellemfjord, on *P. dactylina*, 8 July 1871, Th. Fries (UPS). Diskofjord, Kangikitleq, at the cottage, 69°27′N, 53°30′W, alt. 6 m, on *P. glomerata*, 11 Aug. 1951, Gelting 14216 (UPS). Qutdligssat, 1 km S of churchyard, 70°05′N, 53°01′W, alt. 100 m, on *Ochrolechia frigida*, 27 July 1950, Gelting 13333 (UPS).
Kokoerne, on *P. dactylina*, 10 June 1871, Th. Fries (UPS).
Canada: Manitoba, Churchill, 12 Aug. 1950, Thomson (UPS).
Chile: Punta Arenas, on *O. frigida*, 29 Nov. 1895, Dusén (UPS). West Patagonia, Skyring, Puerto Pinto, on *O. frigida*, 23 April 1908, Skottsberg (UPS).
Norway: Six localities in the provinces Hordaland, Oppland, Sør-Trøndelag, Troms and Finmark (UPS and O).
Novaja Zemlja: Matotschkain Scharr, 1871, Aagaard (UPS).
Svalbard: Ny-Ålesund, Blomstrandhalvøya, 1988, L. & K. Holm 5115b (UPS).
Sweden: Härjedalen, Tännäs par., six localities (UPS).
USA: Alaska, Atka, 29 June 1932, Hultén (UPS). Pribilof Islands, St. Paul, 9 Aug. 1932, Hultén (UPS).

2. **Phaeosporobolus usneae** D. Hawksw. & Hafellner (1986: 526)
Distribution: Europe, Greenland and the Canary Is-

Fig. 29. *Phaeosporobolus alpinus* (Hansen, "Lich. Groenl. Exs." no. 24) on *Ochrolechia frigida*. Vertical section of conidioma-like stroma containing a developing ascoma and young ascospores (x 2200).

lands, here also reported from Australia.
Hosts: A wide range of macrolichens. *Physcia caesia* (Hoffm.) Fürnrohr and *Lichenothelia echinulata* Henssen are new host species. It is found as minute red-brown thalli dispersed over the host.

Specimens: Holsteinsborg d., head of Søndre Strømfjord, south slope of Mt. Hassel, 67°N, on *Physcia caesia*, 31 July 1946, Skytte Christiansen 5578 (herb. Christiansen, with *Polycoccum galligenum*).
Australia: A.C.T., Gudgenly River Surge, 27 km S of Canberra, alt. 700 m, on *Lichenothelia echinulata*, 9 Sept. 1987, Titze (IMI 327471).

Phoma Saccardo (1880a: 4)
Type species: *Phoma herbarum* Westendorp.
Number of species: 2000 are described from mainly a wide range of flowering plants, but that number is certainly too high, six lichenicolous species are accepted.

1. **Phoma epiphyscia** Vouaux (1914: 97)
Fig. 30.
Distribution: France and Greenland.
Hosts: *Phaeophyscia orbicularis* (Necker) Moberg and *Xanthoria parietina* (L.) Th. Fr., here also reported on *Phaeophyscia sciastra* (Ach.) Moberg.

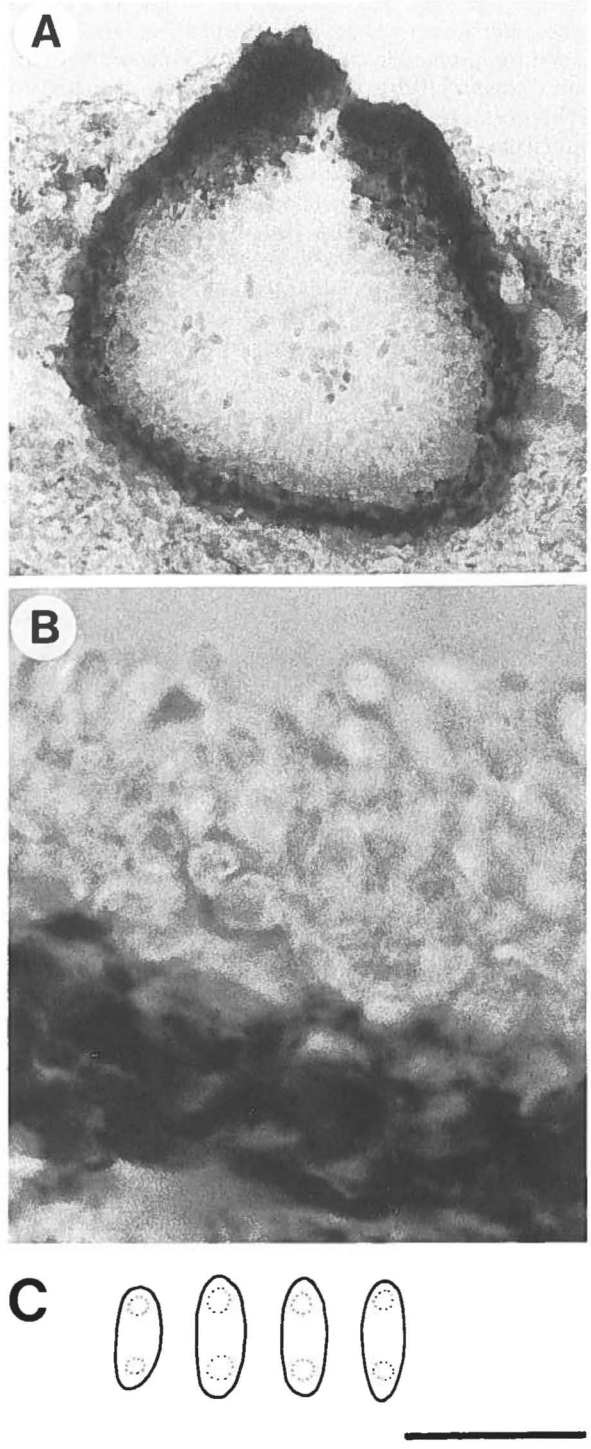


Fig. 30. *Phoma epiphyscia* (Alstrup 801422, holotype) on *Phaeophyscia sciastra*. A: Vertical section of conidioma (x 400). B: Vertical section of conidioma wall with conidiogenous cells and developing conidia (x 2200). C: Conidia. Scale C = 10 µm.

Notes: The type was collected by Bouly de Lesdain whose herbarium was destroyed in 1940, and the species is not represented in the remnants of Vouaux's herbarium (Rondon 1970); the type is therefore assumed to have been lost. However, we find that the new collection from Greenland, on *Phaeophyscia sciastra,* is likely to represent the same taxon. The only difference we noted is that the conidia are up to 7 × 3 µm and not only to 6 × 3 µm as given by Vouaux. The species differs from *Phoma physciicola* Keissler in the shape of the conidia, the length:breadth ratio being 2–2.3 instead of 1.5–1.7. We therefore propose that *Phoma epiphyscia* Vouaux is neotypified with the collection cited below.

Specimen: Greenland, Narssaq d., 1 km S of Qagssiarssuk, 61°08′N, 45°32′W, alt. 140 m, on *Phaeophyscia sciastra,* 4 Aug. 1980, Alstrup 801422h (C-neotypus, with *Ascochyta santessonii* Alstrup & D. Hawksw.).

Phragmonaevia Rehm (1888: 160)
Type species: *Cryptodiscus libertianus* Sacc. & Roum.
Number of species: Five, of which three are lichenicolous.

Note: The type species occurs under the bark of small twigs and the generic name is of uncertain application (Sherwood 1977: 72). A new generic name is shortly to be introduced for the two lichenicolous species occurring on *Peltigera.*

1. **"Phragmonaevia" peltigerae** (Nyl.) Rehm (1896a 166)
Melaspilea peltigerae Nyl. (1868a: 65)
Description: Vouaux (1914: 187).
Distribution: Europe and Greenland.
Report from Greenland: Fredskild (1961).
Hosts: *Peltigera* spp., forming circular white to grey necrotic patches on the thallus, in which the black apothecia are often ± circularly arranged.

Specimens: Holsteinsborg d., head of Søndre Strømfjord, near the rock "Ravneklippen" at the airport, alt. 0–50 m, on *Peltigera aphthosa* (L.) Willd., 4. Aug. 1946, Skytte Christiansen 5581 (herb. Christiansen). Midway in Søndre Strømfjord, northern shore, Itivdlinguaq, alt. 50–150 m, on *Peltigera lepidophora* (Nyl.) Bitter, 24 July 1946, Skytte Christiansen 5565 (herb. Christiansen).

Phylliscum Nyl. (1853: 320)
Type species: *P. endocarpoides* Nyl. (i.e. *P. demangeonii* (Moug. & Nestler) Nyl.).
Number of species: Two, both are normally lichen-forming.

1. **Phylliscum demangeonii** (Moug. & Nestler) Nyl. (1855: 166)
Collema demangeonii Moug. & Nestler (in Montagne 1849: 291)
Description: Forssell (1885: 62).
Distribution: Arctic-alpine, common in Greenland in the lichenized state.
Hosts: *Ochrolechia frigida* (Sw.) Lynge, thelephoroid stage, as purplish brown sterile thalli up to 1.2 mm diam.

Notes: This species is normally found as an umbilicate lichen on rocks in wet situations. It is here reported as a lichenicolous (non-lichenized) fungus for the first time. The lichenicolous specimens are purplish brown, forming adnate thalli up to 1.2 mm diam. and at least 0.15 mm thick; the surface is irregularly undulating, and the cortex and medulla are composed of pseudoparenchymatous cells similar to those of lichenized specimens. When the thalli become lichenized, they gradually change to black, free lobes arise and the surface becomes more regularly plicate. Only fully developed lichenized thalli directly sitting on rock are fertile.

The thelephoroid stage of *Ochrolechia frigida* is of short duration and when it occurs on epilithic lichens as here, it is not succeeded by other morphs of *O. frigida* but leaves the rock bare. We cannot see from our collection whether the lichenicolous *Phylliscum* thalli will later become attached to the rock surface and established as independent, fertile lichens.

Specimen: Narssaq d., Bredefjord, Naimiat, 60°59′N, 46°12′W, alt. 30 m, on *Ochrolechia frigida* on rock associated with e.g. *Phylliscum demangeonii* (lichenized), 11 July 1980, Alstrup 801093 (C).

Polycoccum Sauter ex Körber (1865: 470)
Type species: *Polycoccum sauteri* Körber.
Number of species: 23, all lichenicolous fungi.
Description: Hawksworth & Diederich (1988).

1. **Polycoccum bryonthae** (Arnold) Vězda (1969: 109)
Endococcus bryonthae Arnold (1874: 141)
Description: Hawksworth & Diederich (1988: 297).
Distribution: Previously only known from Austria, Czechoslovakia and Italy.
Hosts: *Caloplaca* sp. (apothecia) in Greenland, also known from *Caloplaca stillicidiorum* (Vahl) Lynge and *Pertusaria bryontha* (Ach.) Nyl.

Notes: The Greenland material is fragmentary, and the host could not be definitely identified without destroying the sample. The cylindrical asci are 8-spored with monostichously arranged ascospores measuring 11–13(–14) × 4.5–6 µm, typical for *P. bryonthae.*

Specimen: Disko, Orpît qaqait, on *Caloplaca* cfr. *jungermanniae* (Vahl) Th. Fr. 10 Aug. 1950, Gelting (UPS).

2. **Polycoccum galligenum** Vězda (1969: 107)
Description: Hawksworth (1975a: 198–199) and Vězda (loc. cit.).
Distribution: Great Britain and Czechoslovakia.
Hosts: *Physcia caesia* (Hoffm.) Fürnrohr, *P. dubia* (Hoffm.) Lettau and *P. wainioi* Räsänen, forming bullate galls 1–3 mm diam. and sometimes inhibiting the formation of soralia.

Specimen: Holsteinsborg, N of Søndre Strømfjord airport, south slope of Mt. Hassel, 67°N, alt. 50–100 m, on *Physcia caesia* on a bird perching stone, 31 July 1946, Skytte Christiansen 5578 (herb. Christiansen, with *Phaeosporobolus alpinus*).

3. **Polycoccum gelidarium** (Mudd) D. Hawksw. (1983a: 5)
Sphaeria gelidaria Mudd (1861: 130)
Fig. 31.
Distribution: Previously known with certainty only from the type collection from the British Isles, here confirmed from the Faroes and reported also from Greenland, Iceland and Alaska.
Host: *Placopsis gelida* (L.) Lindsay, found as dispersed rugose perithecia up to 1.2 mm diam.

Notes: Hawksworth (loc. cit.), on the basis of the fragmentary type collection, gave the spores as 1-septate, and 18 × 10.5 µm. The newly studied collections show that although some spores remain 1-septate, most of them finally become 8-celled by the subdivision into 4 cells of each of the original 2 cells by longitudinal walls. The normal size range is 18–21 × 10.5–14 µm. The species of *Polycoccum* all have 1(–2)-septate spores, and thinner and anastomosed paraphyses. The generic position of *P. gelidarium*, differing also in the massively thick ascomatal walls and in developing in dense groups from a common stroma, merits further study in the light of the new collections.

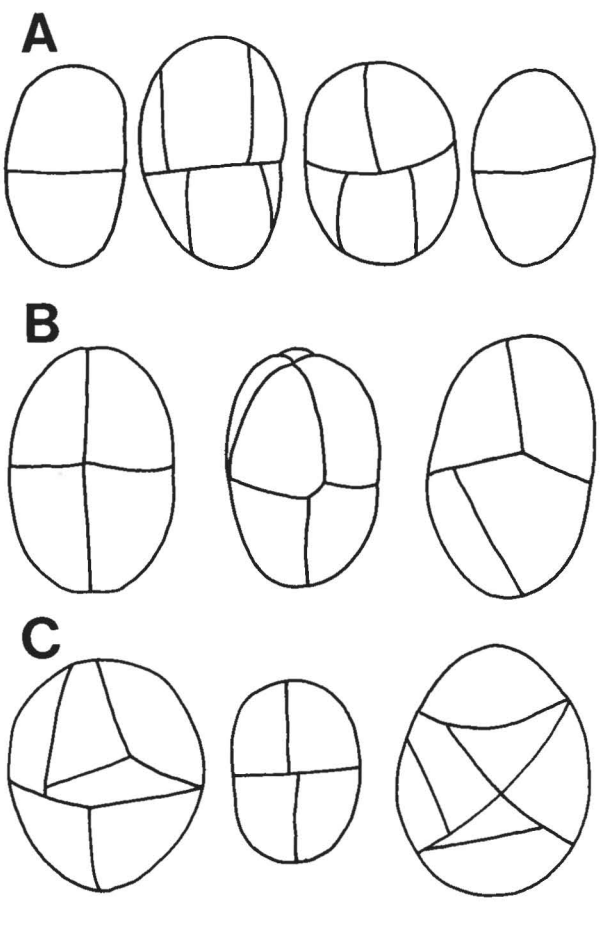


Fig. 31. *Polycoccum gelidarium* on *Placopsis gelida*; ascospore outlines to show variation in septation. A: Nash 14614. B: Rowland L9. C: Poelt & Ullrich. Scale = 10 µm.

Specimens: Disko, Godhavn, E foot of Lyngmarksfjeld, alt. 400 m, 31 July 1983, Poelt & Ullrich (GZU).
The Faroes: Strømø, Aug. 1867, Rostrup (C, Rostrup 1870: 97).
Iceland: Ytri Baegisá, Akureyri, alt. 500 ft., Aug. 1963, Rowland L9 (BM).
USA: Alaska, Keystone Canyon, 22 km E Valdez, exposed rocks adjacent highway 4, 61°05'N, 146°10'W, alt. 120 m, 21 June 1977, Nash III 14614, Lich. Exs. Arizona State Univ. no. 16 (BM).

4. **Polycoccum microstictium** (Leighton ex Mudd) Arnold (1891: 132)
Acarospora cervina [var.] *microstictica* Leighton ex Mudd (1861: 159)
Description: Hawksworth & Diederich (1988: 302–303).
Distribution: Europe and N. America, not reported from Greenland before.
Hosts: On various crustose lichens, in Greenland known only from *Hymenelia lacustris* (With.) Poelt & Vězda and *Rhizocarpon disporum* (Naeg. ex Hepp) Müll. Arg. The infected parts of the *Hymenelia* are unchanged in colour but become swollen and more distinctly areolate. On the *Rhizocarpon* it forms bullate, grey-brown, contiguous galls in patches 0.2–1 mm diam.

Note: The Greenland specimen on *Hymenelia* is identical to the *Polycoccum* collections on *Hymenelia lacustris* from Wales and Ireland discussed by Hawksworth (1989: 24–25).

Specimens: Godthåb d., Godthåbsfjord, Igdlorssuit, at 120 m lake, 64°51'N, 50°28'W, alt. 120 m, on *Hymenelia lacustris*, 8 Aug. 1976, Alstrup 767408 p.p. (C, with *Lecidea hymeneliicola*).
Disko, Igpik E of Godhavn, alt. 10–30 m, on *Rhizocarpon disporum*, 2 Aug. 1982, Poelt & Ullrich (GZU).

5. **Polycoccum squamarioides** (Mudd) Arnold (1874: 174)
Sphaeria squamarioides Mudd (1861: 130)
Description: Hawksworth & Diederich (1988: 305).
Distribution: Europe, the Canary Islands, New Zealand and Greenland, here also reported from N. America.
Reports from Greenland: Hawksworth and Diederich (loc. cit.).
Hosts: *Placopsis gelida* (L.) Lindsay, found as dispersed to aggregate black perithecia c. 0.5 mm diam. on the host thallus (cortex and soralia).

Specimens: Disko, Nordfjord, Perdlertut kûat, 69°58'N, 54°24'W, alt. 250 m, Aug. 1975, Alstrup 75105 (C).
Canada: British Columbia, Amphitrite Point, 1.5 miles SE of

Ucluelet, Vancouver Island, on rocks of exposed headland, above high water mark, 11 Sept. 1974, Burnet 102 (BM).

6. **Polycoccum trypethelioides** (Th. Fr.) R. Sant. (1960: 505)
Diatrype trypethelioides Th. Fr. (1858: 317)
Descriptions: Hawksworth (1978: 191–192) and Hawksworth & Diederich (1988: 305–306).
Distribution: Europe and Greenland.
Reports from Greenland: Alstrup (1981: 123) and Lamb (1972: 9).
Hosts: *Stereocaulon* spp. forming massive subglobose galls on the thallus which may become stunted.

Specimens (selected): Disko, Godhavn, Lyngmarksfjeld, alt. 50–320 m, on *Stereocaulon* sp., July 1983, Poelt & Ullrich (GZU).
Egedesminde d., Arfersiorfik Fjord, Kuánit, 68°05'N, 52°12'W, alt. 15 m, 29 Sept. 1951, Gelting 16401 (herb. Christiansen).
Holsteinsborg d., head of Søndre Strømfjord, N of the airport, Mt. Hassel, alt. 400 m, on *Stereocaulon rivulorum* (Th. Fr.) R. Sant., 6 Aug. 1946, Skytte Christiansen 4826 (herb. Christiansen).
Sukkertoppen d., Nûgssûp qârssua, at unnamed lake, 65°32'N, 51°43'W, alt. 310 m, on *S. nanodes* Tuck., 16 July 1977, Alstrup 77374 (C).
Ivigtut d., Grønnedal, 61°14'N, alt. 200 m, on *S. arenarium* (Sav.) Lamb, 9 July 1946, Skytte Christiansen 5509 (herb. Christiansen).
Julianehåb d., Terrassen, on *S.* cfr. *alpinum*, Gelting 21139c (C).

7. **Polycoccum vermicularium** (Lindsay) D. Hawksw. (1985: 172)
Microthelia vermicularia Lindsay (1869a: 143)
Description: Hawksworth & Diderich (1988: 306).
Distribution: The Falkland Islands and Greenland.
Reports from Greenland: Lindsay (1871: 319).
Host: *Thamnolia vermicularis* (Swartz) Ach. ex Schaerer.

Notes: Lindsay's report was based on one of R. Brown's collections from Jakobshavn, and the description by Fries (1860: 161). The specimen studied by Lindsay has not been restudied by us, but we saw one collection of a lichenicolous fungus on *Thamnolia vermicularis*, which may be this species; unfortunately only very old perithecia were present without asci or ascospores, so that the identity could not be confirmed.

Specimen: Ivigtut d., Grønnedal, 61°14'N, alt. 200 m, 9 July 1946, Skytte Christiansen 5521 (herb. Christiansen).

Pyrenidium Nyl. (1865b: 210)

Type species: *Pyrenidium actinellum* Nyl.
Number of species: Three, including one described here.

Note: The nomenclature and application of the generic name is discussed by Hawksworth (1983b).

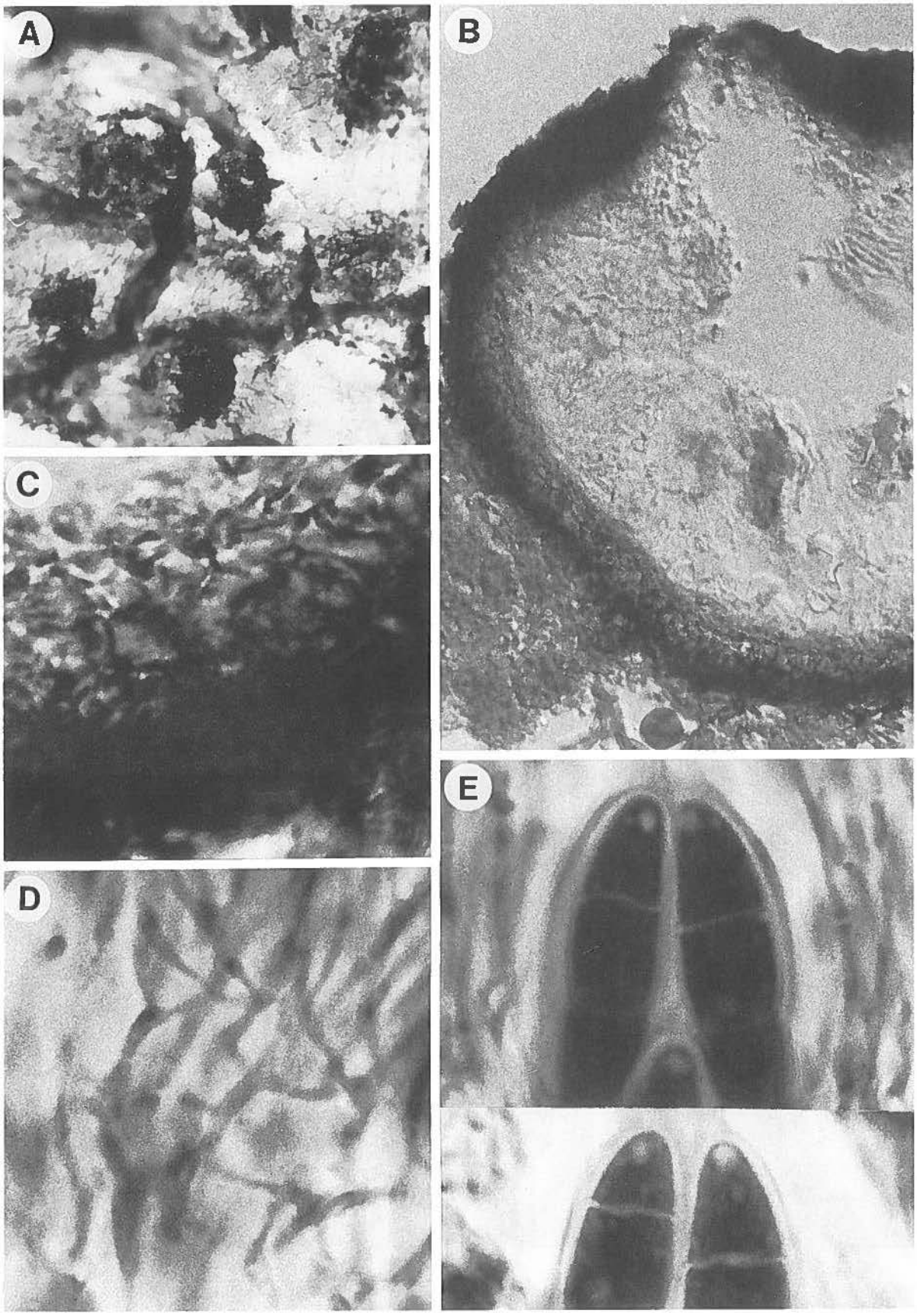
1. **Pyrenidium actinellum** Nyl. (1865b: 210)
?*Leptosphaeria polaris* Sacc. (1882: 83)
Description: Hawksworth (1980a: 368–367).
Distribution: Widespread.
Reports from Greenland: ?Fries (1879) and ?Saccardo (1882).
Hosts: On a wide range of crustose and macrolichens.

Notes: Saccardo's name was based on the description of an unnamed *Sphaeria* no. 8 on *Rhizocarpon geographicum* from Westward Ho! by Fries (1879: 370). The type material has not been located in BM, K or UPS and is presumed lost. However, the name has been listed as a probable synonym of the fungus now known as *P. actinellum* since Keissler (1930: 491) on the basis of the size of the ascospores, and so the name is tentatively included here.

2. **Pyrenidium hyalosporum** Alstrup, D. Hawksw. & R. Sant. *sp. nov.*
Figs 32, 33.
Ascomata perithecia, singularia, erumpescentia, nigra, subglobosa, 0.15–0.25(–0.3) mm diam., cum muris atrobrunneis 20–30(–35) µm latis sed proxime ostiolum ad 30–40 µm, e cellulis aliquantum polyedricis ad pseudoparenchymaticis composita. Hamathecium persistens, e pseudoparaphysibus, cellularibus, plerumque ramosis et anastomosis compositum, 1.5–2 (–2.5) µm latum; centrum I–. Asci elongato-clavati, bitunicati, apicibus crassis sed cum uno rostro lato instructis, fissitunicati, 95–120(–130) × 20–25 µm, ubi maturitati (2–)4-spori. Ascosporae elongato-ellipsoideae ad late fusiformes, (1–)3–4-septatae, hyalinae, cum poris subapicalis 1.5–2.5 µm diam. instructae, laeves, (31–)34–39(–49) × (7.5–)10–12.5(–14) µm.
Typus: Groenlandia, Disko, Nordfjord, Perdlertut kûat, 69°58'N, 54°24'W, alt. 250 m, on *Placopsis gelida* (L.) Lindsay thallus, on basalt, 17 Aug. 1975, Alstrup [Lich. Groenl. Ex. no 207, sub *P. gelida*] (UPS-holotypus; BM-isotypus; IMI 331022-slides).

Ascomata perithecioid, arising singly within undelimited bleached areas of the host thallus, immersed with only the upper 1/4 becoming erumpent, the host cortex splitting radially into teeth-like projections at the point of emergence, black, subglobose, 0.15–0.25(–0.3) mm diam., ostiolate, the ostiole short papilliform, appearing as a whitish pore to 40 µm wide when mature; ascomatal wall mainly 20–30–(35) µm thick, expanded to 30–40 µm thick around the ostiole, dark brown, composed of 4–7 layers of subglobose to somewhat polyhedral pseudoparenchymatous cells, the cells not radially compressed, the innermost layers subhyaline to pale brown, most cells (4–)5–7 µm diam., the outermost layers dark brown with unevenly thickened walls, more irregular in

Fig. 32. *Pyrenidium hyalosporum* (Alstrup, "Lich. Groenl. Exs." no. 207; A: UPS, holotype. B-E: BM, isotype) on *Placopsis gelida*. A: Ascomata erumpent through the host cortex (x 50). B: Vertical section of ascoma (x 400). C: Vertical section of ascoma wall (x 2200). D: Pseudoparaphyses in lactophenol cotton blue (x 2200). E: Ascospores in lactophenol cotton blue showing the subapical pores (x 2200). ▶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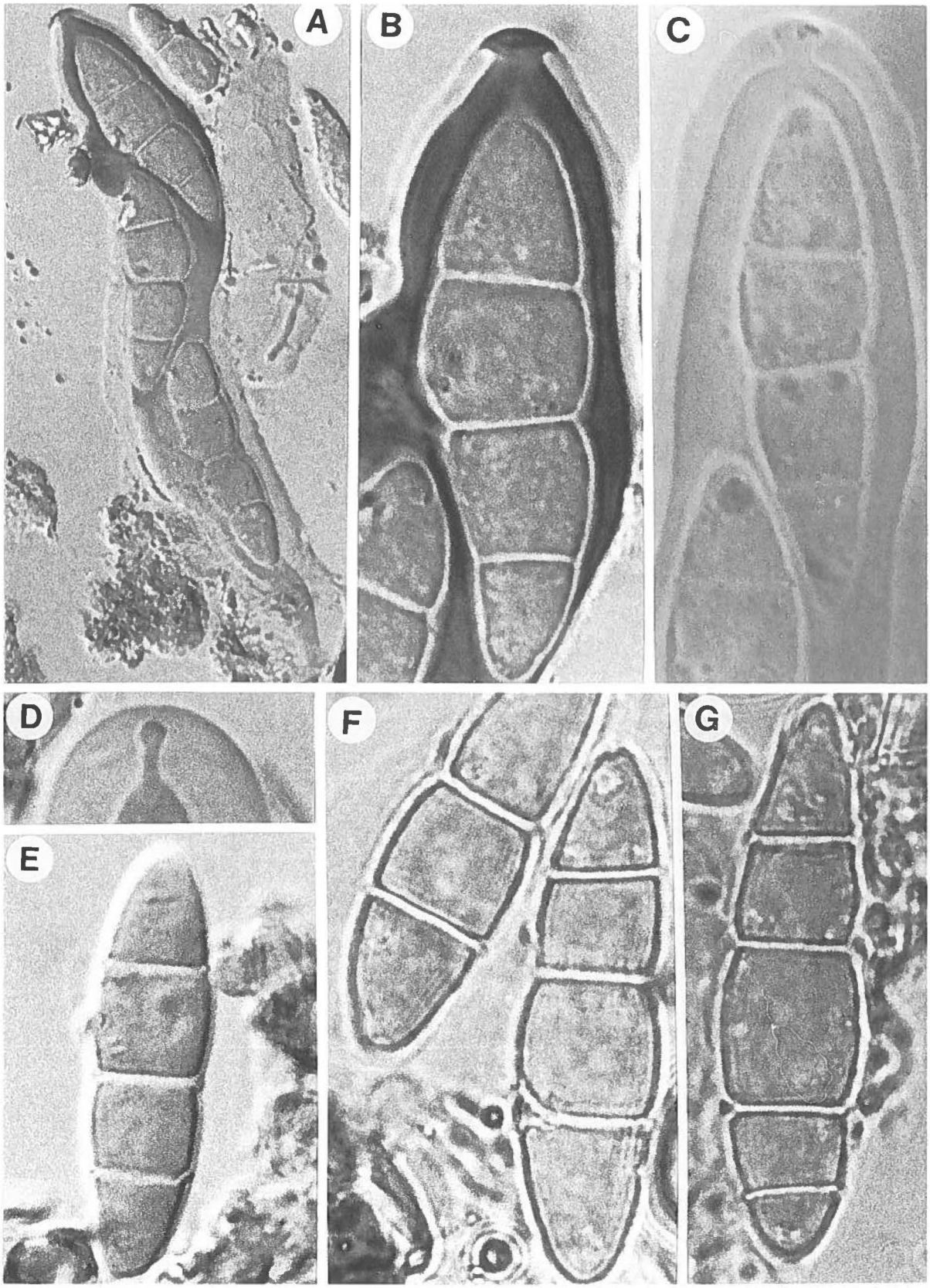
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shape and sometimes elongated but grading into those of the inner layers. Hamathecium persistent, composed of a dense net of branched and frequently anastomosed cellular pseudoparaphyses, frequently septate, 1.5–2(–2.5) µm wide, lacking periphyses and periphysoids; centrum tissues all I–. Asci elongate-clavate, short-stalked, thick-walled, the apex with a broad truncated internal beak almost reaching to the outermost wall layers, lacking an internal annulus, contents I+ orange (dextrinoid), discharge fissitunicate, 95–120(–130) × 20–25 µm, eight ascospores generally differentiated initially, but at maturity mainly (2–)4-spored. Ascospores distichously arranged in the asci, elongate-ellipsoid to broadly fusiform, sometimes slightly asymmetrical, rounded to somewhat attenuated towards the apices, (1–)3–4-septate, slightly constricted at the septa, hyaline, contents I+ orange (dextrinoid), guttulate, with a subapical germpore-like 1.5–2.5 µm diam. spot conspicuous in lactophenol-cottonblue, smooth-walled, lacking a conspicuous sheath, (31–)34–39(–45) × (7.5–)10–12.5(–14) µm.

Distribution: Greenland and Norway.
Host: *Placopsis gelida*, thallus. Infected areas are at first discoloured greyish and then become bleached, with the erumpent ostioles appearing as black spots; evidently a pathogen.

Notes: As this striking species has hyaline ascospores, it was first compared to *Cercidospora* Körber, but cannot be placed there because of fundamental differences in the structure of the ascomata. In that genus the walls are composed of interwoven hyphae (textura intricata) and not pseudoparenchymatous cells (textura angularis), are often pale and in the type species bluish green around the ostiole, and the hamathecium comprises trabeculate pseudoparaphyses (paraphysoids), rather than cellular pseudoparaphyses. In addition, broad truncate internal apical pores are not seen in the asci of *Cercidospora* and no germpore-like spots on the ascospores are known in that genus. However, the ascomatal wall structure, the nature of the hamathecial tissues, and the ascus structure are typical of *Pyrenidium* Nyl. This fungus differs from the species currently accepted in that genus in that the ascospores are hyaline and not dark brown, and in the development of a subapical germpore-like structure; central pores in the septa were not seen either, but would be expected to be difficult to observe in colourless spores. As the differences scarcely warrant the description of a new genus, we preferred to treat this as a hyaline-spored species of *Pyrenidium*. It is of interest to note that some hyaline-spored genera have already been included in the family Dacampiaceae (syn. Pyrenidiaceae) by Barr (1987: 102), for example *Bertiella* (Sacc.) Sacc. & Sydow on dead herbaceous stems or wood. In *B. brenckleana* Rehm on *Aster multiflorus*, some ascospores in a specimen we examined became brownish when old (USA, North Dakota, Kulm, 27 July 1913, J. F. Brenckle [Fungi Dakot. no. 227], IMI 13593), suggesting that the generic limits in the family merit further study.

Additional specimens: Ivigtut d., mountain SW of Ivigtut town, 61°12′N, alt. 150 m, 10 July 1946, Skytte Christiansen 5515 (herb. Christiansen).
Norway: Nordland, Ankenes par., between Rombaksbotn and the railway station of Katterat, 68°25′N, 17°56′E, alt. 110–130 m, 30 Aug. 1959, Santesson 13494a (UPS).

Refractohilum D. Hawksw. (1977a: 204)
Type species: *Refractohilum galligenum* D. Hawksw.
Number of species: Three, all lichenicolous fungi.

1. **Refractohilum peltigerae** (Keissler) D. Hawksw. (1977a: 208)
Ovularia peltigerae Keissler (1920a: 276).
Description: Hawksworth (1977a: 206–208).
Distribution: Europe and British Columbia, not reported from Greenland before.
Hosts: *Peltigera rufescens* (Weis) Humb. and other *Peltigera* species, forming galls up to 1.5 mm diam. Young galls are pale brown, older ones become darker brown.

Notes: The galls of *Hawksworthiana peltigericola* (D. Hawksw.) U. Braun also found on *Peltigera* species differ in that the thallus colour is ± unchanged.

Specimen: Godthåb d., head of Ilulialik, 64°54′N, 50°43′W, alt. 30 m, on *P. rufescens*, 22 July 1976, Alstrup 763222 (C).

Rhagadostoma Körber (1865: 473)
Type species: *Rhagadostoma corrugata* Körber (*R. lichenicola* (de Not.) Keissler.
Number of species: One, lichenicolous.

1. **Rhagadostoma lichenicola** (de Not.) Keissler (1930: 320)
Bertia lichenicola de Not. (1864: Erb. crittogam. ital. no. 1190)
Description: Vězda (1970: 288) and Keissler (loc. cit.: 322–323).
Distribution: Europe and Greenland.
Reports from Greenland: Alstrup (1981: 123).
Hosts: *Solorina crocea* (L.) Ach., forming extensive colonies of aggregated, uneven, black perithecia.

Specimens: Disko, Godhavn, Lyngmarksfjeld, 100–150 m, 10 Aug. 1982, Poelt & Ullrich (GZU).
Sukkertoppen d., head of Sønder Isortoq, Qaersutsiaup qulâ, 65°36′N, 51°54′W, alt. 50 m, associated with *Cercidospora*

◀ Fig. 33. *Pyrenidium hyalosporum* (Christiansen 5515) on *Placopsis gelida*. A: Discharging ascus (x 800). B: Apex of ascus in A, contents orange in Lugol's iodine (x 2200). C: Apex of mature ascus (x 2200). D: Apex of immature ascus still lacking ascospores (x 2200). E-G: Ascospores (x 2200).

lichenicola and *Thelocarpon epibolum* Nyl., 8 July 1977, Alstrup 77003. Sønder Isortoq, Kangerdluk, 65°34'N, 51°51'W, alt. 30 m, 20 July 1977, Alstrup 77565 (C). Sønder Isortoq, N of Nûk, 65°29'N, 52°09'W, alt. 100 m, 24 July 1977, Alstrup 77684 (C).
Narssaq d., Nákâlâq, 60°59'N, 45°56'W, alt. 1100 m, 20 July 1978, Alstrup (C). Narssarssuaq, 61°11'N, alt. 0–50 m, 13 July 1946, Skytte Christiansen 5527 (herb. Christiansen).

Rhizocarpon Ramond ex de Candolle (in Lamarck & de Candolle 1805: 365)
Type species: *Rhizocarpon geographicum* (L.) de Candolle.
Number of species: About 200 are described, the majority being lichenized, three are obligately lichenicolous fungi and some are lichenicolous as young, but become lichenized later.

1. **Rhizocarpon destructans** Alstrup *sp. nov.*
Fig. 34.
Ascomata apothecia, aggregata, 0.35–0.75 mm diam., nigra, plana ad leviter convexa; excipulum nigrum sed interne atro-brunneum; epithecium virido-nigrum; hymenium 55–65 µm altum; hypothecium brunneo-nigrum. Paraphyses ramosae et anastomosae, c. 2 µm latis, apicibus, ad 3 µm latis. Asci clavati, 50–60 × 16–22 µm, 8-spori. Ascosporae late ellipsoideae, brunneae, 3-septatae ad irregulariter submuriformes cum 8–10 cellulis, 17–20 × 8–10 µm.
Typus: Groenlandia, Narssaq d., south shore of Kangerdluarssuk, 60°52'N, 45°52'W, alt. 35 m, on *Lecanora polytropa* (Hoffm.) Rabenh., 6 July 1978, Alstrup 243848h p.p. (C-holotypus, with *Lecidea diexcipula* Alstrup & D. Hawksw.).

Ascomata apothecia, aggregated in white patches on the host thallus, black, 0.35–0.75 mm diam., disc flat to slightly convex; exciple black, inner part dark brown; epithecium 5–8 µm, green-black; hypothecium brown-black; hymenium 55–65 µm, hyaline; all parts are K−. Paraphyses branched and anastomosed, c. 2 µm thick, the apices slightly swollen to 3 µm. Asci clavate, 50–60 × 16–22 µm, 8-spored. Ascospores broadly ellipsoid, brown, 3-septate to irregularly submuriform with 8–10 cells, central spore-walls and septa often thicker and darker than end-walls and septa, 17–20 × 8–10 µm.

Distribution: Greenland, known only from the type collection.
Host: *Lecanora polytropa*, numerous apothecia on white patches of the thallus which is destroyed, pathogenic. *Lecidea diexcipula* occurs on the same sample and the same host, but the two species were apparently not mixed, the *Rhizocarpon* occurring on the most destroyed parts of the host, maybe in places already weakened by infections of the *Lecidea*.

Notes: Several parasitic, lichenized *Rhizocarpon* species are known, but only three obligately lichenicolous species were known, *R. advenulum* (Leighton) Hafellner & Poelt and *R. schedomyces* Hafellner & Poelt which have 1-septate spores and occur on *Pertusaria* spp., and *R. malenconianum* (Llimona & Werner) Hafellner & Mayrhofer, a gall-forming species on *Diplo-*

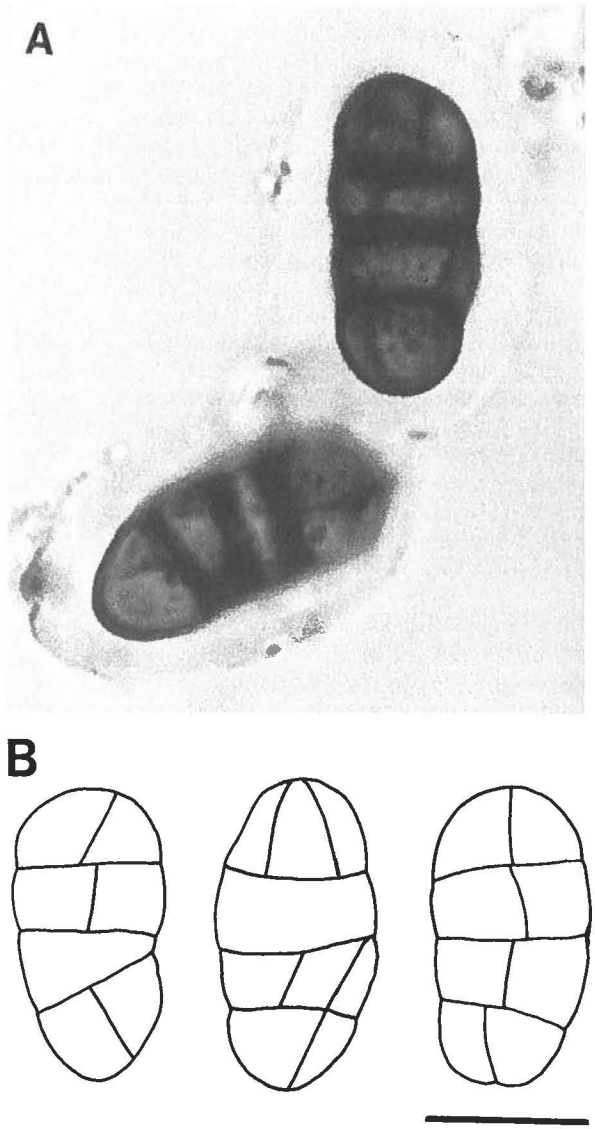


Fig. 34. *Rhizocarpon destructans* (Alstrup 243848h, holotype) on *Lecanora polytropa*. A: Ascospores in 10% KOH showing the swollen gelatinous sheath (x 2200). B: Ascospore outlines. Scale B = 10 µm.

schistes which has spores 1–3-septate, often curved, exceptionally submuriform, with apothecia becoming convex at an early stage and without a raised excipular magin. *Rhizocarpon narssaqensis*, described below, has 3-septate ascospores and the epithecium is K+ purple.

2. **Rhizocarpon narssaqensis** Alstrup *sp. nov.*
Fig. 35.
Ascomata apothecia, nigra, 0.8–1.0 mm diam., plana; excipulum nigrum, 20–30 µm altum; epithecium rubro-brunneum, K+ purpurescens, 10–12 µm altum; hypothecium atrobrunneum; hymenium hyalinum, 70–80 µm altum. Paraphyses ramosae et anastomosae, circa 2 µm latae, apicibus levier crassis ad 3–4 µm latae. Asci clavati, 50–55 × 12–17 µm, 8-spori.

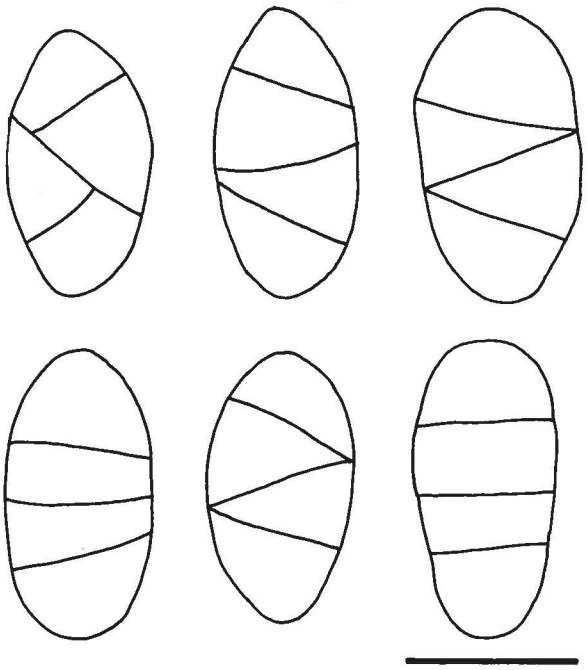


Fig. 35. *Rhizocarpon narssaqensis* (Alstrup 243855); ascospore outlines. Scale = 10 µm.

Ascosporae late ellipsoideae, brunneae, cum 3-septatis plerumque obliquis, 16.5–20 × 8.5–10 µm.
Typus: Groenlandia, Narssaq d., south slope of Nunasarnaussaq, 60°54'N, 45°52'W, alt. 125 m, on *Lecidea atromarginata* Magnusson, 15 July 1978, Alstrup 243885o (C-holotypus).

Ascomata apothecia, one to several in each host areole, black, 0.8–1.0 mm diam., disc flat; exciple 20–30 µm tall, black; epithecium 10–12 µm tall, red-brown, K+ purple; hypothecium dark brown; hymenium 70–80 µm, hyaline. Paraphyses branched and anastomosed, c. 2 µm thick, the apices slightly swollen to 3–4 µm. Asci clavate, 50–55 × 12–17 µm, 8-spored. Ascospores broadly ellipsoid, brown, 3-septate, mostly with oblique septa, 16.5–20 × 8.5–10 µm.

Distribution: Greenland, known only from the type collection.
Host: *Lecidea atromarginata* Magnusson, causing swelling of the thallus and suppression of the formation of apothecia.

Note: The anatomical characters of the apothecia are very similar to those of *Rhizocarpon furax* Poelt & V. Wirth, but that species is clearly lichenized with a yellow thallus.

Rinodina (Ach). Gray (1821: 448)

Type species: *Rinodina sophodes* (Ach.) Gray.
Number of species: About 200 lichenized species have been described, one is known to be a lichenicolous fungus when young and to develop a lichen thallus at a later stage.

1. **Rinodina egedeana** (Lindsay) Alstrup & D. Hawksw. *comb. nov.*
Lecidea egedeana Lindsay (1871: 330)
Karschia egedeana (Lindsay) Vouaux (1913: 463)
Fig. 36.

Apothecia superficial, 0.15–0.2(–0.25) mm diam., constricted at the base, disc red-brown, plane to concave; exciple persistent, fawn, ± translucent, raised, 25–40 µm wide, composed of densely compacted, irregularly shaped and orientated thick-walled hyphae 5–7 µm thick, pale brown at the outermost margin, ± hyaline internally, 25–35 µm thick in vertical section; epithecium ± hyaline, scarcely differentiated; hymenium 60–80 µm tall, I+ blue; hypothecium composed of compacted pseudoparenchymatous cells, hyaline, 40–60 µm tall. Hamathecium of paraphyses, sparsely branched and anastomosed, repeatedly septate, 2.5–3.5 µm thick, the tips pale red-brown, slightly or not expanded. Asci elongate-clavate, lecanoralean, strongly thickened at the apex, outer wall and tholus I+ blue, 50–75 × 12–18 µm, 8-spored. Ascospores distichously arranged in the asci, ellipsoid, sometimes asymmetrical, mischoblastiomorphic, strongly thickened around the central septum which occupies about 1/3 the length of the spore, penetrated by a narrow central canal, the septum reduced in thickness in older ascospores, thickened at the apices, with a central torus, brown, darker at the apices during development, 25–30 × (10.5–)11–13 µm.

Distribution: Greenland.
Report from Greenland: Lindsay (loc. cit.)
Hosts: *Parmelia saxatilis* (L.) Ach. and *Peltigera* sp. found as minute red-brown apothecia resembling *Pachyphiale carneola* (Ach.) Arnold on dead or dying thalli, hardly pathogenic, rather saprophytic or commensalistic.

Notes: This species has not previously been understood, as the type collection seemed to have been lost. It was included in *Karschia* by Vouaux on the basis of the description alone, and Hafellner (1979b: 214) did not succeed in locating the type. However, we found a specimen of *Parmelia saxatilis* from Jakobshavn collected by Dr. R. Brown in 1867 in BM supporting a fungus which without any doubt must be the holotype. We include a full description of the species based on another specimen (Skytte Christiansen 5540), which is a larger collction of the same species.

This species does not appear to have been described as lichenized, nor did we see lichenized specimens. It is distinguished from other lichenicolous species of *Rinodina* in the complex ascospores which recall the *Physcia*-type and the *Dirinaria*-type, but does not appear to be easily accomodated in any of the categories currently recognized (Clauzade & Roux 1985: 682). It is superficially not dissimilar to unlichenized specimens of *Rinodina turfacea* (Wahlenb.) Körber, a common lichen which can also occur as a lichenicolous fungus (see

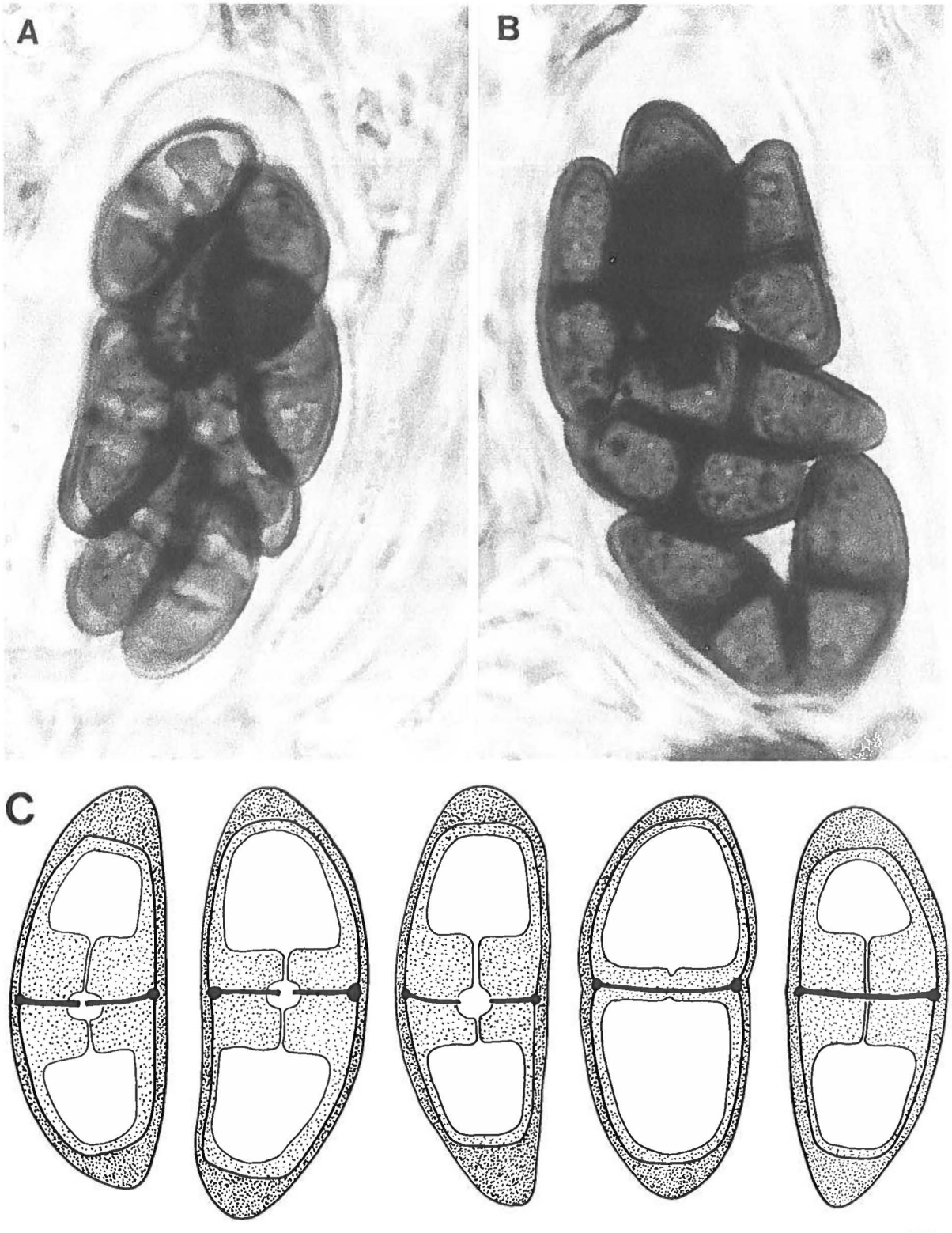


Fig. 36. *Rinodina egedeana* (Christiansen 5540) on *Peltigera* sp. A: Young ascus showing the characteristic spore structure (x 2200). B: Mature ascus in which the lumina in each half of the spore have expanded (x 2200). C: Ascospores. Scale C = 10 µm.

below). However, in that species the ascospores, although of a similar size, lack the strongly thickened septum even in young ascospores; ascospores are not strongly thickened at the ends and darken from the median part during development (Fig. 37).

Specimens: Jakobshavn, on *Parmelia saxatilis*, 29 June 1867, Brown (BM holotype; IMI 330681–slide). The material is very sparse, a part of the collection having fallen off the sheet. Godthåb d., Godthåb town, 64°10′N, alt. 0–50 m, on *Peltigera* sp., 18 July 1946, Skytte Christiansen 5532 and 5540 (herb. Christiansen).

2. **Rinodina turfacea** (Wahlenb.) Körber (1855: 123)
Lichen turfaceus Wahlenb. (1812: 408)
Fig. 37.
Distribution: Widespread in arctic-alpine environments; well-known in Greenland as a lichenized species.
Host: *Peltigera* sp., young apothecia partly hidden in the exposed medulla of the lower side of the host.

Notes: *Rinodina turfacea* is a common lichen occurring on a variety of dead organic substrata. In the collection cited here, however, apothecia occurred without a lichen thallus and without a thalline margin around the apothecia, while other specimens on the same *Peltigera* thallus were distinctly lichenized.

Little is known of the survival and nourishment of germinating lichen ascospores, but they may well persist for some time as parasites or saprophytes before they come into contact with a suitable alga. This period, however, is short for most species, and they normally do not form apothecia at this stage. At least one other case hase been detected in which a lichen fungus can produce apothecia without being lichenized, viz. *Rinodina insularis* (Arnold) Hafellner on *Lecanora rupicola* (L.) Zahlbr.

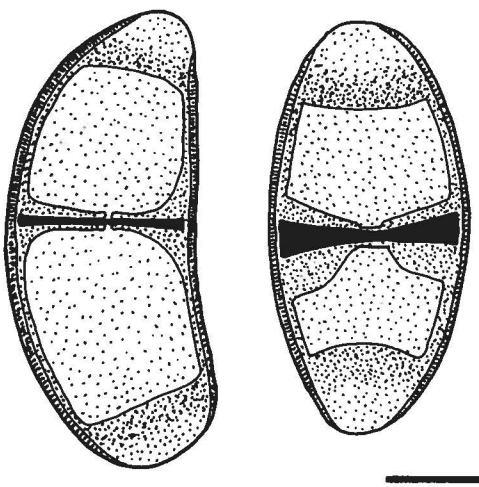


Fig. 37. *Rinodina turfacea* (Christiansen 5564); ascospores. Scale = 10 µm.

Specimen: Holsteinsborg d., Itíudlinguaq, midway in Søndre Strømfjord, 66°30′N, 24 July 1946, Skytte Christiansen 5564 (herb. Christiansen).

Rosellinula R. Sant. (1986a: 311)
Type species: *Rosellinula haplospora* (Th. Fr.) R. Sant.
Number of species: Four, all lichenicolous fungi.
Description: Hafellner (1985: 145–162, sub *Rosellinella*).

1. **Rosellinula frustulosae** (Vouaux) R. Sant. (1986: 311)
Muellerella frustulosae Vouaux (1913: 43)
Description: Hafellner (1985) and Alstrup (1981: 123).
Distribution: Europe, Greenland and Mongolia.
Report from Greenland: Alstrup (loc. cit.).
Hosts: *Lecanora argopholis* (Ach.) Ach. as dispersed ± immersed perithecia in the areolae and apothecia of the host, which becomes bleached.

Sagediopsis (Sacc.) Vainio (1921: 191)
Type species: *Sagediopsis koerberi* (B. Stein) Clements & Shear (? = *Sagediopsis barbara* (Th. Fr.) R. Sant. & Triebel).
Number of species: Two, both lichenicolous.

Notes: This generic name has often been cited as "Sacc. ex Vainio" (e.g. Farr, Leussink & Stafleu 1979: 5544), but *Metasphaeria* [subgen.] *Sagediopsis* Sacc. (1905: 705) was validly published as Saccardo noted "species lichenicoles, parasiticae", which constitutes a diagnosis in the sense of Art. 32.2 as Saccardo regarded the host as the distinguishing feature (cfr. *Epilichen* above). The name must therefore be lectotypified by one of the seven species originally included in the subgenus by Saccardo, and not by *S. tartarina*, the only species accepted by Vainio. However, Clements & Shear (1931: 272) already selected *Leptorhaphis koerberi* B. Stein, the first species listed by Saccardo; although the type material of Stein's fungus is lost, it seems most probable that it represents *S. barbara* (see Aguirre 1990: in press, Keissler 1930: 515). The current application of the generic name is not therefore affected by this change in another citation and typification.

1. **Sagediopsis barbara** (Th. Fr.) R. Sant. & Triebel (in Triebel 1989, in press)
Segestria barbara Th. Fr. (1867: 108)
Description: Aguirre (1990, in press).
Distribution: Poland and Scandinavia.
Hosts: Species of *Lecanora* and *Lecidea*, infected thalli become decolorized.

Specimens: Narssaq d., north shore of Bredefjord, Naimiat, 61°00′N, 46°12′W, alt. 25 m, on unidentified crustose lichen on rock at a river. 11 July 1980, Alstrup 801117 (C).

2. **Sagediopsis campsteriana** (Lindsay) D. Hawksw. & R. Sant. *comb. nov.*
Verrucaria campsteriana Lindsay (1871: 343)

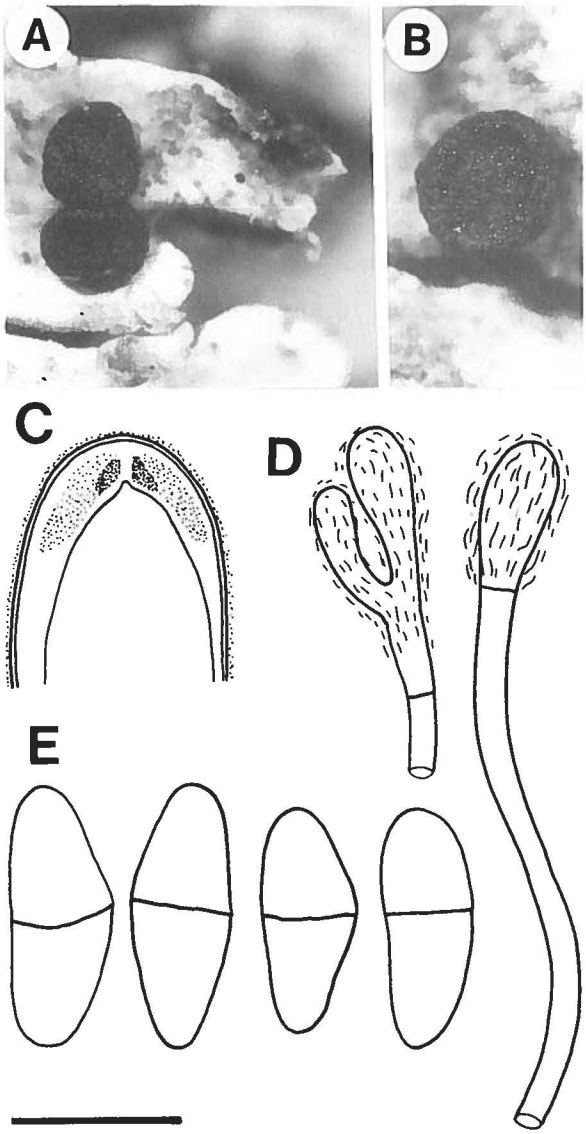


Fig. 38. *Scutula cladoniicola* (Christiansen 5504, holotype) on *Cladonia stricta*. A: Ascomata (x 32). B: Ascoma showing the raised exciple (x 50). C: Ascus apex in Lugol's iodine. D: Paraphyses tips. E: Ascospores. Scale C-E = 10 µm.

Sagediopsis tartarina (Nyl.) Vainio (1921: 191)
Description: Hawksworth (1975a: 192–193).
Distribution: Europe and Greenland.
Previous report from Greenland: Lindsay (loc. cit.).
Hosts: *Ochrolechia, Lecanora* and *Protoblastenia* species.

Notes: Lindsay (loc. cit.) described this fungus from collections made by R. Brown in Greenland in 1867 on *Ochrolechia frigida* from Illartlek glacier. No material from this site could be located in BM, but the description and illustrations leave no doubt as to the application of this name. In the absence of a specimen, Lindsay's Plate 50 Figs 2 a-c is designated as lectotype for this name here.

The ascospores are up to 25 µm long in the specimen on *Ochrolechia lapuensis*.

Specimens: Sukkertoppen d., head of Sønder Isortoq, S of Isuitsup kûa, 65°34'N, 51°42'W, alt. 40 m, on *Ochrolechia lapuensis* (Räsänen) Räsänen, 9 July 1977, Alstrup 77095 (C). Narssaq d., Kangerdluarssuk, Nunasarnaussaq, 65°53'N, 45°52'W, alt. 10 m, on *Ochrolechia frigida* (Sw.) Lynge, 6 July 1978, Alstrup 243852m (C). Pointen, 60°54'N, 46°02'W, alt. 20 m, on *Ochrolechia* cfr. *tartarea* (L.) Massal., 30 Aug. 1978, Alstrup 243821a (C).

Sclerococcum Fr. (1819: 79)

Type species: *Sclerococcum sphaerale* (Ach.) Fr.
Number of species: Two, both obligately lichenicolous fungi.

1. **Sclerococcum simplex** D. Hawksw. (1979a: 249)
Distribution: The British Isles and Greenland.
Hosts: *Pertusaria* cfr. *ophthalmiza* (Nyl.) Nyl. (type specimen) and *Melanelia substygia* (Räsänen) Esslinger, occurring here on white dead parts of the host thallus associated with *Stigmidium dispersum* and *Lichenostigma* sp..

Specimen: Holsteinsborg d., head of Søndre Strømfjord, Nakajanga, 66°52'N, alt. 600 m, on *M. substygia*, 10 Aug. 1946, Skytte Christiansen 5468 (herb. Christiansen).

2. **Sclerococcum sphaerale** (Ach.) Fr. (1825: 173)
Spiloma sphaerale Ach. (1814: 2)
Descriptions: Hawksworth (1975b: 223–227) and Hawksworth & Jones (1981: 485–489).
Distribution: Europe and Greenland.
Hosts: *Pertusaria* species on silicate rocks, found as black dots up to 0.125 mm dispersed on the cortex, commensalistic.

Specimens: Narssaq d., Kangerdluarssuk, Kringlerne, 60°52'N, 45°52'W, alt. 180 m, on *P. lactea* (L.) Arnold, 22 July 1980, Alstrup 80466a.
Disko, Godhavn, 1–2 km E of the town along the coast, alt. 20 m, on *Pertusaria* sp., 31 July 1982, Poelt & Ullrich (GZU).

Scutula Tul. (1852: 118)

Type species: *Scutula wallrothii* Tul. (i.e. *S. miliaris* (Wallr.) Trevisan).
Number of species: About ten, all lichenicolous.
Distribution: Widespread.
Description: Keissler (1930: 148–149).

Notes: This established generic name should ideally be conserved over the earlier *Scutula* Loureiro when the generic relationship to *Catillaria* Massal. has been clarified (Hawksworth 1980a: 382) and the application of the name of the type species resolved. The generic name *Hollosia* Gyelnik may already be available should conservation not be accepted.

1. **Scutula cladoniicola** Alstrup & D. Hawksw. *sp. nov.* Fig. 38.
Ascomata apothecia, sessilia, ad basim valde constricta et plerumque breve stipitata, nigra, (0.25–)0.35–0.5(–0.7) mm diam.; exciplum persistens, primum elevatum sed postea plus-minusve planum, e hyphis rubro-brunneis, tumidis, et 5–7 µm latis compositum; epithecium griseo-brunneum, cum granulis viridis interspersum; hymenium 50–60 µm latum; hypothecium rubrobrunneum. Paraphyses simplices vel interdum ramosae proxime apicem, 1.5–2 µm latae sed apicibus ad 3.5 µm latis et brunneis. Asci elongato-clavati, 38–47 × 8–12 µm, 8-spori. Ascosporae ellipsoideae, 1(–2)-septatae, hyalinae, praecipue laeves, (12.5–)13–15(–16) × 5–6.5 µm.

Typus: Groenlandia, Ivigtut d., Grønnedal, 61°14'N, alt. 0–50 m, on *Cladonia stricta*, 9 July 1946, Skytte Christiansen 5504 (herb. Christiansen-holotypus; IMI 331024 isotypus).

Ascomata apothecia, sessile, strongly constricted below and often shortly stipitate, black, (0.25–)0.35–0.5(–0.7) mm diam., disc concave at first but becoming plane to convex with age; exciple persistent, swollen and raised at first but later ± plane with the disc, black, composed of radially arranged, conglutinated, red-brown, ± swol len hyphae 5–7 µm wide at the outer margin; epithecium greyish brown, interspersed with greenish angular granules; hymenium 50–60 µm tall, I+ blue; hypothecium red-brown, similar in colour to the exciple. Paraphyses simple or occasionally branched near the tips, remotely septate, 1.5–2 µm thick, the apical cell swollen to 2.5–3.5 µm thick with a brown gelatinous coat. Asci elongate, clavate, 38–47 × 8–12 µm, 8-spored. Ascospores distichously arranged in the asci, ellipsoid, rounded or slightly attenuated at the ends, 1(–2)-septate, not constricted at the septum, hyaline, smooth-walled to finely verrucose in aged asci, (12.5–)13–15(–16) × 5–6.5 µm.

Distribution: Greenland, known only from the type collection.
Hosts: *Cladonia stricta* (Nyl.) Nyl., podetia and squamules. The large black apothecia are distinctive and occur on older parts of the thalli, but do not cause any visible damage to the host.

Notes: This conspicous species is quite distinct from the two lichenicolous apothecioid fungi with 1-septate hyaline ascospores already recognized on *Cladonia* species. *Scutula epicladonia* (Nyl.) Sacc. has a poorly developed exciple, apothecia to only 0.3 mm diam., and narrow ascospores 3–4 µm wide; *"Patellaria" cladoniarum* Müll. Arg. described on *Cladonia ceratophylla* Escher from Brazil has apothecia to 0.5 mm diam. but ascospores of a similar width to those of *S. epicladonia*. The paraphyses of *S. cladoniicola* are similar to those of the type species of *Scutula* (which differs in the red-brown colour of the discs) rather than of the dark brown capitate type characteristic of *Catillaria* Massal. s. str.

2. **Scutula epicladonia** (Nyl.) Sacc. (1906: 175)
Lecidea epicladonia Nyl. (1887: 132)

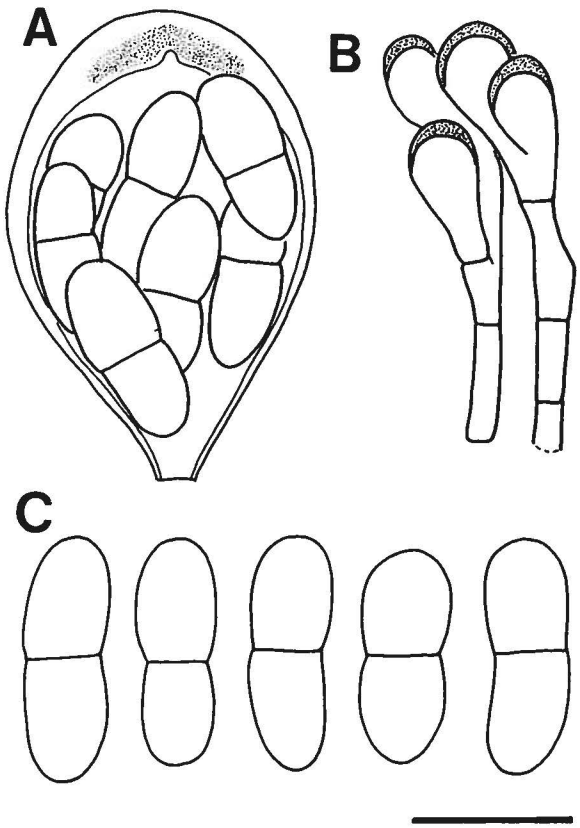


Fig. 39. *Scutula epicladonia* (Christiansen 5574) on *Cladonia coccifera*. A: Ascus in Lugol's iodine. B: Paraphyses tips. C: Ascospores. Scale = 10 µm.

Fig. 39.
Distribution: Europe and Greenland.
Hosts: *Cladonia* spp.

Note: The saccate asci (Fig. 39) are suggestive of *Arthonia* and the generic position of this species merits closer study.

Specimens: Holsteinsborg d., head of Søndre Strømfjord, south slope of Mt. Hassel. 67°N, alt. 50–100 m, on *Cladonia coccifera* (L.) Willd. squamules, 29 July 1946, Skytte Christiansen 5574 (herb. Christiansen). Midway in Søndre Strømfjord, northern shore, Itivdlinguaq, 66°30'N, alt. 50–150 m, on *Cladonia pyxidata* (L.) Hoffm., squamules, 24 July 1946, Skytte Christiansen 5567 (herb. Christiansen).

3. **Scutula solorinaria** (Nyl.) P. Karsten (1885: 150)
Lecidea solorinaria Nyl. (1863: 266)
Distribution: France and Greenland.
Hosts: On the thallus of *Solorina bispora* Nyl.

Notes: This species was confused by Keissler (1930: 156) with *S. krempelhuberi* Körber, which differs in the larger and paler apothecia with a reddish brown exciple, and the ascospore shape and size; its separation from

other species is discussed further by Hawksworth (1986: 507).

Specimens: Narssaq d., Kangerdluarssuk, W of Grænseelv, 60°54′N, 45°52′W, alt. 395 m, on *Solorina bispora*, 25 July 1980, Alstrup 80553 (C).

4. **Scutula stereocaulorum** (Anzi) Körber (1865: 455)
Lecidea stereocaulorum Anzi (1862: 155)
Description: Keissler (1930: 159).
Distribution: Widespread from north temperate to arctic regions and common in S. and W. Greenland.
Reports from Greenland: Branth & Grønlund (1887), Branth (1895), Lynge & Scholander (1932) and Alstrup (1981).
Hosts: *Stereocaulon* spp., found as numerous black apothecia on the thallus which may become stunted if heavily infected.

Specimens (selected): Disko, Godhavn, Blæsedalen, on *S. alpinum* Laur., 2 Aug. 1958, Hansen 929 (C) and 29 July 1982, Poelt & Ullrich (GZU).
Holsteinsborg d., mouth of Søndre Strømfjord, the cove Pâ, alt. 0–50 m, on *S. paschale* (Fr.) Fr., 23 July 1946, Skytte Christiansen 5555 (herb. Christiansen). Midway in Søndre Strømfjord, Itivdlinguaq, 66°30′N, alt. 50–150 m, on *S.* sp., 24 July 1946, Skytte Christiansen 5558 (herb. Christiansen).
Sukkertoppen d., head of Sønder Isortoq, Qaersutsiaup qulâ, 65°36′N, 51°54′W, alt. 50 m, on *Stereocaulon* sp., 8 July 1977, Alstrup 77009 (C).
Godthåb d., Ilulialik, at the waterfall Igassoq, alt. 25 m, on *S. botryosum* Ach., July 1976, Alstrup 760849 (C). Godthåb town, 64°10′N, alt. 0–50 m, on *S. alpinum*, 18 July 1946, Skytte Christiansen 5544 (herb. Christiansen).
Ivigtut d., SW of Ivigtut town, 61°12′N, alt. 250 m, on *S. paschale*, 10 July 1946, Skytte Christiansen 5513 (herb. Christiansen).
Narssaq d., mountain W of Taseq, 60°57′N, 45°59′W, alt. 620 m, on *Stereocaulon* sp., 1 Aug. 1980, Alstrup 801178 (C).
Narssarssuaq, 61°11′N, alt. 0–50 m, on *S. alpinum*, 13 July 1946, Skytte Christiansen 5526 (herb. Christiansen).

5. **Scutula tuberculosa** (Th. Fr.) Rehm (in Saccardo 1906: 174)
Biatorina tuberculosa Th. Fr. (1860: 288)
Description: Keissler (1930: 148–149).
Anamorph: *Karsteniomyces tuberculosus* Alstrup & D. Hawksw. (see p. 41).
Distribution: Widespread in Europe and known also from Canada (British Columbia) and Greenland.
Report from Greenland: Branth (1895: 96).
Hosts: Mostly on *Peltigera* spp. The apothecia arise in discrete groups up to 5 mm diam. and are not dispersed, measuring 0.3–0.4 mm diam. The species was reported on *Solorina crocea* (L.) Ach. by Branth (loc. cit.); the specimen on which his report was based has been restudied and appears to have been correctly identified (Hartz 1892, see below).

Notes: The apothecia are sometimes mixed with pycnidia of the anamorph, which also occurs separately on the same thallus. In the specimen on *Solorina crocea* the ascospores are up to 15.5 µm in length.

Specimens: Disko, Perdlertut, 69°58′N, 54°24′W, alt. 50 m, on *P. leucophlebia* (Nyl.) Gyelnik, 11 Aug. 1975, Alstrup 75–83 (C, with *Karsteniomyces tuberculosus*).
Scoresbysund, Hekla Havn, on *Solorina crocea*, 1892, Hartz (C).

Steinia Körber (in Stein 1873: 169)
Type species: *Steinia geophana* (Nyl.) B. Stein (*Steinia luridescens* Körber).
Number of species: Monotypic.

1. **Steinia geophana** (Nyl.) B. Stein (in Cohn 1879: 209)
Lecidea geophana Nyl. (1861: 212)
Distribution: Europe and N. America.
Reports from Greenland: Alstrup (1986: 11) and Hansen & Poelt (1987: 75–76).
Hosts: Most of the reports including Alstrup's from Greenland are from soil. However, the second report was from a dead *Peltigera* sp. and in Denmark it was found on *Peltigera didactyla* (With.) Laundon (Alstrup & Læssøe 1987: 56–57) and it is here reported from *Solorina saccata* (L.) Ach. The species is often found in a gelatinous algal mat and is supposed to be lichenized, but its biological status needs confirmation.

Specimen: Sukkertoppen d., Kangerdluarssuk, Qivâqe, 65°27′N, 52°33′W, alt. 15 m, on *Solorina saccata*, with *Stigmidium peltideae*, 7 Aug. 1977, Alstrup 771038a (C).

Stigmidium Trevisan (1860: 17)
Type species: *S. schaereri* (Massal.) Trevisan.
Number of species: About 14, all lichenicolous fungi.

Note: The genus is in need of a revision, as the taxonomy is partly based merely on occurrences on different hosts.

1. **Stigmidium conspurcans** (Th. Fr.) Triebel (1989: in press)
Arthopyrenia conspurcans Th. Fr. (1867: 51)
Distribution: See Triebel (loc. cit.).
Hosts: In Greenland on *Psora rubiformis* (Ach.) Hook., found as numerous small black perithecia on the cortex of the squamules which become white.

Specimens: Disko, Godhavn, 27 July 1983, Poelt & Ulrich, in Vězda, Lich. sel. Exs. no. 1975 (as *S. psorae*). Godhavn, Blæsedalen, 69°15′N, 53°34′W, 20 July 1974, Hansen, Lich. Groenl. Exs. no. 107 (UPS). Godhavn, 69°15′N, 53°32′W, alt. 30 m, 29 April 1952, Gelting, Lich. Groenl. Exs. no. 147 (UPS).
Holsteinsborg d., midway in Søndre Strømfjord, northern shore, Itivdlinguaq, alt. 50–150 m, 24 July 1946, Skytte Christiansen 5557 (herb. Christiansen; IMI 331025).
Narssaq d., Nákâlâq, 60°59′N, 45°42′W, alt. 1400 m, 16 July 1980, Alstrup 800362 (C). Kangerdluarssuk, south slope of Nunasarnaussaq, 60°53′W, 45°47′W, alt. 125 m, on *Psora rubiformis*, 15 July 1978, Alstrup 243885i (C).

2. **Stigmidium dispersum** (Lahm ex Körber) D. Hawksw. (1975a: 201)
Arthopyrenia dispersa Lahm ex Körber (1865: 388)
Pharcidia lichenum (Arnold) Winter (1885: 343)

Description: Vězda (1963: 153).
Distribution: Europe and Greenland.
Report from Greenland: Vainio (1905).
Hosts: Reported from a wide range of crustose, foliose and even some fruticose lichens, but in need of verfication due to confusion with other species.

Specimens (selected): Disko, Mudderbugten, Alákariaq, 69°44′N, 51°57′W, alt. 40 m, on *Psoroma hypnorum* (Vahl) Gray, 18 July 1975, Alstrup 75–79 (C).
Holsteinsborg d., midway in Søndre Strømfjord, northern shore, Itivdlinguaq, 66°30′N, alt. 50–150 m, on *Cladonia pyxidata* (L.) Hoffm. squamules, 24 July 1946, Skytte Christiansen 5572 (herb. Christiansen). Angujârtorfiup nunâ, Arnangarngup kûa, 66°32′N, 51°08′W, alt. 200 m, on *Toninia tristis* (Th. Fr.) Th. Fr., 24 June 1979, Alstrup 79260 (C). Head of Søndre Strømfjord, Nakajanga, 66°52′N, alt. 600 m, on *Melanelia substygia* (Räsänen) Esslinger, 10 Aug. 1946, Skytte Christiansen 5468 (herb. Christiansen).
Sukkertoppen, d., Kangerdluarssuk, Qivâqe, 65°27′N, 52°33′W, alt. 20 m, on *Toninia lobulata*, 2 Aug. 1977, Alstrup 771766 (C).
Godthåb d., Godthåb town, near the harbour, 64°10′N, alt. 0–50 m, on *Psoroma hypnorum*, 18 July 1946, Skytte Christiansen 5538 (herb. Christiansen).

3. **Stigmidium ephebes** (Henssen) D. Hawksw. (1975a: 201)
Pharcidia ephebes Henssen (1963: 111)
Distribution: Widespread.
Report from Greenland: Henssen (loc. cit.)
Hosts: *Ephebe* spp., in Greenland on *E. hispidula* (Ach.) Horwood, forming irregular galls.

4. **Stigmidium frigidum** (Sacc.) Alstrup & D. Hawksw. *comb. nov.*
Epicymatica frigida Sacc. (1882: 572)
Distribution: Greenland and USA (Alaska).
Reports from Greenland: Fries (1879: 370) and Saccardo (loc. cit.).
Host: *Thamnolia vermicularis* (Swartz) Ach. ex Schaerer, thallus.

Notes: This name was based on *Sphaeria* no. 10 from Westward-Ho! described by Fries (1879: 370), but not given a name by him. The original material of this taxon has not been located in BM, K or UPS and is presumed to be lost. However, Keissler (1930: 357) listed this name as a possible synonym of *Pharcidia dispersa* (Lahm ex Körber) Winter and from the description it seems most probable that it belongs to the *Stigmidium* seen on the host from Alaska by Hawksworth (1980b: 180), which has ascospores 13–14 × 4.5–5 µm. The above new combination is therefore made to accomodate this fungus here, and the name neotypified on Macoun, "Lich. Can. Exs." no. 180 (E-neotypus).

5. **Stigmidium marinum** (Deakin) Swinscow (1965: 62)
Sagedia marina Deakin (1854: 40)
Distribution: Western Europe and N. America.
Hosts: Maritime species of *Verrucaria*, as patches of minute black perithecia.

Specimen: Sukkertoppen d., Kangerdluarssuk, 65°25′N, 52°30′W, alt. 0 m, on *Verrucaria mucosa* Wahlenb., 11 Aug. 1977, Alstrup 771144 (C).

6. **Stigmidium peltideae** (Vainio) R. Sant. (1960: 510)
Pharcidia peltideae Vainio (1899: 342)
Stigmidium solorinarium (Vainio) D. Hawksw. (1986: 508)
Descriptions: Hawksworth (1975a: 199–200, 1986: 508–510).
Distribution: Europe and Greenland.
Hosts: *Peltigera* and *Solorina* species.

Note: The species on *Solorina* was retained as distinct by Hawksworth (loc. cit.) on the basis of small differences in ascospore size and shape, and also because of the occasionally 3-septate ascospores. Subsequent studies on a larger number of specimens by J. C. David (unpubl.), however, have shown that those features provide no clear separation, and the two taxa are therefore united here.

Specimens (selected): Umanak d., Scheideck NE of Mârmorilik, alt. 850–970 m, 8 Aug. 1983, Poelt & Ullrich (GZU).
Disko, Mudderbugten, Alákariaq, 69°44′N, 52 01′W, alt. 40 m, on *P. aphthosa* (L.) Willd., July 1975, Alstrup 75–10 (C).
Pingo, 69°46′N, 52°02′W, alt. 650 m, on *P. aphthosa* and *P. leucophlebia* (Nyl.) Gyelnik, 26 July 1975, Alstrup 75–64 (C).
Holsteinsborg d., midway in Søndre Strømfjord, Itivdlinguaq, alt. 50–150 m, on *Peltigera* sp., 24 July 1946, Skytte Christiansen 5564 (herb. Christiansen).
Sukkertoppen d., Kangerdluarssuk, Qivâqe, 65°27′N, 52°33′W, alt. 15 m, on *Solorina saccata* (L.) Ach. associated with *Steinia geophana* (Nyl.) B. Stein. and *Thelocarpon epibolum* Nyl., 7 Aug. 1977, Alstrup 771038a and 771035a (C).
E. Greenland, Ymer Ø, Kap Humboldt, on *Solorina bispora* Nyl., 3 Aug. 1929, Lynge (UPS).

7. **Stigmidium stygnospilum** (Minks) R. Sant. (1960: 511)
Cyrtidula stygnospila Minks (1891: 64)
Distribution: Spain, Czechoslovakia and Greenland.
Hosts: *Dermatocarpon miniatum* (L.) Mann and *Catapyrenium lachneum* (Ach.) R. Sant. on which it is found as black semi-immersed perithecia destroying the squamules.

Specimen: Holsteinsborg d., head of Søndre Strømfjord, south slope of Mt. Hassel, 67°02′N, 50°46′W, alt. 75 m, on *Catapyrenium lachneum*, 27 Aug. 1976, Alstrup (C).

Taeniolella S. Hughes (1958: 816)

Type species: *Taeniolella exilis* (P. Karsten) S. Hughes.
Number of species: About 25, mainly saprophytic on wood, but including seven obligately lichenicolous species.
Descriptions: Ellis (1971: 91) and Hawksworth (1979a: 253).

1. **Taeniolella christiansenii** Alstrup & D. Hawksw. *sp. nov.*
Figs 40, 41.
Coloniae dispersae; mycelium superficiale ex cellulis subglobosis et atrobrunneis 5–8 × 4–6 µm; mycelium immersum ex

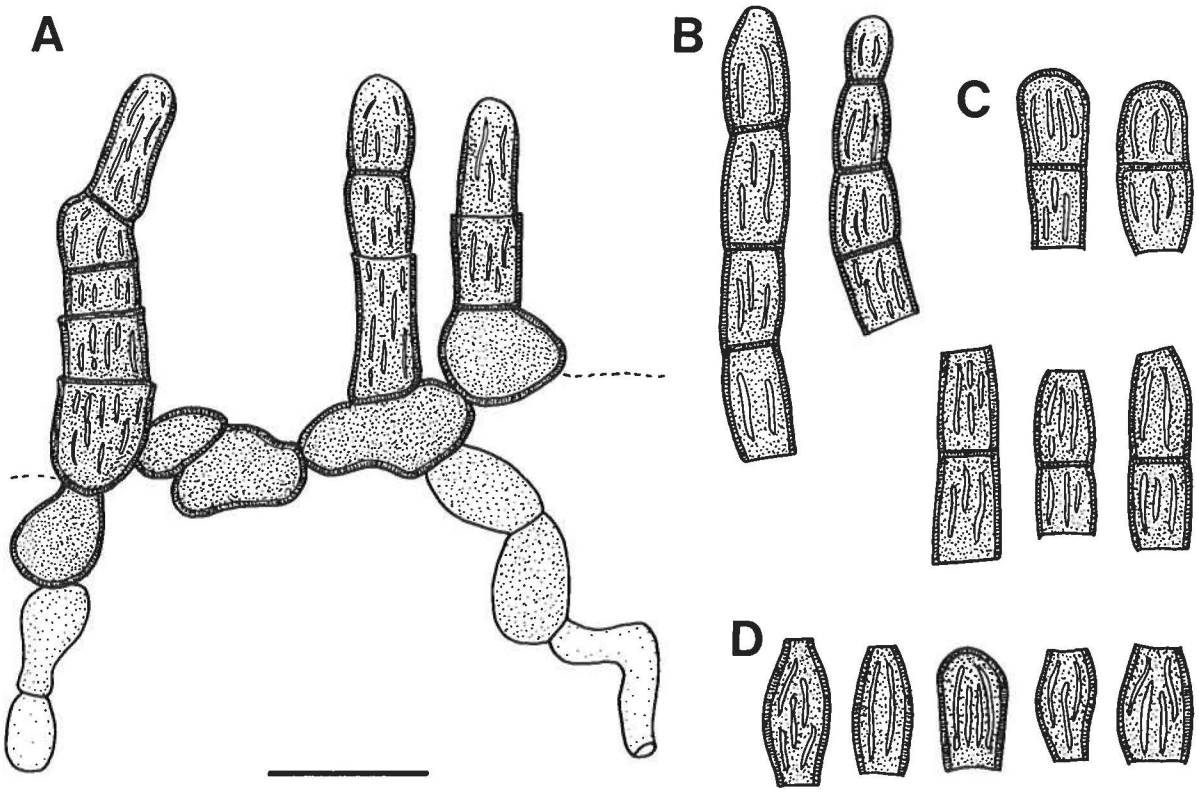


Fig. 40. *Taeniolella christiansenii* (Christiansen 5568, holotype) on *Arthonia nephromiaria*. A: Conidiophores arising from the superficial mycelium and hyphae penetrating the host tissues. B: Conidiophore apices. C: 1-septate conidia. D: Simple conidia. Scale = 10 µm.

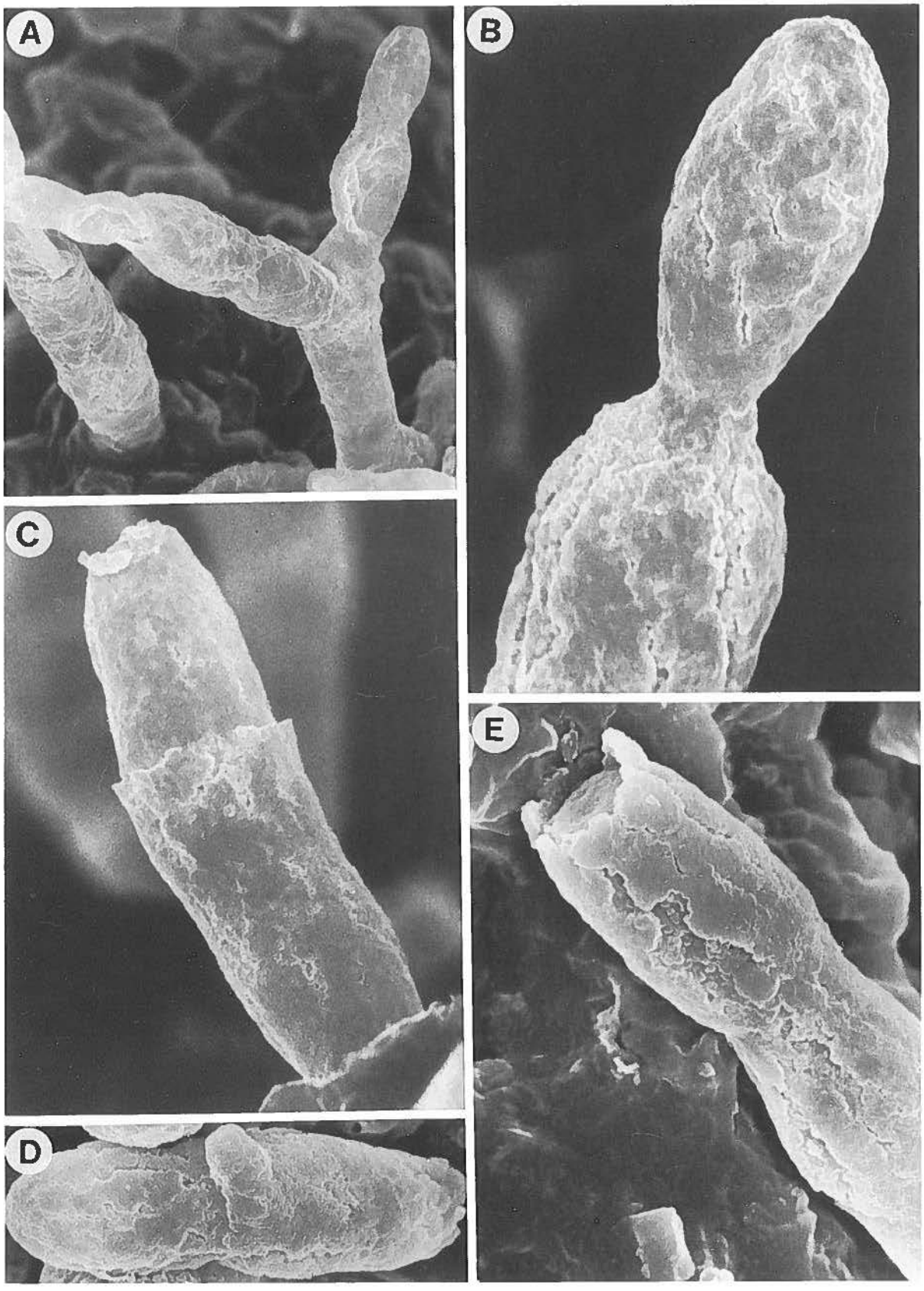
hyphis pallide brunneis ad subhyalinis, 3–4 µm latis. Conidiophora semimacronemata, singularia vel aggregata, recta, simplicia, atrobrunnea, verrucoso-striata, 10–15(–20) µm. Cellulae conidiogenae monoblasticae, integratae, terminales, breve cylindricae, brunneae, verrucoso-striatae. Conidia catenata, sicca, acrogena, dolliiformia, brunnea, simplicia et 8–10 × 3–3.5 µm vel 1-septata et 10–12(–13) × 4.5–5.5 µm.
Typus: Groenlandia, Holsteinsborg d., midway in Søndre Strømfjord, Itivdlinguaq, 66°30′N, alt. 50–150 m, on apothecia of *Arthonia nephromiaria* and on phyllocladia of *Stereocaulon alpinum*, 24 July 1946, Skytte Christiansen 5568 (herb. Christiansen-holopypus).

Colonies scattered on the surface of the apothecia of the host, spreading widely over the surface as chains of torulose hyphae with brown to dark brown subglobose cells mainly 5–8 × 4–6 µm, walls sometimes verrucose-striate; mycelium penetrating the hymenium, of pale brown, torulose, smooth-walled hyphae in the upper parts and of subhyaline hyphae 3–4 µm wide in deeper parts of the tissue. Conidiophores semi-macronematous, arising singly or in small groups, erect, unbranched, dark brown, thick-walled, verrucose-striate, 10–15(–20) × 5–7 µm. Conidiogenous cells monoblastic, integrated, terminal, short cylindrical, brown, thick-walled, verrucose-striate, proliferating wall remnants often persisting as adspersed sheath-like structures. Conidia adhering in chains, mainly separating into simple or 1-septate conidia, doliiform, generally abruptly truncated at the ends, brown, lateral walls thick, verrucose-striate with longitudinal ridges formed from splits and folds in the outermost wall layers, simple conidia 8–10 × 3.5–5 µm, 1-septate conidia 10–12(–13) × 4.5–5.5 µm.

Distribution: Greenland, known only from the type collection.
Hosts: On apothecia of the lichenicolous fungus *Arthonia nephromiaria* Nyl. growing on young phyllocladia of *Stereocaulon alpinum* Laurer, and also spreading to that species. The infected apothecia are partly dark in colour but otherwise, no macroscopic symptoms are apparent.

Notes: This species recalls *T. delicata* in the dimensions of the conidia, but in that fungus simple conidia are not found, and the conidia are smooth-walled and not longi-

Fig. 41. *Taeniolella christiansenii* (Christiansen 5568, holotype) on *Arthonia nephromiaria*. A: Branched conidophores (SEM, x 4000). B: Young conidia at the apex of a conidiogenous celle, (SEM, x 13.300). C: Proliferating conidiogenous cell (SEM, x 9300). D: 1-septate conidia (SEM, x 6300). E: Base of a conidium showing the outer disrupted wall layers (SEM, × 8000). ▶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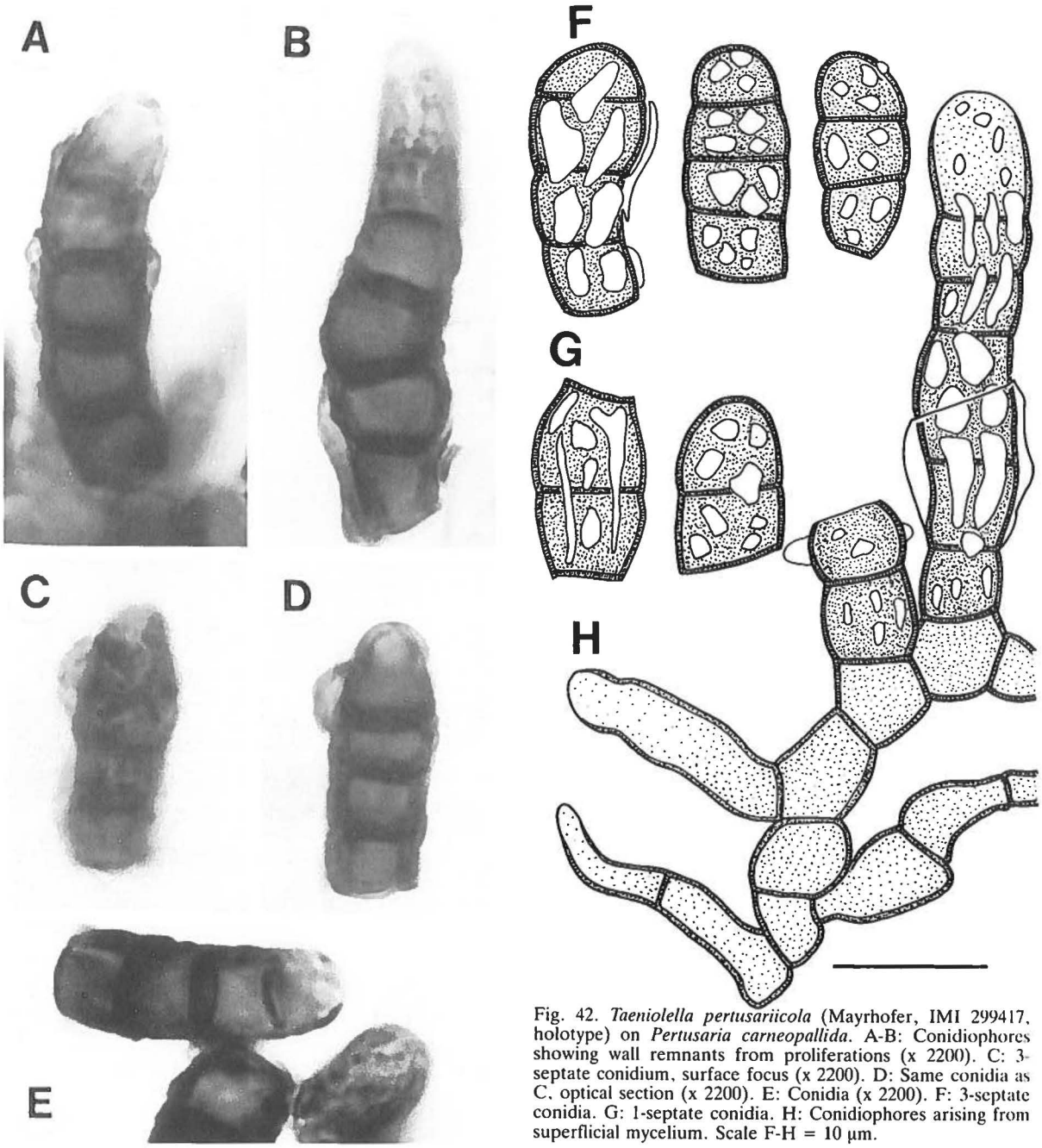


Fig. 42. *Taeniolella pertusariicola* (Mayrhofer, IMI 299417, holotype) on *Pertusaria carneopallida*. A-B: Conidiophores showing wall remnants from proliferations (x 2200). C: 3-septate conidium, surface focus (x 2200). D: Same conidia as C, optical section (x 2200). E: Conidia (x 2200). F: 3-septate conidia. G: 1-septate conidia. H: Conidiophores arising from superficial mycelium. Scale F-H = 10 µm.

tudinally verrucos-striate. The ornamentation is much more regular and delicate than seen in all other lichenicolous species of the genus so far recognized. *T. christiansenii* also recalls *Cladosporium arthoniae* M. S. Christ. & D. Hawksw. in some respects, but in that fungus the conidiogenous cells are not discrete, and the conidia are ellipsoid not doliiform in shape, with a generally verrucose rather than striate ornamentation.

2. **Taeniolella delicata** M.S. Christ. & D. Hawksw. (in Hawksworth 1979a: 253)

Distribution: Europe.

Hosts: On a wide range of crustose lichens. *Icmadophila ericetorum* is a new host species, on which it is found as black sooty patches on the thallus and apothecia, and is pathogenic.

Specimen: Sukkertoppen d., head of Sønder Isortoq, S of river Isuitsup kûa, 65°33'N, 51°44'W, alt. 0–50 m, on *Icmadophila ericetorum* (L.) Zahlbr., Alstrup 77209 (C; IMI 331026).

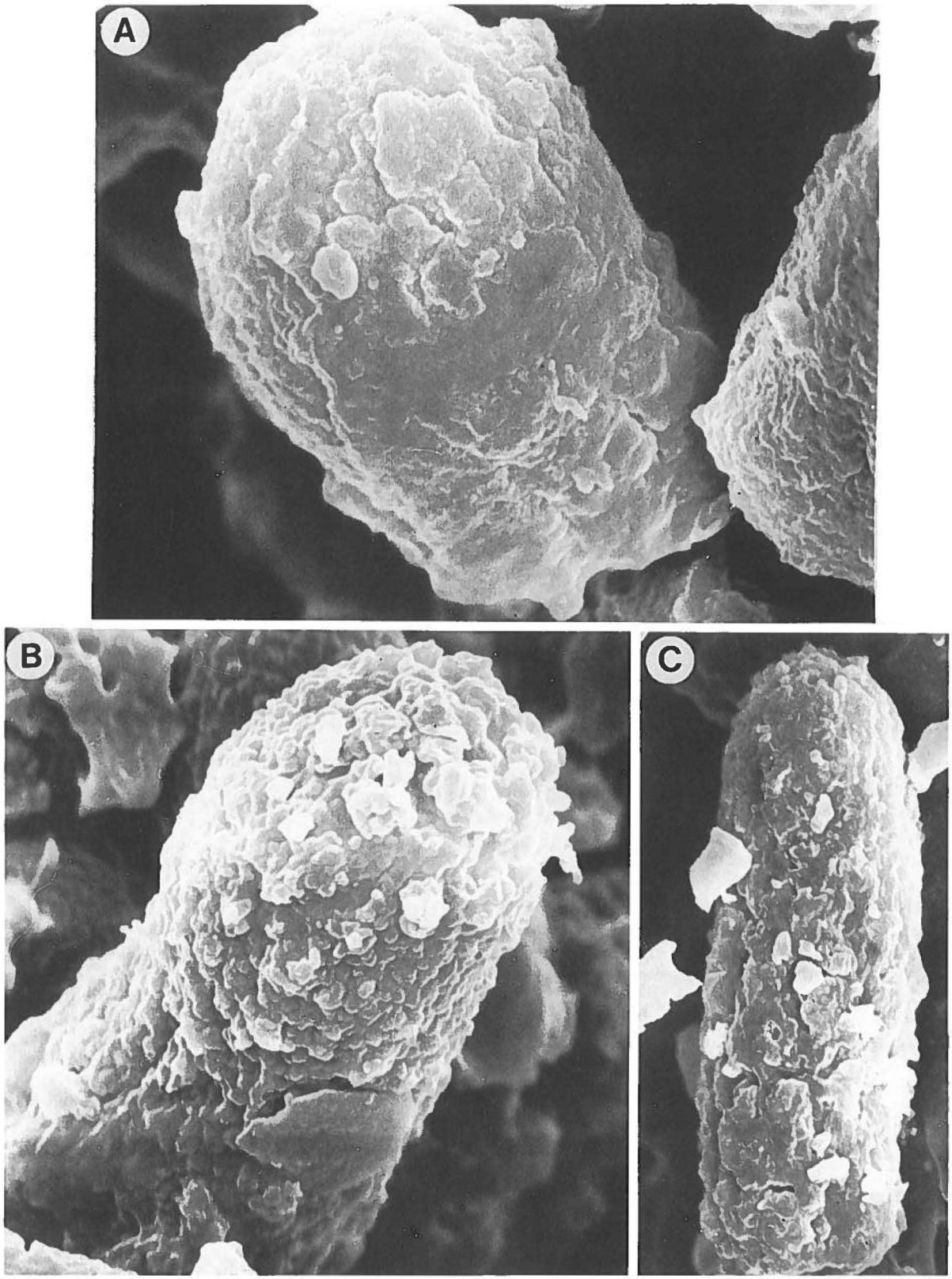


Fig. 43. A: *Taeniolella pertusariicola* (Alstrup 77562b) on *Pertusaria carneopallida*; conidium (SEM, x 13.300). B-C: *Taeniolella* sp. (Alstrup 771408) on *Ophioparma lapponica*. B: Conidium (SEM, x 9300). C: 1-septate conidium (SEM, x 5300).

3. **Taeniolella pertusariicola** D. Hawksw. & H. Mayrh. *sp. nov.*
Figs 42, 43 A.
Coloniae dispersae vel laxe aggregatae; mycelium superficiale ex hyphis pallide brunneis, 6–8 µm latis. Conidophora semimacronemata, caespitosa, recta ad effusa, praecipue simplicia, atrobrunnea, grosse verrucosa, 10–30 × 6–8 µm. Cellulae coniogenae monoblasticae, integratae, terminales. Conidia catenata, sicca, acrogena, late ellipsoidea ad doliiformia, atrobrunnea, grosse verrucosa, (1–)3-septata, 1-septatis est 11–12 × 7–7.5 µm et 3-septatis est (11–)13–16 × 5.5–7 µm.
Typus: Suecica, Torne Lappmark, Kiruna, Abisko, 1.5 km W of Jieprenjokkstugan, alt. 340–400 m, on *Pertusaria carneopallida* (Nyl.) Anzi on *Alnus incana*, 6 Aug. 1980, Mayrhofer (IMI 299417-holotypus; GZU, Vězda, Lich. Sel. Exs. no. 2125 [sub »*T. verrucosa*«]-isotypi).

Colonies scattered or loosely aggregated on the surface of the thallus and especially the apothecia, mainly superficial; mycelium of pale brown repeatedly septate short-celled hyphae 6–8 µm thick. Conidiophores semimacronematous, arising in caespitose tufts, erect to spreading, mainly unbranched, thick-walled, constricted at the septa, dark brown, the outer walls splitting irregularly and coarsely verrucose, 10–30 × 6–8 µm. Conidiogenous cells monoblastic, integrated, terminal, not well-defined, the terminal cells functioning as conidiogenous cells. Conidia adhering in chains, dry, acrogenous, broadly ellipsoid to dolioform, dark brown, 1–3-septate, slightly constricted at the septa, thick-walled, the outer wall splitting to produce a coarse verrucose ornamentation, 1–3-septate, 3-septate conidia predominating, 1-septate conidia 11–12 × 7–7.5 µm, 3-septate conidia (11–)13–16 × 5.5–7 µm.

Hosts: *Pertusaria carneopallida* (Nyl.) Anzi (*P. protuberans* (Sommerf. ex Th. Fr.) Th. Fr.), forming dense blackish growths on the thallus and especially the apothecia.
Distribution: Greenland and Sweden.

Notes: This fungus is similar to *T. verrucosa* M. S. Christ. & D. Hawksw., described from the thalli of *Arthonia impolita* (Hoffm.) Borrer in Sweden, but differs in the narrower and predominantly 3-septate conidia as noted by Hawksworth (in Vězda 1986: 7). The discovery of a second collection on *Pertusaria carneopallida* from Greenland which agrees in all details with that from Sweden means that it is most unlikely that the fungus on this host is merely a part of the range of variation in *T. verrucosa*. It is therefore formally described here as a distinct species.

A further collection from Greenland on *Ophioparma lapponica* (Sønder Isortoq, Ivnarssuaq, 65°26′N, 52°11′ W, alt. 90 m, 31 July 1977, Alstrup 771408, C) may also belong here; the material was poorly developed but the ornamentation of the conidia as studied in the SEM was very similar (Fig. 43 B-C).

Additional specimen: Sukkertoppen d., Sønder Isortoq, head of Kangerdluk, 65°34′ N, 51°57′ W, alt. 25 m, 20 July 1977, Alstrup 77562b (C).

Thelocarpon Nyl. (1853: 318).
Type species: *Thelocarpon laureri* (Flotow) Nyl.
Number of species: 18, of which some are saprophytic, others lichenized or lichenicolous fungi.

1. **Thelocarpon epibolum** Nyl. (1866b: 188)
Descriptions: Ahti (1973: 66–67) and Salisbury (1966: 180–181).
Distribution: North temperate to arctic.
Reports from Greenland: Ahti (loc. cit.), Vainio (1905: 139), Darbishire (1909: 42) and Alstrup (1979: 162).
Hosts: *Peltigera, Solorina* and *Baeomyces* spp. as dispersed to aggregated yellow-green ascomata on dead or dying thalli.

Notes: This species was reported to be lichenized by Salisbury (loc. cit.) having algae in the lower part of the exciple, but Ahti (loc. cit.) was not sure of that.

Specimens: Holsteinsborg d., Holsteinsborg, Præstefjeldet on *P. aphthosa* with *Wentiomyces peltigericola* and *Fayodia striatula*, 28 Aug. 1972, Petersen (C, with *Fayodia*).
Sukkertoppen d., midway in Sønder Isortoq, Ivnarssuaq, 65°27′N, 52°11′W, alt. 10 m on *Peltigera lepidophora*, 28 July 1977, Alstrup 771529 (C). Kangerdluarssuk, Qivâqe, 65°27′N, 52°33′W, alt. 15 m, on *Solorina saccata* (L.) Ach. with *Stigmidium peltideae*, 7 Aug. 1977, Alstrup 771035a (C). Head of Sønder Isortoq, Qaersutsiaup qulâ, 65°36′N, 51°54′W, alt. 50 m, on *Solorina crocea* (L.) Ach. with *Rhagadostoma lichenicola* and *Cercidospora lichenicola*, 8 July 1977, Alstrup 77003 (C).
Godthåb d., Sårdloq, 64°24′N, 51°35′W, on *Peltigera aphthosa*, Aug. 1976, Alstrup 76988 (C). Ilulialik, Ivnajuagtoq, 64°46′N, 50°41′W, alt. 75 m, on *P. aphtosa*, 20 July 1976, Alstrup 762901 (C).

2. **Thelocarpon lichenicola** (Fuckel) Poelt & Hafellner (1975: 70)
Ahlesia lichenicola Fuckel (1870: 281)
Description: Poelt & Hafellner (loc. cit.).
Distribution: Central Europe and Greenland.
Hosts: *Baeomyces rufus* (Huds.) Rebent., here reported from *Lepraria neglecta* auct., apparently commensalistic, but the sample is very small; it may be pathogenic in larger infections.

Specimen: Godthåb d., Godthåb, Store Malene, 64°10′N, 300 m, on *Lepraria neglecta* auct., 20 July 1946, Skytte Christiansen 5546 (herb. Christiansen).

Trimmatostroma Corda (1837: 9)
Type species: *Trimmatostroma salicis* Corda.
Number of species: 17 species are saprophytic mainly on bark, one is lichenicolous.
Description: Ellis (1971: 41).

1. **Trimmatostroma lichenicola** M. S. Christ. & D. Hawksw. (in Hawksworth 1979a: 264)
Distribution: Greenland and Norway, here also reported from Spain.
Report from Greenland: Hawksworth (loc. cit.).
Hosts: In the hymenium of *Candelariella vitellina* (Hoffm.) Müll. Arg., *C. hudsonica* Hakul., *Lecanora fuscescens* (Sommerf.) Nyl., *L. polytropa* (Hoffm.) Rabenh., *Toninia cumulata* (Sommerf.) Th. Fr., *Psoroma hypnorum* (Vahl) Gray and *Caloplaca holocarpa* (Hoffm.) Wade, causing discolouration and eventually destruction of the apothecia.

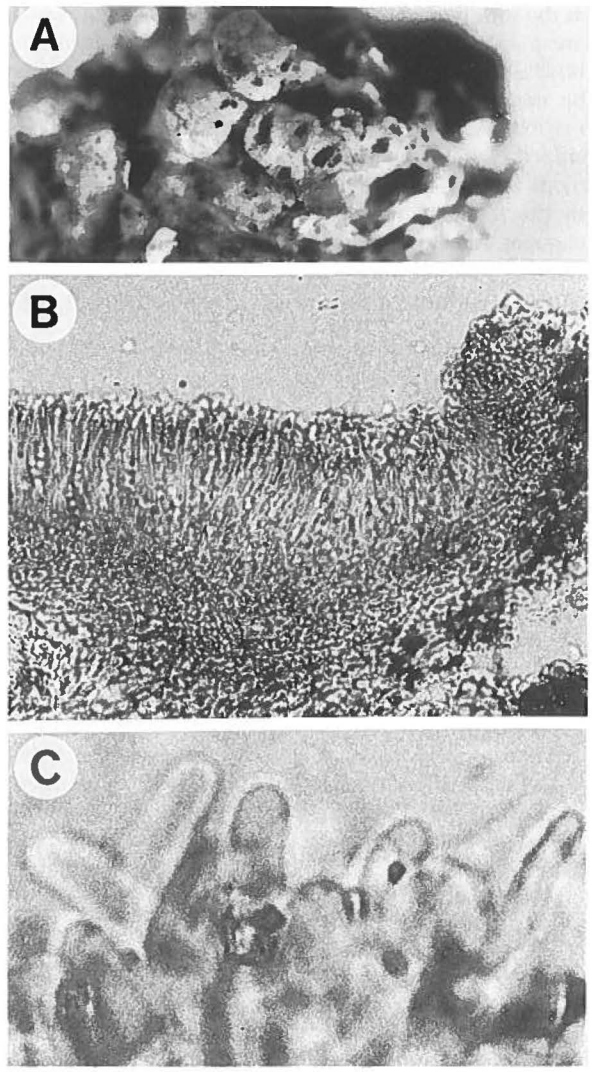
Specimens: Narssaq d. Kangerdluarssuk, Lilleelv, 60°54'N, 45°51'W, alt. 65 m, on *Lecanora fuscescens*, 3 July 1978, Alstrup 78076 (C). Bredefjord, 61°00'W, 45°59'W, alt. 50 m, on *Toninia* sp., 10 Aug. 1980, Alstrup 80857 (C).
Godthåb d., Godthåb town, near the harbour, 64°10'N, on *Psoroma hypnorum*, 21 July 1946, Skytte Christiansen 5548 (herb. Christiansen). Godthåbsfjorden, Karra, 64°47'N, 50°34'W, alt. 400 m, on *Candelariella hudsonica*, 24 July 1976, Alstrup 76483a (C).
Sukkertoppen d., Sønder Isortoq, Ivnarssuaq, 65°26'N, 52°11'W, alt. 90 m, on *Lecanora polytropa*, 31 July 1977, Alstrup 771409.
Spain: Catalunya, Tarragonis, Altatrilla, Pta. de la Mora, Cf 5954, alt. 20 m, on *Caloplaca holocarpa*, 20 Feb. 1987, Giralt.

Unguiculariopsis Rehm (1909: 401)

Type species: *U. ilicincola* (Berk. & Broome) Rehm.
Number of species: 16, of which two are lichenicolous including one transferred to the genus below.
Description: Zhuang (1988: 1–83).

1. **Unguiculariopsis cribriformis** (Norman) Alstrup & D. Hawksw. *comb. nov.*
Lecanora cribriformis Norman (1869: 191)
Pertusaria paradoxa Lindsay (1871: 344)
Fig. 44.
Distribution: Scandinavia and Greenland.
Report from Greenland: Lindsay (loc. cit.).
Hosts: *Pertusaria oculata* (Dicks.) Th. Fr. and *P. dactylina* (Ach.) Nyl., found as brown apothecia immersed in clustered warts on the horizontal thallus of the host.

Notes: This species is closely related to *U. thallophila* (P. Karsten) Zhuang (*Skyttea thallophila* (P. Karsten) Sherw. & D. Hawksw.) which is described in Hawksworth (1980b: 170–172). Sherwood et al. (1980: 489) pointed out that *Skyttea thallophila* differed from the other species of the genus in the ascomata being more or less superficial at maturity, and having rudimentary hairs on the incurved outer surface of the exciple and not merely the summit of the margin, the asci having a thick homogenous wall without a distinct apical cap, and the absence of a greenish pigmentation of the exciple and hairs. Zhuang (loc. cit.) transferred *S. thallophila* to *Unguiculariopsis* for these reasons. *U. cribriformis* shares these features, but is easily distinguished from that species in the hymenium being taller, 60–65 µm, the paraphyses being 2–3 µm thick and up to 4 µm



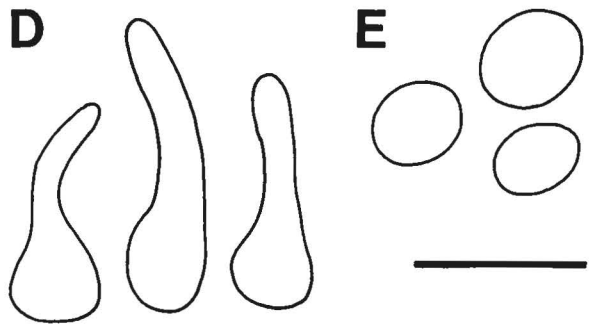


Fig. 44. *Unguiculariopsis cribriformis* (Gelting 14095a) on *Pertusaria dactylina*. A: Ascomata on the host lichen (x 18). B: Vertical section of ascoma showing exciple (x 200). C: Excipular hairs (x 2200). D: Excipular hairs. E: Ascospores. Scale D-E = 10 µm.

at the top, the cylindrical asci 55–60 × 6–6.5 µm, which are 8-spored, and with monostichously arranged globose ascospores, 5–5.5(–6) µm diam. Norman regarded his material as being of an independant lichen and the original description of this species consequently included elements of the host as well as of the lichenicolous fungus. In order to fix the application of his epithet to the lichenicolous fungus we formally select that element as lectotype for Norman's name here (Norway: Finmark, Alta, Sakkobani, on *Pertusaria dactylina,* Norman, O-lectotype).

Additional Specimens: Disko, Qivitut, on *Pertusaria dactylina,* 10 Aug. 1951, Gelting 14095 (UPS).
Norway: Finnmark, ad Jakobselv Varangiae, on *P. dactylina,* Norman (UPS, IMI 328721).

Vouauxiomyces Dyko & D. Hawksw. (in Hawksworth & Dyko 1979: 57)
Type species: *Vouauxiomyces truncatus* (B. de Lesd.) Dyko & D. Hawksw.
Number of species: Three, all lichenicolous fungi; others remain to be formally named.
Teleomorph: *Abrothallus* de Not. species, most of which seem to have anamorphs in this genus.

1. **Vouauxiomyces santessonii** D. Hawksw. (1981: 69)
Teleomorph: *Abrothallus parmeliarum* (Sommerf.) Nyl.
Distribution: British Isles, Greenland and Sweden, but expected to be as widely distributed as the teleomorph.
Hosts: *Parmelia saxatilis* (L.) Ach. and *Platismatia glauca* (L.) Culb. & C. Culb. but probably to be found on more species of *Parmelia* s. str.

Specimen: Narssaq d., Narssarsuaq 61° 11'N, alt. 0–50 m, on *P. saxatilis,* 13 July 1946, Skytte Christiansen 5518 (herb. Christiansen).

Weddellomyces D. Hawksw. (1986: 511)
Type species: *W. epicallopismum* (Weddell) D. Hawksw.
Number of species: Previously monotypic, but three species are added here, and a further species from the British Isles and Spain is in press. *Leptosphaeria crozalsii* Vouaux may also belong to this genus.

Notes: The generic circumscription is enlarged here to accommodate species in which cephalothecioid plates are not developed in the upper parts of the perithecium, the ascospores can have transsepta as well as longisepta, and dimorphism in ascospore shape can occur within the same ascomata. None of these characters alone or in combination are sufficient to serve as generic criteria for separation from *Weddellomyces.* With this broadened circumscription, the following two species must be transferred to the genus in addition to that treated below:
Weddellomyces geographicola (Arnold) Alstrup & D. Hawksw. *comb. nov.* (basionym: *Phaeospora geographicola* Arnold, Verh. zool. -bot. Ges. Wien 46: 193, 1896).

Weddellomyces peripherica (Taylor) Alstrup & D. Hawksw. *comb. nov.* (basionym: *Verrucaria peripherica* Taylor, in Mackay, Fl. Hib. 2: 97, 1836).

The application of the generic name *Xenosphaeria* Trevisan (1860: 18) was considered, as the only two species originally included here were *Verrucaria peripherica* Taylor and *Sagedia engeliana* Sauter, both of which have brown multiseptate to muriform ascospores. This last species is accepted currently in *Dacampia* Massal., as *D. engeliana* (Sauter) Massal. The original diagnosis does not fit one species better than the other, and Arnold (1874: 150–151) implicitly lectotypified the generic name by *X. engeliana,* referring *V. peripherica* to *Phaeospora* Hepp ex B. Stein. The generic name *Xenosphaeria* must therefore be treated as a synonym of *Dacampia.* This treatment is in accordance with the usage of the generic name adopted by Körber (1865: 466), Vainio (1921: 140) and Clements & Shear (1931: 274).

1. **Weddellomyces tartaricola** (Lindsay) Alstrup & D. Hawksw. *comb. nov.*
Verrucaria tartaricola Lindsay (1871: 342)
Fig. 45.
Ascomata perithecioid, mostly immersed, the upper third erumpent through the surface of the host, arising singly or in groups of 4–5, black, shining, broadly subglobose to somewhat obpyriform, ostiolate, 0.2–0.3 mm diam.; ascomatal wall dark brown to black, 23–31 µm thick, not strongly thickened near the ostiole, composed of several layers of compacted, moderately to unevenly thick-walled, polyhedral, pseudoparenchymatous cells, mostly 6–10(–12) µm diam. in surface view, strongly radially compressed in vertical section and then to 18 × 4–6 µm. Hamathecium of cellular pseudoparaphyses, branched and anastomosed, repeatedly septate, 2–2.5 (–3) µm thick; centrum tissue I–. Asci broadly cylindrical, short-stalked with more than a single functional layer, thinner at the apex which takes the form of a broadly truncated internal apical beak, discharge not seen, 75–90 × 12–15 µm, (2–)4(–6)-spored. Ascospores distichously arranged in the asci, mostly broadly ellipsoid and rounded at the ends, often dimorphic with subglobose ascospores found in separate asci in the same ascoma, golden brown, finely verruculose, ellipsoid spores with 3–5 transsepta and often also 1–2 oblique longisepta, a central pore often visible in the transsepta, 24–26(–27) × 9–11 µm, subglobose spores with 1–2 often oblique transsepta, 10–17.5 × 8–11 µm.

Distribution: Greenland, known only from the type collection.
Report from Greenland: Lindsay (loc. cit.).
Host: *Ochrolechia frigida* (Sw.) Lynge, thallus. Infected parts are discoloured suggesting that the species may well be pathogenic. The type collection also supports *Echinothecium glabrum,* but not intimately associated with *W. tartaricola.*

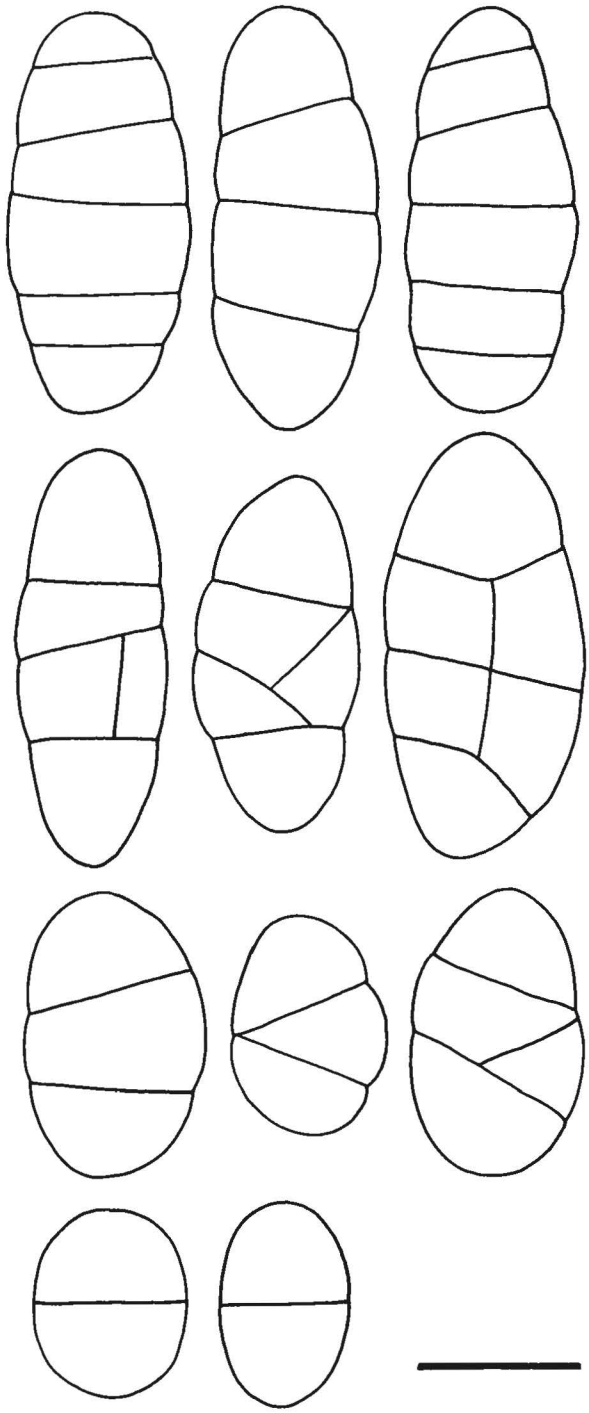


Fig. 45. *Weddellomyces tartaricola* (Brown, holotype); ascospore outlines from a single ascoma showing variation in size and septation. Scale = 10 µm.

Notes: This species is included in *Weddellomyces* despite the lack of a cephalothecioid upper wall to the ascoma and dimorphic ascospores which become muriform, on the basis of the similarity of the cellular walls of the ascomata, the asci, hamathecial type and ascospore ornamentation. *W. geographicola* also has dimorphic ascospores, but in that species the more elongate spores do not develop longisepta and are only 7–9 µm broad; the ascomata of that species appear to open by plates of tissue breaking away as in the type species of the genus (cfr. Zopf 1897: tab. VII, fig. 9). In *W. peripherica* the ascospores are not dimorphic, mostly 3-septate, and smaller, measuring 18–23 × 7–9 µm; however, that species is so far only known from fragmentary collections.

What is definitely the holotype of the name *Verrucaria tartaricola* Lindsay, which had not previously been located and studied since his original occount, was found by locating the host specimen studied by Lindsay filed under the host name in BM.

Specimen: Greenland, Godhavn, on *Ochrolechia frigida*, 5 Sept. 1967, Brown (BM-holotype of *W. tartaricola*).

Wentiomyces Koorders (1907: 168)

Type species: *W. javanicus* Koorders.

Number of species: About 50, mainly on leaves in the tropics.

Description: Müller & von Arx (1962: 490).

1. **Wentiomyces peltigericola** D. Hawksw. (1980a: 384–385)

Distribution: The British Isles and Scandinavia, here also reported from Greenland and the Faroes.

Hosts: *Peltigera* spp., saprophytic on darkened thalli, sometimes associated with *Thelocarpon epibolum* Nyl. and *Fayodia striatula* (Kühner) Singer.

Specimens: Holsteinsborg d., Holsteinsborg, Præstefjeldet on *P. aphthosa* with *Thelocarpon epibolum* and *Fayodia striatula*, 28 Aug. 1972, Petersen (C, with *F. striatula*).
Godthåb d., Kanásut, 64°20'N, 51°43'W, alt. 70 m, on *P. aphthosa*, 21 Aug. 1976, Alstrup 760927 (C). Ilulialik, Ivnajuagtoq, 64°46'N, 50°41'W, alt. 75 m, on *P. aphthosa* with *Thelocarpon epibolum*, 20 July 1976, Alstrup 762901 (C). Head of Ilulialik, on *P. aphthosa*, July 1976, Alstrup 76369 (C).
The Faroes: Eysterey, Toftevatn, on *P. aphthosa* associated with *Thelocarpon epibolum*, 5. Sept. 1956, Degelius (herb. Degelius).

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Host Index

This index lists all species mentioned in the text which occur on different hosts and not only those found in Greenland. The species in Roman type are the hosts for the species in italics immediately below.

Lecania sp.
Bispora christiansenii
Lecanora argopholis
Muellerella pygmaea
Rosellinia frustulosae
L. bicincta
Arthonia glaucomaria
L. cenisea
Lecidella lecanoriicola
L. conizaeoides
Merismatium lopadii
L. dispersa
Didymella sphinctrinoides
L. epibryon
Didymella sphinctrinoides
L. fuscescens
Arthonia clemens
Lecanora hageni
Trimmatostroma lichenicola
L. geophila
Cercidospora epipolytropa
L. intricata
Muellerella pygmaea
L. leptacina
Arthonia destruens
L. muralis
Cercidospora ulothii
L. polytropa
Buellia pulverulenta
Cercidospora epipolytropa
Lecidea diexcipulae
Muellerella pygmaea
Rhizocarpon destrucans
Trimmatostroma lichenicola
L. rupicola
Arthonia glaucomaria
Rinodina insularis
L. straminea
Buellia adjuncta
L. subradiosa
Buellia nivalis
L. spp.
Bispora christiansenii
Carbonea supersparsa
Muellerella lichenicola
Sagediopsis barbara
S. campsteriana
Lichenoconium lecanorae
Lecidea atrobrunnea
Rhizocarpon furax
L. atromarginata
Rhizocarpon narssaqensis
L. lactea
Muellerella pygmaea
L. lapicida
Muellerella pygmaea
L. tesselata
Muellerella pygmaea
L. spp.
Carbonea vitellinaria
Cecidonia umbonella
Sagediopsis barbara
Lepraria neglecta
Geltingia groenlandiae
Merismatium lopadii
Thelocarpon lichenicola
Leprocaulon subalbicans
Arthonia excentrica
A. nephromiaria
Leptogium sp..
Didymella sphinctrinoides
Lichenothelia echinulata
Phaeosporobolus usneae
Lopadium pezizoideum
Merismatium lopadii
L. spp.
Dactylospora urceolata
Melanelia substygia
Sclerococcum simplex
Stigmidium dispersum
Nephroma arcticum
Everniicola flexispora
N. parile
Abrothallus bertianus
N. spp.
Arthonia nephromiaria
Ochrolechia frigida
Phaeosporobolus alpinus
Phylliscum demangeonii
Sagediopsis campsteriana
Weddelomyces tartariicola
O. grimmiae
Echinothecium glabrum
O. lapuensis
Sagediopsis campsteriana
O. tartarea
?Sagediopsis campsteriana
O. spp.
Dactylospora urceolata
Echinothecium glabrum
Geltingia associata
Sagediopsis campsteriana
Ophioparma lapponica
Muellerella pygmaea
Taeniolella sp.
Pannaria pezizoides
Arthonia pelvetii
P. spp.
Illosporium corallinum
Parmelia fraudans
Echinothecium reticulatum
Nesolechia oxyspora
P. omphalodes
Abrothallus parmeliarum
Echinothecium reticulatum
P. pulla
Dactylospora allantoidea
P. saxatilis
Abrothallus parmeliarum
Echinothecium reticulatum
Homostegia piggotii
Illosporium corallinum
Lichenoconium usneae
Lichenopuccinia poeltii
Nesolechia oxyspora
Rinodina egedeana
P. sulcata
Abrothallus parmeliarum
Homostegia piggotii
Lichenopuccinia poeltii
P. spp.
Abrothallus bertianus
Lichenoconium lecanorae
Peltigera aphthosa
Fayodia striatala
Graphium aphthosae
Phragmonaevia peltigerae
Stigmidium peltideae
Thelocarpon epibolum
Wentiomyces peltigericola
P. canina
Illosporium carneum
P. didactyla
Arthonia pelveti
Fayodia striatula
Illosporium carneum
Nectriella ornamentata
Steinia geophana
P. cfr. elizabethae
Fayodin striatula
P. lepidophora
Phragmonaevia peltigerae
Thelocarpon epibolum
P. leucophlebia
Karsteniomyces tuberculosus
Scutula tuberculosa
Stigmidium peltideae
P. malacea
Capronia peltigerae
P. praetextata
Fayodia striatula
Nectriella ornamentata
P. rufescens
Refractohilum peltigerae
P. spp.
Arthonia fuscopurpurea
A. peltigerina
A. pelvetii
Bacidia killiasii
Fayodia striatula
Hawksworthiana peltigericola
Illosporium carneum
Karsteniomyces peltigerea

Phragmonaevia peltigerae
Refractohilum peltigerae
Rinodina egedeana
Scutula tuberculosa
Stigmidium peltideae
Wentiomyces peltigericola
Pertusaria bryontha
Polycoccum bryonthae
P. carneopallida
Taeniolella pertusariicola
P. dactylina
Geltingia associata
Phaeosporobolus alpinus
Unguiculariopsis cribriformis
P. glomerata
Phaeosporobolus alpinus
P. lactea
Sclerococcum sphaerale
P. leioplaca
Opegrapha pertusariicola
P. oculata
Unguiculariopsis cribriformis
P. cf. ophthalmiza
Sclerococcum simplex
P. spp.
Buellia saxatilis
Geltingia associata
Lichenodiplis lecanorae
Sclerococcum sphaerale
Phaeophyscia orbicularis
Phoma epiphyscia
P. sciastra
Ascochyta santessonii
P. sp.
Arthonia destruens
A. epimela
Bispora christiansenii
Buellia pulverulenta
Phacopsis vulpina
Bispora christiansenii
Phaeorrhiza nimbosa
Arthonia epiphyscia
Physcia caesia
Phaeosporobolus usneae
Polycoccum galligenum
P. dubia
Polycoccum galligenum
P. magnussonii
Didymella sphinctrinoides
P. wainioi
Polycoccum galligenum
P. spp.
Arthonia destruens
A. epimela
A. molendoi
Physconia spp.
Buellia pulverulenta
Placopsis gelida
Polycoccum gelidarium
P. squamarioides
Pyrenidium hyalosporum
Polyblastia cruenta
Muellerella pygmaea
Porpidia flavocaerulescens
Muellerella pygmaea
P. pseudomelinodes
Endococcus propinquus
P. tuberculosa
Lasiosphaeriopsis christiansenii
Protoblastenia rupestris
Diclymella sphinctrinoides
P. sp.
Merismatium lopadii
Sagediopsis campsteriana
Protoparmelia badia
Arthonia clemens
Protothelenella sp.
Dactylospora urceolata
Pseudephebe pubescens
Abrothallus bertianus
Pseudocyphellaria spp.
Arthonia pelveti
Psora rubiformis
Stigmidium conspurcans
Psoroma hypnorum
Arthonia clemens
A. fuscopurpurea
Dactylospora urceolata
Stigmidium dispersum
Trimmatostroma lichenicola
Pyrenopsis macrocarpa
Merismatium lopadii
P. sp.
Carbonea vitellinaria
Ramalina farinacea
Phaeosporobolus sp.
Rhizocarpon badioatrum
Endococcus stigma
R. concentricum
Phaeospora rimosicola
R. disporum
Polycoccum microsticticum
R. geographicum
Endococcus stigma
Muellerella pygmaea
?Pyrenidium actinellum
R. superficiale
Endococcus stigma
Muellerella pygmaea
R. spp.
Bispora christiansenii
Carbonea vitellinaria
Endococcus propinquus
Rhizoplaca chrysoleuca
Cercidospora ulothii
Lichenodiplis lecanorae
R. melanophthalma
Cercidospora epipolytropa
Lichenoconium lecanorae
Lichenodiplis lecanorae
R. peltata
Arthonia clemens
R. sp.
Lichenoconium lecanorae
Rinodina olivaceobrunnea
Buellia adjuncta
R. turfacea
Bispora christiansenii
Dactylospora rinodinicola
R. sp.
Dactylospora urceolata
Solorina bispora
Arthonia fuscopurpurea
Scutula solorinaria
Stigmidium peltideae
S. crocea
Cercidospora lichenicola
Rhagadostoma lichenicola
Scutula tuberculosa
Thelocarpon epibolum
S. octospora
Dacampia hookeri
S. saccata
Dacampia hookeri
Stigmidium dispersum
Steinia geophana
Thelocarpon epibolum
S. spp
Arthonia fuscopurpurea
A. pelveti
Stigmidium peltidea
Sphaerophorus fragilis
Echinothecium glabrum
Squamarina lentigera
Lichenoconium lecanorae
Stereocaulon alpinum
Lasiosphaeriopsis stereocaulicola
Opegrapha stereocaulicola
Polycoccum trypetheloides
Scutula stereocaulorum
Taeniolella christiansenii
S. arenarium
Polycoccum trypetheloides
S. botryosum
Scutula stereocaulorum
S. condensatum
Bispora christiansenii
S. intermedium
Lasiosphaeriopsis stereocaulicola
S. nanodes
Polycoccum trypethelioides
S. paschale
Scutula stereocaulorum
S. rivulorum

Lasiosphaeriopsis stereocaulorum
Polycoccum trypethelioides
S. vesuvianum
Lasiosphaeriopsis stereocaulorum
S. spp.
Arthonia nephromiaria
Cercidospora stereocaulorum
Geltingia stereocaulorum
Lasiosphaeriopsis stereocaulicola
Opegrapha stereocaulicola
Polycoccum trypethelioides
Scutula stereocaulorum
Tephromela armeniaca
?Echinothecium glabrum
Endococcus stigma
Thamnolia vermicularis
Geltingia associata
Polycoccum vermicularium
Stigmidium frigidum
Toninia cumulata
Trimmatostroma lichenicola
T. tristis
Stigmidium dispersum
T. sp.
Carbonea vitellinaria
Umbilicaria cylindrica
Clypeococcum grossum
U. polyphylla
Clypeococcum grossum
U. vellea
Clypeococcum grossum
Usnea sp.
Bispora christiansenii
Verrucaria mucosa
Stigmidium marinum
Verrucaria spp. (marine)
Stigmidium marinum
Xanthoria elegans
Arthonia molendoi
Cercidospora caudata
Lichenodiplis lecanorae
Muellerella lichenoides
X. parietina
Arthonia epiphyscia
Didymella sphinctrinoides
Phoma epiphyscia
X. spp.
Arthonia destruens
A. molendoi
Buellia nivalis
Wide host range
Arthonia clemens
Bispora christiansenii
Echinothecium glabrum
Endococcus propinquus
E. rugulosus
E. stigma
Muellerella pygmaea
Nesolechia oxyspora
Phaeospora parasitica
P. rimosicola
Phaeosporobolus usneae
Polycoccum microsticticum
Pyrenidium actinellum
Taenionella delicata
Host unidentified
Arthonia fusca
A. glaucomaria
A. sp.
Carbonia supersparsa
Endococcus propinquus
E. rugulosus
Muellerella pygmaea
Phaeospora parasitica
Sagediopsis barbara

Fungus Index

Host species are not included, these should be sought in the Host Index p. 81. Bold figures refer to main entries and illustrations of accepted species.

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