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ON ASCOMYCETES ON DIAPENSIALES AND ERICALES IN FENNOSCANDIA

1. DISCOMYCETES

BY

BIRGITTA ERIKSSON

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ABSTRACT

The Discomycetes, 52 species in all, on members of *Diapensiales* and *Ericales* in Fennoscandia are treated. Those on *Cassiope* are excluded. Three new genera, *Duplicariella*, *Grovesiella* and *Terriera*, and 3 new species, *Dasyscypha involucrata*, *Duplicariella phyllodoces* and *Godronia empetri*, are established. The following new combinations are proposed, *Coccomyces arctostaphyli* (Rehm) B. Erikss. (bas.: *C. quadratus* (Schm.) Karst. var. *arctostaphyli*), *C. leptideus* (Fr. ex Fr.) B. Erikss. (bas.: *Phacidium l.*), *Colpoma ledi* (Alb. & Schw. ex Fr.) B. Erikss. (bas.: *Hysterium l.*), *Eupropolella diapensiae* (Petr.) B. Erikss. (bas.: *Hysteropezizella d.*), *E. oxycocci* (Dearn. ex Cash) B. Erikss. (bas.: *Naevia o.*), *Grovesiella ericae* (Fr.) B. Erikss. (bas.: *Cenangium e.*), *Monilinia empetri* (Lagerh. in Vestergr.) B. Erikss. (bas.: *Sclerotinia e.*), *Naemacyclus phacidioides* (Fr.) B. Erikss. (bas.: *Stictis p.*), *Neogodronia ledi* (Alb. & Schw. ex Fr.) B. Erikss. (bas.: *Peziza l.*), *Phacidium vestergrenii* (Rehm) B. Erikss. (bas.: *Naevia v.*), *Terriera cladophila* (Lév. in Moug. & Nestl.) B. Erikss. (bas.: *Hysterium c.*), *Topospora andromedae* (P. Henn.) B. Erikss. (bas.: *Septomyxa a.*), and *T. obturata* (Fr.) B. Erikss. (bas.: *Sphaeria o.*).

INTRODUCTION

This paper is an attempt to present a comprehensive treatise of the Discomycete flora on members of *Diapensiales* and *Ericales* in Fennoscandia. The fungi on *Cassiope hypnoides* and *C. tetragona* are excluded as they are for the present studied by Dr. L. Holm (Uppsala).

In accordance with "Engler's Syllabus" (Melchior, 1964) and Takhtajan (1969) *Diapensiaceae* is treated as a separate order, *Diapensiales* ("Morphologische und embryologische Merkmale [Pollen nie in Tetraden ... Endospermhaustorien fehlend usw.] rechtfertigen ... Aufrechthaltung einer eigene Reihe", Melchior, op. cit. p. 379) and *Empetraceae* is referred to *Ericales* ("Morphologische und insbesondere embryologische Merkmale [Tetradpollen, Endosperm-Haustorien] weisen der Fam. jedoch ihren Platz bei den *Ericales* an" op. cit. p. 387). Benson (1965) and Hutchinson (1959) included *Diapensiales* in *Ericales*. *Empetraceae* has been referred to *Sapindales* by Engler-Prantl (1896 p. 125), to *Celastrales* by, amongst others, Hutchinson (op. cit.) and to an order of its own, *Empetrales*, by Benson (op. cit.). In his extensive work on *Bicornes* Samuelsson (1913 p. 179) stated that "... kein einziger Punkt der Blütenmorphologie die Einreihung der *Empetraceen* in die *Bicornes*-Reihe verhindert ... Von den hierhergehörigen Familien kommen sie zweifelsohne den *Ericaceen* am nächsten. Man kann sie als an die Anemophilie angepasste und dadurch stark umgewandelte Abkömmlinge des *Ericaceen*-Typus betrachten". It is remarkable that this has not been accepted by all later students. The studies on the fungi on *Empetrum* confirm also Samuelsson's views.

Most of the samples treated were collected by me in Norway and Sweden (1963–1969). Numerous undetermined gatherings collected by, amongst others, V. Heikinheimo (H) and L. E. Kari (TUR) in Finland and western parts of U.S.S.R., have also been examined. Moreover, I have revised material from C, H, O, S, TUR, UME and UPS.

Acknowledgements

My studies on ascomycetes were started at the Institute of Systematic Botany, Uppsala. I wish to express my sincere gratitude to the Head of this institute, Prof. J. A. Nannfeldt, for the great interest he has taken in my work. I am especially indebted to him for his critical reading of the manuscript and for much valuable advice. I am also greatful to Dr. L. Holm (Uppsala), Dr. R. Santesson (Uppsala) and to my husband, Dr. O. Eriksson (Umeå) for discussions on no-

menclature, etc. and to Mrs. B. Andersson (Uppsala) for translating labels from Finnish to Swedish. My thanks are also due to Dr. E. Müller (Zürich) for gifts of material.

The work on this paper was finished at the Section of Ecological Botany, Institute of Biology, University of Umeå, and I wish to thank the Head of the Section, Prof. B. Pettersson, for granting me access to the facilities of this institute.

The Latin diagnoses were revised by Dr. H. Smith (Uppsala) and the English text by Dr. Sigurdur Magnusson (Edinburgh–Umeå). I am very greatful for these revisions.

LIST OF SPECIES

The genera and species are arranged alphabetically as are the hosts under each species. The type species of all genera except *Helotium*, *Hyaloscypha*, *Mollisia*, *Pyrenopeziza* and *Tapesia* are given.

The taxonomy and nomenclature of the hosts follows Hylander (1955). The only exception is that, for practical reasons, *Empetrum hermaphroditum* is not kept apart from *E. nigrum*, and both are therefore referred to as *E. nigrum* s.lat.

The terminology of the texture of the ascocarps is in accordance with Korf (1958).

When 10 or more samples of a species have been examined, I have usually only listed the provinces where they were collected and the herbaria where they are deposited. When exsiccati have been studied, the name and number are cited. When fewer than 10 samples have been studied, more detailed collection data are given.

Abbreviations

Provinces. — The abbreviations used to depict provinces (in Finland, Norway, Sweden and the Soviet territories belonging to Finland 1920–1944) are the same as those used by Hylander (1953, map at p. 392).

Finland. *Al* (Alandia), *Ab* (Regio aboënsis), *Nyl* (Nylandia), *Ka*+ (Karelia australis), *St* (Satakunta), *Ta* (Tavastia australis), *Sa*+ (Savonia australis), *Kl*+ (Karelia ladogensis), *Oa* (Ostrobottnia australis), *Tb* (Tavastia borealis), *Sb* (Savonia borealis), *Kb*+ (Karelia borealis), *Om* (Ostrobottnia media), *Ok* (Ostrobottnia kajanensis), *Ob* (Ostrobottnia borealis), *Ks*+ (Kuusamo), *Lk* (Lapponia kemensis), *Li* (Lapponia inarensis), *Le* (Lapponia enontekiensis).

Norway. *Östf* (Östfold), *Akh* (Akershus), *Hdm* (Hedmark), *Opl* (Oppland), *Busk* (Buskerud), *Vestf* (Vestfold), *Tel* (Telemark), *AuAgd* (Aust-Agder), *Rog* (Rogaland), *Hrd* (Hordaland), *SoFj* (Sogn og Fjordane), *MöRo* (Möre og Romsdal), *STrd* (Sör-Tröndelag), *NTrd* (Nord-Tröndelag), *Nrd* (Nordland), *Trs* (Troms), *Fnm* (Finnmark).

Sweden. *Sk* (Skåne), *Bl* (Blekinge), *Sm* (Småland), *Öl* (Öland), *Gtl* (Gotland), *Ög* (Östergötland), *Vg* (Västergötland, incl. Gbg), *Hl* (Halland), *Bh* (Bohuslän), *Dls* (Dalsland), *Nrk* (Närke), *Srm* (Södermanland), *Upl* (Uppland), *Vsm* (Västmanland), *Dlr* (Dalarna), *Gstr* (Gästrikland), *Hls* (Hälsingland), *Mpd* (Medelpad), *Ång* (Ångermanland), *Hrj* (Härjedalen), *Jmt* (Jämtland), *Vb* (Västerbotten), *Nb* (Norrbotten), *ÅsL* (Åsele Lappmark), *LyL* (Lycksele Lappmark), *PL* (Pite Lappmark), *LL* (Lule Lappmark), *TL* (Torne Lappmark).

U.S.S.R. *Ka*+ (Karelia australis), *Ik* (Isthmus karelicus), *Sa*+ (Savonia australis), *Kl*+ (Karelia ladogensis), *Kb*+ (Karelia borealis), *Ks*+ (Kuusamo), *Lps* (Lapponia petsamoënsis).

+ = provinces falling within Finland as well as the U.S.S.R.

Collectors:

B.E. = Birgitta Eriksson
O.E. = O. Eriksson
V.H. = V. Heikinheimo
L.H. = L. Holm
L.E.K. = L. E. Kari
J.A.N. = J. A. Nannfeldt
T.V. = T. Vestergren

Herbaria. — The herbaria are abbreviated in accordance with Index Herbariorum (1964). The herbarium of the Section of Ecological Botany, Institute of Biology at the University of Umeå (northern Sweden) is designated UME. This abbreviation will be published in the next edition of Index Herbariorum.

Collections of nomenclatorial interest studied by the present author are marked with !.

Chaetonaevia v. Arx 1951 p. 85

Type species: *Chaetonaevia nannfeldtii* v. Arx.

This genus is so far monotypic. It is characterized by small, intraepidermal, slightly erumpent apothecia, provided with rather long, stiff, hyaline and brittle setae around the margin. According to v. Arx (op. cit. p. 89) *Chaetonaevia* should be closely related to *Laetinaevia* Nannf. and *Naevia* Fr.

1. ***Chaetonaevia nannfeldtii*** v. Arx op. cit. p. 86.

Coll. orig.: Norway, STrd, Mt. Stenfjeldet 24.VII.1950 J. A. von Arx.
Host: *Arctostaphylos alpina* (epi- and hypophyllous).
Descr.: see v. Arx l.c.

Specimens examined:

This inconspicuous fungus is very common on its host all over its Fennoscandian area. (The type locality was given by v. Arx as "Suecia, Jämtlandia, Storlien, prope frontibus Norwegii, Stenfjeldet ..." (l.c.) but this mountain is, in fact, situated in Sör-Tröndelag in Norway.) The fungus is also found in the Alps (see Müller et al. 1958 p. 404).

Finland: *Ks* (H, TUR), *Li* (H, UPS).
Norway: *STrd* (UPS), *NTrd* (O), *Nrd* (UPS), *Fnm* (O, UPS).
Sweden: *Dlr* (UPS), *Hrj* (UPS), *Jmt* (UPS), *Vb* (UPS), *LyL* (UME, UPS), *LL* (UPS), *TL* (UPS).
46 samples in all.

Coccomyces De Not. 1847 p. 38

Type species: *Coccomyces coronatus* (Schum. ex Fr.) De Not.

This genus comprises about 25 widespread species (Ainsworth & Bisby 1963 p. 88). Most of them are "weakly parasitic species which in general develop on injured weakened plants most often towards the end of the growing season or towards the end of the normal life span of the leaves" (Darker 1967 p. 1411). Some species "show affinities to the genus *Lophodermium* and others superficially at least to the *Phacidiaceae* (op. cit. p. 1435).

Best-known is the type species, *C. coronatus*, which occurs on fallen leaves of *Quercus*, *Betula* etc. It does not occur on *Diapensiales* and *Ericales*, but there are three other very similar species on members of the latter order.

In most descriptions the asci are said to be 8-spored (cf., amongst others, Rehm 1888 p. 76, Terrier 1942 p. 38, Dennis 1968 p. 203) but, in fact, two of the species dealt with below have 4-spored asci, viz., *C. leptideus* (Pl. 1 c) and *C. arctostaphyli*.

1a. Asci 8-spored; ascospores 34–38 × 2 μ. On *Ledum palustre*. 2. *C. ledi*
1b. Asci 4-spored.
2a. Ascospores 45–55 × 2–2.5 μ. On *Arctostaphylos uva-ursi*. 1. *C. arctostaphyli*
2b. Ascospores 65–90 × 3–5 μ. On *Vaccinium myrtillus* and *V. vitis-idaea*. 3. *C. leptideus*

Coccomyces arctostaphyli (Rehm) B. Erikss. n.comb.

Coccomyces quadratus (Schm.) Karst. var. *arctostaphyli* Rehm in Ber. Bayer. Bot. Ges. 13 p. 130 (1912). — Coll. orig.: Switzerland, "Schynige Platte" leg. O. Jaap.

?*Coccomyces quadratus* (Schm.) Karst. var. *ursinus* Sacc. & Paol. in Saccardo 1889a p. 96 (nomen dubium). — *Coccomyces ursinus* (Sacc. & Paol. in Sacc.) Petr. 1936 p. 222. — Coll. orig.: U.S.S.R., Siberia, near Kosatchinskaja 1875 N. Martinoff & F. de Thümen, 1637 (not in PAD).

Host: *Arctostaphylos uva-ursi* (usually epiphyllous on dead leaves).

Ascocarps 0.35–0.5 mm in diam., 0.20–0.25 mm high, subepidermal, separate, circular to elliptical or three-corned in outline, black, shining; circular ones opening by 4–5 teeth, elliptical ones by one longitudinal slit and some short ones at its ends; without labial cells (cf. *Lophodermium* fig. 4); covering layer 30–40 μ thick at centre, towards periphery c. 20 μ, composed of slightly carbonized radiating zones alternating with strongly carbonized ones, the hyphae c. 5 μ in diam.; basal layer c. 20 μ thick, composed of hyaline, thin-walled cells.

Asci 90–110 × 9–11 μ, cylindric-clavate, short-stalked, 4-spored, I −. Ascospores 45–55 × 2–2.5 μ, slightly tear-shaped, 1-celled, hyaline, with numerous droplets, provided with a distinct gelatinous sheath.

Paraphyses filiform, slightly curled at the tips, colourless.

The original description of *C. quadratus* var. *ursinus* is very short and incomplete: "a typo differt ascis brevissime stipitatis, 110–120 = 11–13, sporidiis filiformibus, 25–30-cuboideo-guttulatis (an tandem septatis?) 75–80 = 1, et habi-

tatione in foliis. Hab. in foliis *Arctostaphyli Uvae-Ursi*". The ascospores of the *Coccomyces* species on *A. uva-ursi* are not as long as given by Saccardo & Paoletti (cf. above and Müller et al. 1958 p. 415). There is, however, another fungus on leaves of *A. uva-ursi*, *Naemacyclus phacidioides* (see p. 49), the ascospores of which answer better to their description. This fungus lives hypophyllous. As there probably is no original material left of *C. quadratus* var. *ursinus* and as the original description is very incomplete I think the most correct is to regard it as a nomen dubium, and base the name of our fungus on *C. quadratus* var. *arctostaphyli* Rehm. Rehm (op. cit.) reported both *C. arctostaphyli* (p. 130) and *N. phacidioides* (p. 156) from Switzerland. He noted that the former is epiphyllous and the latter hypophyllous. He gave 75–85 × 2.5–3 μ for the ascospores of *C. quadratus* var. *arctostaphyli* but as he commented "Sporen nicht völlig entwickelt" the measures given by him are of minor value. More important is the fact that he distinguished between the two fungi on *A. uva-ursi* and that his description of *N. phacidioides* is quite correct.

Petrak (1936a p. 222) had not seen the original collection of *C. quadratus* var. *ursinus* when he made the combination *C. ursinus*, and based his opinion on material collected by himself in Bulgaria. Judging from his description his fungus is probably *N. phacidioides* (this paper p. 49).

Müller et al. (1958 pp. 413, 416) discussed *C. ursinus* and *N. phacidioides*, which they stated to be easily confused. However, they did not study the type specimen of *C. ursinus* nor Petrak's material. They stated that the ascus tips in their own specimens were I+. Neither Rehm (l.c.) nor Petrak (l.c.) mentioned the iodine reaction. On examining my own samples and the three kindly sent to me by Dr. E. Müller (Kt. Wallis, Zermatt 23.X.1938 Ch. Terrier; Aletschwald, Rieder-furka 9.IX.1962 E. Müller; Kt. Graubünden, Alp Flix (Oberhalbstein) a. 2450 m s.m. 10.X.1958 H. Hess; no. 1 and 3 are dealt with by Müller et al. 1958) I found, however, the asci to be I−. The fungus in these samples is a member of *Coccomyces* and is without doubt conspecific with the fungus described by Rehm.

Specimens examined:

Finland: *Ab*: Nauvo par., Sandö 23.VII.1953a L.E.K. (TUR). — *Li*: Utsjoki par., at the mouth of Kevojoki River 16.VIII.1965 J.A.N. 19224c (UPS).

Sweden: *Hrj*: Tännäs par., Mt. Funäsdalsberget 10.X.1965 I. Nordin (UPS). — *Vb*: Lövånger par., Bjuröklubb 4.VIII.1964 B.E. 387 (UPS).

2. ***Coccomyces ledi*** Rehm 1913 p. 153

Coll. orig.: Sweden, Vb, Vindeln par., Kulbäcksliden VIII.1909 N. Sylvén (S!, holotype).

Hosts: *Ledum groenlandicum* Oed., *L. palustre* ssp. *palustre* and ssp. *decumbens* (Ait.) Hult. (living twigs).

Ascocarps 0.5–0.6 mm in diam., *c.* 0.2 mm high; scattered in pale spots on living twigs, subcuticular, circular, opening by 4–6 teeth, with outer surface black, shining and inner surface lined with hyaline, yellowish cells, covering layer at centre *c.* 50 μ and towards the periphery *c.* 20 μ thick; basal layer *c.* 10 μ thick; hypothecium *c.* 15–20 μ thick of hyaline, thin-walled cells.

Asci 100–130 × 13–17 μ, cylindric-clavate, short-stalked to nearly sessile, 8-spored. Ascospores 34–38 × 2 μ, sigmoid, 1-celled, hyaline, proximal end broader than the distal one, provided with a gelatinous sheath.

Paraphyses 1–2 μ in diam., filiform, tips slightly gelatinized and enlarged, hyaline.

Specimens examined:

Finland: *Ok*, *Ob*, *Lk*, *Le* (all in UPS).

Norway: *Fnm* (UPS).

Sweden: *Ög* (UPS), *Nrk* (UPS), *Gstr* (UPS), *Hls* (UPS), *Mpd* (UPS), *Vb* (S, UME, UPS), *Nb* (UPS), *LyL* (UME, UPS), *LL* (S, UPS), *TL* (UPS).

U.S.S.R.: *Lps* (H, TUR).

37 samples in all.

This parasitic fungus seems to be rather common in the North, as it is often present on herbarium specimens of *Ledum palustre* from the Northern parts. Moreover it is found on herbarium specimens of *L. groenlandicum* and *L. palustre* ssp. *decumbens* from Alaska, Newfoundland, Labrador, Quebec and Greenland.

The fungus matures late in the growing season (August–September).

3. ***Coccomyces leptideus*** (Fr. ex Fr.) B. Erikss. n.comb. — Pl. Ic.

[*Phacidium leptideum* Fr. 1818 p. 312; 1819 p. 107. —] *Phacidium leptideum* Fr. ex Fr. in Syst. Myc. 2 (2) p. 576 (1823). — Coll. orig.: Fries, Scler. Suec. 98 on *Vaccinium myrtillus* (UPS!, lectotype).

[*Xyloma leptostroma* Fr. 1815 p. 197.]

[*Phacidium quadratum* Schm. in Kunze & Schmidt 1817 p. 32. —] *Phacidium leptideum* Fr. ex Fr. var. *quadratum* Schm. in Fries 1849 p. 370. — *Coccomyces quadratus* (Schm.) Karst. 1871 p. 255. — *Coccomycella quadrata* (Schm.) Höhn. 1917 p. 323.

Hosts: *Vaccinium myrtillus* and *V. vitis-idaea* (dead twigs).

Descr.: see Terrier 1942 p. 40. The following may be added:

Asci (100–)107–117(–122) × (10–)13 μ, cylindric-clavate, rather long-stalked, 4-spored, I −. Ascospores 65–90 × 3–5 μ, sigmoid, 1-celled, hyaline.

Paraphyses filiform, with slightly enlarged tips, hyaline.

Specimens examined:

on *V. myrtillus*

Finland: *Ab* (TUR), *St* (C, H), *Li* (H).

Norway: — (C), *Busk* (UPS), *Hrd* (UPS), *NTrd* (UPS), *Nrd* (UME), *Trs* (C), *Fnm* (C).

Sweden: *Sm*? (UPS — Fries, Scler. Suec. 98, lectotype), *Sm* (UME, UPS), *Ög* (UPS), *Upl* (UPS), *Dlr* (UPS), *Gstr* (UPS), *Jmt* (UPS), *Vb* (UME, UPS), *LyL* (UPS), *LL* (UPS).

44 samples in all.

on *V. vitis-idaea*:

Finland: *St* (C; H).
Sweden: *Upl* (UPS), *Vb* (UME, UPS).
10 samples in all.

In his account of *Ph. leptideum* Fries (1823 p. 576) commented "In caulibus exsiccatis a. *Vaccin. Myrtilli.* b. *vitis ideae*, passim". This is in agreement with my own observations. The fungus lives on *V. myrtillus* as well as on *V. vitis-idaea*, but it is more common on the former host. As to its occurrence in Fennoscandia see also p. 59.

Colpoma Wallr. 1833 p. 422

Type species: *Colpoma quercinum* (Pers. ex Fr.) Wallr.

Colpoma and *Sporomega* Cda (p. 57) are treated as synonyms by, amongst others, v. Arx & Müller (1954 p. 132) and Darker (1967 p. 1435). Von Höhnel (1917 p. 319) regarded them as separate and monotypic genera. Nannfeldt (1932 pp. 227 and 250) and Terrier (1942 pp. 51 and 61) were of the same opinion. Sections of ascocarps of their type species (*C. quercinum* and *Sp. degenerans* (Fr.) Cda) show clearly that they must be referred to different genera. The ascocarps of *C. quercinum* open by a longitudinal slit formed by the covering splitting along a zone of non-pigmented cells (cf. Nannfeldt op. cit. fig. 33*e*). In *Sp. degenerans* there is no opening mechanism (cf. Nannfeldt op. cit. fig. 38*b*), and the ascocarps seem to open more or less fortuitously along the line of greatest stress. The hymenium of a mature ascocarp of *Colpoma* is ± flat, whereas in *Sporomega* the hymenium is concave (Pl. I*a–b*). The paraphyses of *C. quercinum* but not of *Sp. degenerans* are interlaced at their ends (Pl. I*b*).

Sporomega is affined to *Pseudophacidium*, as indicated at any rate by the structure of the stromatic tissue, whereas *Colpoma* seems to be closer to, amongst others, *Coccomyces* and *Lophodermium*. The presence or absence ot an opening mechanism seems to be of great value in generic segregation.

Hysterium ledi Alb. & Schw. ex Fr. has the characteristics given above for *C. quercinum* (opening mechanism present, mature hymenium flat, paraphyses with interlaced tips) and should therefore be transferred to *Colpoma*.

1. ***Colpoma ledi*** (Alb. & Schw. ex Fr.) B. Erikss. n.comb. — Fig. 1*a*, Pl. I*a*.

[*Hysterium abietinum* Alb. & Schw. *β ledi* Alb. & Schw. 1805 p. 56. —] *Hysterium ledi* Alb. & Schw. ex Fr. in Syst. Myc. 2 (2) p. 584 (1823). — *Sporomega ledi* (Alb. & Schw. ex Fr.) Karst. 1873 p. 241. — *Clithris ledi* (Alb. & Schw. ex Fr.) Rehm 1888 p. 105. — Coll. orig.: not preserved. Neotype: Lundell & Nannfeldt, Fungi exs. suec. 2084 (UPS!).

Host: *Ledum palustre* (twigs).

Ascocarps up to 3–4 mm long, 0.7–1 mm wide and 0.3–0.4 mm high, scattered, erumpent, elongated, opening by a longitudinal slit formed by the covering layer

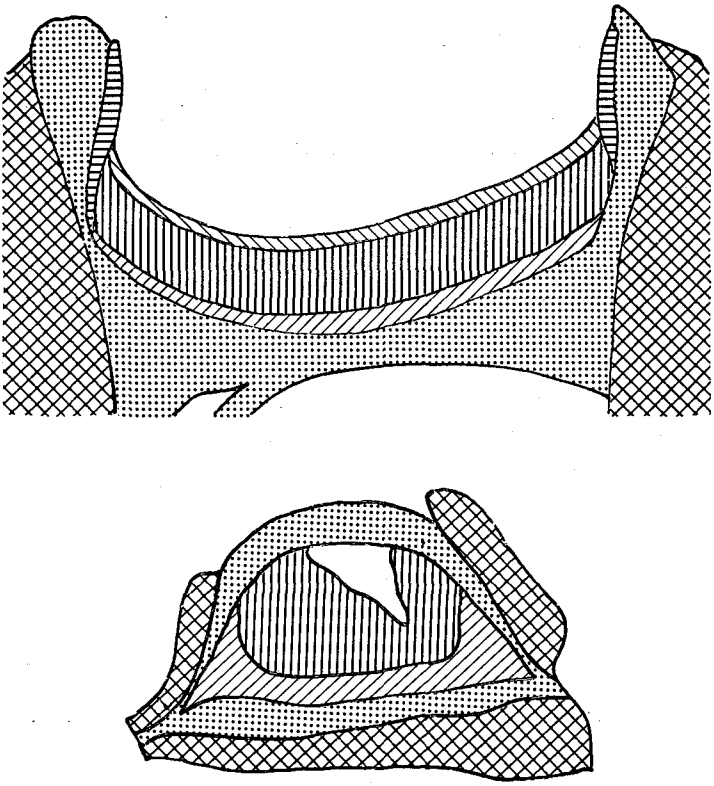

Fig. 1. Diagrammatical sections of ascocarps. a. *Colpoma ledi*. 90 ×. b. *Sporomega degenerans*. 105 ×. — Comp. Pl. I.

splitting along a zone of non-pigmented cells (cf. Nannfeldt 1932 fig. 33*e*); covering layer blackish brown, up to *c.* 80 μ thick in centre and at periphery, *c.* 25–30 μ in between, inner surface of the slit lined with hyaline cells (probably cooperating in the act of opening), basal layer dark-coloured, well developed, varying from *c.* 50 μ near periphery to *c.* 20 μ at centre; internal stroma *c.* 20 μ thick, composed of thin-walled, compressed, hyaline cells; hymenium ± flat.

Asci (68–)86–104(–117) × 8–10(–13) μ, clavate, long-stalked, apex slightly conical, 8-spored, I −. Ascospores (39–)42–55 × 2 μ, fasciculate, filiform, hyaline.

Paraphyses longer than asci, *c.* 2 μ thick, with interlaced ends.

The type species of *Colpoma* possesses a conidial state. Twyman (1946 p. 234) stated that "it forms a melanconiaceous acervulus, but it cannot be identified with any separately named member of *Melanconiaceae*," and that the "conidia ... are unicellular, hyaline, cylindrical or slightly curved and rounded at each end" (op. cit. p. 235). No conidial state has, as far as I know, been found associated with *C. ledi*.

Specimens examined:

Sweden: *Sm*?: Honaprången (UPS — Herb. J. Forsander). — *Ög*: Kvillinge par., Eriksberg 1891 K. Starbäck & E. Haglund (UPS — Rehm, Ascom. 1063), Eriksberg K. Starbäck (S) and VIII.1891 K. Starbäck & E. Haglund (S) — *Srm*: Vallby par., Vallby M. A. Lindblad (S) — *Gstr*: Gävle, Tolfforsskogen 22.VIII.1951 J.A.N. (UPS — Lundell & Nannfeldt, Fungi exs. suec. 2084; neotype) and 13.VII.1956 J.A.N. 14389 (UPS). — *Vb*: Lövånger par., Broträsk 14.VIII.1947 L.H. (UPS — Lundell & Nannfeldt, Fungi exs. suec. 2083).

Dasyscypha Fuck. 1870 p. 304

Type species: *Dasyscypha virginea* (Batsch ex Fr.) Fuck.

1a. Ascocarps whitish.	
2a. Hairs with apical crystals. On *Vaccinium myrtillus* and *V. uliginosum*.	2. D. *rhytismatis*
2b. Hairs without apical crystals. On *Calluna vulgaris*.	4. *D.* cf. *virginea*
1b. Ascocarps dark-coloured.	
3a. Ascocarps clothed with thin-walled, ± hyaline hairs and dark bristles. On *V. uliginosum*.	3. *D. venturioides*
3b. Ascocarps not clothed as 3a. On *V. vitis-idaea*.	1. *D. involucrata*

1. ***Dasyscypha involucrata*** B. Erikss. n.sp. — Pl. II*a–b*.

Coll. orig.: Sweden, Vb, Umeå B.E. 1607c (UPS, holotype; UME, isotype).

Host: *Vaccinium vitis-idaea* (dead twigs).

Apothecia *c.* 0.5 mm diam. et *c.* 0.35 mm alta, solitaria vel subcaespitosa, erumpentia, breviter stipitata, patellariformia, involucro lato cupulato e stipite edito apothecium partim cingente, textura involucri eadem ut apothecii; excipulum textura prismatica vel oblita, hyphis brunneo-luteolis; excipulum hyphis 4–6 μ crassis, brunneis vel brunneo-griseis, cylindraceis, parieto tenue, subtiliter granuloso, dense obtectum; hymenium convexum, pallide griseum, hypothecio et stipite textura globosa vel prismatica, cellulis hyalinis.

Asci 40–45 × 5–6 μ, cylindracei, breviter stipitati, octospori, poro in iodo coerulescente. Ascosporae 7–8 × 2 μ, uniseriatae, fusiformes, non-septatae, hyalinae.

Paraphyses lanceolatae.

Hab. in ramis emortuis *Vaccinii vitis-idaeae*.

Ascocarps *c.* 0.5 mm in diam. and *c.* 0.35 mm high, single or in small clusters, erumpent, short-stalked, cup- and saucer-shaped, with broad cup-shaped involucre arising from stalk and partly surrounding the ascocarp proper; involucre has same texture as excipulum of ascocarp; excipulum of textura prismatica to oblita, hyphae yellow to yellowish brown, thin-walled, excipulum covered by dense growth of hyphae

4–6 μ wide, brown to brownish grey, cylindrical, obtuse, thin-walled, finely granulate, hyaline; hymenium convex, greyish white; hypothecium and stalk of textura globosa-prismatica, cells hyaline, thick-walled.

Asci 39–46 × 5–6 μ, cylindrical, short-stalked, 8-spored, I +. Ascospores 7–8 × 2 μ, uniseriate, fusiform, non-septate, hyaline, each with two large drops.

Paraphyses longer than asci, lanceolate.

This fungus holds a unique position within the genus *Dasyscypha* as it possesses an involucre. At an early stage the real ascocarp is ± completely enclosed by the involucre, which later gradually opens. Mature ascocarps have been found from May to July.

Specimens examined:

Sweden: *Vb*: Lövånger par., Avan 28.VII.1946 L.H. (UPS). Bygdeå par., Dalkarlså 27.VII.1963 B.E. 200a (UPS); Dalkarlså, Havgärdan, pine forest 21.IV.1968 B.E. 1566 (UME), 21.V.1968 B. & O.E. 1599 (UME). Umeå, Degersjö, between the bog Svarttjärn and the hill Stortorrberget 2.VI.1968 B.E. 1607c (UME, isotype; UPS, holotype). Degerfors par., Överrödå, Rödåborg 20.V.1969 B.E. 1765a (UME). — *LL*: Jokkmokk par., Kvikkjokk, Storholmen in Lake Saggat 4.VIII.1963 B.E. 257 (UPS).

2. ***Dasyscypha rhytismatis*** (Phill.) Sacc. 1889b p. 453.

Peziza (*Dasyscypha*) *rhytismatis* ("*rhytismae*") Phill. in Phillips & Plowright 1880 p. 101. — *Lachnella rhytismatis* Phill. 1887 p. 250. — *Lachnum rhytismatis* (Phill.) Nannf. 1939 p. 242. — Coll. orig.: "Scotland. The Rev. James Keith." 1878, W. Phillips on *Rhytisma acerinum* on *Acer pseudoplatanus*.

Syn. cet.: see Dennis 1949 p. 27.

Hosts: polyphagous, in *Ericaceae* on *Vaccinium myrtillus* and *V. uliginosum* (fallen leaves).

Descr.: see Dennis l.c.

Specimens examined:

on *V. myrtillus*:

Norway: *Rog* (UPS).
Sweden: *Gtl*, *Upl*, *TL* (all in UPS).
10 samples in all.

on *V. uliginosum*:

Finland: *Al* (TUR).
Norway: *Rog* (UPS).
Sweden: *Sm*, *Upl*, *Vb* (all in UPS).
10 samples in all.

3. ***Dasyscypha venturioides*** (Ell. & Ev.) Dennis 1963 p. 373. — Pl. II*c–d*.

Peziza (*Dasyscypha*) *venturioides* Ell. & Ev. 1888 p. 99. — *Trichopeziza venturioides* (Ell. & Ev.) Sacc. 1889b p. 419. — Coll. orig.: U.S.A., New Jersey, Newfield VI.1888 J. B. Ellis & B. M. Everhart, on *Gaylussacia dumosa* Torr. & Gray (NY).

Pirrotaea venturioides Rom. & Sacc. in Saccardo 1889b p. 388, on fallen leaves of *Vaccinium uliginosum*. — *Lachnum venturioides* (Rom. & Sacc.) Nannf. 1932 p. 131. — Coll. orig.: Sweden, Nrk, Kumla 23.VI.1885 L. Romell 16867 (S, lectotype).

Hosts: *Gaylussacia dumosa* Torr. & Gray, *G. resinosa* Torr. & Gray ex A. Gray and *Vaccinium uliginosum* (fallen leaves).

Dennis (1963 p. 374) bases his description on the type specimen (NY). Mine is based on specimens from fallen leaves of *Vaccinium uliginosum*.

Ascocarps up to *c.* 150 μ high (omitting bristles), diameter roughly the same when expanded, scattered, erumpent, short-stalked or nearly sessile, obovate-ellipsoid when dry, saucer-shaped when expanded; excipulum of textura angularis, cells pale brown, thin-walled, 13–18 μ across, excipulum clothed with hairs as well as bristles; hairs up to *c.* 30 μ long and *c.* 4–5 μ thick near the base, pale brown, thin-walled, cylindrical, obtuse, finely granulate; bristles up to 225 μ long and *c.* 5–6 μ thick near the base, blackish brown, thick-walled, acutely pointed, smooth, except for the finely punctate base; hairs occurring all over the ascocarp except for the stalk, bristles more frequent in the upper part of the ascocarp; subhymenial part of textura epidermoidea, cells hyaline, thick-walled; hymenium ± plane, whitish.

Asci (26–)29–38 × 5–6 μ, cylindrical, short-stalked, 8-spored, I +. Ascospores 7–9 × 1.5 μ, uniseriate, fusiform, non-septate, hyaline.

Paraphyses *c.* 1.5 μ thick, filiform, somewhat lanceolate, not exceeding the asci.

The two descriptions are very similar and just as Dennis (l.c.) "I feel little doubt these two species on Ericaceous leaves are the same". Moreover, Dennis thinks that "there is an obvious relationship with *D.* (*Dasyscyphus*) *misellus* (Rob. & Desm.) von Höhnel and a case could be made for proposing a new genus to include these peculiar species with two kinds of hairs and filiform paraphyses, unless one refers them to *Zoellneria* Velen.". As I have not seen *D. misella* I cannot comment this proposal.

Specimens examined:

Finland: *Ab*, *St* (all in TUR).

Norway: *Rog* (UPS).

Sweden: *Sm* (UPS), *Nrk* (S — lectotype of *Pirrotaea venturioides*), *Upl* (UPS), *Dlr* (UPS), *Vb* (UME, UPS).

15 samples in all.

D. venturioides is rather common on fallen, slightly decayed leaves of *V. uliginosum*.

4. ***Dasyscypha*** cf. ***virginea*** (Batsch ex Fr.) Fuck. 1870 p. 305.

Hosts: polyphagous, in *Ericaceae* on *Calluna vulgaris* (dead twigs).

Descr.: see Dennis 1949 p. 12.

Specimens examined:

Sweden: *Sm*: Femsjö par., Hallanäs skog 22.IX.1943 S. Lundell (UPS). — *Bh*: Uddevalla, Björkbäck 17.V.1949 and 8.XI.1949 S. Woldmar (UPS).

Duplicaria Fuck. 1870 p. 265

Type species: *Duplicaria empetri* (Pers. ex Fr.) Fuck.

Duplicaria is characterized by ± circular ascocarps with an irregular opening, a thin but distinct basal stroma, clavate asci with iodine-negative tips, bifusiform, non-septate ascospores and filiform paraphyses with curled tips. *Bifusella* v. Höhn. is very similar but has no or very slightly developed basal stroma and paraphyses "wanting or tending to disappear at maturity" (Darker 1967 p. 1426). According to Darker (l.c.) the pycnidia of *Bifusella* are "large or, if small, tending to coalesce into large areas, conspicuous, covered by a thin pseudoparenchymateous layer attached to the cuticle; spermatia relatively large, bacillar" and the pycnidia of *Duplicaria* "small and black".

1. ***Duplicaria empetri*** (Pers. ex Fr.) Fuck. 1870 p. 265.

[*Xyloma empetri* Pers. in Mougeot & Nestler, Stirp. Crypt. Vog.-Rhen. 481 (1815). — *Hypoderma sphaerioides* (Alb. & Schw.) DC. var. *empetri* (Pers.) DC. 1815 p. 165. —] *Sphaeria empetri* Pers. ex Fr. in Syst. Myc. 2 (2) p. 522 (1823). — Coll. orig.: Mougeot & Nestler, Stirp. Crypt. Vog.-Rhen. 481 (UPS!, lectotype).

[*Xyloma empetri* Fr. 1818 p. 363. — *Rhytisma empetri* (Fr.) Fr. 1819 p. 105.]

Sporomega empetri Rostr. 1888 p. 543.

Host: *Empetrum nigrum* s.lat. (dead leaves, rarely on twigs).

Descr.: see Terrier 1942 p. 58.

This species has been described at least three times and each time with *empetri* as the epithet, viz., (1) *Sphaeria empetri* Pers., (2) *Xyloma empetri* Fr. and (3) *Sporomega empetri* Rostr.

Lophodermium empetri (Fr.) Sacc. in Bresadola & Saccardo 1897 p. 281 is *Duplicaria empetri*, but the basionym *Excipula empetri* Fr. is conspecific with *Phaeangellina empetri* (see p. 54).

Hysterodiscula empetri (White in B. & Br.) Petrak (=*Melasmia empetri* Magn. 1886 p. 104) is by some authors considered to be the pycnidial state of *D. empetri* (see, among others, Arwidsson 1936 pp. 402 and 407, Darker 1967 p. 1427, Dennis 1968 p. 204). Magnus (op. cit. p. 106), Petrak (1942 p. 211) and others, doubted this because of differences in position and tissue structure of the fruiting bodies, etc. I think the latter authors are right. *H. empetri* is seen as a long black crust on living twigs of *Empetrum*. It is also systemic and causes abnormally elongated erect twigs, usually with smaller leaves.

Specimens examined:

Finland: *Ta* (H), *Ob* (TUR), *Lk* (S, UPS).

Norway: — (C), *Busk* (UPS), *Hdm* (S), *Fnm* (UPS).

Sweden: *Sm* (UPS), *Hrj* (UPS), *Jmt* (UPS), *Vb* (S, UME, UPS), *LyL* (UME), *LL* (S, UPS), *TL* (UPS).

24 samples in all.

Besides the specimens accounted for above there is a list of some finds of *D. empetri* published by Arwidsson (1936 p. 407).

D. empetri is common all over Fennoscandia although it seems more common in the northern parts. I agree with Arwidsson (l.c.) "wenigstens vorläufig ist es am richtigstens, *Duplicaria* ebenso wie die Gattung *Empetrum* selbst auf der nördlichen Halbkugel als eine circumpolare, mehr oder weniger borealer Art aufzufassen". It was collected by Wahlenberg in northern Finland (Lk) as early as 1802 (S, UPS) and before 1826 by Sommerfelt (1826 p. 226) in northern Norway.

Duplicariella B. Erikss. n. gen. Hypodermatacearum

Type species: *Duplicariella phyllodoces* B. Erikss.

Genus characteribus familiae *Hypodermatacearum*. *Duplicaria* similis sed ascosporis fusiformibus.

Under a lens the single known species of this genus is very similar to a *Duplicaria* by its circular, wrinkled ascocarps with an irregular opening. There are, however, differences, especially in the shape of the ascospores. *Duplicaria* has bifusiform ascospores, *Duplicariella* fusiform to drop-shaped.

1. ***Duplicariella phyllodoces*** B. Erikss. n.sp. — Fig. 2*a–b*.

Coll. orig.: Sweden, Jmt, Åre par. 5.IX.1885 C. J. Johanson (UPS, holotype).
Host: *Phyllodoce coerulea* (dead leaves, epiphyllous).

Apothecia 0.3–0.5 mm in diam. et 0.15–0.17 mm alta, epiphylla, solitaria, intraepidermalia, orbicularia, atrata.
Asci 80–115 × 15–18 μ, clavati, stipitati, octospori, poro in iodo non coerulescente. Ascosporae 17–24 × 3–4 μ, fusiformes, non-septatae, hyalinae, muco involutae.
Paraphyses 2 μ crassae, filiformes, ramosae, apicaliter paullo incrassatae.
Habitat in foliis emortuis *Phyllodoce coeruleae*.

Ascocarps 0.3–0.5 mm in diam., *c.* 0.15–0.17 mm high, epiphyllous, black, shining, scattered, intraepidermal, circular in outline, lens shaped in section; opening irregularly without opening mechanism; covering layer 25–30 μ thick at the centre, narrowing to 15–20 μ at the periphery, of textura epidermoidea, cells ± thick-walled; basal layer 10–15 μ thick, of textura globosa, cells brown, ± thick-walled; subhymenial layer 15–20 μ thick, of textura angularis, cells small, hyaline; marginal parts of ascocarp filled with small, hyaline, ± elongated cells.

Asci 80–115 × 15–18 μ, clavate, short- or rather long-stalked, 8-spored, I −. Ascospores 17–24 × 3–4(–5) μ, fusiform to drop-shaped, non-septate, hyaline, provided with a rather thin gelatinous sheath.

Paraphyses *c.* 2 μ thick, filiform, branched, club-shaped at the ends.

Specimens examined:

Finland: *Ks*: Kuusamo par., the slope of Mt. Rukatunturi 29.VII.1952 V.H. (H).
Norway: *Tel*: Vestfjorddalen VIII.1879 A. Blytt (C). — *Opl*: Dovre par., Fokstuen VII.1890 F. Börgesen (C).

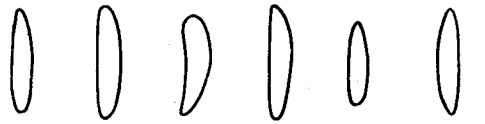

Fig. 2. *Duplicariella phyllodoces* (Holotype). a. Ascus with ascospores. 570 ×. — b. Ascospores. 660 ×.

Sweden: *Jmt*: Åre par., Mt. Åreskutan, Mörvikshummeln 5.IX.1885 C. J. Johanson (UPS, holotype), Handöl, by the W. shore of Handölan River 6.VIII.1951 J.A.N. 11838c (UPS), 3 km NW. of "Blåhammarstugan" 5.VIII.1967 E. Rosén (UME). — *LyL*: Tärna par., Hemavan, *c.* 700 and *c.* 750 m.s.m. 15.VIII.1967 B.E. 750, 751 (UME), Mt. Atoklinten, *c.* 990 m.s.m. 17.VIII.1967 B.E. 773 (UPS). — *LL*: Jokkmokk par., Kvikkjokk, Mt. Snjerak 2.VIII.1963 B.E. 220e (UPS). — *TL*: Jukkasjärvi par., Katterjokk, by Lake Katterjaure 26.VII.1952 L.H. 1054b (UPS).

The fungus seems to be common on dead, still attached leaves. The fruit bodies do not mature until late summer or autumn. All gatherings accounted for above are immature apart from the holotype and B.E. 750.

Eupropolella Höhn. 1917 p. 311

Type species: *Eupropolella vaccinii* (Rehm) Höhn.

Müller (1957 p. 130) gave a thorough description of the genus *Eupropolella* and its type species. Regarding the systematic position he stated "Am nächsten kommt er den von Nannfeldt (1932) umgeschriebenen *Naevioideae*, unterscheidet sich aber von den dort in dieser Unterfamilie zusammengefassten Gattungen durch die gefärbten, deutlich septierten Sporen" (op. cit. p. 131).

Members of the genus have hitherto been found only on leaves of hosts belonging to *Diapensiales* and *Ericales*.

1a. Epithecium light-coloured. On *Vaccinium oxycoccus*. — 2. *E. oxycocci*
1b. Epithecium dark-coloured.
2a. Ascospores containing small angular "bodies". On *Diapensia lapponica*. — 1. *E. diapensiae*
2b. Not so. On *Andromeda polifolia*, *Arctostaphylos uva-ursi*, *Vaccinium oxycoccus* and *V. vitis-idaea*. — 3. *E. vaccinii*

1. ***Eupropolella diapensiae*** (Petr.) B. Erikss. n.comb. — Pl. III*d–e*.

Naevia diapensiae Petr. in Kari 1936 p. 8 (nomen nudum). — *Hysteropezizella diapensiae* Petr. in Ann. Myc. 34 p. 451 (1936). — Coll. orig.: U.S.S.R., Lps, Petsamo par., Pilgujaur 6.VIII.1931 L.E.K. (TUR!, now devoid of ascocarps). Neotype: Norway, Fnm, Sörvaranger par., Elvenes 29.VI.1864 Th. M. Fries (UPS!).

Host: *Diapensia lapponica* (dead leaves).

Descr.: see Petrak l.c. To Petrak's thorough description some details may be added, viz., ascus tip I +; ascospores 3-septate (according to Petrak 1-septate), often containing 1–2 pale brown, angular "bodies" which disappear on application of iodine (Pl. III*e*); paraphyses with club-shaped ends. Moreover, the ascocarps are subcuticular to intraepidermal and not subepidermal as Petrak stated.

Petrak (op. cit. p. 452) pointed out that the species differs from *Hysteropezizella spp.* in having an epithecium, "da er aber in bezug auf der Bau der Fruchtschicht, der Sporen und des Gehäuses weitgehende Übereinstimmung zeigt, kann er nur hier untergebracht werden". In some species of *Hysteropezizella*, however, the ends of the paraphyses are enlarged and brownish (sect. *Phaeonaevia* Nannf. 1932 p. 121) but they are not, as far as I know, forming an epithecium. There are also other characteristics indicating that *N. diapensiae* is a *Eupropolella* and not a *Hysteropezizella*, e.g. (1) tissue of the ascocarpic wall, (2) hymenium of *E.* becomes exposed by the splitting up of the overlaying host tissue into lobes (in *H.* the ascocarps are sunken in the leaf tissue and the hymenium is exposed by a pore or when an elliptic patch of the epidermis is thrown off) and (3) all species of *H.* live, as far as I know, on various *Graminae, Cyperaceae* and *Juncaceae*.

The small angular "bodies" in the ascospores distinguish this species from *E. vaccinii*, which it otherwise resembles greatly, e.g. as to ascospore size (12–)13–17(–18) × 4–4.5 μ. But, until more samples have been studied it seems wisest to keep the two species separate.

Petrak (l.c.) stated "Dieser Pilz ist auf dem mir vorliegenden Material nur sehr spärlich vorhanden und meist auch sehr schlecht entwickelt". I have examined the original collection (TUR) but I could not find any ascocarps. The only other collection I have studied matches Petrak's description very well and is without doubt conspecific with his fungus. As the holotype is useless, I have selected the sample in UPS, which is very rich in mature ascocarps, as the neotype.

Specimens examined:

Norway: *Fnm*: Sör-Varanger par., Elvenes 29.VI.1864 Th. M. Fries (TUR, isoneotype; UPS, neotype).

U.S.S.R.: *Lps*: Petsamo par., Pilgujaur 6.VIII.1931 L.E.K. (TUR, holotype).

2. ***Eupropolella oxycocci*** (Dearn. ex Cash) B. Eriksson n.comb. — Pl. III*c*.

Naevia oxycocci Dearn. ex Cash in Shear et al. in U.S. Dept. Agr., Techn. Bull. 258 p. 16 (1931). — Lectotype: U.S.A., N.H., North Wakefield, on *Vaccinium macrocarpon* 17.VII.1921 C. L. Shear (BPI!).

Hosts: *Vaccinium macrocarpon* Ait. and *V. oxycoccus* (hypophyllous).

Descr.: see Shear et al. l.c. Ascus tip I + may be added to Cash's description.

This fungus was first collected by Dearness and preserved in his herbarium under the name of *Naevia oxycocci*. In the original collection of *Lophodermium*

oxycocci var. *hypophyllum* Dearn. & House (NY!), collected by H. D. House, there are some leaves of *V. oxycoccus* in a separate envelope, on which "*Stictis Naevia* like" is written. This specimen was collected in the same locality and in the same year as Dearness' own material of *N. oxycocci*. The ascocarps in Dearness' samples are immature. The name of Dearness' fungus was validated by Cash (in Shear et al. l.c.) when she published a description based on specimens in two samples of *V. macrocarpon* (BPI!). Dearness' own gatherings have been studied by Shear et al. who found them to be wholly immature. I have selected one of Cash's samples (on *V. macrocarpon*) as the lectotype. Yet, there exists a second *Eupropolella* on *V. oxycoccus*, viz. *E. vaccinii* (see below). Besides the colour of the epithecium there are other differences between these two, e.g. *E. oxycocci* is hypophyllous, *E. vaccinii* epiphyllous. The ascospore sizes are 7–12 × 1.5–2.5 μ and (13–)14–18 × (3–)4–5 μ resp.

Specimen examined:

Sweden: *LL*: Jokkmokk par., Kvikkjokk, by the path to Mt. Prinskullen 3.VIII. 1963 B.E. 246b (UPS).

3. ***Eupropolella vaccinii*** (Rehm) Höhn. 1917 p. 311. — Pl. III*b*.

Pseudopeziza vaccinii Rehm 1882 p. 114. — *Sphaeropezia vaccinii* (Rehm) Rehm 1888 p. 74. — Coll. orig.: Austria, Taschach-Gletscher in Pitzthal, Tyrol, on *Vaccinium vitis-idaea* VIII.1875 H. Rehm (S!, holotype).

Phacidium oxycocci Fr. 1823 p. 575. — *Trochila oxycocci* (Fr.) Karst. 1871 p. 250.

Phacidium arctostaphyli Karst. 1870 p. 256. — *Sphaeropezia arctostaphyli* (Karst.) Rehm 1910 p. 299.

Trochila phacidioides "(Fr.)" Karst. 1871 p. 249.

Trochila andromedae "(Fr.)" Karst. 1871 p. 249 (non *Phacidium andromedae* Fr. 1823 p. 574.) — *Sphaeropezia andromedae* (Karst.) Rehm 1888 p. 73.

Phacidium arctostaphyli Karst. f. *vitis-idaeae* in Bresadola & Saccardo 1897 p. 276 (nomen nudum).

Phacidium arctostaphyli Karst. f. *vaccinii* in D. Saccardo, Mycoth. Ital. 1058 (1903) (nomen nudum).

Aulagraphum orbiculare "(Ehrenb.)" Rostr. 1904 p. 10.

Eupropolella arctostaphyli Müller, Hütter & Schüepp 1958 p. 419.

Hosts: *Andromeda polifolia, Arctostaphylos uva-ursi, Vaccinium oxycoccus, V. vitis-idaea* (leaves).

Descr.: see Karsten 1870 p. 256, 1871 p. 249–250; Müller 1957 p. 130; Müller, Hütter & Schüepp 1958 p. 419.

This fungus has hitherto been described at least 5 times (+2 nomina nuda) from 4 different host species and it has been referred to at least 6 different genera, viz., *Aulagraphum*, *Eupropolella*, *Phacidium*, *Pseudopeziza*, *Sphaeropezia*, and *Trochila*. The reason why this fungus has been referred to so many genera may be that it is often overripe when collected. The ascospores remain 0–1-septate and hyaline for a long time and become 3-septate and brownish rather late. I have

examined a fairly large number of specimens from the above mentioned host species and have found them to be morphologically indistinguishable. The average ascospore sizes are tabulated below:

Host species	Size of ascospores
A. polifolia	15–18.5(–22) × 3–4 μ
A. uva-ursi	(14–)15–18.5(–22) × 4–5 μ
V. oxycoccus	(13–)14–18 × (3–)4–5 μ
V. vitis-idaea	14–16 × 3.5 μ

The fungi from the different hosts are all conspecific with the type species of *Eupropolella*, viz., *E. vaccinii*. The oldest name of this species seems to be *Phacidium oxycocci* (on *V. oxycoccus*) although no authentic material exsists and consequently "*oxycocci*" would be the correct epithet under *Eupropolella*. Cash in 1931 (in Shear et al.), however, described a congeneric (but not conspecific) fungus as *Naevia oxycocci* Dearn. (see p. 22), and this had better retain its epithet as it has no synonyms and seems to be restricted to *V. oxycoccus* and its closest allies. On the other hand, *Phacidium oxycocci* has two synonyms. The oldest is *Ph. arctostaphyli* Karst. (1870), but Müller et al. have in 1958 described an *Eupropolella arctostaphyli*, which in my opinion is conspecific with *Ph. oxycocci*. The second synonym is *Pseudopeziza vaccinii* Rehm and it is the most suitable basionym, thus *E. vaccinii* becomes the correct name for the species also in its broader sense.

Many authors, amongst others, Karsten (1871 p. 249) and Rehm (1888 p. 73), have based the name of this species on *Phacidium andromedae* Fr. Fries's description in Syst. Myc. (1823 p. 574) reads "erumpens, pusillum, subsphaericum, atrum, perithecii lacinii 3–4 obtusis, disco fusco-pallido". According to Fries, the fungus occurs on both stems and leaves, whereas *E. vaccinii* is found only on leaves. Fries has apparently been of the opinion that his fungus was ascigerous, but the original collection of *Ph. andromedae* (Fries, Scler. Suec. 132) only contains an epiphyllous, conidial fungus (conidia 1-septate, fusiform, hyaline, 7.5–11(–13) × 2–3 μ), which I have on several occasions found on both stems and leaves of *A. polifolia*. This fungus alone is found in another sample in UPS labelled by Fries as "*Phacidium andromedae*" and in Roumeguère, Fungi gall. 837 (UPS). Although Fries's imperfect description may be said to fit *E. vaccinii*, the fungus in the original collection is a different one and the epithet *andromedae* cannot therefore be used. *Trochila andromedae* "(Fr.)" Karst. is of course *E. vaccinii* but as follows from the above not conspecific with *Ph. andromedae*.

As mentioned above *Phacidium arctostaphyli* (Karsten, Fungi fenn. 843) belongs to *Eupropolella* and is conspecific with *E. vaccinii*.[1] Karsten (1870 p. 256) listed *Stictis phacidioides* Fr. as a synonym of his *Ph. arctostaphyli*. *Stictis* (*Propolis*) *phacidioides* was described by Fries (1822 p. 198) as "hypophylla ... disco convexo

[1] This is also the case with *Phacidium arctostaphyli* f. *vaccinii* (S!) and certainly also with *Ph. arctostaphyli* Karst. f. *vitis-idaeae*.

lacteo pruinoso ... In foliis *Arbuti uvae ursi*". When Karsten in 1871 transferred *Ph. arctostaphyli* to *Trochila* he used the epithet *phacidioides* ("*Trochila phacidioides* (Fr.) Karst."). It is, however, obvious that he did not examine any authentic material (Fries, Scler. Suec. 277), as this shows the fungus to be a *Naemacyclus* (see p. 49).

In Herb. Rehm (S) there are two samples of *E. vaccinii* on *V. vitis-idaea*, both with the same collection data. One is labelled *Phacidium vaccinii* Fr. with "*Excipula Vaccinii* Rehm nov. sp. 11/11 1877" on a separate label, but with a line drawn through it (host originally incorrectly taken to be *V. uliginosum*, corrected later on). The other sample (the original collection of *Pseudopeziza vaccinii*) is labelled "*Pseudopeziza vaccinii* nov. sp. 9/1877. An dürren Blättern von *Vaccinium*". When describing the fungus, Rehm (1882 p. 114) gave *V. uliginosum* as host. It is, however, *V. vitis-idaea* and the fungus does not seem to occur on *V. uliginosum* at all.

The sample cited by Rostrup (1904 p. 10) as "*Aulagraphum orbiculare* (Ehrenb.) Rostr." on *Andromeda polifolia* contains a fungus conspecific with *E. vaccinii* and is certainly not *Hysterium orbiculare* Ehrenb. on *Cassiope lycopodioides* (Pall.) D. Don (Ehrenberg, 1820 p. 98, table XX, fig. XV; Saccardo 1883 p. 799). As the genus *Cassiope* seems to have a rather exclusive fungus flora, it is improbable that *A. polifolia* and *C. lycopodioides* should be hosts of the same fungus.

Specimens examined:

on *A. polifolia:*

Finland: *St* (H), *Ta* (S — Karsten, Fungi fenn. exs. 842; UPS — ditto, lectotype).
Norway: *Akh* (O), *Tel* (C, as *Aulagraphum orbiculare* (Ehrenb.) Rostr.).
Sweden: *Jmt*, *Vb*, *LL* (all in UPS).
9 samples in all.

on *A. uva-ursi*:

Finland: *Ta* (UPS — Karsten, Fungi fenn. exs. 843), *Li* (UPS).
Sweden: *Dlr* (UME), *Vb* (UME, UPS).
5 samples in all.

on *V. oxycoccus*:

Finland: *St* (H), *Ta* (UPS — Karsten, Fungi fenn. exs. 841).
Norway: *Akh* (C).
Sweden: *Vb* (UPS).
4 samples in all.

on *V. vitis-idaea*:

Finland: *Lk* (H), *Li* (UPS).
Norway: *Akh* (S), *Busk* (UPS).
Sweden: *Upl* (UME, UPS), *Dlr* (UME), *Hls* (UPS), *Vb* (C, S, UME, UPS), *LL* (UPS), *TL* (UPS).
12 samples in all.

Godronia Moug. & Lév. in Moug. 1846 p. 355[1]

Type species: *Godronia mühlenbeckii* Moug. & Lév. in Moug.

Con. st.: *Topospora* Fr. 1835 p. 347. — Type species: *Topospora uberiformis* (Fr.) Fr.

Fuckelia Bon. 1864 p. 134. — Type species: *Fuckelia ribis* Fr.

Groves (1965 p. 1195) has published a thorough historical review of this genus and found its correct name to be *Godronia* and not *Crumenula* De Not. or *Scleroderris* (Pers. ex Fr.) Bon.

Groves (op. cit.) has tried to connect the perfect and imperfect states by cultural studies. In some species he has been successful, in others the conidial connections have been more or less probably but not definitely established. He thinks that the grouping of the conidial states of *Godronia* species in a single form genus is desirable, and that *Topospora* should be considered the correct generic name for this. However, the name *Fuckelia* may be used for the conidial state of *Godronia ribis*, which represents one of the extreme variants among conidial states of *Godronia*. He writes "for practical reasons it is probably desirable to maintain *Fuckelia* as a distinct genus but it can be interpreted as a compound *Topospora* with a massive basal stroma in which numerous cavities develop at the top" (op. cit. p. 1203).

Mature pycnidia are found as early as April–May, whereas the ascocarps do not appear to mature until late summer.

1a. Ascospores shorter than 25 μ.
2a. Medullary excipulum of brown to blackish brown cells; ascospores 15–20 μ long. On *Vaccinium uliginosum*. — 7. *G.* sp. 1
2b. Medullary excipulum of brown to greyish brown cells; ascospores 19–26 μ long. On *V. vitis-idaea*. — 5. *G. foliicola*
1b. Ascospores mostly longer than 60 μ. On *Calluna vulgaris*, *V. myrtillus*, *V. oxycoccus* and *V. vitis-idaea*. — 3. *G. cassandrae*
1c. Ascospores mostly 25–60 μ long.
3a. Medullary excipulum extensive, reaching the substratum in central parts.
4a. Medullary excipulum in basal parts of textura angularis of dark to blackish brown thick-walled cells, upwards merging into t. prismatica of thin-walled greyish brown cells; ascospores 44–55(–65) × 2.5–4 μ; hymenium greyish. On *Andromeda polifolia*. — 1. *G. andromedae*
4b. Medullary excipulum brown to brownish grey, of textura epidermoidea in basal parts, of t. angularis marginally, of t. prismatica around the hymenium; ascospores (27–)35–55(–65) × 2–3(–4) μ; hymenium greyish to whitish. On *C. vulgaris*. — 2. *G. callunigera*

[1] According to Pritzel (1872–1877 p. 226) Mougeot's paper was published in 1845, but according to Groves (1965 p. 1207) in 1846. (Mougeot's paper has not been available for study.)

3b. Medullary excipulum not reaching the substratum.
5a. Ascospores 48–63 × 2 μ, 3–7-septate. On *Empetrum nigrum*. 4. *G. empetri*
5b. Ascospores 28–44 × 1.5–2.5 μ, 3-septate. On *V. uliginosum*. 6. *G. urceoliformis*

1. ***Godronia andromedae*** P. Henn. 1902 p. 103. — Pl. III*a*.

Coll. orig.: Germany, Berlin, Hort. Bot. V. 1901 P. Hennings, ascigerous + conidial state (S!, isotype).

Con. st.: *Topospora andromedae* (P. Henn.) B. Erikss. n.comb. — *Septomyxa andromedae* P. Henn. in Verh. Bot. Ver. Brandenburg 43 p. 104 (1902). — Coll. orig.: the same as for the ascigerous state.

Host: *Andromeda polifolia* (twigs).

Ascocarps 0.45–0.8 mm in diam. and about as high, separate, erumpent, short-stalked, olive- to dark brown, striped with blackish brown, longitudinally furrowed, slightly fibrillose striate, opening circularly with a pale, narrow, somewhat lobed, slightly fimbriate margin; basal stroma slightly developed of textura epidermoidea or partly textura angularis, the cells yellowish brown, thick-walled; medullary excipulum extensive, reaching the substratum in the central part, subtending the hymenium and extending up around it, in the basal part of textura angularis, the cells dark brown to blackish brown, thick-walled, upwards merging into textura prismatica, the cells thin-walled greyish brown; ectal excipulum of textura oblita of thick-walled yellow hyphae *c.* 3–4 μ in diam., outermost rows darker, easily sloughing off; hypothecium of hyaline, closely interwoven hyphae; hymenium deeply concave, greyish.

Asci 75–110 × 6–10 μ, cylindric, short-stalked, rounded at apex, 8-spored. Ascospores 44–55(–65) × 2.5–4 μ, elongate-fusiform, slightly pointed at both ends, finally 5-septate, hyaline.

Paraphyses *c.* 2–3 μ in diam., numerous, filiform, simple, tips slightly swollen.

Pycnidia up to *c.* 0.8 mm long, *c.* 120 μ broad and *c.* 250 μ high, separate, erumpent, circular to elongate, black, opening by a longitudinal slit at the top, cavity somewhat lobed; tissue of a layer of textura angularis in the basal part, the cells pale brownish grey, upwards merging into textura oblita of brownish yellow hyphae; outermost layer dark brown.

Conidiophores lining the cavity, *c.* 15–30 × 2 μ, hyaline, branched, septate, bearing conidia at the tip.

Conidia 8–13 × 2–2.5 μ, fusiform, straight, 1-septate, hyaline.

Intermixed with ascocarps of *G. andromedae* Hennings found a coelomycete, which he described as *Septomyxa andromedae*. He considered it the conidial state because "das Gehäuse beider Pilze eine überraschende Aehnlichkeit in der gelbgrünlichen Färbung besitzen". The isotype in S contains 2 apothecia and numerous pycnidia. This pycnidial fungus is without doubt a good member of *Topospora*. It has often been confused with another conidial fungus on *A. polifolia*, congeneric with, amongst others, *Diplodina andromedae* (Rostr.) Jörst. (Jörstad 1965 p. 85) = *Diplodina rostrupii* Vestergr. (Vestergren 1906 p. 2) on *Cassiope hypnoides*, *Loiseleuria procumbens* and *Phyllodoce coerulea* and *D. fructigena* Karst. (Karsten 1888 p. 42) on *Ledum palustre*. There are, however, distinct differences in the texture of the pycnidial wall, e.g., the *Topospora* is stromatic,

the other fungus not. *T. andromedae* is found only on twigs, whereas the other fungus occurs also on leaves.

The ascocarps of *G. andromedae* resemble those of *G. callunigera*. Their conidial states, however, are different (conidia 1-septate, straight, 8–13 × 2–2.5 μ in *G. andromedae*; 1–3-septate, ±sickle-shaped, 15–25(–30) × (2–)2.5–3(–3.5) μ in *G. callunigera*).

Specimens examined:

Sweden: *Gstr*: Gävle, Tolfforsskogen, *c.* 1 km WNW. of the manor of Tolffors 13.VIII.1951 J.A.N. 11739b, ascig. + conid. (UPS). — *Vb*: Bygdeå par., Dalkarlså 30.VII.1966 O.E. 3477c, ascig. (UPS); Dalkarlså, the bog Hamptjärnsmyren 5.VIII. 1966 B.E. 667c, ascig. (UPS); Dalkarlså, Storvarpet 30.VII.1967 B.E. 730a, ascig. + conid. (UME, UPS).

2. ***Godronia callunigera*** (Karst.) Karst. 1885 p. 144.

Peziza callunigera Karst. 1869 p. 171. — *Crumenula callunigera* (Karst.) Karst. 1871 p. 212. — *Scleroderris callunigera* (Karst.) Nannf. 1932 p. 287. — Coll. orig.: Finland, Ta, Tammela par., Mustiala 6.X.1868 P.A. Karsten (H).

Godronia urceolus (Alb. & Schw.) Karst. f. *callunae* in Bresadola & Saccardo 1897 p. 273.

Con. st.: see Groves 1965 p. 1210.

Host: *Calluna vulgaris* (twigs).

Descr.: see Groves l.c.

Pycnidia of *Topospora* type are nearly always found associated with the ascocarps. The pycnidia have 1–3-septate conidia, which are cylindric-fusiform, ±sickle-shaped, hyaline, 15–25(–30) × (2–)2.5–3(–3.5) μ. According to Groves (op. cit. pp. 1206, 1212) the connection between *G. callunigera* and its conidial state has not been proved culturally. He obtained cultures from ascospores as well as from conidia, but no conidia were produced in culture. He stated "the presumed connection rests on the similarity in appearance of the cultures and the association of the two states in nature" (p. 1206). The conidial state seems to be more frequent than the ascigerous one.

The pycnidial fungus described by Niessl (1872 p. 211) as belonging to *Grovesiella* (*Cenangium*) *ericae* was probably the conidial state of *G. callunigera* (see p. 37).

Besides *G. callunigera* there is another species of *Godronia* on *Calluna vulgaris*, viz., *G. cassandrae* (see below). The differences tabulated below are based on Groves' descriptions (1965 pp. 1210, 1212–1213) and my own observations:

	G. callunigera	*G. cassandrae*
Basal stroma	Slightly developed	Well developed
Medullary excipulum	Brown to brownish grey, reaching the substratum in the central part	Dark brown to black, not reaching the substratum

Ectal excipulum	Hyphae inclining at a low angle to the surface, tips of hyphae protruding like hairs giving the ascocarp a rough surface	Hyphae running parallel, outermost rows of darker cells, surface ± smooth
Shape of ascocarp	Height and width almost equal	Proportionally higher
Colour of ascocarp	Reddish brown to blackish	Tawny to reddish brown to dark olivaceous brown
Shape of hymenium	Deeply concave	Concave to plane
Size of asci	80–110(–120) × 8–10(–11) μ	(70–)95–115(–130) × (7–)7.5–9(–10.5) μ
Size of ascospores	(27–)35–55(–65) × 2–3(–4) μ	(40–)50–70(–85) × (1.5)2–3(–3.5) μ
Conidia	15–25(–30) × (2–)2.5–3(–3.5) μ, 1–3-septate, ± sickle-shaped	(7–)9–14(–18) × 1.5–2.5(–3.5) μ, (0–)1-septate, ± straight

Specimens examined:

Finland: *Oa* (TUR), *Lk* (H).

Sweden: *Vrm* (UPS), *Upl* (UPS), *Jmt* (UPS), *Vb* (UME, UPS), *LyL* (UME), *LL* (UPS).

14 samples in all.

In Fennoscandia *G. callunigera* seems to have a more northern distribution than *G. cassandrae*. Besides the gatherings listed above I have examined one from the Italian Alps (Italy, Valesia, leg. Carestia. Herb. Bresadola 53, S) labelled *Godronia urceolus* (Alb. & Schw.) Karst. f. *callunae*.

3. *G. cassandrae* Peck 1886 p. 50.

Coll. orig.: U.S.A., N.Y., Karner, on *Chamaedaphne calyculata*, VIII. 1885 C. H. Peck (NYS!).

Dasyscypha callunae Rehm in Sydow, Myc. march. 575 (188–), ascigerous + conidial state (nom. nud.).

Syn. cet.: see Groves 1965 p. 1214.

Con. st.: *Topospora obturata* (Fr.) B. Erikss. n.comb. — *Sphaeria obturata* Fr. in Syst. Myc. 2 (2) p. 495 (1823). — Coll. orig.: Fries, Scler. Suec. 128, on *Vaccinium oxycoccus* (UPS!).

Syn. cet.: see Groves l.c.

Hosts: *Calluna vulgaris* and *Chamaedaphne calyculata* (twigs), *Vaccinium myrtillus* (berries, leaves and twigs), *V. oxycoccus* (buds, leaves and twigs), *V. vitis-idaea* (twigs) and plants of several other families, e.g., *Alnus*, *Betula*, *Ribes*, *Salix*, *Sorbaria* A. Br., *Spiraea* (cf. Groves op. cit. pp. 1213 and Smerlis 1968 p. 597).

Descr.: see Groves op. cit. p. 1212.

The original collection of the ascigerous state is on *Chamaedaphne calyculata*, but the species has later been found on several other members of *Ericaceae* as well as on members of other families (see above). Groves (op. cit. pp. 1213–1215) established 6 "forms" of this species. He considered their taxonomic status to be somewhat doubtful, as they are apparently morphologically indistinguishable in

both perfect and imperfect states. He stated, however, "in view of the pathogenic significance of the *Vaccinium* fungus it was thought desirable to maintain some sort of distinction between the strains occurring on different hosts ..." (op. cit. p. 1215). Smerlis (op. cit. p. 598) demonstrated by inoculations that physiological forms of *G. cassandrae* exist. "On the basis of pathogenicity, it would seem that two forms, f. *betulicola* and f. *cassandrae* occur in Quebec". As to the "status of f. *vaccinii* additional research is needed". F. *callunae*, f. *ribicola* and f. *spiraeicola* were not included in his investigations at all.

Sydow, Myc. march. 575 ("*Dasyscypha callunae* Rehm n.sp. ad inter. ... 6.1884 leg. P. Sydow"), contains a *Godronia* which I consider conspecific with *G. cassandrae* but not with *G. callunigera* as Groves claimed (op. cit. p. 1210), at least in the copies studied by me (S and UPS). Pycnidia of *Topospora* with short, 1-septate conidia are associated with the ascocarps.

"*Crumenula ericae* (Fr.) Phill." (1887 p. 357) as well as "*Godronia ericae* (Fr.) Rehm" (1889 p. 240) are conspecific with *G. cassandrae*. The confusion concerning *G. cassandrae* and *Grovesiella* (*Cenangium*) *ericae* is dealt with in greater detail on p. 36.

Specimens examined:

on *C. vulgaris*:

Norway: *Rog*: Stavanger, by Lake Mosvatn 17.V.1963 B.E. 44d, conid. (UPS). Madla par., Kvernevigen 17.V.1963 B.E. 52c, conid. (UPS).

Sweden: *Öl*: Ås par., Ottenby lund 17.VI.1888 K. Starbäck, ascig. + conid. (S); Ås, N. of the church 6.VI.1963 B.E. 151a, conid. (UPS). Böda par., Svartvik, *c.* 30 m from the shore 1.VI.1963 B.E. 137, conid. (UPS). — *Ög*: Simonstorp par., Rodga 1.VIII.1888 E. Haglund, ascig. + conid. (S). — *Upl*: Singö par., Fogdö-Kolskär 28.VI.1964 B.E. 356b, conid. (UPS). — *Dlr*: Gustafs par., by Lake Mossbysjön 23.VI. 1968 B.E. 1669, conid. (UME). — *Vb*: Umeå, Norrfors, by the road to Norrmantorp 25.V.1968 B.E. 1595b, conid. (UME).

on *V. myrtillus*:

Finland: *St*: Tyrvää par., Sammaljoki 9.VI.1912 V.H. 276a +b, ascig. + conid. (H). — *Li*: Inari par., Laanila 29.VI.1927 V.H., conid. (H).

Norway: *Rog*: Madla par., Kvernevigen 17.V.1963 B.E. 54a, conid. (UPS).

Sweden: *Upl*: Uppsala-Näs par., Nåsten 8.V.1966 B.E. 642b, conid. (UPS). — *Dlr*: Säter par., by the brook between Lake Ljustern and Lake Bladtjärn 15.IV.1968 B.E. 1559, ascig. (imm.) + conid. (UME). — *Vb:* Burträsk par., Tjärn, the hill Flakaberget 13.VIII.1964 B.E. 410a, conid. (UPS). — *LL*: Jokkmokk par., Kvikkjokk, Mt. Snjerak 2.VIII.1963 B.E. 244a, conid. (UPS).

on *V. oxycoccus*:

Finland: *Ks* (TUR).

Sweden: *Gtl* (UPS), *Sm* (UPS), *Upl* (UPS), *Dlr* (UME), *Vb* (UME, UPS), *LL* (UPS). 14 samples in all.

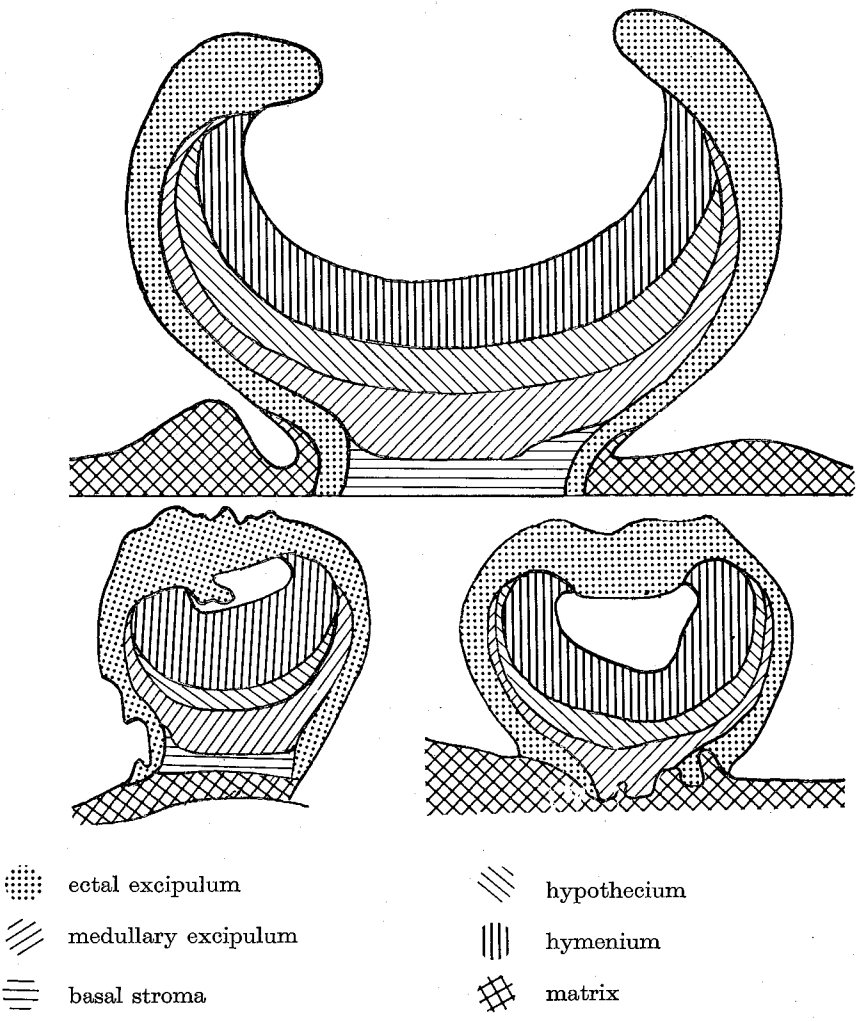

Fig. 3. Diagrammatical sections of ascocarps. a. *Godronia sp.* 1. 105 ×. b. *G. empetri.* 80 ×. c. *G. foliicola.* 95 ×. — Comp. Pl. IV.

on *V. vitis-idaea*:

Finland: *Nyl, St, Om, Ob, Li* (all in H).
Norway: *Opl* (UPS).
Sweden: *Öl* (UPS), *Sm* (UPS), *Upl* (UPS), *Dlr* (UME), *Vb* (UME, UPS).
16 samples in all.

Besides the specimens on *C. vulgaris* listed above I have examined 5 from Germany: Grunewald bei Berlin VI.1884 P. Sydow (S — Sydow, Myc. march. 575 as *Dasyscypha callunae* Rehm; UPS — ditto), Grunewald bei Berlin VI.1884 P. Sydow (S); bei Königstein 30.VI.1884, Herb. W. Krieger, 323 (S). See also under *G. callunigera* (p. 29).

4. ***Godronia empetri*** B. Eriksson n.sp. — Fig. 3*b*, Pl. IV*c–d*.

Coll orig.: Finland, Ab, Korppoo par., Svarvars 21.VII.1947e L.E.K., ascigerous + conidial state (TUR, holotype).

Con. st.: *Topospora* sp.

Host: *Empetrum nigrum* s.lat. (twigs).

Apothecia *c.* 0.4 mm diam. et aequialta, solitaria, erumpentia, sessilia vel breviter stipitata, fusco-brunnea, leviter furfuracea et striata; textura stromatis basi epidermoidea vel angularis; textura excipuli medullaris basaliter angularis, marginem versus prismatica, cellulis fusco-brunneis; excipulum externe textura oblita, hyphis luteolis parieto crassissimo 3–5 μ diametro.

Asci 80–90 × 8–11 μ, cylindracei, breviter stipitati, octospori. Ascosporae 48–63 × 2 μ, filiformes, 3–7-septatae, hyalinae.

Paraphyses 1–1.5 μ diametro, numerosi, filiformes, simplices, apice non incrassati.

Status conidiophorus adest.

Pycnidia solitaria, erumpentia, globosa vel elongata, atrata.

Conidia 18–24(–28) × 3 μ, fusiformia, recta vel modice curvata 1–3-septata, hyalina.

Hab. in ramis emortuis *Empetri nigri*.

Ascocarps *c.* 0.4 mm in diam. and about as high, solitary, sessile or very shortly stipitate, dark-brown to blackish brown, longitudinally slightly furrowed, somewhat fibrillose-striate; basal stroma rather poorly developed, tissue of textura epidermoidea, hyphae hyaline to pale brown, upwards merging into textura angularis; medullary excipulum of textura angularis in the part subtending the hymenium and of textura prismatica extending around it, both with ± dark-brown cells; ectal excipulum of textura oblita, the hyphae pale yellow, thick-walled, parallel-running, 3–5 μ in diam., the outermost rows darker and sloughing off easily; hypothecium of hyaline, closely interwoven hyphae; hymenium ± concave, grey.

Asci 80–90 × 8–11 μ, cylindric, short-stalked, 8-spored. Ascospores 48–63 × 2 μ, filiform, 3–7-septate, hyaline.

Paraphyses 1–1.5 μ in diam., numerous, filiform, simple, tips not swollen.

Pycnidia up to *c.* 0.8–1 mm long, *c.* 0.3 mm broad and *c.* 0.2–0.3 mm high, solitary, erumpent, circular to elongate, black, containing one single cavity; tissue in basal part of textura epidermoidea to angularis, cells greyish brown, thick-walled; pycnidial wall of textura prismatica to epidermoidea, cells thick-walled, yellowish brown.

Conidiophores short, arising from the basal layer.

Conidia 18–24(–28) × 3 μ, fusiform, ± sickle-shaped, 1(–3)-septate, hyaline.

The ascocarps resemble those of *G. cassandrae*, but there are small differences in the ascocarp wall. The pycnidia are good members of *Topospora*. They seem to be close to the presumed pycnidial state of *G. callunigera* in having 1(–3)-septate, ± sickle-shaped conidia.

Specimens examined:

Finland: *Ab*: Iniö par., Norrby 15.VI.1938 L.E.K., ascig. (TUR). Korppoo par., Kjöllingby, Svarvars 21.VII.1947e L.E.K., ascig. + conid. (TUR, holotype). — *Ob*: Rovaniemi par., 19.VI.1927a V.H., conid. (H).

U.S.S.R.: *Lps*: Petsamo par., Petsamo 18.VII.1931 V.H., conid. (H).

All the samples are from the eastern parts of Fennoscandia. This is possibly a species with an exclusively eastern distribution.

5. ***Godronia foliicola*** Schläpf. 1969 p. 36. — Fig. 3 *c*, Pl. IV *a*.

Coll. orig.: Switzerland, Kt. Graubünden, bei Arosa VIII.1963 E. Rahm (ZT, holotype; UME!, isotype).

Con. st.: see below.

Host: *Vaccinium vitis-idaea* (dead leaves and twigs).

Ascocarps 0.45 mm in diam., 0.3–0.4 mm high, separate, erumpent, sessile, brown to reddish brown, slightly fibrillose striate; basal stroma slightly developed, of textura epidermoidea, the cells nearly hyaline; medullary excipulum of textura angularis in basal part and of textura prismatica in the part surrounding the hymenium, the hyphæ pale brown to greyish brown, thick-walled; ectal excipulum of textura oblita, the hyphæ rather pale yellow, *c.* 4–5 mm wide, outermost rows somewhat darker and easily sloughing off; hypothecium of hyaline, closely interwoven hyphae; hymenium concave to plane, whitish grey.

Asci 56–69(–80) × (7–)8–9 μ, cylindric, short-stalked, 8-spored, I +. Ascospores 19–26 × 3–4 μ, biseriate, fusiform, straight, 1–3-septate, hyaline.

Paraphyses 2–2.5 μ wide, numerous, filiform, not or only slightly swollen at the tips.

No pycnidia have been observed associated with the ascocarps on the host. Schläpfer (op. cit. p. 37) has, however, found pycnidia in culture "... kleine, schwarze Pycnidien. Die Konidien sind hyalin, einzellig, spindelförmig, gerade oder gekrümmt und messen 7–10 × 2–3 μ. Sie werden an flaschen- oder birnförmigen, 7.5–9 × 3 μ grossen Phialiden abgeschnürt."

Specimens examined:

Sweden: *Vb*: Umeå, Röbäck 5.VI.1906 C. P. Laestadius, imm. (UME). — *LL*: Jokkmokk par., Kvikkjokk, Storholmen in Lake Saggat 4.VIII.1963 B.E. 254d (UPS).

6. ***Godronia urceoliformis*** (Karst.) Karst. 1885 p. 144.

Peziza urceoliformis Karst. 1869 p. 172. — Coll. orig.: U.S.S.R., Lt, Kola Peninsula, near Kola 16.VII.1861 P. A. Karsten (H, holotype).

Con. st.: *Topospora* sp.

Host: *Vaccinium uliginosum* (berries, twigs).

Descr.: see Groves 1965 p. 1249. The following may be added to his description, basal stroma slightly developed, of textura epidermoidea of hyaline, rather thick-walled hyphae, ± absent in the central part, where the medullary excipulum reaches the substratum.

Under a lens the ascocarps of *G. urceoliformis* and *G. cassandrae* are easily confused, but microscopically *G. urceoliformis* can be recognized by its smaller asci and ascospores. The conidial state associated with *G. urceoliformis* differs from *Topospora obturata* in the structure of the pycnidial wall. It consists throughout of textura oblita of ± dark-walled cells. The pycnidial wall in *T. obturata* is of textura prismatica, composed in the upper parts of thin-walled, yellowish brown cells. Both are, however, good members of *Topospora*.

G. urceoliformis has not been cultured by Groves (op. cit. p. 1250), but he stated that "the tissue structure of the two states is very similar and the conidia are very similar to those of other *Godronia* species so that there seems to be little doubt of connection".

Specimens examined:

Finland: *St*: Tyrvää par., Ekojärvi 21.VI.1912c V.H., conid. (H).

Sweden: *Gstr*: Gävle, Tolfforsskogen, Pingeltorp 28.VII.1963 J.A.N. 18020a, ascig. (UPS). — *Vb*: Bygdeå par., Dalkarlså, Rödhällan 5.V.1968 B.E. 1577a, conid. (UME). Umeå, Norrfors, Norrmantjärn, SE. shore 25.V.1968 1593b, ascig. imm. + conid. (UPS); Stöcksjö, Nomyran 1.VI.1968 B.E. 1603b, ascig. imm. (UME). — *LL*: Jokkmokk par., Kvikkjokk, Storholmen in Lake Saggat 4.VIII.1963 B.E. 256b, ascig. + conid. (UPS).

(U.S.S.R.: *Lt*: Kola Peninsula, near Kola 16.VII.1861 P. A. Karsten, ascig. (H, holotype)).

Groves reported the fungus on *V. myrtillus* as well as on *V. uliginosum*. I have, however, found it on the latter species only. *V. myrtillus* is the only host species mentioned by Migula (1913 p. 946).

7. ***Godronia*** sp. 1. — Fig. 3*a*, Pl. IV*b*.

Con. st.: not found.

Host: *Vaccinium uliginosum* (twigs).

Ascocarps 0.8–0.85 mm in diam., 0.5–0.6 mm high, separate, erumpent, short-stipitate or nearly sessile, blackish brown to dark brown, smooth; basal stroma of textura epidermoidea, the hyphae greyish brown, thick-walled, *c.* 4–6 μ wide; medullary excipulum of textura angularis in the basal parts and of textura prismatica around the hymenium, the cells brown to blackish brown; ectal excipulum of textura oblita, the hyphae brownish yellow, thick-walled, *c.* 4–5 μ wide, outermost rows darker; hypothecium of hyaline, closely interwoven hyphae; hymenium concave to plane, grey.

Asci 80–85 × 6–9 μ, cylindric, short-stalked, 8-spored, I +. Ascospores 15–20 × 3–5 μ, biseriate, fusiform, straight, 1–3-septate, hyaline.

Paraphyses 1.5–2 μ wide, numerous, filiform, simple, tips slightly swollen.

No pycnidia have been observed associated with the ascocarps.

The material available is too sparse to make the establishment of a new species possible.

Specimen examined:

Norway: *Rog*: Randaberg par., Tungenes 16.V.1963 B.E. 41a (UPS).

Grovesiella B. Eriksson n.gen. Helotiacearum

Type species: *Grovesiella ericae* (Fr.) B. Eriksson.

Apothecia solitaria, erumpentia, patellariformia, breviter stipitata, brunnea vel fusco-brunnea, excipulo basaliter textura angularis, intus hyphis hyalinis, extus fusco-brunneis cellulis parietibus crassissimis, excipulo marginem versus textura oblita hyphis brunneo-luteolis parietibus crassissimis.

Asci cylindracei, breviter stipitati, octospori, poro in iodo coerulescente. Ascosporae fusiformes vel obovatae, 1-(2–3-)septatae, hyalinae.

Paraphyses filiformes, septatae, leviter ramosae, apicaliter paullo incrassatae, epithecium non formantes.

Ascocarps solitary, erumpent, saucer-shaped, when dry laterally compressed, short-stalked, brown to blackish brown; excipulum at the base of textura angularis, innermost cells hyaline to pale brown, thin-walled, outermost cells blackish brown, thick-walled, upwards of textura oblita, the hyphae brownish yellow, thick-walled, the two types of texture sharply demarcated; outermost rows of cells easily sloughing off giving the ascocarp a slightly rough surface; hypothecium of textura intricata, the cells hyaline; hymenium plane, yellowish.

Asci cylindric, short-stalked, 8-spored, ascus tip usually I +.[1] Ascospores biseriate, fusiform, proximal end often slightly broader and shorter than the distal one, 1(–2–3)-septate, hyaline.

Paraphyses as long as or somewhat longer than the asci, filiform, septate, slightly branched, ends somewhat swollen, not forming an epithecium.

1. ***Grovesiella ericae*** (Fr.) B. Eriksson. n.comb.

Cenangium ericae Fr. in Syst. Myc. 2 (1) p. 188 (1822). — *Crumenula ericae* "(Fr.)" Phill. 1887 p. 357. — *Godronia ericae* "(Fr.)" Rehm 1889 p. 240. — *Scleroderris ericae* (Fr.) Nannf. 1932 p. 287. — *Encoeliopsis ericae* (Fr.) Groves 1969 p. 1320. — *Godronia bicellulata* Schläpf. 1969 p. 34. — Coll. orig.: not preserved. Neotype: Sweden, Sm, Femsjö par., 27.VIII.1929 J.A.N. 3420 (UPS!).

Cenangella ericae "(Niessl)" Rehm 1889 p. 232.

Host: *Calluna vulgaris* (twigs, between dead, still attached leaves).

Fungus causing dead areas in living stands of *Calluna*. Ascocarps up to 1.2 mm in diam. and *c.* 0.5 mm in height, separate, erumpent, saucer-shaped, when dry laterally compressed (from 2 or 3 sides), short-stalked, brown to blackish brown; excipulum at the base of textura angularis, innermost of hyaline to pale brown, thin-walled cells, outermost of blackish brown, thick-walled cells, the two types of texture sharply demarcated; outermost rows of cells easily sloughing off giving the ascocarp a slightly rough surface; hypothecium of textura intricata of hyaline cells; hymenium plane, yellowish.

Asci 74–83 × 7–9 μ, cylindric, short-stalked, 8-spored, usually I +.[1] Ascospores

[1] Although the ascus tips of, e.g., B.E. 902 (UPS) are I –, some tips will stain blue if the mounts are treated with NaOH (0.1 mol.), heated and finally treated with HNO_3 (0.1 mol.). Minks was the first to use this technique as early as 1881 (see O. Eriksson 1966 p. 315). In, e.g., O.E. 2447 (UPS) most of the tips are distinctly I +, but some are only weakly so and a few even I –.

(11–)17–20 × 3 μ, biseriate, fusiform, proximal end often slightly broader and shorter than the distal one, 1–(2–3)-septate, hyaline.

Paraphyses as long as or somewhat longer than the asci, filiform, septate, slightly branched, tips slightly swollen not forming an epithecium.

No conidial state has been observed associated with the ascocarps neither on the host nor in culture (Schläpfer 1969 p. 4).

Groves (1969 p. 1320) referred *Cenangium ericae* to *Encoeliopsis* Nannf. There are, however, distinct differences between this fungus on *Calluna* and the type species of *Encoeliopsis*, *E. rhododendri* (Ces. ex De Not.) Nannf. (Rehm, Ascom. 253), in the texture of the ascocarp as well as in the shape of the paraphyses. The inner layer of the excipulum in *E. rhododendri*, i.e. "pars fundi excipuli" (Nannfeldt 1932 p. 307), is composed of hyaline hyphae in textura intricata; the outer layer of the excipulum, i.e. "pars parietis excipuli", consists of dark brown, thin-walled cells. The paraphyses of *E. rhododendri* are definitely longer than the asci and have distinctly enlarged, brown-coloured tips. From *Godronia* it differs, e.g., in lacking "the zone of textura oblita surrounding the hymenium, and the dark medullary excipulum of textura angularis" (Groves 1965 p. 1199).

Besides *G. ericae* there are, at least, two other, rather similar fungi on *Calluna vulgaris*, viz., *Godronia callunigera* and *Godronia cassandrae* (see p. 28 and p. 29), both with a pycnidial state belonging to the genus *Topospora*. There seems to be no conidial state known of *G. ericae* (cf. above), although Fuckel as well as Niessl described such a state.

(1) Niessl (1872 p. 211) gave a thorough description of the true *Cenangium ericae* Fr. The pycnidial fungus described by him as "*Pestalozzia Callunae* Cesati in Rbh. fungi eur. Nr. 161" ("stylosporis fusiformibus, curvulis utrinque obtusiusculis, pedicellatis hyalinis, 3-septatis. ... 28 mk. 1., 1.5–2 cr.") most probably belongs to *G. callunigera* (see p. 28). Niessl (op. cit. p. 212) was quite sure that this was the conidial state of *Cenangium ericae*, a view not shared by Schröter (1897 p. 146). My opinion is that the sample studied by Niessl contained *Grovesiella* (*Cenangium*) *ericae* as well as the pycnidial state of *G. callunigera*. I have myself met with, at least, two samples containing a mixture of these two species (B.E. 585 and 671, both in UPS).[1]

(2) The fungus considered by Fuckel (1870 p. 271) to be the pycnidial state of *G. ericae* ("Stylosporis cylindraceis, curvatis, 10 Mik. long., 2 Mik. crass., hyalinis, continuis. An dürren Aestchen von *Calluna vulgaris* ..."), is probably the conidial state of *G. cassandrae*. He gave no description of the perfect state, which may thus have been the true *Cenangium ericae* or *G. cassandrae*.

Crumenula ericae "(Fr.)" Phill. has according to Phillips (1887 p. 357) ascospores 90 × 1.5 μ and conidia 16 × 2 μ, "stylospores cylindraceo-fusiform, curved, at length uniseptate". As mentioned above, however, the ascospores of Fries's species are (11–)17–20 × 3 μ, fusiform, 1(–2–3)-septate. Phillips' fungus must thus be another species, either *Godronia callunigera* or *G. cassandrae*. The latter choice

[1] The UPS copy of Rabenhorst, Fungi eur. 161 contains the conidial state of *G. callunigera* and that of Rabenhorst, Fungi eur. 1445 *G. ericae*.

is the more probable one since (1) the ascospores of *Crumenula ericae* are of about the same length as those of *G. cassandrae* and much longer than those of *G. callunigera* (see p. 29), (2) the conidia of *G. cassandrae* are ±straight, (0–)1-septate, those of *G. callunigera* ±sickle-shaped, 1–3-septate and longer (see p. 29).

That Phillips misinterpreted *Cenangium ericae* Fr. is demonstrated also by another fact. The fungus in Rehm, Ascom. 466 and Rabenhorst, Fungi eur. 1445 is the true *Cenangium ericae* Fr. = *Grovesiella ericae*. However, Phillips commented that "Neither Rehm's 'Asco', No. 466, nor Rabh., 'Fungi Eur.' 1445" contained a fungus conspecific with his *Crumenula ericae*.

Godronia ericae "(Fr.)" Rehm is another name based on *Cenangium ericae* Fr. Rehm (1889 p. 240) cited Sydow's Myc. march. 575 (sub *Dasyscypha callunae*). He gave the same ascospore size as Phillips (l.c.) gave for *Crumenula ericae*, viz., 90×1.5 μ. As noted on p. 29 in this paper *D. callunae* in conspecific with *G. cassandrae*. Rehm (l.c.) reported *Godronia ericae* from "... um Berlin und bei Königstein ..." From these localities there are 5 samples in S, all containing *G. cassandrae*.

Massee (1895 pp. 132, 133) evidently examined both *G. cassandrae* (as *Crumenula ericae*) and *G. callunigera* (as *Crumenula callunigera*), cf. Groves (1965 p. 1212).

Accordingly the fungus called *Crumenula ericae* (Fr.) by Phillips and *Godronia ericae* (Fr.) by Rehm is probably *G. cassandrae* and the two conidial states considered to pertain to *Cenangium ericae* Fr. by Fuckel and Niessl probably belong to *G. cassandrae* and *G. callunigera* respectively.

For other details concerning the nomenclatorial confusion in which *Cenangium ericae* Fr. has been involved see Nannfeldt (1932 p. 287) and Groves (1965 p. 1211 and 1969 p. 1321).

Specimens examined:

Sweden: *Sm* (UPS), *Vrm* (UPS), *Upl* (UME, UPS — Lundell & Nannfeldt, Fungi exs. suec. 2594), *Dlr* (UME, UPS), *Vb* (UME, UPS).
14 samples in all.

This fungus seems to be common, at least in Sweden. Attacked stands catch the eye readily as they appear as grey spots in otherwise green areas of *C. vulgaris*. Mature specimens have been noted from August–September.

Helotium Pers. ex S. F. Gray 1821 p. 660

1. ***Helotium fructigenum*** (Bull. ex Fr.) Fuck. 1870 p. 314.

Peziza fructigena Bull. ex Fr. 1822 p. 118. — Coll. orig.: not preserved.
Syn. cet.: see Dennis 1956 p. 79.
Hosts: polyphagous, in *Ericaceae* on *Calluna vulgaris* (twigs).
Descr.: see Dennis l.c.

Specimen examined:

Sweden: *Upl*: Uppsala, 600 m NW. of Husbyborg 25.XII.1943 Eric Åberg (UPS).

Hyaloscypha Boud. 1885 p. 118

1. ***Hyaloscypha lachnobrachya*** (Desm.) Nannf. var. ***araneocincta*** (Phill.) Dennis 1949 p. 73.

Peziza araneocincta Phill. 1880 p. 308. — Coll. orig.: Great Britain, "Leigh Down, Bristol, Clifton —.X.— C. Bucknall, on decayed Birch leaves".
Syn. cet.: see Dennis l.c.
Hosts: polyphagous, in *Ericaceae* on *Andromeda polifolia* (leaves).
Descr.: see Dennis l.c.

Specimen examined:

Sweden: *Vb*: Bygdeå par., Dalkarlså, Stendammet 27.VII.1963 B.E. 206f (UPS).

Lophodermium Chev. 1826 p. 435

Type species: *Lophodermium arundinaceum* (Schrad. ex Fr.) Chev.

Lophodermium has been divided into several genera by von Höhnel (1917 p. 311) and Tehon (1935 p. 38) among others. The criteria used were host position and mycelial composition of the ascocarp. Nannfeldt (1932) and Terrier (1942) did not accept any division of the genus. Darker (1967 p. 1414) considered that "the generic limits applied by von Höhnel ... and Tehon are so patently artificial that they have rarely been given recognition by other mycologists. Although certain broad divisions might be suggested it seems premature to attempt to make any worthwhile reorganization at this time. *Lophomerum* Quelette & Magasi [1966 p. 275], however, makes use of phragmosporous septation as a character to segregate certain species from the large mass of *Lophodermium* species. Care must be exercised in applying this criterion since under extremely moist conditions many species of this genus can be forced to form a central septum or even to germinate within the ascus". The pigmentation of the cells of the covering layer has turned out to be a valuable character for species distinction. I have been able to group the species in two distinct types. In the first group, the cells of the covering layer are ±uniformly pigmented (maculare type, Pl. V *a*, *c*, *e*). In the second group, the cells of the outer layer and of a broad bend subtending the labial cells are dark brown to almost black and the remaining cells subhyaline (melaleucum type, Pl. V *b*, *d*).

In describing the tissue structure of the ascocarp I have followed the terminology of Terrier (1942 p. 17).

As Darker has pointed out (op. cit. p. 1415) the current usage of *Lophodermium*

(i.e., sensu De Notaris 1847) is illegal. Nearly all mycologists (except Kuntze 1898 p. 486) have treated the genus sensu De Notaris. Darker therefore proposed conservation of *Lophodermium* with *L. arundinaceum* as its type species.

1a. Pigmentation of the cells of the covering layer of maculare type (see Pl. V *a*, *c*, *e*).	
2a. Ascospores mostly shorter than 25 μ. On *Vaccinium oxycoccus*.	4. *L. oxycocci*
2b. Ascospores mostly longer than 25 μ.	
3a. Labial cells yellowish; pigmentation of the cells of the covering layer uniform. Ascospores (26–)30–37(–43) × 1–1.5. On *Andromeda polifolia*.	1. *L. intermissum*
3b. Labial cells hyaline; pigmentation of the cells of the covering layer ± uniform.	
4a. Ascospores 47–65 × 2–2.5 μ. On *Ledum palustre*.	7. *L.* sp. 1
4b. Ascospores 33–48 × 1–2 μ. On *V. uliginosum*.	2. *L. maculare*
1b. Pigmentation of the cells of the covering layer of melaleucum type (see Pl. V *b*, *d*).	
5a. Parasitic. On leaves of *Pyrola* spp.	5. *L. pyrolae*
5b. Saprophytic.	
6a. Ascocarps ± circular in outline. Ascospores 24–29 × 1–1.5 μ. On *L. palustre*.	6. *L. sphaerioides*
6b. Ascocarps elliptic. Ascospores 33–55 × 2–2.5 μ. On *Vaccinium myrtillus*, *V. oxycoccus* and *V. vitis-idaea*.	3. *L. melaleucum*

1. ***Lophodermium intermissum*** Starb. 1895 p. 17. — Pl. V *c*.

Coll. orig.: Sweden, Ög, Kvillinge par., Torshag, E. Haglund (S, not to be found).
Host: *Andromeda polifolia* (leaves and twigs).

Ascocarps 0.35–0.65 mm long, 0.25–0.40 mm broad and *c.* 0.25 mm high, solitary, subcuticular, oblong to elliptic, dark brown to blackish, opening by a longitudinal slit; pigmentation of the covering layer of maculare type; labia 50–70 μ thick, labial cells 10–15 μ long, yellowish; basal layer 13–20 μ thick, blackish brown; internal stroma *c.* 10–15 μ thick of hyaline, thin-walled, compressed cells.

Asci 50–65 × 5–6 μ, cylindric-clavate, short-stalked, 8-spored, I −. Ascospores (26–)30–37(–43) × 1–1.5 μ, filiform, hyaline.

Paraphyses *c.* 2 μ in diam., hyaline, slender, tips slightly swollen.

The type specimen has been mislaid, but the specimens studied by me agree completely with Starbäck's original description. Usually the ascocarps are circular to broadly elliptic, in one sample, however, they are triangular (Norway).

Specimens examined:

Finland: *Lk*: Sodankylä par., by Jesiojoki River 24.VI.1927b V.H. (H).
Norway: *Akh*: Vestre Akershus par., Hakkloen 22.IX.1879b A. Blytt (O).
Sweden: *Upl*: Vänge par., the bog SE. of St. Göken 6.VI.1964 B.E. 313a (UPS). — *Vb*: Bygdeå par., Dalkarlså, Stendammet 27.VII.1963 B.E. 206b (UPS); Dalkarlså, E. of the bog Hamptjärn 29.VII.1963 B.E. 208e (UPS); Dalkarlså, between the bogs

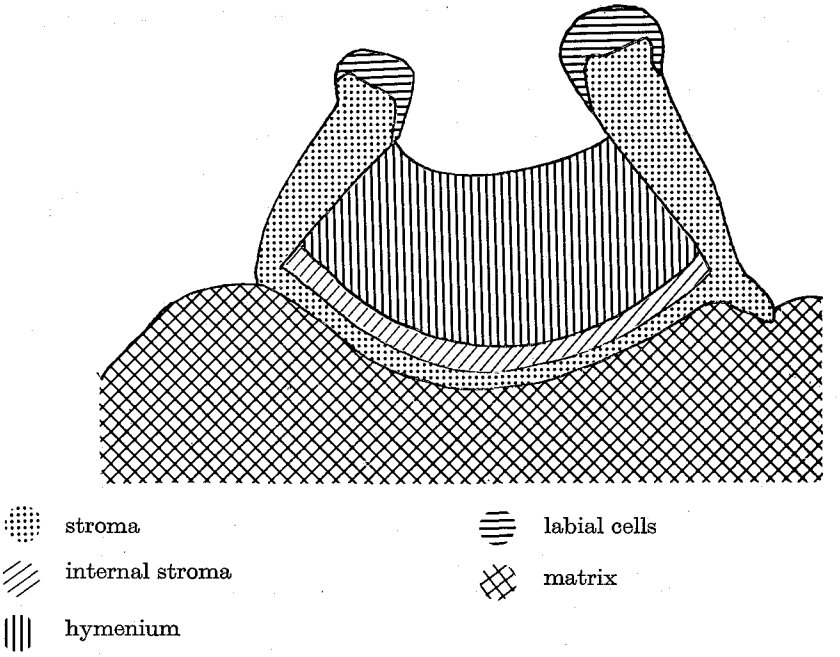

Fig. 4. Diagrammatical section of ascocarp of *Lophodermium maculare*. 230 ×. — Comp. Pl. V.

Rödmyran and Forsmyran 30.VII.1966 O.E. 3477b (UPS). Lövånger par., Bjuröklubb, near the lighthouse 4.VIII.1964 B.E. 383d (UPS). Nysätra par., the skerry St. Vännskär 14.VIII.1964 O.E. 2436e (UPS). — *LL*: Jokkmokk par., Kvikkjokk, Storholmen in Lake Saggat 4.VIII.1963 B.E. 258d (UPS).

2. ***Lophodermium maculare*** (Fr.) De Not. 1847 p. 45. — Fig. 4, Pl. V *a*.

Hysterium maculare Fr. 1823 p. 592. — Coll. orig.: Fries, Scler. Suec. 167 (UPS!, lectotype).

Host: *Vaccinium uliginosum* (dead leaves).

Descr.: see Tehon 1935 p. 99. The pigmentation of the cells of the covering layer as pointed out above should be added to this description (p. 38 and Pl. V *a*).

In one sample (B.E. 237a, UPS), I have found yellowish labial cells. In the others they were colourless.

Specimens examined:

Finland: *Al* (TUR), *Ab* (TUR), *Ta* (UME), *Ok* (TUR), *Ob* (H, TUR), *Lk* (H), *Li* (C).
Norway: *Busk* (UPS), *Rog* (UPS), *Hrd* (UPS), *STrd* (C, UPS).
Sweden: *Sm*? (UPS — Fries, Scler. Suec. 167, lectotype), *Vrm* (UPS), *Upl* (UPS),

Dlr (C), *Hls* (UPS), *Jmt* (UPS), *Vb* (UME, UPS), *Nb* (C), *LL* (UPS).
54 samples in all.

This fungus seems to be extremely common.

3. ***Lophodermium melaleucum*** (Fr. ex Fr.) De Not. 1847 p. 44. — Pl. V *b*.

[*Hysterium melaleucum* Fr. 1815 p. 192, 1819 p. 96. —] *Hysterium melaleucum* Fr. ex Fr. 1823 p. 589. — Coll. orig.: Fries, Scler. Suec. 29, on *Vaccinium vitis-idaea* (UPS!, lectotype).

[*Hysterium pulchellum* Fr. 1815 p. 193. — *Hysterium melaleucum* Fr. *β pulchellum* Fr. 1819 p. 96. —] *Hysterium melaleucum* Fr. ex Fr. *β pulchellum* Fr. ex Fr. 1823 p. 589.

Hosts: *Vaccinium myrtillus* (berries), *V. oxycoccus* (epi- and hypophyllous), *V. vitis-idaea* (leaves, hypophyllous and twigs).

Descr.: see Tehon 1935 p. 100. The pigmentation of the cells of the covering layer is described above (p. 38 and Pl. V *b*). The labial cells are yellowish and not bright orange as Tehon (l.c.) stated.

This fungus as well as *L. maculare* produces pale spots on the attacked part of the host. The size and shape of asci and ascospores are moreover very similar, but they are without doubt separate species. The pigmentation of the covering layer differs (cf. Pl. V *a* and *b*) and the labial cells of *L. melaleucum* are usually ±yellowish, whereas those of *L. maculare* are hyaline (see above).

The shape of the ascocarps varies from broadly elliptic to circular. The circular open by three teeth, the elliptic by a longitudinal slit.

L. melaleucum β pulchellum with "labiis distinctis viridi-luteis" (Fries 1823 p. 589) on leaves of *V. vitis-idaea*, cannot be distinguished as a separate taxon.

Starbäck (in Vestergren 1899 p. 159) described a new variety of *L. melaleucum*, viz. var. *aureomarginata* (Vestergren, Micr. rar. sel. 52) on leaves of *Betula*. It is characterized by "apotheciis ... distinctissime aureo-viridulo-marginatis" (l.c.). This fungus is undoubtly not closely related to *L. melaleucum*. The epithet refers to the coloured labial cells.

Tehon (1935 p. 100 and fig. I:4) gave *Vaccinium pennsylvanicum* as a host species of *L. maculare*, but the pigmentation of the cells of the covering layer of the ascocarp drawn by him (Thümen, Myc. univ. 75) is of the *melaleucum* type. On examining the Uppsala copy of the cited number (labelled *L. maculare* De Not. f. *vaccinii pennsylvanici*) I found the fungus to be closer to *L. melaleucum* than to *L. maculare*.

Specimens examined:

on *V. myrtillus*:

Sweden: *LyL*: Tärna par., Mt. Gieravardo, northern slope, birch region 16.VIII.1967 B.E. 761b (UME).

on *V. oxycoccus*:

Sweden: *Ög:* Kvillinge par., Eriksberg 1891 K. Starbäck & E. Haglund (S, UPS — Rehm, Ascom. 1065 as *L. oxycocci*). — *Vb*: Holmö par., Holmön, SW. of the harbour Byviken 9.VII.1967 B.E. 722 (UME). Umeå, Sörböle, by Lake Hatten 26.VIII.1968 B.E. 1683c (UME).

on *V. vitis-idaea*:

Finland: *Ab* (TUR), *Nyl* (H), *St* (H).
Norway: *Rog, Hrd, Nrd* (all in UPS).
Sweden: *Sk* (C), *Sm*? (UPS — Fries, Scler. Suec. 29, lectotype), *Sm* (UPS), *Gtl* (UPS), *Nrk* (UPS), *Srm* (UPS), *Upl* (UPS), *Vsm* (UPS), *Jmt* (UPS), *Vb* (S, UPS), *Nb* (C), *LL* (UPS), *TL* (UPS).
46 samples in all.

This species has been found on three host species. It is common on *V. vitis-idaea.* I have seen 3 Fennoscandian and 2 German gatherings on *V. oxycoccus* (Jaap, Fungi sel. exs. 369, C, S; Krieger: Fungi sax. exs. 2158, S). Both German gatherings were mistakenly taken to be *L. oxycocci*, this is also the case with Rehm, Ascom. 1065 (see above). On *V. myrtillus* I have only found the fungus once on immature berries. The ascocarps are ±immature, but cross sections have revealed that the fungus must be *L. melaleucum.*

4. ***Lophodermium oxycocci*** (Fr.) Karst. 1873 p. 244 — Pl. V *e*.

Hysterium oxycocci Fr. 1823 p. 588. — Coll. orig.: Fries, Scler. Suec. 169 (UPS!, lectotype).
Lophodermium oxycocci (Fr.) Karst. var. *hypophyllum* Dearn. & House 1925 p. 65. — *L. hypophyllum* (Dearn. & House) Shear in Shear et al. 1931 p. 14.
Host: *Vaccinium oxycoccus* (dead leaves, epi- and hypophyllous).

Ascocarps up to *c.* 0.6 mm long, 0.35–0.5 mm across, 0.12–0.16 mm high, solitary, subcuticular, oblong, elliptic, black, opening by a longitudinal slit, pigmentation of the covering layer of maculare type, labia up to 30 μ thick, labial cells up to 13 μ long, white to yellowish; basal layer 8–13 μ thick, dark brown to black, internal stroma 40–50 μ thick, of rather large hyaline cells.
Asci (34–)39–52(–68) × (4–)5–7 μ cylindric, rather long-stalked, 8-spored. Ascospores 17–25 × 1.5 μ, filiform, hyaline.
Paraphyses filiform, undulating, tips ± curved and swollen.

There are two *Lophodermium* species on leaves of *V. oxycoccus*, viz. *L. melaleucum* and *L. oxycocci*. The species may easily be distinguished from each other under the microscope. *L. melaleucum*: pigmentation of the covering layer of melaleucum type, asci (55–)75–98 × 7–10 μ, ascospores 33–55 × 2–2.5 μ, paraphyses not undulating, tips club-shaped, internal stroma thinner, *c.* 10–15 μ (cf. Pl. V *b* and *e*).

Shear (l.c.) studied samples of both species but he did not examine the type collection of *L. oxycocci*. The three samples that he considered to be *L. oxycocci*

are in fact *L. melaleucum* (see p. 42). This led Shear to regard *L. oxycocci* and *L. hypophyllum* as separate species. I have examined the original collection of both *L. hypophyllum* (NYS) and *L. oxycocci* (UPS) and found them conspecific.

Specimens examined:

Finland: *Nyl* (H).
Sweden: *Sm*? (UPS — Fries, Scler. Suec. 169), *Upl* (S, UPS), *Dlr* (UPS), *Vb* (UME, UPS), *LL* (UPS).
11 samples in all.

5. ***Lophodermium pyrolae*** Parmelee 1958 p. 865.

Coll. orig.: Canada, B.C., Vancouver Island, Base of Mt. Arrowsmith, alt. 1500–3000 ft 29.IX.1956 W.G. Ziller, on *Pyrola bracteata* Hook. (DAOM; UPS!, isotype).
Hosts: *Pyrola* spp. (living leaves).
Descr.: see Parmelee l.c.

This species was originally described from Canada. It differs from the members of *Lophodermium* on *Ericaceae* treated in this paper in producing reddish-brown to greyish spots on living leaves. The fruit bodies are circular to elliptic. They usually open by a longitudinal slit. The circular ascocarps, however, open by three teeth (cf. *Coccomyces spp.* and *L. intermissum*). *L. pyrolae* seems to be the only Discomycete found on members of *Pyrolaceae*.

Specimens examined:

Sweden: *Hrj*: Tännäs par., Malmagsvålen, on *Pyrola media* 2.VIII.1933 J.A.N. 4863 (UPS). — *Jmt*: Åre par., Högåsen, on *Pyrola "minor × rotundifolia"* 4.VIII.1951 J.A.N. 11768 (UPS).

6. ***Lophodermium sphaerioides*** (Alb. & Schw. ex Fr.) Rehm 1887 p. 41. — Pl. V *d*.

[*Hysterium sphaerioides* Alb. & Schw. 1805 p. 57. —] *Hysterium sphaerioides* Alb. & Schw. ex Fr. 1823 p. 588. — Coll. orig.: Fries, Scler. Suec. 168 (UPS!, lectotype).
Host: *Ledum palustre* (leaves).

Ascocarps up to 0.5 mm long, 0.2–0.25 mm high, solitary, subcuticular, ± circular, dark brown to blackish brown, opening by a ± elongated slit, seated in colourless spots on dead leaves; pigmentation of the cells of the covering layer of melaleucum type (cf. Pl. V *d*); labial cells yellowish, 10–13 μ long, clothing the outer surface of the labia; basal layer 13–16 μ thick, dark brown to blackish; internal stroma *c.* 20 μ thick of hyaline, thin-walled, compressed cells.

Asci (39–)47–57 × 5 μ, cylindric-clavate, long-stalked, 8-spored, I −. Ascospores 24–29 × 1–1.5 μ, filiform, hyaline.

Paraphyses *c.* 2 μ thick, slender, separate, hyaline, agglutinating, tips slightly swollen.

Duby (1861 p. 56) published the combination *L. sphaerioides* with *Hysterium sphaerioides* as basionym. Since he put a question-mark after the generic name,

the combination cannot be regarded as valid (see International Code of Botanical Nomenclature, 1961 Art. 33–34). Rehm (l.c.) seems to be the first author to validate the combination.

Specimens examined:

Finland: *Ab*: Merimasku par., Merimasku —.V.— (UPS — Karsten, Fungi fenn. exs. 157).

Sweden: *Sm*? (UPS — Fries, Scler. Suec. 168, lectotype). — *Upl*: Uppsala, Bondkyrka par., Nåsten 1.VI.1925 J.A.N. 1972 (UPS); Nåsten, *c.* 400 m W. of "Lurbo Bro" 24.V.1936 S. Lundell & Eric Åberg (C, UPS — Lundell & Nannfeldt, Fungi exs. suec. 387); Nåsten, near Håga gård 30.V.1966 B.E. & O.E. 648 (UPS), 18.IX.1966 B.E. 675 (UPS). Bälinge par., the bog Ryggmossen 7.X.1922 J.A.N. 1973 (UPS).

7. ***Lophodermium*** sp. 1.

Host: *Ledum palustre* (leaves).

Ascocarps up to 1 mm long, 0.3–0.4 mm across, 0.15–0.25 mm high, solitary, subcuticular, oblong to elliptical, dark-brown to blackish, opening by a longitudinal slit; pigmentation of the cells of the covering layer of maculare type; labia *c.* 55 μ thick, labial cells 5–6 μ long, colourless (seated on the inside); basal layer 14–20 μ thick, dark brown to blackish; internal stroma 25–28 μ thick of hyaline, thin-walled cells.

Asci 93–95 × 9 μ, cylindric-clavate, short-stalked, 8-spored, I −. Ascospores 47–65 × 2–2.5 μ, filiform, hyaline, provided with a gelatinous sheath.

Paraphyses 2–2.5 μ thick, filiform, slightly thickened at the apices, agglutinating.

The position of the labial cells differs from that of all the other species of *Lophodermium* dealt with in this paper. In view of the pigmentation of the cells of the covering layer *Lophodermium* sp. 1 seems most closely related to *L. maculare* and *L. intermissum*. However, the asci and ascospores of *L. maculare* are smaller and the paraphyses are curled at the ends and the shape of the paraphyses of *L. intermissum* is different from that of *Lophodermium* sp. 1. The material is, however, too scanty to justify the establishment of a new species.

Specimen examined:

Finland: *Li*: Utsjoki par., Kevo, at the Research Station 15.VIII.1965 J.A.N. 19214 (UPS).

Mollisia (Fr.) Karst. 1871 p. 15

Mollisia is very closely related to *Tapesia* Fuck., which is considered to include "those species of *Mollisia* in which the ascocarps are seated on a common subiculum or web of superficial hyphae" (Dennis 1968 p. 182). Intermediate forms exist and the two genera should probably be united. Unfortunately, *Tapesia* is the older name and *Mollisia* is the more widely used.

At least two separate species of *Mollisia* differing in ascospore size and host range, are to be found on *Ericales*.

1. ***Mollisia*** sp. 1.

Hosts: *Vaccinium oxycoccus* (berries, leaves), *V. uliginosum* (leaves, twigs).

The ascocarps are characterized by greyish hymenium, ascospores one-celled, hyaline, 6–9 × 1.5–2 μ.

Specimens examined:

on *V. oxycoccus*:

Sweden: *Upl*: Jumkil par., Vallmo källa 12.VI.1964 B.E. 317c (UPS). — *Vb*: Bygdeå par., Dalkarlså 27.VII.1963 B.E. 202d (UPS).

on *V. uliginosum*:

Finland: *Al*: Lemland par., Eskskär 6.VI.1952 L.E.K. (TUR).
Norway: *Rog*: Randaberg par., Tungenes 16.V.1963 B.E. 42b (UPS).

2. ***Mollisia*** sp. 2.

Hosts: *Calluna vulgaris* (twigs), *Empetrum nigrum* s.lat. (twigs).

The ascocarps are characterized by yellowish grey hymenium, ascospores one-celled, hyaline, 9–11 × 2–3 μ.

Specimens examined:

on *C. vulgaris*:

Sweden: *Vrm*: Varnum par., S. of Prästerud 19.IX.1964 B.E. 437d (UPS). — *Vb*: Bygdeå par., S. Sörbäck 5.VIII.1966 B.E. 671b (UPS).

on *E. nigrum*:

Finland: *Ob*: Rovaniemi 30.VII.1935b A. V. Auer (TUR). — *Li*: Inari par., Laanila 30.VI.1931 L.E.K. (TUR).
Sweden: *Vb*: Bygdeå par., Dalkarlså, the bog Rundmyren 3.VIII.1964 B.E. 373 (UPS).
U.S.S.R.: *Lps*: Petsamo par., Petsamo 18.VII.1931b V.H. (H).

Monilinia Honey 1928 p. 153.

Type species: *Monilinia fructicola* (Wint.) Honey.
Con. st.: *Monilia* "Pers.". — Type species: *Monilia fructigena* "Pers."

Monilinia is characterized by a pseudosclerotium, "In this we have a mycelium invading the outer tissues of the substratum and so permeating the tissue as to be a compact mass of both host and fungous tissue. ... An important and almost constant character ... is a definite blackened layer (cortex or rind) of heavy pseudoparenchymateous cells which form a protective layer on all exposed surfaces (both inner and outer) of this compact mass of host and fungous tissue" (Honey op. cit. p. 142).

The genus is moreover characterized by a macroconidial state belonging to *Monilia* (see Honey op. cit. pp. 145, 154–155, figs. 3–4). The members of *Monilinia* have previously been referred to *Sclerotinia* Fuck., which has true sclerotia and a botryoid macroconidial state. Whetzel published a synopsis of *Monilinia* in 1945. For the nomenclature of *Monilia* see Vuillemin 1911.

I have met with 2 types of pseudosclerotia among the *Monilinia* species dealt with in this paper, viz.,

1. the hollow sphaerioid type found in *M. baccarum*, *M. oxycocci* and *M. urnula* Pl. VII *a–e*). Whetzel (1945 p. 654) characterized this type as follows, "A medulla of large, thick-walled hyphae is covered inwardly as well as outwardly by a well-defined black rind. ... The rotting away of the enclosed tissues leaves a more or less complete hollow sclerotial sphere of leathery or rubbery consistency ... which wrinkles and shrivels on drying, usually more or less tightly enclosing the seed or unrotted core of the fruit",

2. a compact type found in *M. empetri* and *M. megalospora* (Pl. VI *b* and VII *f*). The sclerotium is compact and does not form a hollow sphere. It is outwardly covered by a black rind as in type 1 (cf. Woronin 1888 p. 36 and taf. IX: 11).

On *Ledum palustre*, which unlike the other host species has a capsule but no berry, each carpel becomes a sclerotium of its own. The sclerotia, which seem to be of the compact type (2) eventually become connected with each other in the centre of the fruit as Woronin & Nawaschin pointed out (1896 p. 205 and taf. IV: 37) "ein ... schwartzbrauner Ring umfasst auch den zentralen Gefässbündelcylinder der Frucht (Fig. 37)." In Pl. VII *g* in this paper the "Ring" has not yet been formed.

1. ***Monilinia baccarum*** (Schröt.) Whetzel 1945 p. 672. — Pl. VII*e*.

Rutstroemia (*Sclerotinia*) *baccarum* Schröt. 1879 p. 180. — Coll. orig.: Germany, "bei Rothenfels im Badischen Murgthale" VI.1879 J. Schröter.

Con. st.: *Monilia baccarum* Migula 1913 p. 1077. — Coll. orig.: ?

Host: *Vaccinium myrtillus* (ascocarps from mummified fruits, conidia on young shoots).

Descr.: see Schröter op. cit. pp. 178–180 and Woronin 1888 pp. 31–34, Taf. VIII.

Specimens examined:

Finland: *Ab* (TUR), *Nyl* (H, UPS — Rabenhorst, Fungi eur. 3772).
Sweden: *Ög*, *Vrm*, *Upl*, *TL* (all in UPS).
10 samples in all (only sclerotia).

2. ***Monilinia empetri*** (Lagerh. in Vestergr.) B. Erikss. n.comb. — Pl. VI*a–e*.

Sclerotinia empetri Lagerheim in Vestergren in Bot. Not. 1899 p. 163 (1899). — Coll. orig.: Vestergren, Micr. rar. sel. 56 (UPS!, only sclerotia seen).

Host: *Empetrum nigrum* s.lat. (ascigerous state from mummified berries, conidial state unknown).

Descr.: see Lagerheim in Vestergren op. cit. pp. 163–164. The following (based on B.E. 1777) may be added to this description. Stroma compact, not forming a hollow sphere, outwardly covered with a black rind (see Pl. VI *a–c*); ascocarp long-stalked, cupulate, dark brown to dark reddish brown. Asci cylindric-clavate, 113–117 × 10–12 μ, 4-spored?, I +. Ascospores 13–18(–21) × 5–6 μ, uniseriate, ellipsoidal, one-celled, hyaline. Paraphyses cylindrical, *c.* 3 μ thick. Attacked berries are grey (if cuticle is still present) or brown and ± furrowed. They are found in the attached or fallen state. In the hymenium of some mature apothecia I have found hyaline conidia (5–8 × 1–2 μ), obviously originating from the hymenium (but not from the ascospores). No separate conidial state has been found.

Specimens examined:

Norway: *Fnm*: Alta par., Bosekop VII.1895 G. Lagerheim, scler. (UPS — Vestergren, Micr. rar. sel. 56).

Sweden: *Vb*: Holmö par., Holmön, *c.* 200 m W. of the harbour Byviken 9.VII.1967 B.E. 721, scler. + imm. apoth. (UME, UPS) and 29.VIII.1968 O.E. 3860, scler. (UME). Bygdeå par., Dalkarlså, on the top of Prästskär (skerry) 5.VII.1968 B.E. 1672, scler. (UME); Dalkarlså, Rödhällan (skerry) 8.IX.1968 B.E. 1686, scler. (UME) and 15.VI.1969 O.E., scler. + imm. apoth. (UME). Sävar par., Täfteå, Sandskär, W. part 31.V.1969 B.E. 1777, scler. + mature apoth. (UME, UPS).

This fungus probably has a montane-maritime distribution. I have collected it near the Bothnian Gulf. Arwidsson (1936 p. 404) reported it from Greenland. My samples from Vb are all on *Empetrum* growing among *Sphagnum* on exposed parts at the coast. There are no previous records of the mature ascigerous state. The apothecia seen by Lagerheim were evidently very young. The hitherto only mature sample (B.E. 1777) is from late May (*Empetrum* is flowering at this time).

3. ***Monilinia ledi*** (Naw.) Whetzel 1945 p. 673. — Pl. VII*g*.

Sclerotinia ledi Naw. 1894 p. 118. — Coll. orig.: Finland, Nyl, Kanneljärvi par., Leistila, in the spring of 1893 S. Nawaschin & M. Woronin.

Con. st.: *Monilia* sp.

Hosts: *Ledum palustre* (ascocarps from mummified fruits), *Vaccinium uliginosum* (conidia on young shoots).

Descr.: see Woronin & Nawaschin 1896 pp. 132–140, Taf. III; pp. 199–207, Taf. IV and p. 46 in this paper.

Woronin & Nawaschin (op. cit. p. 129) pointed out that this species is heteroic with the ascigerous state on *L. palustre* and the conidial on *V. uliginosum*. Yet another *Monilinia* is found on *V. uliginosum*, viz., *M. megalospora* (see below). After thorough investigations they came to the conclusion that the two conidial states on *V. uliginosum* are morphologically distinguishable.

1. The attack: *M. ledi* infects whole shoots; *M. megalospora* single leaves only.
2. The conidial size: *M. ledi* 176–220 × 110–176 μ; *M. megalospora* 240 × 300 μ.
3. The behaviour when growing in water differs.
4. The mode of germination on the stigma differs.

5. No sclerotia develop when "wrong" conidia are applied to the stigma, although a germ tube grows into it.

Later nobody seems to have tackled the problem. The heteroecism was accepted by Honey (1928 p. 150).

I have seen both types of conidial states on *V. uliginosum*.

Specimens examined:

Finland: *Ka*: Miehikkälä par., Muurikkala 13.VIII.1928 J. I. Liro & H. Mollis, scler. (UPS — Liro, Myc. fenn. 474). — *Ta*: Lammi par., Evo 6.VI.1903 J. I. Lindroth (= Liro), conid., on *V. uliginosum* (UPS — Vestergren, Micr. rar. sel. 841a), 30.I.1904 J. I. Lindroth (= Liro), scler. (UPS — Vestergren, Micr. rar. sel. 841b).

Sweden: *Srm*: Nacka par., Järla 20.X.1896 G. Lagerheim, scler. (S). — *Upl*: Östra Ryd par., Östra Ryd 14.VIII.1910 T.V., scler. (S). Uppsala, 29.VIII.1859 J.-E. Zetterstedt, scler. (UPS); Nåsten 30.V.1966 B.E. 646a, scler. (UPS). Vänge par., Fiby urskog 6.VI.1966 B.E. 651a, scler. (UPS). — *Vb*: Umeå, Norrfors, Norrmantjärn 25.V.1968 B.E. 1592, scler. (UME).

4. ***Monilinia megalospora*** (Woron.) Whetzel 1945 p. 673. — Pl. VII*f*.

Sclerotinia megalospora Woron. 1888 p. 35. — Coll. orig.: Finland, "im Sommer 1884" M. Woronin.

Con. st.: *Monilia sp.*

Host: *Vaccinium uliginosum* (ascocarps from mummified fruits, conidia on leaves).

Descr.: see Woronin op. cit. pp. 35–38, Taf. IX–X.

Mature sclerotia differ from those of the three other *Monilinia* species attacking species of *Vaccinium* treated in this paper (see above p. 46).

The differences between the conidial states of *M. ledi* and *M. megalospora* are listed above.

Specimens examined:

Finland: *Nyl*: Kanneljärvi par., Leistila 1887 M. Woronin, scler. (S, UPS — Rabenhorst, Fungi eur. 3773).

Sweden: *Srm*: Nacka par., Augustendal 21.V.1921 T.V., conid. (S). — *Vb*: Umeå, the hill Ersmarksberget 11.VIII.1964 B.E. 396c, scler. (UPS); Norrfors, Norrmantjärn 25.V.1968 B.E. 1593c, scler. (UME).

5. ***Monilinia oxycocci*** (Woron.) Honey 1936 p. 105. — Pl. VII*c–d*.

Sclerotinia oxycocci Woron. 1888 p. 28. — Coll. orig.: Finland, "im Sommer 1884" M. Woronin.

Con. st.: *Monilia* sp.

Host: *Vaccinium oxycoccus* (ascocarps from mummified fruits, conidia on young shoots).

Descr.: see Woronin op. cit. pp. 28–30, Taf. VII.

Specimens examined:

Finland: *Ab* (TUR — scler., conid.), *Nyl* (UPS — ascig.), *Ta* (H — scler.).

Sweden: *Sm* (UPS — conid.), *Bh* (UPS — scler.), *Srm* (S — ascig.; UPS — scler.,

Lundell & Nannfeldt, Fungi exs. suec. 2398 and ascig.), *Upl* (UPS — scler. and ascig.), *Vsm* (UPS — conid.), *Dlr* (UPS — scler.), *Vb* (UME — scler.).

20 samples in all.

6. ***Monilinia urnula*** (Weinm.) Whetzel 1945 p. 673. — Pl. VII*a–b*.

Peziza urnula Weinm. 1832 p. 455. — *Sclerotinia urnula* (Weinm.) Rehm 1893 p. 804. — Coll. orig.: ?

Sclerotinia vaccinii Woron. 1888 p. 3.

Con. st.: *Monilia* sp.

Host: *Vaccinium vitis-idaea* (ascocarps from mummified fruits, conidia on young shoots).

Descr.: see Woronin 1888 p. 3–27, Taf. I–VI.

Specimens examined:

Finland: *Al* (TUR — scler.), *Nyl* (UPS — conid., Rabenhorst, Fungi eur. 3774 and Liro, Myc. fenn. 473), *St* (H — scler.), *Ks* (S — conid.).

Sweden: *Sm* (UPS — conid.), *Upl* (UPS — scler., conid.), *Vb* (UME — scler., conid.), *Nb* (S — conid.).

13 samples in all.

Naemacyclus Fuck. 1873 p. 49

Type species: *Naemacyclus niveus* (Pers. ex Fr.) Sacc.

The taxonomic position of this genus is uncertain. Müller et al. (1958 p. 417) stated: "Zu erwähnen ist jedoch, dass auch Anklänge zu den *Phacidiales* bestehen; für eine eindeutige Stellungsnahme reichen aber unsere Untersuchungen ... nicht aus." Dennis (1968 p. 205) referred it to *Phacidiaceae*, a family in which he placed all *Phacidiales* not *assigned* to *Cryptomycetaceae* and *Hypodermataceae*.

1. ***Naemacyclus phacidioides*** (Fr.) B. Erikss. n.comb.

Stictis phacidioides Fr. in Syst. Myc. 2 (1) p. 198 (1822). — *Propolis phacidioides* (Fr.) Fr. 1849 p. 372. — Coll. orig.: Fries, Scler. Suec. 277 (UPS!, lectotype).

?*Coccomyces quadratus* (Schm.) Karst. var. *ursinus* Sacc. & Paol. in Saccardo 1889a p. 96 (nomen dubium). — *Coccomyces ursinus* (Sacc. & Paol. in Sacc.) Petr. 1936 p. 222.

Stictis arctostaphyli Ferd. & Winge 1907 p. 253. — *Naemacyclus arctostaphyli* (Ferd. & Winge) Rehm 1911 p. 1.

Coccomyces quadratus (Schm.) Karst. var. *arctostaphyli* Rehm ex Jaap 1907 p. 251 (nomen nudum; non *C. quadratus* (Schm.) Karst. var. *arctostaphyli* Rehm 1912 p. 130, see p. 11 in this paper).

Naemacyclus penegalensis Rehm in Jaap 1909 p. 34 (nomen nudum).

Naemacyclus adeanus Rehm in Rehm, Ascom. 1903, in schedae (nomen nudum).

Host: *Arctostaphylos uva-ursi* (hypophyllous).

Descr.: see Müller et al. 1958 p. 417. Some details of the morphology of the ascospores and paraphyses may be added: ascospores sigmoid and tear-shaped, usually

1-septate with the septum slightly closer to the proximal end (I have also seen ascocarps with pluriseptate spores, cf. also Jaap 1909 p. 34); tips of paraphyses provided with small grains forming an epithecium; grains I + (visible also after treatment with lactic blue and water), cf. also Rehm (1912 p. 156).

Fries (1822 p. 198) commented *Stictis* (*Propolis*) *phacidioides*, "hypophylla, epidermide in lacinias 5 aequales acutas rupta erumpens, disco convexo lacteo pruinoso. Fries exs. n. 297" (=277). Corda (1838 p. 38, fig. 132) published good drawings of this fungus (Scler. Suec. 277).

Karsten (1870 p. 256) erroneously listed *Propolis phacidioides* Fr. as synonym of his *Phacidium arctostaphyli*, which in fact belongs to *Eupropolella* (see p. 23).

Coccomyces quadratus var. *arctostaphyli* is used by Rehm for two different fungi, viz., *N. phacidioides* (in Jaap 1907 p. 251) and *C. arctostaphyli* (1912 p. 130, see also this paper p. 11).

For further discussion on *C. quadratus* var. *ursinus* see p. 11.

Specimens examined:

Finland: *Ta* (UME), *Li* (H, UPS).
Norway: *Rog* (UPS), *Hrd* (UPS).
Sweden: *Sm*? (UPS — Fries, Scler. Suec. 277, lectotype), *Vb* (UPS), *Nb* (S).
11 samples in all.

Neogodronia Schläpfer 1969 p. 48

Type species: *Neogodronia bresadolae* (Rehm) Schläpfer.

Cenangella bresadolae Rehm, on *Rhododendron* spp., was recently (1969 p. 1320) referred to *Encoeliopsis* Nannf. by Groves. Schläpfer, however, erected a new genus, *Neogodronia*, for it. I consider this correct. I have studied the type species of both this genera and found differences in the texture of the ascocarp and in the shape of the paraphyses (cf. also p. 36 in this paper). A second species is below transferred to *Neogodronia*, viz. *Peziza ledi* Alb. & Schw. ex Fr. on *Ledum spp.* It may be worth mentioning that *Ledum* and *Rhododendron* are closely related.

1. ***Neogodronia ledi*** (Alb. & Schw. ex Fr.) B. Eriksson n.comb.

[*Peziza ledi* Alb. & Schw. 1805 p. 343 —] *Peziza ledi* Alb. & Schw. ex Fr. in Syst. Myc. 2 (1) p. 114 (1822). — *Cenangium ledi* (Alb. & Schw. ex Fr.) Fr. 1849 p. 364. — *Crumenula ledi* (Alb. & Schw. ex Fr.) Karst. 1871 p. 214. — *Godronia ledi* (Alb. & Schw. ex Fr.) Karst. 1885 p. 144. — *Scleroderris ledi* (Alb. & Schw. ex Fr.) Nannf. 1932 p. 286). — *Encoeliopsis ledi* (Alb. & Schw. ex Fr.) Groves 1969 p. 1325. — Coll. orig.: not preserved. Neotype: Lundell & Nannfeldt, Fungi exs. suec. 2085 (UPS!).

Host: *Ledum* spp. (dead leaves and twigs).

Ascocarps up to *c.* 1.5 mm in diam. and *c.* 0.7 mm high, solitary, erumpent, saucer-shaped, when dry laterally compressed (from two or three sides), short-stalked, furfuraceous, yellowish to dark brown, smooth, except for the slender, fibrillose, laciniate margin, hard in consistency; stalk in the central part composed of a loose tissue of

hyaline, thin-walled cells in textura prismatica, upwards merging into an up to 40 μ thick layer of textura prismatica-porrecta composed of hyaline to pale brown cells, surrounding and subtending the hymenium; outermost part of excipulum (up to 25 μ) of textura oblita, the hyphae yellowish brown, thick-walled, margin of textura intricata of brown, thick-walled hyphae; hymenium ± plane, yellowish.

Asci 70–90 × 6–7 μ, cylindric, ± long-stalked, 8-spored, occasionally I +.[1] Ascospores (13–)16–26 × 3–4 μ, biseriate, ± tear-shaped, with proximal end broader than the distal one, sometimes slightly curved, 1-septate, finally multiseptate, sometimes becoming branched and budding off small, hyaline conidia of *Phoma*-type 1–3 × 1 μ (in the hymenium, but outwith ascus).

Paraphyses somewhat longer than the asci, hyaline, filiform, septate, branched, slightly enlarged tips, not forming an epithecium.

Albertini & Schweinitz (1805 p. 343) naturally enough did not mention the size and shape of ascospores. From their drawing (op. cit. table X n. 71) it seems very probable that their fungus is conspecific with ours.[2] Neither Karsten (1871 p. 214, 1885 p. 144) nor Rehm (1889 p. 239) found any ascospores. Schröter (1893 p. 145), who reported *Peziza ledi* from Silesia, gave the ascospore size as 60 × 1 μ. His fungus was obviously not *P. ledi* but probably a true *Godronia*. I have myself found a *Godronia* on *L. palustre* (Sweden, Vb, Umeå 20.IV.1968 B.E. 1563, UME), unfortunately immature. Groves (1969 p. 1326) reported one from twigs of *Ledum* from Canada. There may be a separate species on Ledum.

Peziza ledi has previously been referred to *Cenangium*, *Crumenula*, *Godronia*, *Scleroderris* and *Encoeliopsis*. It differs from *Cenangium* Fr. in the texture of the ascocarpic wall and in the ascospore shape. *Cenangium* has "derben knorpelig gelatinösen Apothezien, mit sehr dickem Hypothezium, mit einer dünnen, kohlig und unregelmässig parenkymatischen Rindenschichte und mit einer dicken, oben kohlig parenchymatischen, die Scheibe deckenden Gewebeschichte" (Nannfeldt 1932 p. 312) and "ascospores ... broadly elliptic-fusiform ... hyaline, non-septate" (Dennis 1968 p. 137). From *Godronia* it differs, among others, in the texture of the ascocarpic wall and the iodine reaction of the ascus tip. *Crumenula* De Not. and *Scleroderris* (Pers. ex Fr.) Bon. are mere synonyms of *Godronia* (see p. 26). Groves (1969 p. 1325) referred *P. ledi* to *Encoeliopsis*. I have, however, found that *P. ledi* and the type species of *Encoeliposis* are not congeneric (cf. p. 50 in this paper).

Similarities in general aspect, texture of ascocarpic wall, shape and septation of ascospores, iodine reaction of ascus tip (cf. above), want of pycnidial state make it rather clear that *P. ledi* and *N. bresadolae* are congeneric. In both species I have also found that the ascospores bud off small conidia of *Phoma*-type in the hymenium.

[1] According to Groves (1969 p. 1326) the iodine reaction of the ascus is not consistent. In some of his samples the reaction was positive. All the samples studied by me are I – (even if treated with NaOH and HNO_3, see note on p. 35 in this paper).

[2] Ascocarps with long, filiform ascospores are often ± urceolate whereas ascocarps with short ascospores are ± saucer-shaped.

P. ledi resembles *Grovesiella ericae* (see p. 35) in gross morphology and ascospore shape, but differs for example in the texture of apothecium, the iodine reaction and in that the ascospores bud off conidia in the hymenium.

Hitherto no conidial state seems to be known neither in nature nor in culture (Groves op. cit. p. 1326).

Specimens examined:

Finland: *Nyl* (H).
Sweden: *Upl* (C), *Dlr* (UME, UPS), *Hls* (UPS), *Vb* (UME, UPS).
20 samples in all.

This fungus seems to be very common, at least in the northern parts of Sweden.

Pezicula Tul. & Tul. 1865 p. 182

Type species: *Pezicula carpinea* Pers. ex Tul. & Tul.

1. ***Pezicula myrtillina*** (Karst.) Karst. 1871 p. 165.

Peziza myrtillina Karst. in Fungi Fenn. exs. 827 (1869). — Coll. orig.: Karsten, Fungi Fenn. exs. 827 (BM!, lectotype, slide in UPS; the UPS copy is devoid of apothecia).
Host: *Vaccinium myrtillus* (dead twigs).
Descr.: see Karsten l.c.

Specimens examined:

Finland: *Ta*: Tammela par., Mustiala autumn 1865 P. A. Karsten (BM — Karsten, Fungi Fenn. exs. 827, lectotype).
Sweden: *Sm*, Lidhult par., S. of Lake Yasjön 3.VII.1929 J.A.N. 2235 (UPS).

This fungus seems to be extremely rare in Fennoscandia.

Phacidium Fr. ex Fr. 1823 p. 571

Type species: *Phacidium lacerum* Fr. ex Fr.

1a. Ascospores (8–)10–13 × 3–3.5 μ. On *Vaccinium vitis-idaea*. 1. *P. vaccinii*
2a. Ascospores 13–17 × 4.5–5 μ. On *Ledum palustre*. 2. *P. vestergrenii*

1. ***Phacidium vaccinii*** Fr. 1823 p. 575.

Coll. orig.: Fries, Scler. Suec. 289 (UPS!, lectotype).
[*Xyloma erumpens* Fr. 1815 p. 575.]
Host: *Vaccinium vitis-idaea* (dead leaves, epi- and hypophyllous).

Ascocarps *c.* 0.5 mm in diam. and *c.* 0.3 mm high, scattered, intraepidermal, circular in outline, concolorous, opening by 3–5 teeth formed by overlaying epidermis splitting up radially; covering layer up to *c.* 70 μ thick in centre and only 10 μ at margin, blackish brown; basal layer *c.* 7–10 μ thick, dark brown; hymenium flat, subhymenial layer *c.* 10 μ thick, of textura angularis, cells small, hyaline.

Asci 35–42 × 8 μ, clavate, short-stalked, 8-spored, I +. Ascospores (8–)10–13 × 3–3.5 μ, uniseriate, ellipsoidal-fusiform, non-septate, hyaline.

Paraphyses longer than the asci, filiform, septate, hyaline.

Specimens examined:

Sweden: *Sm*? (UPS — Fries, Scler. Suec. 289, lectotype) — *Vb*: Umeå, IX.1909 J. Vleugel (S); the hill Ersmarksberget 11.VIII.1964 B.E. 401a (UPS). Burträsk par., Tjärn 13.VIII.1964 O.E. 2418a (UPS).

The perfect state of this fungus seems to be rare, whereas its supposed conidial state, *Ceuthospora latitans* (Fr.) Höhn., is common. Under a lens the two states look very similar. The ascigerous state is found in late summer and autumn, the conidial state mostly during the spring.

2. ***Phacidium vestergrenii*** (Rehm) B. Erikss. n.comb. — Pl. VIII*d*.

Naevia vestergrenii Rehm in Ann. Myc. 11 p. 153 (1913). — Coll. orig.: Vestergren, Micr. rar. sel. 1641 (UPS!, lectotype).

Host: *Ledum palustre* (dead leaves, epiphyllous).

Ascocarps 350–400 μ in diam. and 150–200 μ high, scattered, intraepidermal, circular in outline, concolorous, opening by 3–5 teeth formed by overlaying epidermis splitting up radially; covering layer 50–90 μ thick in centre and 20–25 μ at margin, blackish brown; basal layer 10–20 μ thick, brown; hymenium flat; subhymenial layer *c.* 15 μ thick, of textura angularis, cells small, hyaline.

Asci 55–57 × 8–10 μ, clavate, rather long-stalked, apex rounded to somewhat flattened, 8-spored, I +. Ascospores 13–17 × 4.5–5 μ, uniseriate, ellipsoidal to fusiform, non-septate, hyaline.

Paraphyses slightly longer than asci, filiform, septate, hyaline.

Under a lens this fungus can easily be taken for a member of *Naevia* Fr. Microscopical examination, however, reveals that it must be transferred to *Phacidium*, chiefly because of the distinct and well developed stroma (basal layer distinct, though thin) and the positive iodine reaction of the ascus tip. The species is very similar to *Ph. vaccinii* (see above), but the ascocarps are smaller and the asci and ascospores larger. No pycnids have been observed.

Specimens examined:

Finland: *Li*: Utsjoki par., Kevo, at the Research Station 15.VIII.1965 J.A.N. 19214a (UPS).

Sweden: *LL*: Jokkmokk par., Jokkmokk VII.1904 T.V. (UPS — Vestergren, Micr. rar. sel. 1641, lectotype).

U.S.S.R.: *Lps*: Petsamo par., Petsamo 3.VII.1927 V.H. (H).

The ascocarps, which appear on dark to blackish brown, attached leaves are easily overlooked. It is therefore difficult to say if *Ph. vestergrenii* is as rare as the small number of gatherings indicates or if in Fennoscandia it is an exclusively northern species.

Phaeangellina Dennis 1955 p. 360

Type species: *Phaeangellina empetri* (Phill.) Dennis.

Dennis (op. cit. p. 362) stated that this genus is very closely related to *Chloroscypha* Seav. (*Helotiaceae*). The latter seems, however, to be a natural genus occurring on conifers only, and he therefore preferred to erect a new genus, *Phaeangellina*, for the fungus on *Empetrum*. *Phaeangellina* is for the present monotypic.

1. ***Phaeangellina empetri*** (Phill.) Dennis 1955 p. 361.

Cenangium empetri Phill. 1891 p. 89. — Coll. orig.: Great Britain, "Orkney, in August 1888, by Professor Trail".

Excipula empetri Fr. 1822 p. 190. — *Lophodermium empetri* "(Fr.)" Sacc. in Bresadola & Saccardo 1897 p. 281.

Syn. cet.: see Dennis (l.c.).

Host: *Empetrum nigrum* s.lat. (dead leaves).

Descr.: see Dennis 1968 p. 117.

I have not studied any authentic material of Phillips' fungus, but my specimens match the description given by Dennis.

Excipula empetri Fr. is distributed as no. 248 in Fries, Scler. Suec. The sample in UPS contains very few fruiting bodies and these are immature. I have compared sections of this fungus with such of immature ones of *Ph. empetri* and have found them to be conspecific. There is nothing in Fries's description (l.c.) that contradicts this. He pointed out (l.c.) that there is a similar fungus on *Juniperus*. He probably meant *Chloroscypha sabinae* (Fuck.) Dennis, which greatly resembles *Ph. empetri*. Moreover, it is very improbable that Fries should have overlooked this very inconspicuous and rather common fungus on *Empetrum*.

Lophodermium empetri (Fr.) Sacc. (S, "97, *Lophodermium Empetri* (Fr.) Sacc. *Excipula Empetri* a Carestia Riva Valdobbia S. Guigno 1859 Sulle foglie dell' *Empetrum nigrum* Carestia") is *Duplicaria empetri* (see p. 19).

Specimens examined:

Finland: *Al*, *Ab*, *Ks* (all in TUR).

Norway: *Rog* (UPS), *Hrd* (UPS), *Nrd* (UME, UPS), *Fnm* (UPS).

Sweden: *Sm*? (UPS — Fries, Scler. Suec. 248), *Sm* (UPS), *Gtl* (UPS), *Bh* (UPS), *Upl* (UPS), *Jmt* (UPS), *Vb* (UME, UPS), *LL* (UPS), *TL* (UPS).

38 samples in all.

Ph. empetri seems to be more common in the south-west of Norway than in other parts of Fennoscandia. Nearly all gatherings of *Empetrum* from this area are heavily infested with it.

Pseudophacidium Karst. 1885 p. 157

Type species: *Pseudophacidium ledi* (Alb. & Schw. ex Fr.) Karst.

Con. st.: *Myxofusicoccum* Died. 1912 p. 71. — Type species: *Myxofusicoccum obtusulum* (Sacc. & Br.) Died.

1. ***Pseudophacidium ledi*** (Alb. & Schw. ex Fr.) Karst. l.c. — Pl. VIIIc.

[*Xyloma ledi* Alb. & Schw. 1805 p. 60. — *Phacidium ledi* Schm. in Kunze & Schmidt 1817 p. 31. —] *Phacidium ledi* Alb. & Schw. ex Fr. 1823 p. 574. — Coll. orig.: Fries, Scler. Suec. 327, on *Ledum palustre* (not seen).

Syn. cet.: see v. Arx & Müller 1954 p. 121.

Con. st.: *Myxofusicoccum ericeti* (Sacc.) Petr. 1921 p. 304. — *Fusicoccum ericeti* Sacc. 1914 p. 292. — Coll. orig.: "M. Weisskirchen, 1913 (n. 28)", leg. F. Petrak, on *Calluna vulgaris*.

Myxofusicoccum callunae Shear in Shear et al. 1931 p. 18.

Hosts: polyphagous, in *Ericaceae* on *Calluna vulgaris* (dead twigs), *Ledum palustre* (dead leaves and twigs), *Vaccinium macrocarpon* Ait. and *V. uliginosum* (dead twigs).

Descr.: of ascigerous state see Terrier 1942 p. 49 (on *L. palustre*), v. Arx & Müller op. cit. p. 122 (on *L. palustre*), Dennis 1968 p. 209 (on *C. vulgaris*); of conidial state see Petrak 1921 p. 303 (on *C. vulgaris*), Shear et al. op. cit. l.c. (on *V. macrocarpon*).

I have found no differences between the fruit bodies (in both ascigerous and conidial states) on the three host species dealt with in this paper. von Arx & Müller (l.c.) regarded *P. ledi* as polyphagous. Until more thorough investigations, including cultural studies, have been carried out, this seems to be the best solution.

The conidial state is as common as the ascigerous one. Nearly all samples contain both. The small, inconspicuous pycnidia are, however, easily overlooked (Pl. VIII *c*).

Hysterium degenerans Fr. (1823 p. 585) is the basionym of *Sporomega degenerans* (Fr.) Cda and not conspecific with *P. ledi* (on *V. uliginosum*) as Karsten (1871 p. 252; 1885 p. 157) thought.

Specimens examined:

on *C. vulgaris*:

Sweden: *Upl* (UPS), *Jmt* (UPS), *Vb* (UME), *LL* (UPS).
4 samples in all.

on *L. palustre*:

Finland: *Ta* (UPS — Karsten, Fungi Fenn. exs. 849), *Nyl* (H).
Sweden: *Sm* (UPS), *Dlr* (UPS), *Vb* (UME, UPS).
7 samples in all.

on *V. uliginosum*:

Finland: *Ab* (UPS — Karsten, Fungi Fenn. exs. 334).
Sweden: *Sm* (UPS), *Upl* (UPS), *Gstr* (UPS), *Hls* (UPS), *Jmt* (UPS), *Vb* (UME, UPS), *LyL* (UME).
9 samples in all.

Pyrenopeziza Fuck. 1870 p. 293

It is very difficult to delimit this genus from *Mollisia* (and *Mollisia* from *Tapesia*, see p. 44). Hütter (1958) treated them as separate genera and gave some distinguishing characters (op. cit. p. 10), e.g., the ascocarps of *Pyrenopeziza* are usually erumpent with a ± fimbriate margin, those of *Mollisia* usually superficial and have a smooth margin.

1. ***Pyrenopeziza arctostaphyli*** Müller, Hütter & Schüepp 1958 p. 421.

Coll. orig.: Switzerland, Raetia, Oberhalbstein, Alp Flix 10.IX.1958 H. Hess.
Host: *Arctostaphylos uva-ursi* (dead leaves and twigs).
Descr.: see Müller et al. l.c.

I have not examined the original collection, on leaves, but my fungus, on twigs, matches very well the description and drawing of Müller et al.

Specimen examined:

Norway: *Rog*: Haugesund, Mt. Steinsfjell 20.V.1963 B.E. 80a (UPS).

Rhytisma Fr. ex Fr. 1823 p. 565

Type species: *Rhytisma acerinum* Pers. ex Fr.
Con. st.: *Melasmia* Lév. 1846 p. 276. — Type species: *Melasmia acerina* Lév.

1. ***Rhytisma andromedae*** Pers. ex Fr. 1823 p. 567. — Pl. VIII*a–b*.

Placuntium andromedæ (Pers. ex Fr.) Höhn. 1917 p. 317. — Coll. orig.: Fries, Scler. Suec. 133 (UPS!, lectotype).
Con. st.: *Melasmia* sp.
Host: *Andromeda polifolia* (leaves, usually also other parts).
Descr.: see Nannfeldt 1932 p. 249 and Darker 1967 p. 1437. The following may be added to their descriptions: ascocarps opening by straight-curved, ± concentric slits, covering layer on the inner aspect of the slit clothed with hyaline tissue, i.e., opening mechanism present ("Quellkörper").

The imperfect state has still not been described, although it is very common (cf. Darker op. cit. p. 1437). It seems to be a good member of *Melasmia* Lév. The following description is based on a great number of gatherings from Fennoscandia:
Pycnidial stroma up to *c.* 5 mm across (on leaves epiphyllous) and 15 mm long (on stems); in section, up to *c.* 100 μ thick, scattered, intraepidermal, black, containing one or more pycnidial cavities separated by stromatic columns; covering layer 5–8 μ thick, composed of dark brown cells; conidiophores 18–25 μ long, arising in vertical rows from horizontal, slightly brownish layer, *c.* 10 μ thick, composed of ± elongated, thick-walled cells, conidiophores terminally bearing conidia 4–8 × 1 μ.

The pycnidial stromata are formed during summer (July), and conidia are found in July and August (exceptionally September). The production of conidia is often so copious that they form a waxy film on the surface of the stroma. Sterile

stromata gathered in early August are 50–100 μ thick, with a covering layer 10–40 μ thick (cf. Pl. VIII *b*). The sterile stromata found in late September are up to 250 μ thick (covering layer *c.* 60 μ thick). Stromata with immature hymenia have been found during March–May (Pl. VIII *a*). Mature ascigerous stromata appear from May to early August. The hypophyllous stromata develop during spring. In April (B.E. 1516, UME) the hypophyllous stroma is only *c.* 50 μ thick (covering layer *c.* 20 μ), but in May it is well developed, *c.* 125 μ thick (covering layer *c.* 30 μ), see Pl. VIII *a*. Pycnidial stromata are often found encircling the ascigerous stromata which may be immature (in late summer, see Pl. VIII *b*) or mature. In these cases, the pycnidial stromata always contain numerous cavities.

The development of *R. andromedae* will not be fully understood until cultural studies have been carried out. However, judging from field observations it appears to proceed along the following lines: During summer, pycnidial stromata from ascospores and conidia are laid down. In autumn we find thicker immature ascigerous stromata, in which, hymenia develop in early spring. The hymenia mature during summer and new leaves are infected. The development of an ascigerous stroma is probably not necessarily preceded by a pycnidial state, at least not in autumn.

von Höhnel (1917 p. 317) referred *R. andromedae* to a separate genus, *Placuntium* Ehrenb. ex Höhn., because of its site in the host tissues and the shape of the ascospores. Terrier (1942 pp. 64, 66), v. Arx & Müller (1954 p. 132) and Darker (1967 p. 1437) have all accepted *Placuntium*. Nannfeldt (1932 p. 247) saw no reason for regarding it as a separate genus and neither did Dennis (1968 p. 199). In this paper the fungus on *Andromeda* is retained in *Rhytisma*. Until our knowledge of all the species involved is more thorough this seems to be the most sensible solution.

Specimens examined:

This conspicuous fungus is common all over Fennoscandia. Only the samples filed in H, TUR, UME and UPS are accounted for in this paper.

Finland: *Ab* (TUR), *Nyl* (H), *St* (H), *Ta* (TUR), *Kl* (TUR), *Ok* (TUR), *Ob* (TUR), *Ks* (TUR), *Lk* (H, Tur), *Le* (H, UPS).

Norway: *Hrd* (UPS).

Sweden: *Bl* (UPS), *Sm*? (UPS — Fries, Scler. Suec. 133, lectotype), *Sm* (UPS), *Ög* (UPS), *Vg* (UPS), *Dls* (UPS), *Vrm* (UPS), *Nrk* (UPS — Eriksson, Fungi par. scand. 185), *Upl* (UPS), *Dlr* (UPS), *Gstr* (UPS), *Hls* (UPS), *Jmt* (UPS), *Vb* (UME, UPS), *LyL* (UME), *LL* (UPS), *TL* (UPS).

91 samples in all.

Sporomega Cda 1842 p. 34

Type species: *Sporomega degenerans* (Fr. ex Fr.) Cda.

This genus is discussed under *Colpoma* (p. 14).

1. ***Sporomega degenerans*** (Fr. ex Fr.) Cda 1842 p. 76. — Fig. 1*b*, Pl. I*b*.

Hysterium degenerans Fr. in Kunze & Schmidt 1823 p. 60. — *Hysterium degenerans* Fr. ex Fr. 1823 p. 585. — Coll. orig.: Fries, Scler. Suec. 40 (UPS!, lectotype).
Phacidium laevigatum Fr. 1849 p. 369 (nomen nudum).
Syn. cet.: see Rehm 1888 p. 104.
Host: *Vaccinium uliginosum* (dead twigs).
Descr.: see Nannfeldt 1932 p. 250, Terrier 1942, p. 51.

In UPS there is a collection labelled *Phacidium laevigatum* (herb. E. Fries), which is conspecific with *S. degenerans* (Pl. I *b*).

Specimens examined:

Finland: *St* (H).
Norway: — (C), *Rog* (UPS).
Sweden: *Sm*? (UPS — Fries, Scler. Suec. 40, lectotype), *Sm* (UPS), *Nrk* (UPS), *Upl* (UPS), *Gstr* (UPS), *Hls* (UPS), *Vb* (S, UME, UPS).
19 samples in all.

Tapesia Fuck. 1870 p. 300

For the delimitation against *Mollisia*, see p. 44.

1. ***Tapesia*** cf. ***melaleucoides*** Rehm 1891 p. 578.

Coll. orig.: Rehm, Ascom. 153b, ut *Tapesia fusca* (UPS!, isotype).
Host: polyphagous, in *Ericaceae* on *Calluna vulgaris* (dead twigs).
Descr.: see Rehm l.c.

The Fennoscandian fungus of this genus on *C. vulgaris* has preliminarily been called *Tapesia melaleucoides*.

Specimens examined:

Finland: *Sa*: Lappfjärd par., Riisoo 1.VII.1946 A. Railonsala (TUR).
Sweden: *Bl*: Karlskrona, Wämö, near the hospital 24.IX.1946 S. Lundell (UPS). — *Sm*: Femsjö par., Björkeråknen 10.VII.1929 J.A.N. 2358 (UPS). — *Öl*: Böda par., Böda Crown Forest 29.VII.1953 J.A.N. 13243 (S, UPS). — *Ög*: Gryt par., *c.* 800 m E. of Forshem 13.VIII.1967 J.A.N. 20138 (UME, UPS). — *Upl*: Djurö par., Sandön VII.1881 K. Starbäck (UPS). Funbo par., Storudden 3.VIII.1942 E. Åberg (UPS).

Terriera B. Erikss. n. gen. Hypodermatacearum

Type species: *Terriera cladophila* (Lév. in Moug. & Nestl.) B. Erikss.

Genus *Hypodermatacearum*. *Lophodermium* et *Sporomega* subsimilis sed differt paraphysibus apicaliter incrassatis agglutinatisque epithecium fuscum formantibus.

The genus shows affinities with *Lophodermium* and *Sporomega*. It differs from *Lophodermium* in the paraphysial type and in the lack of labial cells. *Sporomega*

has a different type of paraphyses and opening mechanism, and the tissue at the marginal parts of the ascocarp is composed of small, hyaline, ±angular cells.

1. ***Terriera cladophila*** (Lév. in Moug. & Nestl.) B. Erikss. n.comb.

Hysterium cladophilum Lév. in Mougeot & Nestler, Stirp. Crypt. Vog.-Rhen. 1243 (1850). — *Sporomega cladophila* (Lév. in Moug. & Nestl.) Duby 1861 p. 60. — *Lophodermium cladophilum* (Lév. in Moug. & Nestl.) Rehm 1887 p. 42. — Coll. orig.: Mougeot & Nestler, Stirp. Crypt. Vog.-Rhen. 1243 (UPS!).

Lophodermium vaccinii "(Carm.)" Schröt. 1893 p. 177.

Host: *Vaccinium myrtillus* (twigs).

Descr.: see Terrier 1942 p. 52.

Terrier's description is in complete accordance with my own observations. The mode of fungal attack is similar to that by *Coccomyces leptideus* (see p. 13). The ascocarps are seated in pale spots on twigs of still living stands of *V. myrtillus*. (The label of the original collection is inscribed "Habitat cum *Phacidio leptideo* in *Myrtilli* caulibus exsiccatis").

Hysterium vaccinii Carm. was regarded as a synonym of *T. cladophila* up to 1938, when Boughey (p. 239) showed it to be a *Gloniopsis*.

Specimens examined:

Norway: *Rog*: Randaberg par., Tungenes, SE. of the lighthouse 16.V.1963 B.E. 36B a (UPS). Madla par., Kvernevigen 17.V.1963 B.E. 43a, 54f, 59a (UPS). Stavanger, by Lake Stokkevatn 19.V.1963 B.E. 69 (UPS). Karmöy, *c.* 3.2 km N. of Kopervik 20.V.1963 B.E. 76b (UPS). — *Hrd*: Odda par., Skarsmo, between Haugesund and Odda 22.V.1963 B.E. 90e (UPS).

In Fennoscandia the distributions of *T. cladophila* and *Coccomyces leptideus* appear not to overlap. I have seen no samples of the former from Finland and Sweden, whereas *C. leptideus* is common in these countries (see p. 13). All the Fennoscandian samples of *T. cladophila* are from south-western Norway, where *C. leptideus*, on the other hand, does not appear to exist. In my seven gatherings of *V. myrtillus* from Bergen (Hrd) and Geilo (Busk) I have not found *T. cladophila* but in two of them *C. leptideus*.

Lind (1934 p. 83) reported *L. cladophilum* from Sweden (TL) on *Andromeda polifolia* and *V. myrtillus*. I have not been able to find these samples.

Trichobelonium Rehm 1891 p. 590

Type species: *Trichobelonium obscurum* (Rehm) Rehm.

This genus is closely related to *Mollisia* and *Tapesia* (see pp. 44, 58), but differs from them by long, 3-multiseptate ascospores.

1. ***Trichobelonium obscurum*** (Rehm) Rehm l.c.

Gorgoniceps obscura Rehm 1884 p. 54. — Coll. orig.: Rehm, Ascom. 714.
Host: *Calluna vulgaris* (dead branches).
Descr.: see Rehm l.c.

Specimens examined:

Sweden: *Sk*: Veberöd par., Romeleåsen 19.VI.1925 J.A.N. 12958 (UPS). — *Upl*: Uppsala, Hällby 4.XI.1953 J.A.N. 13497 (S, UPS).

This species may be much overlooked as it occurs on the basal, more or less buried parts of dead branches.

FUNGUS INDEX

Page numbers in italics refer to passages on which the listed species and genera are treated more in detail. New taxa and combinations occur on pages marked*

HOST/FUNGUS INDEX

with keys to the discomycetes on the fennoscandian members of *Diapensiales* and *Ericales*.

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Empetrum hermaphroditum p. 9
— *nigrum* p. 9
— *nigrum* s. lat.
1a. Ascocarps from fallen mummified berries — *Monilinia e.* p. 46
1b. Not so
2a. Ascocarps cup-shaped
3a. Ascospores ellipsoidal — *Mollisia sp.* p. 45
3b. Ascospores filiform — *Godronia e.* p. 32
2b. Ascocarps not cup-shaped
4a. Ascocarps immersed, ±circular in outline. Ascospores bifusiform — *Duplicaria e.* p. 19
4b. Ascocarps erumpent, turbinate, vertically ±furrowed. Ascospores broadly ellipsoidal — *Phaeangellina e.* p. 54
Gaylussacia dumosa p. 17, 18
— *resinosa* p. 18
Ledum groenlandicum p. 12, 13
— *palustre ssp. palustre*
1a. Ascocarps from fallen, mummified berries — *Monilinia l.* p. 47
1b. Not so
2a. Ascocarps cup-shaped — *Neogodronia l.* p. 50
2b. Ascocarps immersed
3a. Ascospores ellipsoidal, non-septate
4a. Asci I −. Ascospores 9–13 × 4–5 μ — *Pseudophacidium l.* p. 55
4b. Asci I +. Ascospores 13–17 × 4–5 μ — *Phacidium v.* p. 53
3b. Ascospores filiform
5a. On leaves — *Lophodermium spp.* p. 43, 44
5b. On twigs
6a. Ascocarps elongated — *Colpoma l.* p. 14
6b. Ascocarps circular in outline, on pale spots on living twigs — *Coccomyces l.* p. 12
— — *ssp. decumbens* p. 12,13
Loiseleuria procumbens p. 27
Phyllodoce coerulea — *Duplicariella p.* p. 20
Pyrola bracteata p. 43
— *media* — *Lophodermium p.* p. 43
— *minor* × *rotundifolia* — *Lophodermium p.* p. 43
Vaccinium macrocarpon p. 22, 23, 55
— *myrtillus*
1a. Ascocarps from fallen mummified berries — *Monilinia b.* p. 46
1b. Not so
2a. Ascocarps light coloured
3a. On fallen leaves — *Dasyscypha r.* p. 17
3b. On dead twigs — *Pezicula m.* p. 52
2b. Ascocarps dark coloured
4a. Ascocarps cup-shaped — *Godronia c.* p. 29
4b. Ascocarps immersed
5a. Ascocarps circular in outline, opening by 4–6 teeth — *Coccomyces l.* p. 13

5b. Ascocarps broadly elliptical in outline, opening by a longitudinal slit
6a. Ends of paraphyses forming an epithecium. Ascospores 60–70 × 1 μ — *Terriera c.* p. 59
6b. Ends of paraphyses not forming an epithecium. Ascospores 33–55 × 2–2.5 μ — *Lophodermium m.* p. 41

— *oxycoccus*

1a. Ascocarps from fallen, mummified berries — *Monilinia o.* p. 48
1b. Not so
2a. Ascocarps cup-shaped
3a. Ascocarps ellipsoidal — *Mollisia sp.* p. 45
3b. Ascospores filiform — *Godronia c.* p. 29
2b. Ascocarps immersed
4a. Ascocarps elongated. Ascospores filiform — *Lophodermium spp.* p. 41, 42
4b. Ascocarps ±circular in outline. Ascospores ellipsoidal — *Eupropolella spp.* p. 22, 23

— *pennsylvanicum* p. 41

— *uliginosum*

1a. Ascocarps from fallen, mummified berries — *Monilinia m.* p. 48
1b. Not so
2a. Ascocarps whitish — *Dasyscypha r.* p. 17
2b. Ascocarps dark coloured
3a. Ascocarps clothed with hairs and dark, stiff bristles — *Dasyscypha v.* p. 17
3b. Not so
4a. Ascocarps ±cup-shaped
5a. Ascospores non-septate — *Mollisia sp.* p. 45
5b. Ascospores septate — *Godronia spp.* p. 33, 34
4b. Ascocarps immersed
6a. Ascospores ellipsoidal. On twigs — *Pseudophacidium l.* p. 55
6b. Ascospores filiform
7a. On leaves — *Lophodermium m.* p. 40
7b. On twigs — *Sporomega d.* p. 58

— *vitis-idaea*

1a. Ascocarps from fallen, mummified berries — *Monilinia u.* p. 49
1b. Not so
2a. Ascocarps cup-shaped
3a. Ascocarps hairy — *Dasyscypha i.* p. 16
3b. Ascocarps smooth — *Godronia spp.* p. 29, 33
2b. Ascocarps immersed
4a. Ascospores filiform
5a. Ascocarps ±circular in outline, opening by 4–6 teeth — *Coccomyces l.* p. 13
5b. Ascocarps ±elongated, opening by a longitudinal slit — *Lophodermium m.* p. 41
4b. Ascospores filiform
6a. Ascospores ellipsoidal, non-septate, hyaline — *Phacidium v.* p. 52
6b. Ascospores cylindrical, 1–3-septate, ultimately brownish — *Eupropolella v.* p. 23

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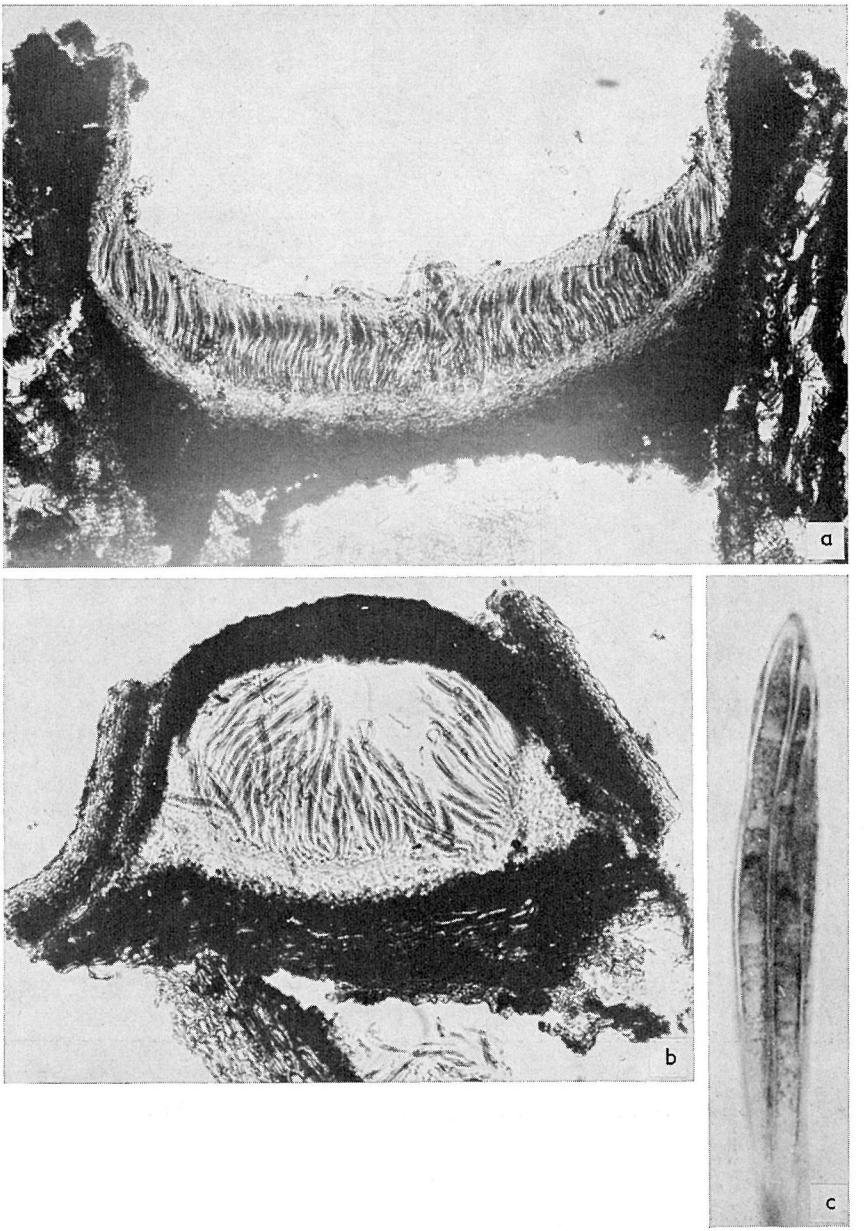
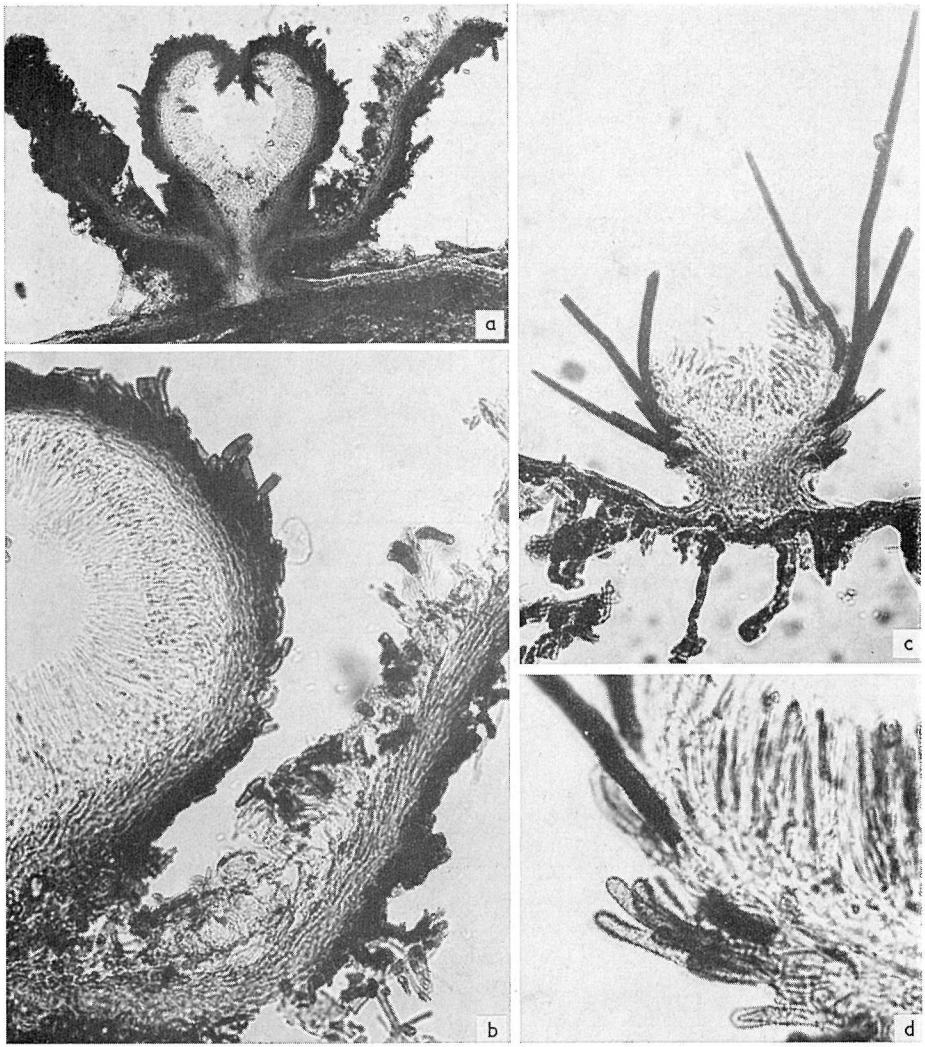
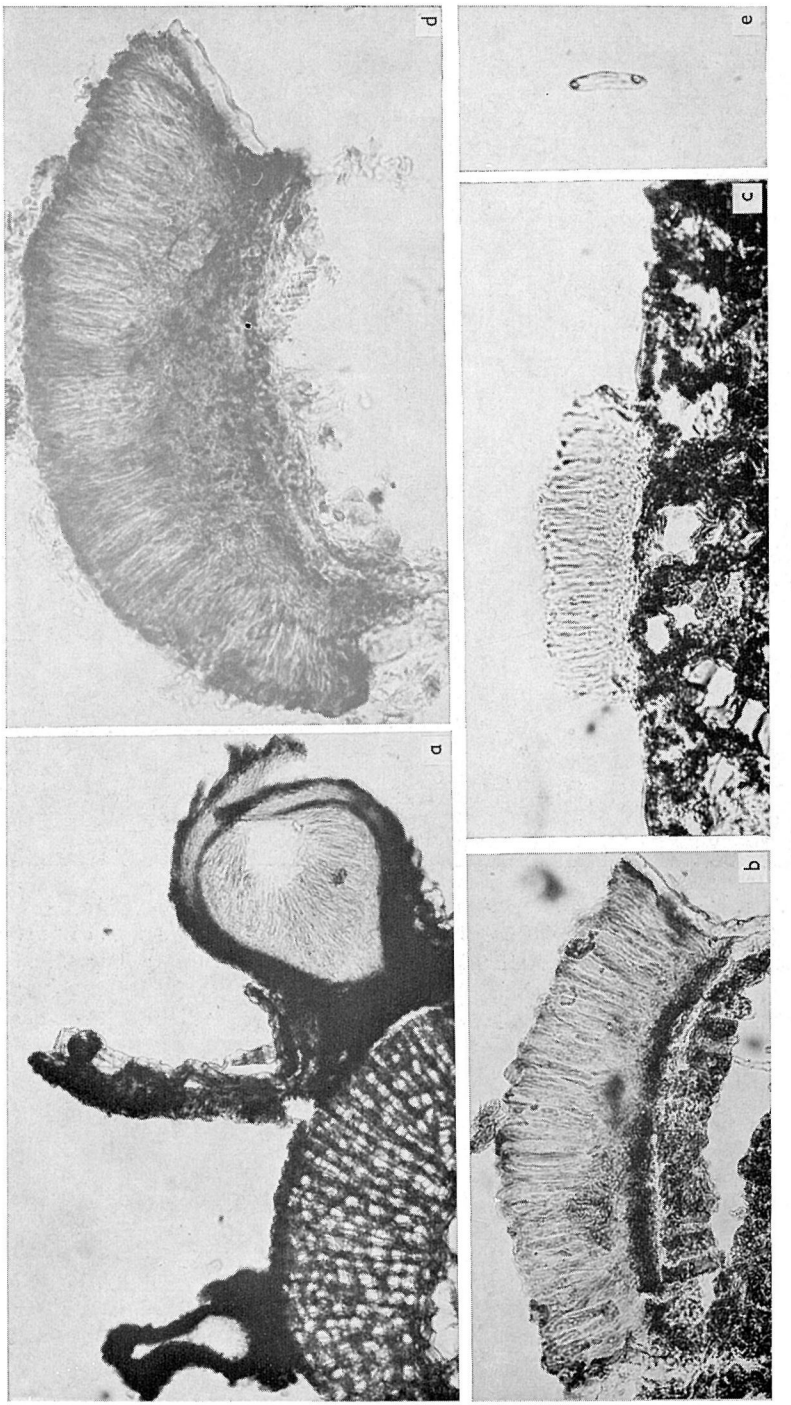


Pl. I. a. *Colpoma ledi*, section of ascocarp (Rehm, Ascom. 1063, UPS). 115 ×. Comp. Fig. 1 a. — b. *Sporomega degenerans*, ditto c. *Phacidium laevigatum*, Hb. (E. Fries, UPS). 140 ×. Comp. Fig. 1 b. — c. *Coccomyces leptideus*, ascus with spores (B.E. 11 a, on *Vaccinium myrtillus*, UPS). 750 ×.

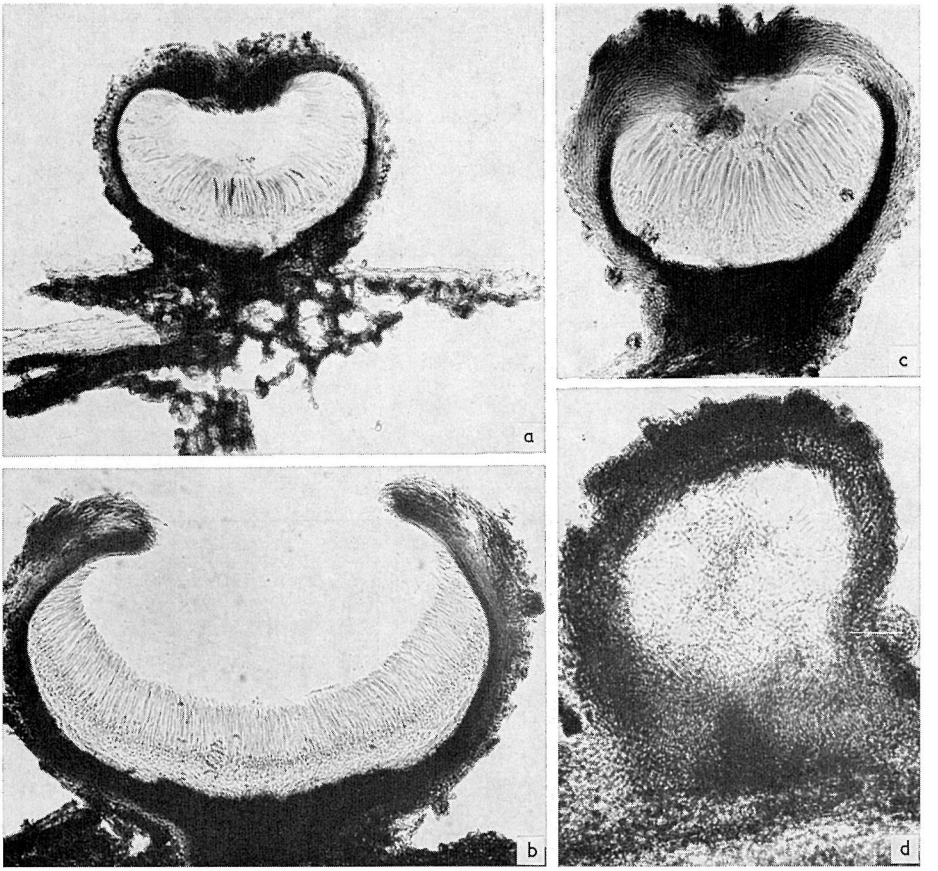
Pl. II



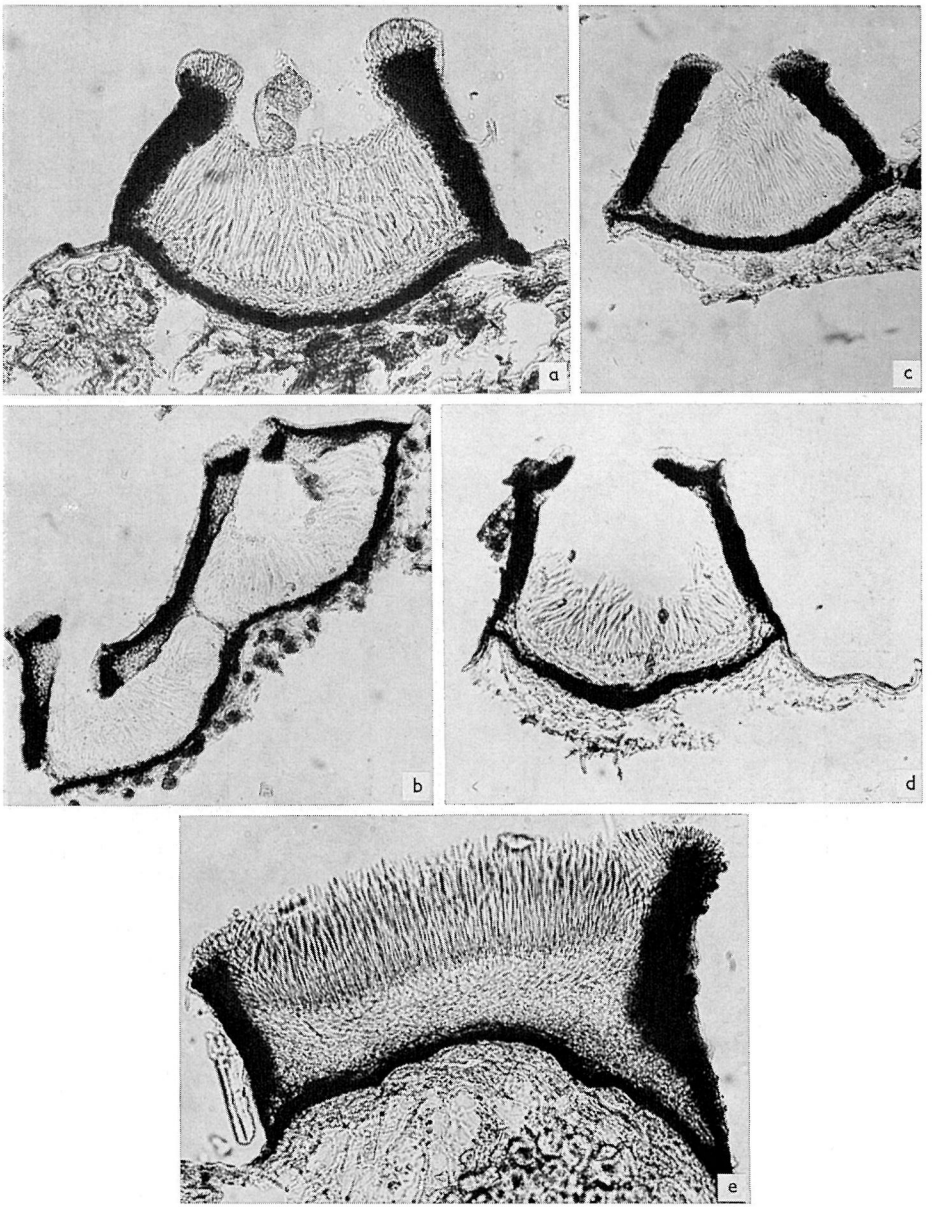
Pl. II. Sections of ascocarps. a.–b. *Dasyscypha involucrata* (B.E. 1566 a, UME). a. 80 ×, b. 240 ×. — c.–d. *D. venturioides* (B.E. 644 c, UME). c. 230 ×, d. 580 ×.



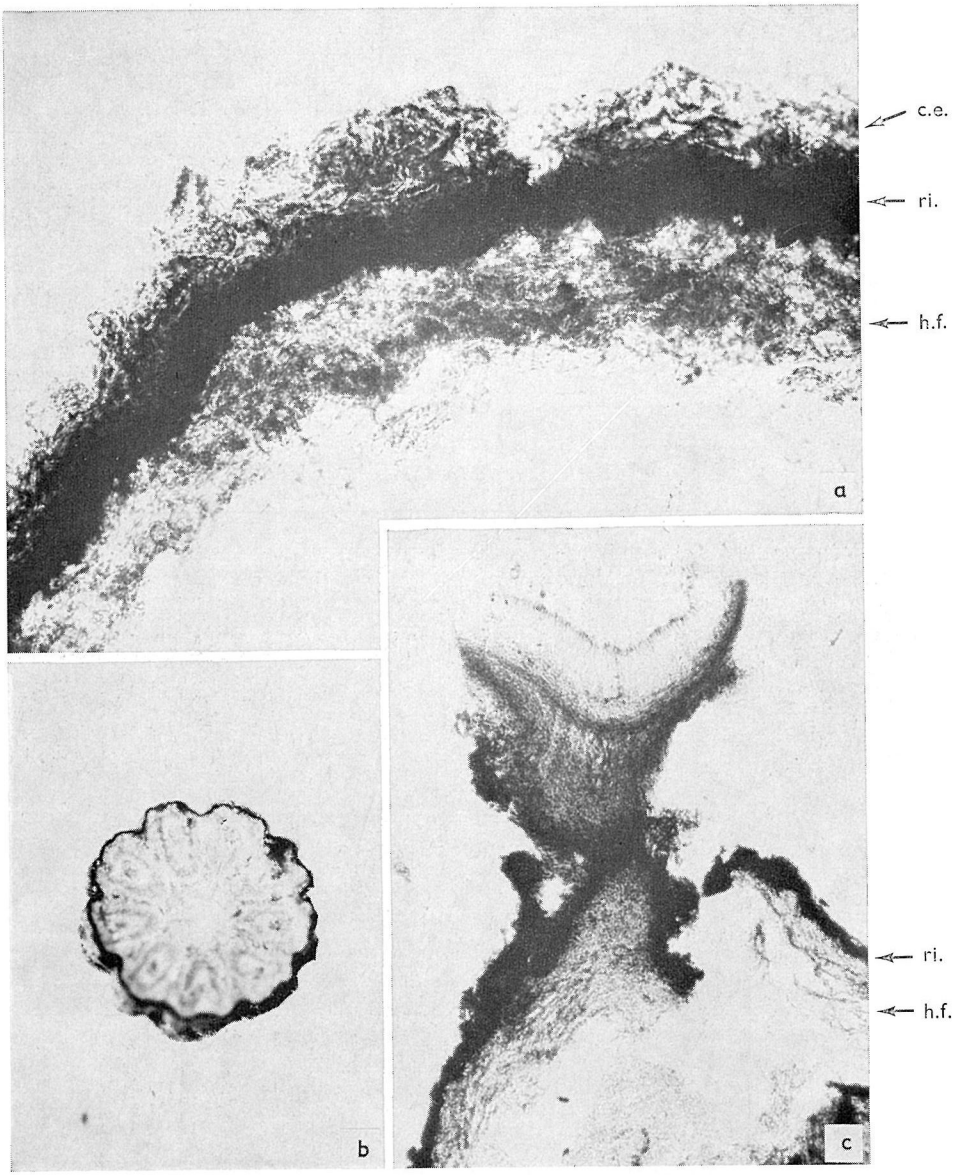
Pl. III. a. *Godronia andromedae*, sections of ascocarp and pycnidium (B.E. 730 a, UME). 90 ×. — b. *Eupropolella vaccinii*, section of ascocarp (Karsten, F. fenn. 842, on *Andromeda polifolia*, UPS). 175 ×. — c. *E. oxycocci*, ditto (B.E. 246 b, UPS). 210 ×. — d.–e. *E. diapensiae*, d. ditto, e. ascospore (Neotype, UPS). d. 210 ×, e. 660 ×.



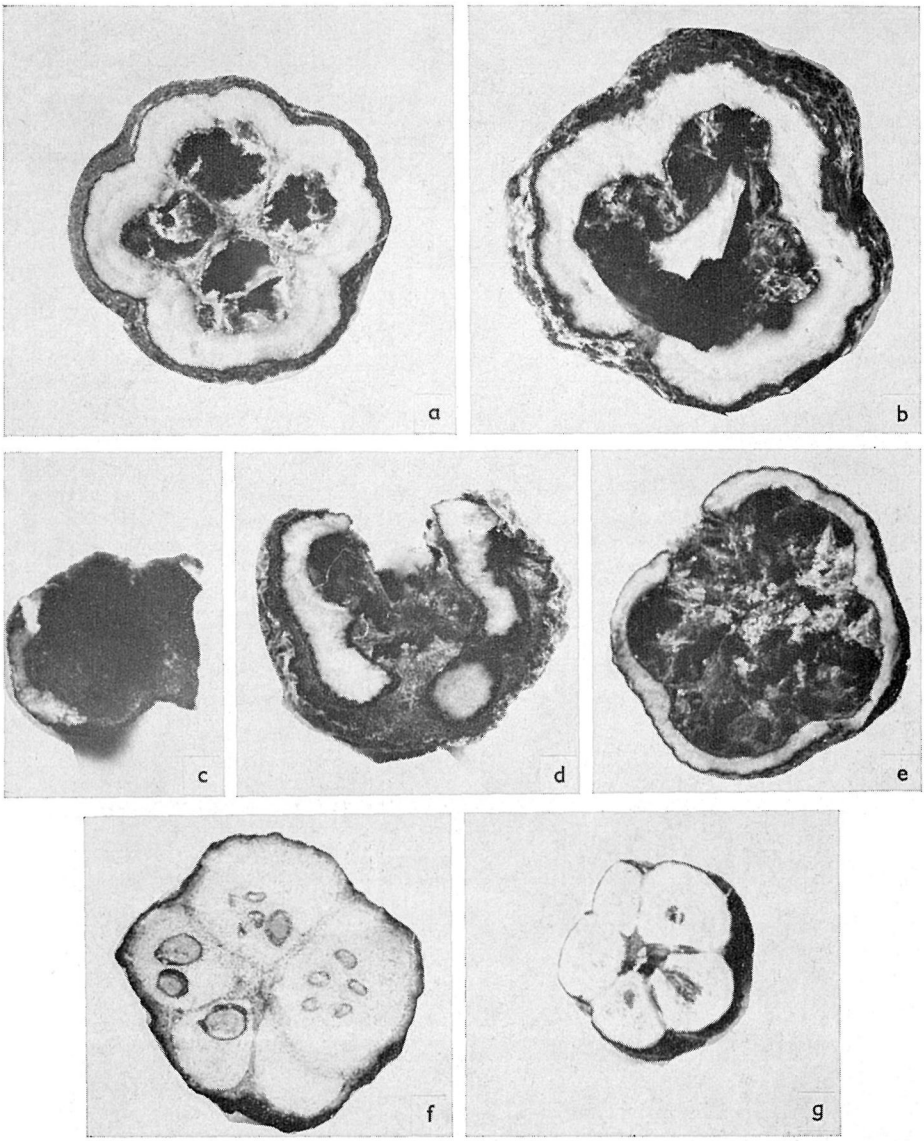
Pl. IV. a. *Godronia foliicola*, section of ascocarp (B.E. 254 d, UPS). 90 ×. — b. *G. sp.* 1, ditto (B.E. 41 a, on *Vaccinium uliginosum*, UPS). 80 ×. — c.–d. *G. empetri*, c. ditto. 105 ×. d. section of pycnidium (Holotype, TUR). 180 ×. Comp. Fig. 3.



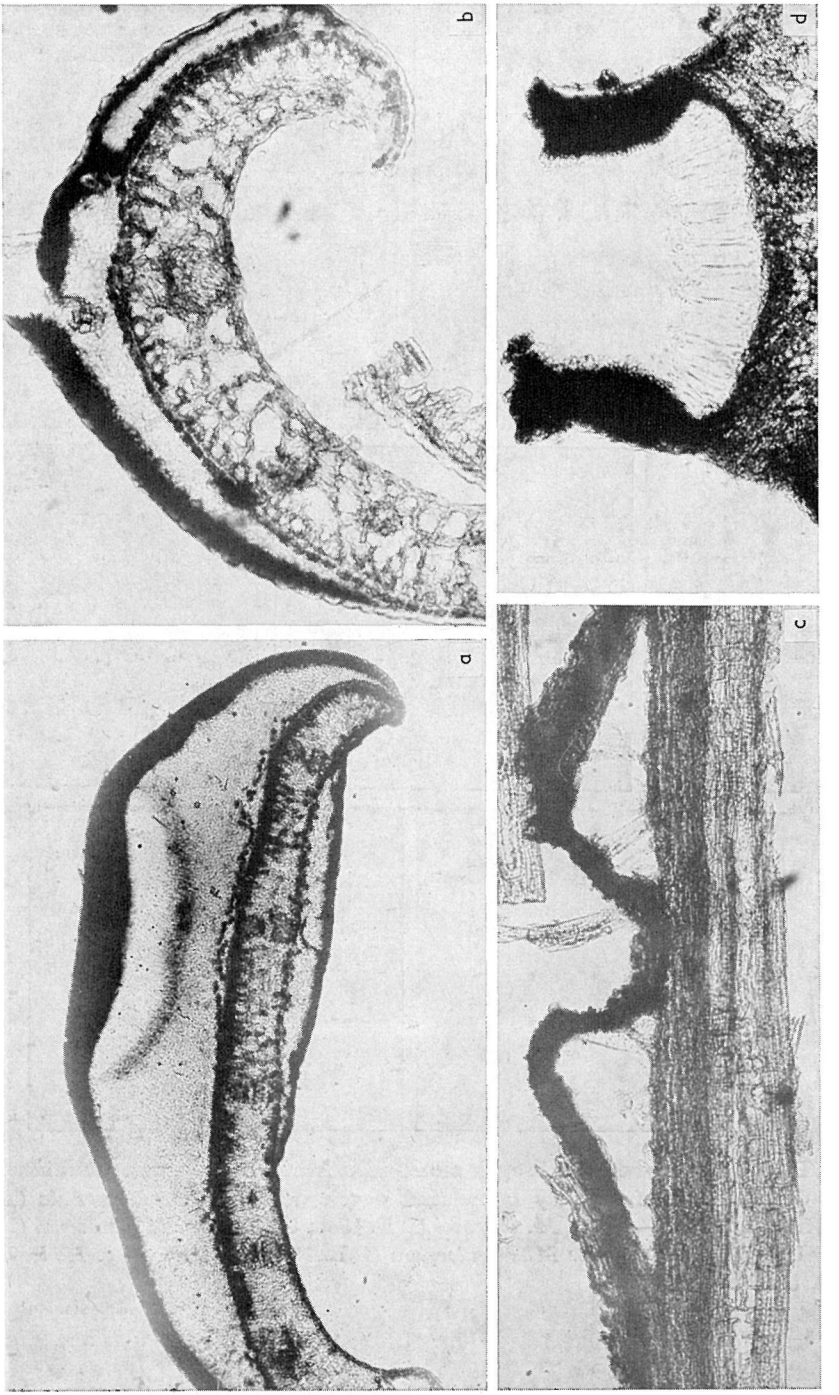
Pl. V. Sections of ascocarps of *Lophodermium*. — a. *L. maculare* (L.E.K. 14.VII.1943, TUR). 180 ×. Comp. Fig. 4. — b. *L. melaleucum* (B.E. 204 a, UPS). 100 ×. — c. *L. intermissum* (B.E. 206 b, UPS). 100 ×. — d. *L. sphaerioides* (B.E. 648 b, UPS). 120 ×. — e. *L. oxycocci* (O.E. 2388, UPS). 190 ×.



Pl. VI. *Monilinia empetri* (B.E. 721, UME). — a.–b. Sections through mummified fruits. a. 300 ×, b. 10 ×. — c. Section through an immature ascocarp. 45 ×. — *c.e.* = cuticle and epidermal cells; *ri.* = outer rind; *h.f.* = host and fungous tissue.



Pl. VII. *Monilinia*, sections through mummified fruits. In a.–e. outer and inner rind well developed, in f.–g. only outer rind developed. — a.–b. *M. urnula* (L.E.K. 19.IX.1943, TUR). — c.–d. *M. oxycocci* (B.E. 1556, UME). —e. *M. baccarum* (L.E.K. 12.VIII.1946, TUR). — f. *M. megalospora* (B.E. 1593 c, UME). — g. *M. ledi* (B.E. 1592, UME). — All 8 ×.



Pl. VIII. a.–b. *Rhytisma andromedae* (a. B.E. 1590 b, UPS; b. L.E.K. 7.VIII. 1943, TUR). a. Section through immature ascigerous stroma; b. ditto outwardly lined by a mature conidial stroma. a. 40 ×, b. 100 ×. — c. *Pseudophacidium ledi* (B.E. 1582, on *Vaccinium uliginosum*, UME), section of pycnidia. 105 ×. — d. *Phacidium vestergrenii* (J.A.N. 19214 a, UPS), section of ascocarp. 160 ×.